

GENERAL SPECIFICATIONS FOR HANDHOLES

1. TECHNICAL SCOPE

- 1-A.** These specifications cover precast Fibercrete® (G.F.R.C.), concrete & polymer concrete handholes 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 handholes 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 units for truck shipment. Shipping and delivery responsibilities will be defined in the project specific purchase documents. The Supplier shall provide all necessary documentation as stated in this specification.

2. DIMENSIONS AND DESIGN

- 2-A.** Drawings shall be made available for engineering approval, field installation, and field 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 handhole unit 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.** Handhole shall be of sleeve design and easily assembled by two people. It shall be composed of a bottomless box, bolt-down accommodations, and a hardware kit. FHR units shall also include a penta-head lifting tool and cast-in Con-Duct terminations.
- 2-D.** The handhole bases shall have a rigid, flat, and stable top surface.
- 2-E.** Handholes shall have an aluminum floating nut, which is capable of being easily replaced if it gets damaged.
- 2-F.** Provisions, such as cast-in threaded inserts, must be offered for lifting traffic rated handholes. Mounting holes must be adequately reinforced to avoid damaging the handhole, and to provide an ultimate strength of at least 5 times the part weight when the unit is lifted in accordance with the manufacturer's instructions.
- 2-G.** The handhole color shall be a natural concrete gray unless otherwise required and agreed upon.
- 2-H.** The handhole shall be designed and constructed so that it and any related hardware will not trap or hold water when required, and so that it will be able to withstand repeated freeze and thaw cycles.
- 2-I.** 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".
- 2-J.** Units must have been tested/evaluated to verify performance under ASTM designation A-16 (AASHTO HS20-44) loads. Testing performed in accordance with ANSI/SCTE 77 using the loads specified in ASTM C857.

3. PERFORMANCE AND MATERIALS

- 3-A.** Cement shall conform to the requirements of ASTM C595 - Type IL.
- 3-B.** Course and fine aggregates shall conform to ASTM C33 "Specification for Concrete Aggregates".
- 3-C.** Preparation of concrete shall conform to ASTM A94 "Specification for Ready-Mix Concrete" & ACI 304 "Guide for Mixing, Transporting and Placing Concrete".

Concast Handhole Specifications

3-D. LAY-UP GFRC - (PART NUMBERS WITH FH PREFIX)

- 3-D.1** Composed of cement mortar reinforced by alkali resistant glass fiber, and deformed high tensile welded wire. It is fabricated via the Concast spray lay-up method which incorporates a minimum of 4 percent volume A.R. glass fibers.
- 3-D.2** Conforms to AIA Masterspec Section 03491 for Glass Fiber Reinforced Concrete and quality control procedures per PCI# MNL-130-91.

3-E. PREMIX GFRC - (PART NUMBERS WITH FH PREFIX)

- 3-E.1** Composed of cement mortar reinforced by alkali resistant glass fiber, and a deformed prefabricated high tensile welded wire. It is fabricated via casting into steel forms.
- 3-E.2** Shall obtain a minimum compressive strength of 6000 PSI at 28 days of age.

3-F. MICRO-CONCRETE (PART NUMBERS WITH FHR PREFIX)

- 3-F.1** Precast concrete handholes shall be cast into steel forms.
- 3-F.2** Concrete shall contain 6% entrained air (plus or minus 1%)
- 3-F.3** Shall obtain a minimum compressive strength of 7500 PSI at 28 days of age.

3-G. POLYMER CONCRETE (PART NUMBERS WITH PH PREFIX)

- 3-G.1**
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|--------------------------------------|------------|---|
| • Compressive Strength | ASTM C39 | Min: 13,000 psi |
| • Tension Strength | ASTM C307 | Min: 2000 psi |
| • Flexural Strength | ASTM C580 | Min: 3,700 psi |
| • Absorption | ASTM C97 | Max: .09% |
| • Rate of burning | ASTM D635 | Classified HB |
| • Freeze/thaw resistance 1000 cycles | ASTM C580 | Durability factor at 300 cycles (%) - 100 |
| • Chemical & Stain Resistance | ASTM D1308 | |
| Sodium Chloride 5% | ASTM D1308 | No visual effect |
| Sulfuric Acid 0.1N | ASTM D1308 | No visual effect |
| Ammonium Hydroxide 28% | ASTM D1308 | No visual effect |
| Potassium Hydroxide 20% | ASTM D1308 | No visual effect |
| Calcium Chloride 5% | ASTM D1308 | No visual effect |
| Sodium Hydroxide 0.1N | ASTM D1308 | No visual effect |
| Ethyl Alcohol 100% | ASTM D1308 | No visual effect |
| Acetic Acid 5% | ASTM D1308 | No visual effect |
| Nitric Acid 30% | ASTM D1308 | No visual effect |
| Hydrochloric 0.2N | ASTM D1308 | No visual effect |

3-H. REINFORCEMENT

3-H.1 Steel reinforcing bars shall conform to ASTM A615 "Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement".

3-H.2 Steel reinforcing wires shall conform to ASTM A496 "Specification for Steel Wire, Deformed for Concrete Reinforcement".

3-H.3 Steel reinforcing weld wire cages shall conform to ASTM A497 "Specification for Steel Welded Wire Fabric, Deformed for Concrete Reinforcement".

3-I. The handholes must not be affected by asphalt, transformer oil, other common chemicals, weather, or other normal service conditions that it might be exposed to.

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. The handholes must not warp, rust, be UV degradable, or sustain combustion.

3-L. With equipment installed; the handholes shall be capable of withstanding temperature variations of -40° Fahrenheit to 149° Fahrenheit without cracking, splitting, or otherwise deforming. Material shall have been tested and conform to ASTM C666/C666M-03.

3-M. When required, site-specific, PE stamped, seismic calculations shall be provided.

3-N. 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-O. METAL COMPONENT PERFORMANCE

3-O.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-O.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-O.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

Concast Handhole Specifications

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 soils engineer. The excavation can then be brought back up to the prescribed grade with a thoroughly compacted granular material.
- 4-B.** All handhole excavations shall be backfilled to restore pre-existing conditions or to the final grade as specified by the owner.
- 4-C.** All backfill material shall be a granular material as required by the soils engineer. Handhole unit shall be designed to have no limitations of backfill height.
- 4-D.** Installation guidelines shall be made available online.



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Fibercrete® Handholes