

SECTION 05010 – SANITARY SEWER MANHOLE CASTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers ductile iron castings and composite castings. All castings for manholes on sewer mains up to 48 inches in diameter shall have a clear opening of 30 inches.

1.02 DESCRIPTION

- A. This specification is applicable for ductile iron castings and composite castings. Prior to the Contractor supplying castings, all manufacturers shall be approved suppliers and be able to demonstrate that there is an acceptable quality control program at the producing foundry and/or molding facility.

1.03 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.04 RELATED SECTIONS

- A. Section 01300 – Submittals.
- B. Section 01015 – Specific Project Requirements.
- C. Section 03370 – Sanitary Sewer Manhole Construction.

1.05 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.
- B. American Association of State Highway and Transportation Offices (AASHTO):
 - AASHTO M306 (Latest Revision) – Drainage, Sewer, Utility, and Related Castings.
 - Standard Specifications for Highway Bridges.
- C. American Society for Testing and Materials (ASTM) International:
 - ASTM A536 Standard Specification for Ductile Iron Castings.
 - ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - ASTM C478 Standard Specification for Precast Reinforced Concrete Manholes Sections.
 - ASTM D2240 Standard Test Method for Rubber Property – Durometer Hardness.
 - ASTM C501 Standard Testing for Wear and Abrasion.
 - ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
 - ASTM C1028 Standard Testing for Coefficient of Friction.
- D. U.S. Environmental Protection Agency: Material Safety and Data Sheet.
- E. Federal Register: 29 CFR 1910.1200 Hazard Communications.

- F. Federal Standards:
 - FED-STD-123 Marking for Domestic Shipment (Civilian Agencies).
- G. United States Customs Service:
 - Custom Regulation Chapter 1, Part 134, Article 19, U.S.C. 1304.

1.06 CONTACTOR SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Certified shop drawings for all castings, product data, manufacturer's catalog cut sheets, specifications, and installation details.
 - 2. Casting identification and location:
 - (a) Iron Casting submittals shall include a certification of conformance in accordance with AASHTO M306 (Part 9, Certification).
 - (b) Composite Frames and Cover submittals shall include a certification of conformance to proof-load testing section of AASTHO M306.
 - (c) A foundry certification shall be furnished stating that samples representing each lot have been tested, inspected and are in accordance with this specification.
 - 3. A manufacturer's affidavit certifying that the castings furnished comply with the provisions of these specifications, regardless of whether or not the purchaser has an inspector at the plant.
 - 4. All submittals shall be approved by the City before castings are ordered by the Contractor.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the work.
- B. The Manufacturer shall guarantee items to be free of defects.
- C. Manufacturer shall have a quality control process in place and shall provide a copy of their "Quality Control Manual."
- D. The manufacturer shall keep records of all tests, MSDS sheets, foundry, lot records, product liability insurance and any customs documentation control data for a period of 3 years. The supplier agrees to furnish copies of records within two weeks after the receipt of request for such records.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Check materials upon arrival. Identify and segregate as to types, functions, and sizes. Store materials off of the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Unless otherwise specified on the purchase order, cleaning, preservation, and packaging of castings shall be in accordance with the manufacturer's commercial practice. Packing and marking shall also be adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.
- C. If the number of defective items exceeds two and one-half percent of the lot, the purchaser will reject the remaining quantity in the lot and the supplier will redeliver the remaining quantity of the lot.
- D. All castings shall be marked in accordance with the requirements of Federal Standard No. 123 and with Chapter 1, Part 134 of the United States Customs Service Regulations, including 19 U.S.C. 1304 paragraph, as applicable. Failure to conform to the above requirements will be just cause for rejection of castings.

PART 2 - PRODUCTS

2.01 DUCTILE IRON CASTINGS

- A. Castings shall be manufactured and tested in accordance with ASTM A536 and AASHTO M306-10.

2.02 COMPOSITE FRAMES AND COVERS

- A. Castings shall conform to the following standards:
 - 1. Composite frames and covers shall be manufactured from fiber reinforced polymer (FRP) and the color shall be black. Fiber reinforcement shall consist of fiberglass, carbon, aramid, basalt, and/or natural fibers. The polymer matrix shall be thermoset consisting of a polyester, vinyl ester, epoxy, polyurethane, and/or hybrid chemical composition.
 - 2. Cover shall have a gasket seal, and two locking lugs made of stainless steel. The locking lugs shall be designed to lock under the seat of the frame. Lock lugs shall be actuated by a stainless-steel 3/8 Allen Head bolt. All metal hardware shall be 316 Stainless Steel.
 - 3. Proof Load Testing: Traffic service frames and covers shall have a first article proof load test conducted and the results of that proof load shall be made available to the purchaser upon request. The proof load shall be conducted in accordance with the method and procedure that is outlined in AASHTO M306. The product shall be tested on a suitable and calibrated load testing machine, the composite frame and cover shall hold a 50,000-pound proof load for one minute without experiencing any cracks or detrimental permanent deformation. During the load testing process visible cracking, visible cracks or delamination will be cause for rejection. When load is removed, Permanent Set (Deflection) of more than 1/8" (.125") measured at center of load area will be cause for rejection. All testing shall be conducted on a NIST calibrated and certified load test machine.
 - 4. Ultraviolet resistance: Cover shall meet ultraviolet requirements as defined in ASTM G154 (Cycle 1 for 1600 hours). Specimens shall be tested for ultimate flexural strength, retaining at least 75% of control values for load and deflection at failure.
 - 5. Coefficient of Friction: Static Coefficient of Friction of cover shall be 0.5 or greater, as described in ASTM C1028 Standard, in both wet and dry applications.
 - 6. Wear and Abrasion: Shall be tested in accordance with ASTM C501, Test shall be 1000 cycles of a H22 wheel with 1000g load. Wear Index is calculated 88/Weight Loss (grams). The four test cycle average shall have a calculated wear index of >300

2.03 WORKMANSHIP AND FINISH

- A. Castings shall be of uniform quality, free from all defects, holes, shrinkage, cracks and any other surface defect. Ductile iron castings shall be ground smooth and cleaned by shot blasting. Runners, risers, fins, and other cast-on pieces shall be removed.
- B. As-cast dimensions may vary by one half the maximum shrinkage possessed by the metal or $\pm 1/16$ in/ft.
- C. As-cast weight may vary by ± 5 percent from the drawing/specification weight.
- D. For traffic service castings, bearing surfaces between manhole rings and covers or grates and frames shall be cast or machined with such precision to prevent rocking.

- E. Circular manhole frames and covers shall be furnished with machined horizontal bearing surfaces unless otherwise specified in the standard details.
- F. In other matters of workmanship and finish, the castings shall conform to any points agreed upon by the City and the manufacturer/supplier.

2.04 MANHOLE FRAMES AND COVERS

- A. Frames and covers shall be as indicated and shall be of the type suitable for the application. The frames and covers shall be circular and the covers without vent holes. Covers located in the combined sewer system may have vent holes, see Section 01015 – Specific Project Requirements.
- B. Markings – See Figure 1, Figure 2, and Figure 3 for approved markings at the end of this section.
- C. The minimum clear opening shall be 30 inches for all 5.0-foot diameter manholes and 6.0-foot diameter manholes.
- D. All covers shall have provisions for ease of opening, such as concealed pick holes.
- E. Special Requirements for Paved Areas (ductile iron or composite acceptable):
 - 1. Definition: Areas subject to vehicular traffic. Includes, but is not limited to, all paved areas.
 - 2. All frames and covers shall be “Traffic Rated” in accordance with AASHTO M306 (HS-25) Loading.
 - 3. All DI manhole frames and covers shall be hinged, adjustable and self- leveling. Frames and covers shall be adjustable to meet any slope and grade of the roadway (from 0 to 17%) and shall be able to be raised or lowered in ¼ inch increments, up to 2¼ inches. Ring height shall be adjustable after installation without disturbing the surrounding pavement or composite frames and covers using grade rings to meet grade
 - 4. Acceptable manufactures include the following (or approved equal):
 - (a) Hinged ErgoXL Self-Level Manhole Frame and Cover with Gasket Cover as manufactured by East Jordan.
 - (b) PAMREX VIATOP (reference #CDVT6OQG) as manufactured by CertainTeed.
 - (c) Composite Access Products (CAP)
- F. Special Requirements for Green Spaces (composite only required):
 - 1. Definition: Areas that are not subject to regular vehicular traffic. Includes, but is not limited to, greenways, easements, sidewalks, and driveways.
 - 2. All frames and covers shall be rated for AASHTO M306 (HS-25) Loading.
 - 3. Flange shall incorporate bedding slots or bolt holes.
 - 4. Acceptable manufacturers include the following (or pre-approved equal):
 - (a) CAP as manufactured by Composite Access Products.
 - (b) Durostreet as manufactured by East Jordan.
- G. Special Requirements for Flood Plains:
 - 1. Definition: Areas that are designated Flood Plains.
 - 2. All frames and covers shall be watertight.
 - 3. All frames and covers shall be rated for AASHTO M306 (HS-25) Loading.
 - 4. Flange shall incorporate bedding slots or bolt holes.
 - 5. Stainless Steel bolts and nuts for lid shall be supplied with anti-seize coating.
 - 6. Acceptable manufacturers include the following (or pre-approved equal):
 - (a) CAP Bolt down as manufactured by Composite Access Products.

2.05 FRAME AND CHIMNEY SEALING SYSTEM

- A. Per Section 03370 – Sanitary Sewer Manhole Construction.

PART 3 - EXECUTION

3.01 MANHOLE FRAMES AND COVERS

- A. The Contractor shall coordinate the installation of the castings with the work of the other trades in order to avoid delays. Install inserts or anchors as required by individual items.
- B. Install items as specified and in accordance with the manufacturer's instructions.
- C. Install items plumb, level, in alignment and anchor securely. All manhole frames with hinged lids shall be anchored at four points.

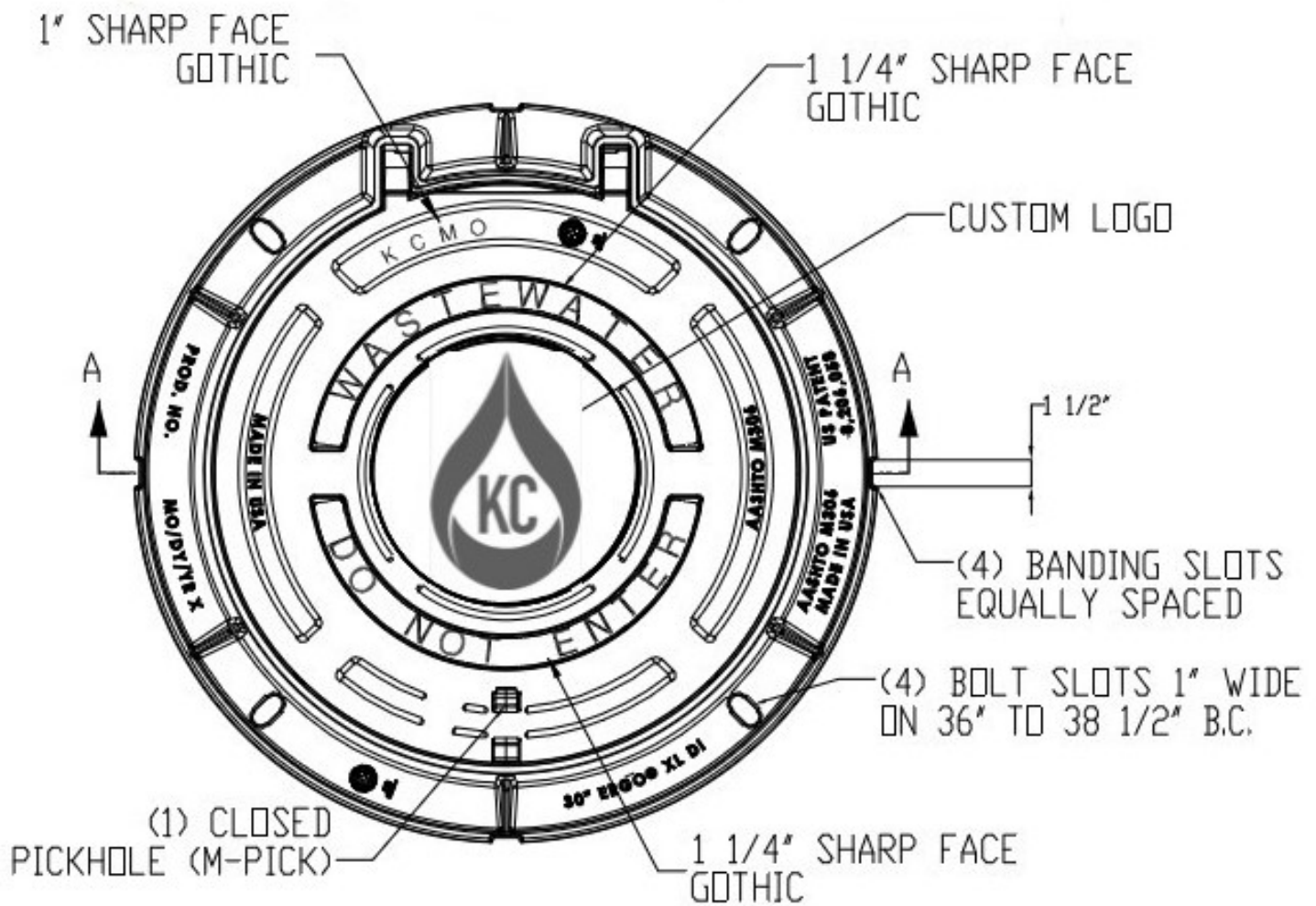
3.02 CLEANING

- A. Clean all items after installation to remove rust, dirt, oil, grease, and other deleterious substances.
- B. Clean all welds, bolted connections and abraded areas and apply the shop coating. Touch up damaged areas with the shop coating.

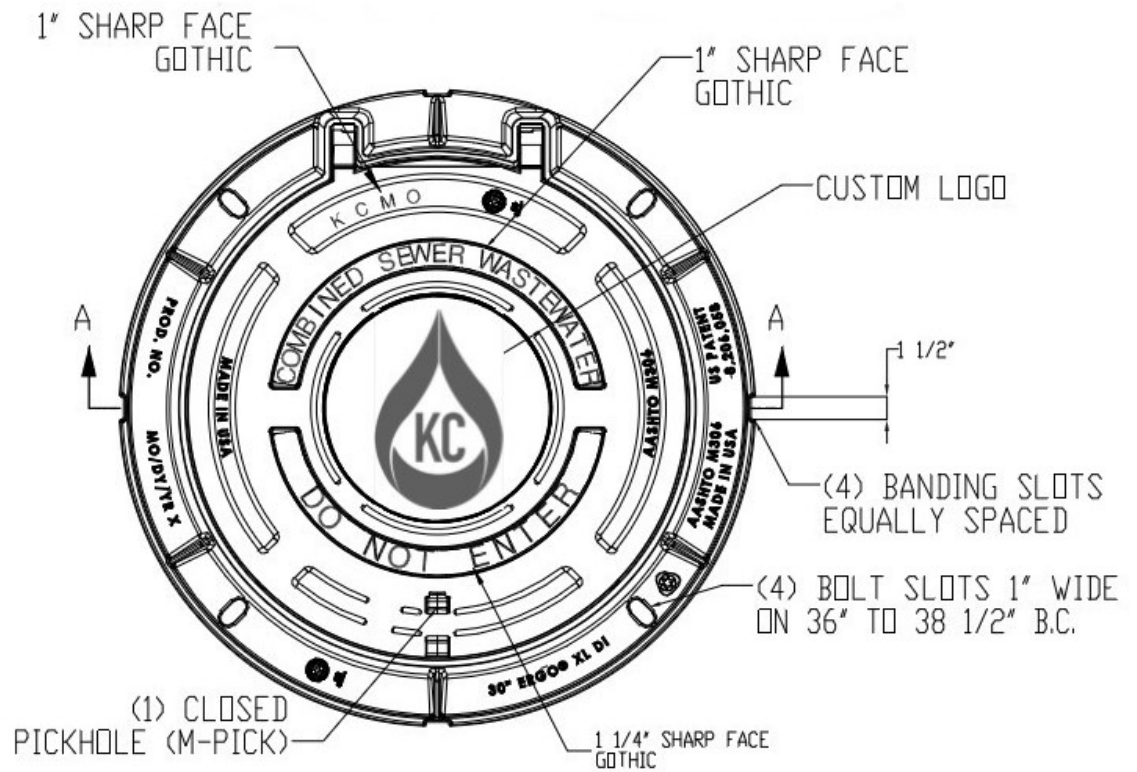
3.03 WARRANTY

- A. All castings shall have a lifetime warranty against manufacture defects for all components.

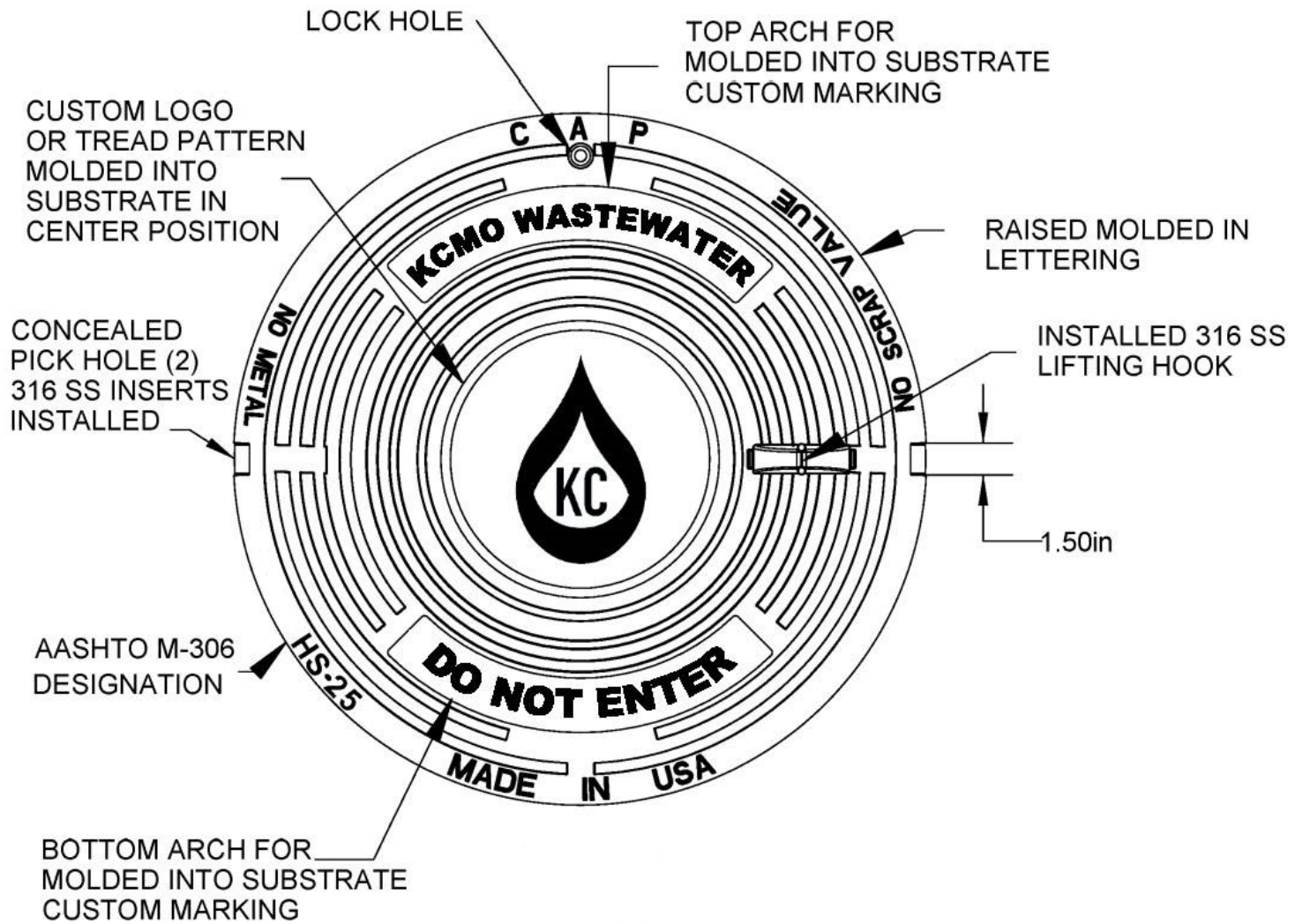
Figure 1, Figure 2, and Figure 3 on pages 6, 7 and 8, respectively.



**Figure 1: Standard Sanitary Sewer Manhole Markings
For Ductile Iron Castings**



**Figure 2: Optional Sanitary Sewer Manhole Markings
For Ductile Iron Castings
See Section 01015 – Specific Project Requirements**



**Figure 3: Standard Sanitary Sewer Manhole Markings
For Composite Castings**

END OF SECTION