

SPRINGFIELD WATER AND SEWER COMMISSION



MATERIAL SPECIFICATIONS

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Springfield Water and Sewer Commission

Material Specifications

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CHAPTER 1 REVISIONS

1. Version 1 of these Material Specifications was written April 1, 2008.
2. Revisions of these Material Specifications as of June 18, 2008
3. Version 2 of these Material Specifications was written as an Interim version as of October 20, 2017. A final version will be written in 2018
4. Version 3 of these Material Specifications was written after review of the Interim Version 2 and was Finalized July 1, 2020.
5. Version 4 of these Material Specifications was written after review of the Finalized Version 3 and was Finalized November 1, 2020.



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CHAPTER 2 GENERAL PROVISIONS

2.1.1 Reference to Specifications

These specifications may be referred to as the Commission's Specifications.

2.1.2 Severability

The provisions of these Specifications are severable. If any provision of these Specifications or any specific application to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications which can be given effect in the absence of the invalid provision or application.

2.1.3 Applicable Regulations

Every user of the public water system, private water mains, public sewer system, or private sewer mains shall be subject to regulations of the Commission, as they apply, and to any charges, rates, fees and assessments which are or may be established by the Commission. Any user of the public water system, private water mains, public sewer system, or private sewer mains shall also be subject to applicable Local, State, and Federal regulations.

2.1.4 Reference Standards

Where reference is made to one of the below standards, the revision in effect at the time of bid opening shall apply.

1. American Concrete Institute (ACI)
2. American Iron and Steel Institute (AISI)
3. American National Standards Institute (ANSI)
4. American Society of Testing and Materials (ASTM)
5. American Water Works Association (AWWA)
6. American Welding Society (AWS)
7. Ductile iron Pipe Research Association (DIPRA)
8. Manufacturing Standardization Society of the Valve and Fittings (MSS)
9. National Fire Protection Association (NFTA)
10. NSF International (NSF)



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CHAPTER 3 WATER MAINS AND APPURTANANCES,

Section 3.1 WATER PIPE – DUCTILE IRON

3.1.1 General

1. Ductile Iron Pipe provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Material Specification.
2. Ductile Iron Pipe shall be designed and manufactured in accordance with the most current ANSI A21.50/AWWA C-150 and ANSI A21.51/AWWA C-151, the latest revision and all addenda thereto.
3. Ductile Iron Pipe shall be NSF 61 certified.
4. The product(s) shall have all parts cast and assembled in North America or meet the requirements with the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
5. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product.



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3.1.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer/vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all products to be used. All finished product(s) shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the finished product(s) showing overall dimensions,
 - (b) Material specifications for each component of the finished product(s),
 - (c) Coating applied to each component of the finished product(s), if applicable,
 - (d) Weight of each component and total weight for each finished product(s), and
 - (e) Country of origin for each component.
3. If applicable and/or in addition, the manufacturer/vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying type of coating, color of coating, manufacturer of coating, part number of the coating, and a sample on a 3-inch by 5-inch chip.
4. Certification of where product(s) is made:
 - (a) If the product(s) is made in North America the manufacturer shall furnish a letter certifying the product is made in North America and signed by the Owner or President of the Company.
 - (b) If the product(s) meet the requirements of AIS the manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer/vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the product(s) and all materials in its construction exactly conform to the applicable requirements of these Material Specifications and the applicable AWWA Standard(s).
6. The manufacturer/vendor shall furnish a certified statement that all finished product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.



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7. The manufacturer/vendor shall furnish a warranty for the product(s) that states that the product(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the product(s) for a minimum ten (10) year time period from time of delivery.
8. The manufacturer/vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
9. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.1.3 Ductile Iron Push-on Joint Water Pipe

1. Cement Lining
 - (a) All pipe shall be double cement lined with an approved mortar lining and sealed with an approved asphaltic material seal coat in accordance with ANSI A21.4/AWWA C-104 of the latest revision.
 - (b) Provisions of AWWA C-104, Section 4.11 relating to characteristics of asphaltic seal coat as to deleterious effect upon the quality, color, taste or odor imparted to potable water shall be strictly observed.



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2. Exterior Coating

- (a) All pipe shall have a base layer of arc-applied, 99.99% pure zinc coating, having a mass of 200g/m² and shall comply with all applicable parts of ISO 8179 for zinc coatings.
- (b) All pipe shall have a finish layer of shop-applied bituminous paint in accordance with AWWA C-151 latest the revision and shall comply with all applicable parts of ISO 8179 for zinc coatings.

3. Length

The maximum length shall be twenty (20) feet.

4. Joints

- (a) Pipe to have push-on type joints conforming to ANSI A21.11/AWWA C-111.
- (b) Standard Styrene Butadiene Rubber (SBR) gasket shall be provided complete with lubricant. For special conditions that require gaskets other than the standard SBR gasket see the Material Specification for Special Gaskets.
- (c) Gaskets and lubricant shall be standard for the pipe used and approved by Springfield Water and Sewer Commission. Rubber gaskets and lubricant for the joints shall be shipped in bags.
- (d) The Springfield Water and Sewer Commission may require, under certain terrain conditions that restrained joints be used. The method of restraining may either, be of an locking gasket type joint, interlocking type joint, or mechanical joint restraint, as specified in Section 3.16 of these Specifications and as required by the Springfield Water and Sewer Commission.

5. Roundness

- (a) Pipe to be field cut shall be gauged full length, a mechanical joint gland shall fit over the full length of a gauged pipe.
- (b) 10% of each pipe size of each delivery shall be gauged the full length and clearly marked as gauged pipe.

6. Wedges

Three (3) serrated bronze wedges shall be provided for each length of pipe ordered.

7. Markings



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- (a) The pressure rating, metal thickness class, net weight of pipe without lining, length of pipe, date of manufacture and the name of the manufacturer shall be clearly marked on each length of pipe.
- (b) Pipe to be field cut and gauged full length shall be specially marked with green ends or other marking approved by the Commission.
- (c) Pipe markings shall include the word “Zinc” in the pipe markings or label required by AWWA C-151 and/or other markings as deemed appropriate by the manufacturer.

8. Pipe Class

- (a) All pipe delivered shall be a minimum Thickness Class 52, unless otherwise approved by the Commission’s E&TS.
- (b) The Metal Thickness and Pressure Class of Ductile Iron Pipe Table below is being provided as a reference. The rated water working pressure based on AWWA C-151 standard laying condition: Type #2. Metal Thickness Class shall be as shown in following table:

Size	Thickness Class	Metal Thickness	Pressure Class	Metal Thickness
4	52	0.29	350	0.25
6	52	0.31	350	0.25
8	52	0.33	350	0.25
10	52	0.35	350	0.26
12	52	0.37	350	0.28
16	52	0.4	350	0.34
20	52	0.42	300	0.36
24	52	0.44	300	0.4
30	52	0.47	250	0.42
36	52	0.53	200	0.42
42	52	0.59	200	0.47
48	52	0.65	200	0.52
54	52	0.73	200	0.58

Note: all dimensions are in inches

9. Inspection

The Commission reserves the right to retain an outside inspection laboratory to inspect pipe at manufacturer's foundry, inspection costs to be paid by the Commission.



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3.1.4 Delivery(s)

1. Delivery shall be specified in terms of number of days from receipt of order.
2. Delivery shall be made by truck to locations designated in the Commission's service area in which include Ludlow, Springfield, Agawam, Westfield, Granville, and Blandford, all in Massachusetts.
3. When applicable, the low bidder shall notify the Commission of the quantity comprising a minimum truckload.
4. When applicable, the Commission reserves the right to mix product size to reach a full truckload.
5. The manufacturer/vendor and/or shipper must use care in preparing the product(s) for shipment and in handling during shipment and delivery, to insure that the product(s) are delivered without damage. Particular attention must be directed at protecting the product(s) from damage. Damaged product(s) will not be accepted and returned to manufacturer/vendor at the manufacturer/vendor's cost.
6. The manufacturer/vendor, on request, shall provide the Commission or Installer with an affidavit for each and every delivery of an order, stating that the product(s) and all materials in its construction exactly conform to the applicable requirements of these Material Specifications and the applicable AWWA Standard(s).

3.1.5 Flanged Ductile Iron Pipe

1. Flanged Ductile Iron-Pipe shall, as a minimum, shall meet all specifications in of Paragraphs 3.1.1, 3.1.2, 3.1.3, and 3.1.4 except the joints and gaskets shall be as follows:
2. Flanged Ductile Iron Pipe and Fittings provided to the Commission or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
3. Flanged Pipe shall be bid without accessories (gaskets and bolts).
 - Accessories shall be as specified in Section 3.16 of these Material Specifications.
4. Flanged Ductile Iron-Pipe, as a minimum, shall conform to the most current ANSI A21.15/AWWA C-115 and all addenda thereto.
5. All Flanged Pipe delivered shall be a minimum Thickness Class 53, unless otherwise approved by the Commission's E&TS.



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6. Flanged Ductile Iron-Pipe shall have the bolt circle and bolt holes conform to dimensions and drilling of ANSI B16.1, Class 125 or ANSI A21.15/AWWA C-115.
7. All flanges installed on ductile iron pipe for mechanical applications shall be constructed of ASTM A536, Grade 65-45-12 ductile iron. Gray cast iron flanges shall not be allowed.
8. Flanges shall be rated for a working pressure of not less than 250-PSI.
9. Class 125 drilled flanges shall be flat-faced and have the following properties:

(a) Tensile Strength	70,000-psi
(b) Yield Stress	50,000-psi.
(c) Percent Elongation	5.0
(d) Max. Working Pressure Pipe 3-in to 18-in dia.:	350-psi
(e) Max. Working Pressure Pipe 24-in to 64-in dia.:	250-ps

3.1.6 Pipe Manufactures Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. U. S. Pipe and Foundry Co. – Tyton Joint,
2. American Ductile Iron Pipe Co. – Fastite Joint,
3. Atlantic States Pipe (McWayne, Inc.) – Tyton up to 24-inch and Fastite greater than 24-inch (gaskets are not interchange able with US Pipe or American Pipe),
4. or the Approved equal product of another manufacture provided the product(s) are manufactured as per these Material Specifications.



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Section 3.2 Special Gaskets

1. Gaskets to be used when Volatile Organic Compounds (VOC), such as hydrocarbons, acids, vegetable oils, and petroleum products are present, shall be as follows:
 - (a) Gaskets shall be VITON® - VITON® is the registered trade name for the fluoroelastomer (FKM) manufactured by DuPont. However, it is commonly used as the generic term for all FKM elastomers.
 - (b) FKM gaskets shall be resistant to hydrocarbons, acids, vegetable oils, and petroleum products.
 - (c) FKM gaskets shall provide permeation resistance to low molecular weight petroleum products and/or other VOC contaminants.



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Section 3.3 INSULATED PIPE AND INSULATION SYSTEMS

3.3.1 Pre-Insulated Ductile Iron Pipe

1. All Push-on Joint Insulated ductile iron water pipe as a minimum, shall meet all specifications in of Paragraphs 3.1.1, 3.1.2, 3.1.4, 3.1.4 and the following additional requirements.
2. The insulating system shall consist of 2-inch rigid foam insulation in a waterproof protective outer jacket or protective outer jacket, both to be applied at the factory.
3. Insulation shall consist of 2-inches of rigid polyurethane foam in accordance with the following:
4. The density shall be 2.2 to 3.0 lbs/ft³ (35 to 48 kg/m³) in accordance with ASTM D1622,
5. The water absorption shall be 4% by volume in accordance with ASTM D2842,
6. The closed cell content shall be 90% minimum in accordance with ASTM D2856,
7. The system compressive strength shall be 60 to 80 lbs/in² (414 to 552 kPa) in accordance with modified ASTM D1621,
8. The thermal conductivity shall have a K value of 0.14 to 0.17 Btu-in/hr-ft²-°F (0.020 to 0.026 W/m-°C), and
9. The service range shall be -49° F to 185° F (-45° C to 85° C).
10. The water proof protective outer jacket shall for below grade installations shall be UV inhibited polyethylene and in accordance with the following, unless otherwise approved by the Commission's E&TS:
11. The sealant shall be butyl rubber and resin,
12. The minimum service temperature shall be -49° F (-45° C),
13. The minimum installation temperature shall be -30° F (-34° C),
14. The minimum thickness shall be 50 mils (1.27mm), and
15. The tensile strength shall be 38 lbs/inch-wide (6.8 kg/cm-wide) in accordance with ASTM D1000).



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16. The protective outer jacket shall for above grade installations shall be galvanized steel lock seam (Spiwrap® is the registered trade name) and in accordance with the following, unless otherwise approved by the Commission's E&TS:
17. The protective outer jacket shall be factory installed, and
18. The wall thickness shall be 18-gauge, 0.051-inch (1.3mm) thick.
19. Bell and spigot joints shall be sealed using a single turn of 6-inch (150mm) wide butyl mastic tape or heat shrink wrap/closure seal.
20. Insulation kits for the mechanical joints shall be supplied and shall be pre-fabricated urethane half shells with fully bonded polymer protective coating on all exterior surfaces, including the ends and pre-rolled, form fitting, outer cover metal sheet of the same material and gauge as the pipe jacket. Kits shall be supplied silicone caulking for the seams, stainless steel attachment strips, clips, and heat shrink sleeves to seal between pipe and kits.
21. The pipe shall be insulated as shown on the drawings.

3.3.2 Insulated Pipe Manufactures Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Urecon Pre-Insulated Pipe,
2. Perma Pipe,
3. Tricon,
4. or the Approved equal product of another manufacture provided the product(s) are manufactured as per these Material Specifications.



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Section 3.4 Field Applied Insulation Systems

3.4.1 General

1. Field Applied Insulation Systems provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Material Specification.
2. ***Insert Product Name*** shall be designed and manufactured in accordance with the most current ANSI ____/AWWA C-____ and ANSI A____/AWWA C-____, the latest revision and all addenda thereto.
3. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (d) North America shall mean the United States, Canada, and Mexico,
 - (e) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (f) Incidental parts may be purchased/obtained from other countries to provide a finished product, in accordance with these Material Specifications, and
 - (g) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (h) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
4. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of product(s) or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of these Material Specifications or applicable standard, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).
5. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts



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installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.

6. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
7. Field Applied Insulation Systems for less than 4-feet of cover, above grade, or across bridge span(s) is typically a four part system that includes the insulation sections, an insulation jacket, the seals, and/or bands.
8. Insulation jackets for above grade installations shall be aluminum, unless otherwise specified by the Commission.
9. Insulation jackets for below grade installations shall be a self-adhesive composite rubber modified asphalt with cross laminated polyethylene, known as cold insulation wrap (CI Wrap), unless otherwise specified by the Commission.
10. The above shall be supplied as follows, unless otherwise approved by the Commission's E&TS:

3.4.2 Insulation Sections

1. The insulating sections for above grade and below grade installations shall consist of 2-inch rigid foam insulation in a waterproof protective outer jacket or protective outer jacket, both to be applied at the factory.
2. Insulation shall consist of 2-inches of rigid polyurethane foam in accordance with the following:
 - (a) The density shall be a minimum of 1.9 lbs/ft³ in accordance with ASTM D1622,
 - (b) The water absorption shall be less than 1% by volume in accordance with ASTM C272,



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- (c) The closed cell content shall be 90% minimum in accordance with ASTM D6226,
 - (d) The system compressive strength shall be 25 to 30 lbs/in² in accordance with modified ASTM D1621,
 - (e) The thermal conductivity shall have a K value of 0.14 to 0.17 Btu-in/hr-ft²-°F in accordance with ASTM C518, and
 - (f) The service range shall be -49° F to 185° F.
3. The insulation sections shall be fabricated in half-section of 3-foot lengths. The half-sections shall fit tightly over the pipe to be insulated, except for the joint locations and the fittings where an oversized cover is made to allow for any bell joint or hardware.

3.4.3 Jacketing for Above Grade Installations

- 1. Insulation jackets for above grade installations shall be 0.020-inch thick aluminum with an internal moisture barrier. The aluminum shall be from alloys 3105 or 3003.
- 2. The internal moisture barrier shall be 3-mil polyethylene heat laminated to the inside of the metal jacket sections.
- 3. The aluminum jackets shall be delivered in half sections and in __-inch lengths.

3.4.4 Straps Above Grade Installations

- 1. Straps for above grade installations shall be soft annealed, 3/4-inch wide, 0.020-thick, 304 stainless steel.

3.4.5 Jacketing for Below Grade Installations

- 1. Insulation jackets for below grade installations shall be a self-adhesive composite rubber modified asphalt with cross laminated polyethylene, known as cold insulation wrap (CI Wrap).
- 2. The CI Wrap shall be 50-mil thick.
- 3. The aluminum jackets shall be delivered in standard roll sizes of 4-inch by 75-feet for the seams, fittings, and repairs and 36-inch by 75-feet for the insulation sections.

3.4.6 Field Applied Insulation Manufactures Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the



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component(s) shall result in the product no longer being approved and removed from this list.

1. ITW Insulation Systems,
2. Foster Products,
3. Tricon Piping Systems, or
4. Equal provided the product(s) are manufactured as per these specifications.



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Section 3.5 POLYETHYLENE ENCASEMENT

3.5.1 General

1. Polyethylene Encasement (PE) provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. PE as a minimum shall conform to the most current American Water Works Association Standard C-105 and all addenda thereto.
3. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Produced shall mean molten polyethylene(s) formed into a sheet to create a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Manufactured shall mean sheets and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
4. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).
5. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.



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6. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished products and/or protective coatings will not be accepted.

3.5.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the gate valve showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of specification(s) of each component that has the product applied identifying component surface preparation, primer (if applicable), type of component(s), color of component(s), manufacturer of component(s), part number of the component(s), and a sample on a 3-inch by 5-inch chip, if applicable.
4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AISAS, an explanation, in the letter, of how the products meets the AISAS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. The manufacturer and/or vendor shall furnish a certified statement that all gate valves of the same make and model bid, regardless of the year of manufactured,



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shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.

8. The manufacturer and/or vendor shall furnish a warranty for the gate valves that states that the gate valves shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole gate valve for a minimum ten (10) year time period from time of delivery.
9. The manufacturer and/or vendor shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a shell test and seat test to demonstrate the valve body and seat will hold pressure as required.
10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (a) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (b) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.5.3 Polyethylene Encasement

1. Polyethylene Encasement shall be V-Bio Polyethylene Encasement in full compliance with this Material Specification.



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2. V-Bio Polyethylene Encasement (PE) shall consist of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness of not less than eight mils in accordance with ANSI/AWWA C105/A21.5, ASTM D4976, and the following.
3. The inside surface of the V-Bio PE wrap to be in contact with the pipe exterior shall be infused with a blend of antimicrobial compound to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.
4. V-Bio PE shall be provided in tubes for water mains, bends, offsets, reducers, and other pipe shaped appurtenances, unless otherwise approved by the Commission.
5. V-BioPE shall be provided in sheets for valves, tees, crosses, and other odd shaped appurtenances, unless otherwise approved by the Commission.
6. Physical properties of finished PE film shall be:
 - (a) Tensile strength 3,600 psi *
 - (b) Elongation 800 percent *
 - (c) Dielectric strength 800 V/mil thickness minimum
 - (d) Impact Resistance 600 g minimum
 - (e) Propagation Tear Resistance 2,550 grams force minimum *

*Minimum in machine and transverse direction
7. V-Bio PE tubing and sheets shall be provided with a bright white exterior and a bright yellow interior and shall be clearly marked every two feet along its length with the following information in one-inch high letters:
 - (a) Manufacturer's name or trademark
 - (b) Year of Manufacture
 - (c) ANSI/AWWA C105/A21.5
 - (d) Minimum film thickness and material type
 - (e) Applicable range of nominal pipe diameter size(s)
 - (f) Warning – Corrosion Protection – Repair any damage



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8. Tubes and sheets shall be provided in the following minimum sizes for the appropriate pipe sizes, unless otherwise approved by the Commission:

Polyethylene Tube and Sheet Sizes for Ductile Iron Pipe															
Pipe Diameter in inches	4	6	8	10	12	16	20	24	30	36	42	48	54	60	64
Flat Tube in inches	14	16	20	24	27	34	41	54	67	81	81	95	108	108	121
Sheet in inches	28	32	40	48	54	68	82	108	134	162	162	190	216	216	242
Rolls of 100-foot tape per 1000-feet	3	3	3	4	4	6	7	8	10	15	15	17	20	20	21

9. V-Bio PE tubing shall be supplied in the following minimum lengths, unless otherwise approved by the Commission:
- (a) Up to 16-inch diameter pipe – 300-feet long
 - (b) 24-inch to 30-inch diameter pipe – 220-feet long
 - (c) 30-inch to 64-inch diameter pipe – 110-feet long
10. V-Bio PE tubing shall be provided with perforations every 22-feet, unless otherwise approved by the Commission.

3.5.4 Adhesive Tape for Polyethylene Encasement

1. Adhesive tape shall be a minimum of 2-inches wide.
2. Adhesive tape shall be an anticorrosion material made of PE or polyvinyl chloride (PVC) that is 10-mil thick. Duct tape is not allowed.
3. PE or PVC adhesive tape shall have heat a laminated adhesive layer of butyl glue.
4. PE or PVC adhesive tape shall be supplied in the approximate quantities defined in the chart above.



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3.5.5 Polyethylene Encasement Manufactures Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. REPCOR Inc.,
2. T. Christy Enterprises, Inc. (Christy's),
3. Trumbull Industries, or
4. Equal provided the product(s) are manufactured as per these specifications.



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Section 3.6 GATE VALVES

3.6.1 General

1. Gate Valves provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Gate Valves as a minimum shall conform to the most current American Water Works Association Standard C-509 (full wall) or C-515 (reduced wall) and all addenda thereto.
3. Gate Valve bodies shall be of high strength ductile iron ASTM A-536 grade 65-45-12.
4. Gate Valves maximum working pressure shall be 250-PSI static pressure.
 - (a) Gate Valves shall be shell tested at 500-PSI minimum with the gate in the open position.
 - (b) Gate Valves shall be seat tested at 250-PSI minimum with the gate in the closed position on each side of the seat.
5. Gate Valves shall be bid without accessories (glands, gland gaskets and bolts).
 - Accessories shall be as specified in Section 3.16 of these Material Specifications.
6. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.



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7. Inspection:

- (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
- (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).

8. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.

9. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished products and/or protective coatings will not be accepted.

10. Valves shall be bid without accessories (glands, gland gaskets and bolts).

11. Accessories shall be as specified in Section 3.16 of these Material Specifications.

3.6.2 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the gate valve showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.



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3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AISAS, an explanation, in the letter, of how the products meets the AISAS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. The manufacturer and/or vendor shall furnish a certified statement that all gate valves of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
8. The manufacturer and/or vendor shall furnish a warranty for the gate valves that states that the gate valves shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole gate valve for a minimum ten (10) year time period from time of delivery.
9. The manufacturer and/or vendor shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a shell test and seat test to demonstrate the valve body and seat will hold pressure as required.
10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered



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- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
- (a) Approved means the contractor can supply the material as shown on the drawing(s).
- (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
- (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.6.3 Class 250B - Resilient Seated 4” - 16” Gate Valves and Tapping Valves

1. The valve body and bonnet shall be coated on all exterior and interior surfaces with fusion bonded epoxy conforming to the requirements of AWWA C-550 (most current revision) for Protective Epoxy Interior Coatings for Valves and Hydrants.
2. The valve body markings shall include the manufacturers name or mark, pressure rating, material (D.I.), and year of manufacture and be cast into the body.
3. Valves ordered under this specification will be within the following size schedules 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, and 16-inch.
4. Valves to be provided with a minimum of two (2) O-ring stem seals.
5. Valves shall be of the non-rising stem (NRS) design.
6. Valves shall be wrench-nut operated with a 2-inch square-operating nut made of ductile iron and **right hand** to open.
7. Valves ordered under this Specification shall be provided with valve ends selected from the following:
 - (a) Mechanical joint both ends
 - Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C-111.
 - (b) Flanged both ends



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- The end flanges of flanged valves shall conform to dimensions and drilling of ANSI B16.1, Class 125 or ANSI A21.10/AWWA C-110.

(c) Mechanical joint X flanged

- Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C-111.
- The end flanges of flanged valves shall conform to dimensions and drilling of ANSI B16.1, Class 125 or ANSI A21.10/AWWA C-110.

(d) Mechanical joint X tapping valve flange

- Mechanical joint bell dimensions shall conform to ANSI A21.11/AWWA C-111.
- Tapping valve flanges that form the joint with the tapping sleeve shall conform to the dimensions MSS SP-60 in sizes 4" through 12". The connecting MJ bell of the tapping valve mating with the tapping machine must be parallel and concentric with the opposite flange and concentric with the waterway to provide proper alignment for the tapping operation. This flange shall conform to the dimensions of MSS SP-113. Tapping valves provided must be manufactured to be used with the Mueller CL-12 Drilling Machine with the following shell cutter diameters 3 1/2", 5 1/2", 7 1/2", 9 1/2", and 11 1/2".

8. The resilient-seat wedge shall be constructed of cast iron or ductile iron and fully encapsulated in a rubber compound for water service, constructed of STYRENE BUTADIENE RUBBER (SBR) rubber, and must meet or exceed ASTM D-2000 3 BA 715. No bare metal shall be left exposed. Wedge rubber shall be molded in place and banded tightly to the cast iron or ductile iron core and shall not be mechanically attached with screws, rivets, or similar fasteners. The wedge shall be symmetrical and seat equally well with flow in either direction.
9. The resilient-seat shall be made of an elastomer compound that complies with Section 4.2.2.7 of AWWA Standard C-515, (most current revision).
10. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.



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11. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
12. Valve stems and stem nuts shall be made of a copper alloy or stainless steel and the minimum yield strength shall be 40,000-PSI.

3.6.4 Class 250B - Outside-Screw-And-Yoke (OS & Y) Rising Stem

1. In addition to Paragraphs 3.6.1, 3.6.2, and 3.6.3 OS&Y valves shall meet the following requirements:
2. Valves ordered under this specification will be within the following size schedules: 3-inch, 4-inch, 6-inch, 8-inch, 10-inch and 12-inch.
3. OS&Y gate valves shall be **LEFT HAND TO OPEN**.
4. Valves shall be of the outside screw-and-yoke (OS&Y) rising stem design. Design shall be such that the stuffing box can be packed when the valve is in the fully open position and under pressure.
5. OS&Y valves shall be operated by hand wheels sized in accordance with Table 5, C-509. Hand wheel shall be of the spoke-type only. An arrow showing the direction to turn the hand wheel to open the valve, with the word “OPEN” in ½” or larger letters in a break in the arrow shaft shall be cast on the rim of the hand wheel so as to be readily readable.
6. Valves ordered under this Specification shall be provided with flange valve ends on both ends. The end flanges of flanged valves shall conform to dimension and drilling in accordance with ANSI B16.1, Class 125 or ANSI A21.10/AWWA C-110.
7. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall



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be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.

8. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
9. Valves shall be bid without accessories (companion flanges, glands, gland gaskets and bolts).
10. Accessories shall be as specified in Section 3.16 of these Material Specifications.
11. Valve stems and stem nuts shall be made of a copper alloy or stainless steel and the minimum yield strength shall be 40,000-PSI.
12. Any conflict between this paragraph and the other specified paragraphs concerning OS&Y valves then this paragraph shall govern.

3.6.5 Class 250B - 4" - 16" Valves Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. American Flow Control – Series 2500 (reduced wall),
2. Clow – Model 2638 (reduced wall) or 2640 (full wall),
3. J & S – Series 6600, 6700 (OS&Y), and 6900 (all full wall),
4. Kennedy – Series 7000 (reduced wall) or full wall special order,
5. M & H – Series 7000 (reduced wall) or 7500 (full wall),
6. Mueller – Model 2361 (reduced wall) or 2362 (full wall),
7. US Pipe – Model USP0 (reduced wall) USP1 (full wall),
8. East Jordan Iron Works – Model Flowmaster, or



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9. Equal provided the products are manufactured as per these specifications.



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Section 3.7 BUTTERFLY VALVES

3.7.1 General

1. Butterfly Valves (BV) provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).
4. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
5. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at



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protecting the protective coating from damage. Damaged finished products and/or protective coatings will not be accepted.

3.7.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the gate valve showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AISAS, an explanation, in the letter, of how the products meets the AISAS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. The manufacturer and/or vendor shall furnish a certified statement that all butterfly valves of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.



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8. The manufacturer and/or vendor shall furnish a warranty for the butterfly valves that states that the butterfly valves shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole butterfly valve for a minimum ten (10) year time period from time of delivery.
9. The manufacturer and/or vendor shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a shell test and seat test to demonstrate the valve body and seat will hold pressure as required.
10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.7.3 Class 250B - Butterfly Valves

1. All Butterfly Valves (BV) as a minimum shall conform to the most current American Water Works Association Standard C-504 and all addenda thereto.
2. All BV bodies shall be of high strength ductile iron ASTM A-536 grade 65-45-12.
3. All BV maximum working pressure shall be 250-PSI static pressure.

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4. Required shop testing, in accordance with AWWA C504:
 - (a) Each Class 250B valve shall be shop tested and certified for leakage with the disc in the horizontal plane.
 - BV shall be shell tested at 500-PSI minimum with the disc in the open position.
 - BV shall be seat tested at 250-PSI minimum with the gate in the closed position on each side of the seat.
 - (b) After each BV is completely assembled, including the actuator, it shall be operated several times in the factory to ensure it is in working condition.
5. All BV shall be bid without accessories (glands, gland gaskets and bolts).
 - Accessories shall be as specified in Section 3.16 of these Material Specifications.
6. All BV shall be rubber-seated, tight closing against stainless steel. BV shall be designed for direct bury service.
7. All BV body ends shall be mechanical joint conforming to ANSI A21.11/AWWA C-111, unless otherwise specified.
8. All BV shall be provided with manual actuators. All manual actuators shall be provided with a 2-inch square operating nut made of ductile iron. Manual valve actuators shall be capable of holding the disc in any position without creeping or fluttering. Manual actuators shall be serviceable without removal from the valve. A shaft seal shall be incorporated between the manual actuator and the valve.
9. All BV actuators shall be equipped with adjustable mechanical stop limiting devices to prevent over travel of the valve disc in the open and closed positions. Flow stops in the valve flow stream will not be allowed.
10. All BV manual actuators shall be of the traveling nut design rated for 450 foot-pounds of input torque against the open and closed stops. Such actuators shall be totally enclosed for buried service in a gearbox. Gears must operate in a lubricant and be totally sealed to prevent entry of dirt or liquids into the actuator.
11. Unless otherwise specified, all BV shall be right hand to open (clockwise). The operating nut shall be painted red.
12. All BV shall have an epoxy coating on the interior, exterior, and the vane. The coating shall meet all requirements of AWWA C-550 of latest revision. All bodies and vanes shall be factory coated prior to assembly and testing. All ferrous surfaces of the valve body, waterway, and vane shall receive an epoxy coating with a



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minimum dry film thickness of 8-mils. All exterior surfaces shall be coated with an epoxy with a minimum of 6-mils dry film thickness. Fusion Bonded is acceptable.

13. All BV seats shall be of synthetic Nitrile (Buna-N) compound, unless otherwise specified.
14. All BV seats shall be recessed into the body and held in place with epoxy injection or attached to the disk with type 304, 316, or ASTM A564 stainless steel hardware to restrain the seats from any movement at the maximum rated flow in either direction. When the seat is attached to the disc the bolts shall pass through the seat, retainer, and disc.
15. All BV shafts shall be turned, ground, and polished and shall be constructed of Type 630/17-4 PH/ASTM A584 stainless steel and shall be sized per AWWA Standard for Rubber-seated Butterfly Valves C-504, latest revision.
16. All BV disc shall be secured to the shafts with pins. These pins shall be of the same material as the shaft and pass completely through the disc and shaft. Pins shall be tightly secured with lock-washers and nuts to ensure line vibrations cannot loosen the connection.
17. Shaft seals shall be of the chevron or O-ring type.
18. Valve bearings shall be sleeve type, corrosion resistant, and self-lubricating. Bearing load shall not exceed 20-percent of the compressible strength of the bearing or shaft materials, and shall be secured in the trunion by a machined edge. Ferrous bearings in the flow stream shall not be allowed.
19. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
20. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford,



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Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.

3.7.4 Butterfly Valves Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Clow – Series 4500, Style 1450-CL250,
2. DeZurik, BAW-CL250,
3. Henry Pratt Company, Model Groundhog HP-250,
4. Kennedy – Series 4500, Style 1450-CL250,
5. M & H – Series 4500, Style 1450-CL250,
6. Mueller – Model Linesal XP,
7. Val-Matic, Series 2000-CL250, or
8. Equal provided the products are manufactured as per these specifications.



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Section 3.8 CHECK VALVES

3.8.1 General

1. Check Valves provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Check Valves as a minimum shall conform to the most current American Water Works Association Standard C-508 and all addenda thereto.
3. Working pressure 250 PSI. Test pressure 500 PSI.
4. Check Valves shall be bid without accessories (glands, gland gaskets and bolts).
 - Accessories shall be as specified in Section 3.16 of these Material Specifications.
5. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
6. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).



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7. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
8. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.8.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the check valve showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.



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6. The manufacturer shall furnish a certified statement that all check valves of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the check valves that states that the check valves shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole check valve for a minimum ten (10) year time period from time of delivery.
8. The manufacturer shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a million-cycle continuous test to demonstrate the durability of the flexible connection.
9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.8.3 Check Valves

1. Check Valves body and cover shall be of high strength ductile iron ASTM A-536 grade 65-45-12.



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2. Check Valves working pressure shall be 250-PSI static pressure. Check valves provided under this specification shall be shell tested at 500-PSI minimum with the flapper in the open position. Check valves provided under this specification shall seal drop tight at pressures greater than 5-PSI minimum.
3. Check valve flow area when fully open shall be not less than the area of the circle of the diameter of the nominal pipe size.
4. The check valve body and cover shall be coated on all exterior and interior surfaces with fusion bonded epoxy conforming to the requirements of AWWA C-550 (most current revision) for Protective Epoxy Interior Coatings for Valves and Hydrants.
5. The check valve body markings shall include the manufacturers name or mark, pressure rating, material (D.I.), and year of manufacture and be cast into the body.
6. Check valves ordered under this specification will be within the following size schedules 4-inch, 6-inch, 8-inch, 10-inch, and 12-inch.
7. Check valves ordered under this Specification shall be provided with flanged ends conform to dimensions and drilling of ANSI B16.1, Class 125 or ANSI A21.10/AWWA C-110.
8. The check valve disc shall be constructed of ductile iron or alloy steel and fully encapsulated in a rubber compound for water service, molded, not split and glued, constructed of styrene butadiene rubber (SBR) or Nitrile (Buna-N) compounds, and must meet or exceed ASTM D-2000 3 BA 715 and ANSI A21.11/AWWA C-111, latest revision. No bare metal shall be left exposed. Disc-rubber shall be molded in place and banded tightly to the ductile iron or steel core and shall not be mechanically attached with screws, rivets, or similar fasteners.
9. Check valve disc travel shall not be more than 35-degrees for full open position.
10. Bronze seat rings are not allowed. Disc shall be the only moveable part. No o-rings or other bearings are allows.
11. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.



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12. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
13. Valves shall be bid without accessories (glands, gland gaskets and bolts).
14. Accessories shall be as specified in Section 3.16 of these Material Specifications.

3.8.4 Check Valves Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. American Flow Control: Series 2100 - RSCV1,
2. Val-matic: Series 500A – VMC502A,
3. Henry Pratt Company: RD-Series Flex-0205,
4. Milliken Valve Company; Series 850 – Figure 851, or
5. Equal provided the products are manufactured as per these specifications.



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Section 3.9 AIR VALVE ASSEMBLIES AND AIR CORPORATIONS

3.9.1 General

1. Air Valve Assemblies and Air Corporations provided to the Commission or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Brass components of the Air Valve Assemblies may be made from copper alloy No. 83600, in accordance with ASTM B30, ASTM B62, or ASTM B584 and AWWA C-800 latest version containing 85% copper, 5% tin, 5% lead, and 5% zinc (brass 85-5-5-5).
3. Copper tube components of the Air Valve Assemblies shall be type "L", manufactured in America.
4. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
5. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).



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6. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
7. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished product(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished product(s) will not be accepted.
8. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.9.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the corporation and curb stop showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.



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5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a certified statement that all products shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the product that states that the products shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole check valve for a minimum ten (10) year time period from time of delivery.
8. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
9. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.9.3 Standard Air Valve Assembly

1. One-inch or Two-inch corporations: may be brass 85-5-5-5, tapered inlet ball corporation with One-inch or Two-inch CC thread on the inlet side and One-inch or Two-inch female IP thread on the outlet side. One is required for each assembly.



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2. Corporations may rotate 360 degrees in either direction or rotate $\frac{1}{4}$ turn only and **OPEN LEFT**, counter-clockwise.
3. One-inch or Two-inch 90-degree elbows: may be brass 85-5-5-5, female on both ends with One-inch or Two-inch IP thread. Three are required for each assembly.
4. One-inch or Two-inch Ball Valve Curb Stop and Waste: may be brass 85-5-5-5, ball valve type with One-inch or Two-inch female IP thread on both ends. A tee head A stop & waste hole shall be provided. One is required for each assembly.
5. Curb Stops shall rotate $\frac{1}{4}$ turn only and **OPEN LEFT**, counter-clockwise.
6. One-inch and/or Two-inch Nip: may be brass 85-5-5-5, male on both ends with One-inch or Two-inch IP thread. Minimum length shall be six-inches and maximum length shall be twelve-inches, unless otherwise approved by the Commission. Three are required for each assembly.
7. One-inch or Two-inch Riser pipe: may be brass 85-5-5-5, male on both ends with One-inch or Two-inch IP thread. The length shall be from the last 90-degree elbow to four-to-six-inches below finished roadway. One is required for each assembly.
8. One-inch or Two-inch cap: may be brass 85-5-5-5, One-inch or Two-inch female IP thread. One is required for each assembly.

3.9.4 One-Piece Air Valve Assembly

1. The One-Piece Air Valve shall be of a type equal to Wedge Manufacturing, L.L.C., catalog numbers 10060 for 1-inch and 20060 for 2-inch, or an approved equal.
2. One-inch or two-inch corporations: may be brass 85-5-5-5, tapered inlet ball corporation with One-inch or Two-inch CC thread on the inlet side and One-inch or Two-inch male IP thread on the outlet side. One is required for each assembly.
3. Corporations may rotate 360 degrees in either direction or rotate $\frac{1}{4}$ turn only and **OPEN LEFT**, counter-clockwise.
4. One-Piece Air Valves shall be provided with a lower operating lever made of cast or stamped brass that is secured to the brass ball valve with a marine type brass cotter pin.
5. One-Piece Air Valves shall be provided with a brass ball valve with female iron pipe threads at both ends. The ball valves shall be drilled on the riser side for drainage.



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6. One-Piece Air Valves shall be provided with an adapter at both ends made of copper. The adapters shall have male threads on one end and plain on the other for crimp fitting.
7. One-Piece Air Valves shall be provided with a copper riser pipe. The Riser pipe shall be crimp fit to the copper adapters at both ends.
8. One-Piece Air Valves shall be provided with a tee handle made of cast brass. The tee handle shall be secured to the operating rod with stainless steel roll pin.
9. One-Piece Air Valves shall be provided with an operating rod made of 3/8-inch diameter brass CDA 360, ASTM B-16.
10. One-Piece Air Valves shall be provided with a split ring connector that shall secure the operating rod to the riser. The fasteners shall be stainless steel.
11. One-Piece Air Valves shall be provided with a lower mechanism that connects the operating rod to the lower operating lever. The lower mechanism shall be secured to the operating rod with a stainless steel roll pin. The lower mechanism shall be secured to the lower operating lever with a 3/8-inch X 1/2-inch stainless steel bolt with a Nylock safety nut.

3.9.5 Air Corporations

1. Air corporations shall be one-inch.
2. Tapered inlet ball type corporations, may be brass 85-5-5-5, shall be with one-inch CC thread on the inlet side, and one-inch male IP thread on the outlet side.
3. Corporations may rotate 360 degrees in either direction or rotate 1/4 turn only and **OPEN LEFT**, counter-clockwise.
4. Air corporations shall be provided with a 1-inch female IP threaded brass cap, unless otherwise approved by the Commission.

3.9.6 Air Valve Assembly Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.



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1. Tapered inlet ball type corporations with one-inch or two-inch CC thread on the inlet side and one-inch or two-inch female IP thread on the outlet side

	<u>1-inch</u>	<u>2-inch</u>
(a) Ford:	FB1600-4	FB1600-7
(b) Red Hed:	Not Available (NA)	RHB43875
(c) Mueller:	B-20045 (state size)	B-20045 (state size)
(d) McDonald:		
(e) Cambridge:		

2. Ball Valve Curb with Stop and Waste and with One-inch or Two-inch female IP thread on both ends

	<u>1-inch</u>	<u>2-inch</u>
(a) Ford:	B11-444SW	B11-777SW
(b) Red Hed:	RHB22202	RHB22205
(c) Mueller:	B-20283 (state size)	
(d) McDonald:		
(e) Cambridge:		

3.9.7 Air Corporation Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Tapered inlet ball type corporations with one-inch CC thread on the inlet side and one-inch male IP thread on the outlet side

(a) Ford:	FB800-4
(b) Red Hed:	RH43842
(c) Mueller:	B-2996 (state size)
(d) McDonald:	



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(e) Cambridge:



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Section 3.10 VALVE BOXES

3.10.1 General

1. Valve Boxes provided to the Commission or installer shall be telescopic in design, Cast Iron, heavy pattern, adjustable type top section, bottom section, and cover and manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The valve boxes shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 105 Class 35B strength of materials requirements.
3. Valve boxes shall be strong, durable, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
 - (a) An HS20 load rating is required.
 - (b) Cast iron shall conform to American Society of Testing and Materials (ASTM) A48, Class 35B.
 - (c) Valve boxes covers and seats shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
4. The Commission may require valve boxes be subjected to proof load testing as follows:
 - (a) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards – Proof Load Testing (PLT).
 - (b) The PLT shall show no detrimental deformation or cracks when a proof load of 25,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (c) Permanent deformation shall not exceed 1/8-inch.
 - (d) All testing shall be at the supplier's expense.
5. Valve boxes top sections, bottom sections, covers, and enlarged bases shall be provided with individual permanent markings that are easily discernable and show the following:
 - (a) Name of the producing foundry and country of manufacture preceded by the words "Made in", such as "Made in USA"
 - (b) AASHTO designation or ASTM designation number



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- (c) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (d) Heat identification and cast date (MM/DD/YY),
 - (e) The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and location of the markings must meet and be subject to the approval of the Commission's aesthetic judgment.
6. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
- (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement govern.
7. All valve boxes tops, bottoms, and covers shall be coated with an approved petroleum asphaltic seal coat.
8. The manufacturer/vendor/shipper must use care in preparing valves boxes for shipment and in handling during shipment and delivery, to insure that the product(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged product(s) will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

3.10.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.



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2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the product(s) showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product(s) meet all the requirements of the AIS, an explanation, in the letter, of how the product(s) meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a certified statement that all product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the product(s) that states that the product(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole product(s) for a minimum one (1) year time period from time of delivery.
8. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed product(s) have been made, and the results of all tests conform to the requirements of the American Association of State Highway and Transportation Officials (AASHTO) M 105 Class 35B strength of materials requirements, American Society of Testing and Materials (ASTM) A48, Class 35B, and as the Commission may require the National Institute of Standards Technology (NIST) standards – Proof Load Testing.



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9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.10.3 Two Piece Valve Boxes

1. In addition to the General Section above the following shall be provided:
2. The total weight of the valve box assembly (top, cover and bottom sections) shall be 105 pounds minimum.
3. Valve boxes shall be of lengths adapted to five-feet of pipe cover or more and have a minimum of six-inches of overlap in the most extended position
4. The top section shall have:
 - (a) A top flange to increase the stability of the box to remain at the present height
 - (b) A smooth cast seat to accept the lid and insure a non-rocking installation.
 - (c) The top section shall be 24-inches to 27-inches long and weigh a minimum of 40-pounds.
5. The bottom section shall have:



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- (a) A belled base and have an inside diameter of 5'-1/4"
- (b) The belled base shall enclose the valve, the valve stuffing box / seal plate, and operating nut.
- (c) A bottom flange of sufficient bearing area to prevent settling.
- (d) The bottom section shall be 36-inches to 40-inches long and weigh a minimum of 45-pounds.

3.10.4 Three Piece Valve Boxes

1. In addition to the General Section above the following shall be provided:
2. The total weight of the valve box assembly (top, cover, bottom, and base sections) shall be 145 pounds minimum.
3. Valve boxes shall be of lengths adapted to five-feet of pipe cover or more and have a minimum of six-inches of overlap in the most extended position
4. The top section shall have:
 - (a) A top flange to increase the stability of the box to remain at the present height.
 - (b) A smooth cast seat to accept the lid and insure a non-rocking installation.
5. The bottom section shall have:
 - (a) A belled base and have an inside diameter of 5'-1/4".
 - (b) A bottom flange of sufficient bearing that will fit onto a number six base.
6. The number six base section shall have:
 - (a) At the top opening a minimum inside diameter of 5'-1/4".
 - (b) The belled base shall enclose the air valve assembly and allow the lever to operate freely.
 - (c) A bottom flange of sufficient bearing area to prevent settling.

3.10.5 Valve Box Cover

1. In addition to the General Section above the following shall be provided:
2. The valve box cover shall have:



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- (a) A 7-5/16-inch diameter with a 2-inch thick lid and a 1-1/2-inch deep skirt. The overall height shall be 3-1/2-inches.
- (b) The valve box cover shall weigh no less than 13 pounds
- (c) The valve box cover shall have the word “Water” cast in the top.
- (d) The valve box cover shall be designed to remain seated when subjected to mobile traffic conditions.
- (e) The valve box cover shall be close fitting and substantially dirt tight and flush with the top of the box rim.

3.10.6 Valve Box Riser(s)

- 1. In addition to the General Section above the following shall be provided:
- 2. The valve box riser(s) shall be either fixed or slide type.
- 3. Valve box riser(s) shall be provided the following lengths:
 - (a) 1-inches – fixed
 - (b) 1-1/2- inches – fixed
 - (c) 2- inches – fixed
 - (d) 3-inches – fixed
 - (e) 4-inches – fixed
 - (f) 6-inches – slide
 - (g) 10-inches to 12inches – slide
 - (h) 13-inches to 18-inches - slide
- 4. A top flange to increase the stability of the box to remain at the present height.
- 5. A smooth cast seat to accept a standard valve box cover and insure a non-rocking installation.
- 6. The lower portion of valve box extension shall be, at most, 5-3/4-inch in diameter in order to fit inside the top section of an existing gate box.



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3.10.7 Valve Boxes Manufacturers and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Bibby Ste-Croix

- (a) Valve box complete: V683 (5664S)
- (b) Top section only: V747
- (c) Bottom section only: 7354
- (d) Cover: V878
- (e) 1-inch fixed riser: V829
- (f) 1-1/2-inches fixed riser: V830
- (g) 2-inch fixed riser: V831
- (h) 3-inch fixed riser: V832
- (i) 4-inch fixed riser: V833
- (j) 6-inch slide riser: V856
- (k) 10-inch to 14-inch slide riser: V858
- (l) 15-inch to 24-inch slide riser: V862
- (m) #6 enlarged base: 7341,

2. Bingham and Taylor –

- (a) Valve box complete: 5664-S (Fig. 4908)
- (b) Top section only: 56-S
- (c) Bottom section only: 64-S
- (d) Cover: 4905-L1.5
- (e) 1-inch fixed riser: 6016-B and specify raise desired



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- (f) 1-1/2-inches fixed riser: 6016-B and specify raise desired
 - (g) 2-inch fixed riser; 6016-B and specify raise desired
 - (h) 3-inch fixed riser: 6016-B and specify raise desired
 - (i) 4-inch fixed riser: 6016-B and specify raise desired
 - (j) 6-inch slide riser: NA (use item k)
 - (k) 10-inch to 14-inch slide riser: 6020 and specify raise desired (10-1/2-inches)
 - (l) 15-inch to 24-inch slide riser: 6020 and specify raise desired (15-inches)
 - (m)#6 enlarged base: 4909-A,
3. East Jordan Iron Works –
- (a) Valve box complete: 85553960 (664-A)
 - (b) Top section only: _____
 - (c) Bottom section only: _____
 - (d) Cover: 6800 (2-inch skirt)
 - (e) 1-inch fixed riser: 8500010
 - (f) 1-1/2-inches fixed riser: 850002015
 - (g) 2-inch fixed riser; 8500020
 - (h) 3-inch fixed riser: 8500030
 - (i) 4-inch fixed riser: 8500040
 - (j) 6-inch slide riser: NA (use item l)
 - (k) 10-inch to 14-inch slide riser: NA (use item l)
 - (l) 15-inch to 24-inch slide riser: 855558009 (#69) (16-1/2-inches)
 - (m)(#6) enlarged base: 85605006, or
4. Equal provided the products are manufactured as per these specifications.



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Section 3.11 HYDRANTS – DRY BARREL

3.11.1 Public Hydrants

3.11.2 General

1. Hydrants provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Hydrants as a minimum shall conform to the most current American Water Works Association Standard C-502 and all addenda thereto.
3. Working pressure 250 PSI. Test pressure 500 PSI.
4. Hydrant shall open RIGHT (clockwise).
5. The direction to open shall be cast with an indicating arrow and “OPEN” into the operating nut and weather shield or into the bonnet and shall be clearly visible when viewed from the top.
6. Hydrants shall be for 5-feet-0-inch, 5-feet-6-inch, 6-feet-0-inch, and 6-feet-6-inch bury. The standard depth of bury is 6-feet-0-inch, unless otherwise specified by the Commission (See delivery requirements, below). Depth of bury shall be painted on the lower barrel section of the hydrant.
7. Hydrant shall be of the full compression design, opening against and closing with the water pressure.
8. All internal parts shall be designed for rapid and simple removal employing a compact lightweight wrench that will withdraw all working parts from the base of the hydrant as a unit.
 - The design and construction of the hydrant shall be such that a Commission maintenance and repair crew can fully disassemble the hydrant from the frangible coupling in no more than one (1) hour.
9. Hydrants shall be bid without accessories (glands, gland gaskets and bolts).
 - Accessories shall be as specified in Section 3.16 of these Material Specifications.
10. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,



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- (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
- (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
- (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
- (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.

11. Inspection:

- (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
- (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the hydrants.

12. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.

13. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.

14. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.11.3 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.



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2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the hydrant showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight for each bury depth, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a certified statement that all hydrants of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the hydrants that states that the hydrants shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole hydrant for a minimum ten (10) year time period from time of delivery. The manufacturer shall repaint, recoat hydrants, or replace hydrant or hydrant parts that exhibit coating failure, such as rusting, chipping, flaking, under normal condition and from handling during delivery for a minimum three (3) year time period from time of delivery. Coating failures caused by Installer will not be a cause of coating failure.
8. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed hydrant have been made, and the results of all tests conform to the requirements of the American Water Works Association



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Standard Specification C-502. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.

9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.11.4 Bonnet

1. The bonnet shall be one piece and made of high strength cast iron ASTM A-126 Class B or of high strength ductile iron ASTM A-536 grade 65-45-12.
2. The bonnet shall be free draining.
3. The bonnet shall be designed to make tampering difficult and provide a convenient means for lubricating.

3.11.5 Barrel Sections

1. The barrel sections shall be one piece and made of high strength cast iron ASTM A-126 Class B or of high strength ductile iron ASTM A-536 grade 65-45-12.
2. The lower barrel shall be provided with a bury line painted or embossed onto it.



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3. The upper and lower barrel joint shall be no less than 2-inches above the bury line.
4. The upper barrel nozzles shall be “three (3) way” and as follows:
 - (a) The upper barrel shall be equipped with (2) two each 2-1/2-inch hose nozzles, 180 degrees apart.
 - (b) The upper barrel be equipped with one (1) each 4-1/2-inch pumper nozzle on the same plane and in between the 2-1/2-inch hose nozzles.
 - (c) The location of the center line of the upper barrel nozzles shall be at least 16-inches above the bury line so that a 15-inch wrench can freely turn 360-degrees without hitting the ground.
5. Changes in shape or size of the barrel sections shall be curved. The junction of the hose and pumper outlets shall be rounded.
6. The upper and lower barrel joint shall be connected with a traffic safety flange.
 - (a) The traffic safety flange shall be designed so that in the event of accident, damage, or breaking of the hydrant above or near the ground line the main valve will remain closed.
 - (b) The traffic safety flange shall be of the split flange, split coupling type, or lock ring designed to permit 360-degree rotary movement of the upper barrel without shutting down service or removing the flange bolt
 - (c) The traffic safety flange may be high strength cast iron ASTM A-126 Class B or of high strength ductile iron ASTM A-536 grade 65-45-12 or other approved material designed so that in the event of accident, damage, or breaking of the hydrant above or near the ground line the main valve will remain closed.
 - (d) Break-away bolts, break-away barrel, lugs or individual metal keeper devices are not acceptable.
7. Hydrants shall be provided with permanent markings cast or stamped, mechanical or adhesive attachment shall not be acceptable, that are easily discernable (at least 1/2-inch to 1-inch tall) after the hydrant is installed (characters in parentheses are examples of permanent markings) that include the following:
 - (a) Identity of manufacturer by name, initials, insignia, or abbreviations commonly in use,
 - (b) Size of main valve opening (5-1/4”),
 - (c) Material the barrels are made of (DI or CI),



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- (d) Year of manufacture (2010),
- (e) Pressure rating (250 PSI), and
- (f) Underwriters Laboratory Listed (UL).

3.11.6 Outlet Nozzles

1. Hydrant outlet nozzles shall be bronze and fastened into the nozzle section of the upper barrel by a mechanical means.
 - (a) Screwed in outlet nozzles shall be provided with a lock pin/screw to prevent the outlet nozzle from backing out, or;
 - (b) Recessed lug & groove outlet nozzles shall be provided with a threaded retainer or lock pin/screw to prevent outlet nozzle from backing out.
 - (c) Hydrant outlet nozzles shall not have any movement when locked into place.
 - (d) Caulking the outlet nozzle into the upper barrel shall not be allowed.
2. Hydrant outlet nozzles shall have National Fire Protection Association (NFPA) Number 194 National (American) Standard Fire Hose Coupling Screw Threads.

3.11.7 Outlet Nozzle Caps

1. Outlet nozzle caps shall be made of high strength Cast Iron ASTM 126A Class B
2. Outlet nozzle caps shall have National Fire Protection Association (NFPA) Number 194 National (American) Standard Fire Hose Coupling Screw Threads.
3. Nozzle caps shall be provided with 1-1/8" (point to flat) pentagon and shall be not less than 1" high.
4. All nozzle caps shall be provided with a metal slip ring attached to the nozzle cap and metal chains connected to the slip ring and hydrant barrel. The chain (slip) ring and chains shall allow the nozzle caps to rotate freely.
 - (a) The chain (slip) ring shall not be less than 1/4-inch diameter steel.
 - (b) The chain shall be non-kink double/twisted loop steel and shall not be less than 3/16-inch diameter. Each link shall be approximately 1-1/2-inches long. Each chain shall have at least eleven (11) links.
 - (c) The slip ring and chain shall be rust proof coated or plated or stainless steel.



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3.11.8 Operating Mechanism

1. Operating nut shall be made of high strength ductile iron ASTM A-536 grade 65-45-12 or bronze
 - (a) 1-1/8" (point to flat) pentagon and shall be not less than 1" high.
 - (b) Operating nut may function as both an operating nut and weather-shield.
 - (c) The operating mechanism may be sealed with a rubber weather-shield or O-ring seal.
2. The design and construction of the hydrant operating mechanism of the hydrant shall be such that one (1) person shall be able to open and close the hydrant under a maximum operating pressure of 250-PSI with a 15-inch wrench.
3. The design and construction of the hydrant operating mechanism located at the top of the hydrant shall be such that no part of the operating threads will be in contact with water in the upper barrel (standpipe) when the hydrant is in service.
 - (a) The working threaded parts of the operating mechanism shall not have any steel or iron parts against steel or iron parts. The threaded portion of the operating stem or the stem nut (or sleeve) shall be made of bronze or stainless steel.
 - (b) Details and materials for the dry-top construction shall be subject to the approval of the Commission.
4. Hydrant operating mechanism assembly shall be housed in a compact housing with an integral lubrication chamber.
 - (a) Two (2) O-rings shall be provided to seal the lubrication chamber from water in the hydrant barrel from entering the lubricating chamber under pressure.
 - (b) An additional O-ring shall be used in the hold down nut to prevent dirt, condensation or atmospheric contamination entering the lubrication chamber from outside.
 - (c) The moving surface against which these two "O"-rings bear upon to create the seal must be of bronze or stainless steel.
5. A travel stop nut or similar device may, but is not required, be used to limit main valve travel and to prevent putting main stem into over compression.
6. The upper operating assembly shall be compatible with the "Custodian" vandal proof device as manufactured by Hydra-Shield Manufacturing, Inc. The



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"Custodian" device must be able to be installed without further machining or modification to the hydrant.

7. The upper and lower operating rods may be made of cold roll steel (CRS), hot rolled steel (HRS), stainless steel (SS), or other material approved by the Commission. The lower operating rod shall not protrude past the lower barrel
8. The operating rods shall be connected with frangible coupling designed so that in the event of accident, damage, or breaking of the hydrant above or near the ground line the main valve will remain closed.
 - (a) The frangible coupling shall be held in place to the operating rods with at least one (1) stainless steel pin or bolt in each rod.
 - (b) Details and materials for the frangible connections shall be subject to the approval of the Commission.

3.11.9 Main Valve Assembly

1. Hydrant valve opening 5-1/4" minimum as sized by seat ring internal opening.
2. The hydrant main valve may be either three (3) piece design or one (1) piece design, as follows:
3. Three (3) piece design includes a top plate, main valve, and bottom plate:
 - (a) The valve top plate may be high strength ductile iron ASTM A-536 grade 65-45-12, high strength Cast Iron ASTM 126A Class B, bronze, or other material approved by the Commission.
 - (b) The valve bottom plate may be high strength ductile iron ASTM A-536 grade 65-45-12, high strength Cast Iron ASTM 126A Class B, bronze, or other material approved by the Commission.
 - (c) The valve bottom plate shall be fully epoxy coated by a fusion or thermal bonding in accordance with AWWA C-550. Bronze or stainless steel valve bottom plates do not require epoxy coating.
 - (d) The main valve may be high strength ductile iron ASTM A-536 grade 65-45-12, high strength Cast Iron ASTM 126A Class B, bronze, or other material approved by the Commission fully encapsulated in a rubber compound for water service, molded, not split and glued, constructed of styrene butadiene rubber (SBR) or Nitrile (Buna-N) compounds, and must meet or exceed ASTM D-2000 3 BA 715 and ANSI A21.11/AWWA C-111, latest revision. No bare metal shall be left exposed.



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4. One (1) piece design is a single piece:
 - (a) The main valve may be high strength ductile iron ASTM A-536 grade 65-45-12, high strength Cast Iron ASTM 126A Class B, steel, or other material approved by the Commission.
 - (b) The main valve shall be fully encapsulated in a rubber compound for water service, molded, not split and glued, constructed of ethylene propylene diene Monomer (EPDM) rubber in accordance with [ASTM](#) standard D-1418, styrene butadiene rubber (SBR) or Nitrile (Buna-N) compounds in accordance with ASTM D-2000 3 BA 715 and ANSI A21.11/AWWA C-111, latest revision. No bare metal shall be left exposed.
5. The main valve assembly shall have a bronze sub-seat and a bronze seat ring.
6. The mechanically installed sub-seat of the hydrant shall be constructed of bronze, and be an integral part of the bottom shoe/elbow.
 - The sub-seat shall be mechanically installed with threads, lock rings, or other Commission approved method.
7. The seat ring shall also be of bronze and shall be a working component of the main valve assembly.
8. Seal between seating and sub-seat shall consist of “o” rings located in machined grooves, above and below the drainage channel.
9. There shall be a minimum of two (2) drain ports one hundred and eighty-degrees apart. The drain ports shall be provided in the bottom barrel, bottom shoe/elbow, or between the bottom barrel and bottom shoe/elbow.
10. All "O" rings shall seal against bronze.

3.11.10 Bottom Shoe/Elbow

1. The bottom shoe/elbow shall be made of high strength ductile iron ASTM A-536 grade 65-45-12.
2. The bottom shoe/elbow shall be provided with flat cast bottom to set the hydrant on.
3. The bottom shoe/elbow shall be provided with 6-inch mechanical joint connection in accordance with ANSI/AWWA C111/A21.11.



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3.11.11 Coatings

1. Coatings require proper surface preparation in order for the coating systems to adhere to the component being coated. At a minimum the components shall be mechanically blast cleaned and/or immersed in a chemical cleaner or heat cleaned in a furnace in order to insure a properly prepared surface that is clean and clear of any grease, oil, dirt, etc., in accordance with AWWA C502 and C-550, latest versions.
2. The bonnet shall be fully epoxy coated by a fusion or thermal bonding, a polyester powder coat, or an epoxy wet or electrodesposition coat primer with a polyurethane top coat paint system in accordance with AWWA C502 and C-550, latest versions, and shall be applied to the interior (excluding lubricating chamber) and exterior of the bonnet.
 - (a) The color shall be a gloss aluminum/silver in accordance with Federal Standard 595 Paint Specification FS 17178.
 - (b) All threads and/or functional openings and surfaces shall be protected prior to coating and the barrel delivered without coating on the threads and/or functional openings and surfaces.
3. The upper barrel shall be fully epoxy coated by a fusion or thermal bonding, a polyester powder coat, or an epoxy wet or an electrodesposition coat primer with a polyurethane top coat paint system in accordance with AWWA C502 and C-550, latest versions, and shall be applied to the interior and exterior of the upper barrel.
 - (a) The color shall be gloss blue angels yellow in accordance with Federal Standard 595 Paint Specification FS 13655 or RGB Hex Code FDD31D.
 - (b) All threads and/or functional openings and surfaces shall be protected prior to coating and the barrel delivered without coating on the threads and/or functional openings and surfaces.
4. The lower barrel may be covered with two (2) coats of asphaltic tar coatings, the first being allowed to dry before the second is applied or may be fully epoxy coated by a fusion or thermal bonding or coated in accordance with AWWA C-502 and C-550, latest version, and shall be applied to the interior and exterior of the lower barrel.
5. The nozzle caps shall be fully epoxy coated by a fusion or thermal bonding, a polyester powder coat, or a epoxy wet or electrodesposition coat primer with a polyurethane top coat paint system in accordance with AWWA C502 and C-550, latest versions, and shall be applied to the interior and exterior of the nozzle caps.



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- (a) The color shall be a gloss aluminum/silver in accordance with Federal Standard 595 Paint Specification FS 17178.
 - (b) All threads and/or functional openings and surfaces shall be protected prior to coating and the barrel delivered without coating on the threads and/or functional openings and surfaces.
6. The bottom shoe/elbow shall be fully epoxy coated by a fusion or thermal bonding in accordance with AWWA C-502 and C-550 and shall be applied to the interior and exterior of the bottom shoe/elbow.

3.11.12 Manuals, Spare Parts, Tools, Touch-up Paint, Training, Repairs

- 1. The requirements of this section are for Commission Price Agreements and are not for Commission Approved Contractors or Commission Capital Projects, unless specifically asked for in the project.
- 2. The manufacturer shall provide four (4) 24-inches by 36-inches (vertical) cut sheets showing all the hydrant components, component material, and component part numbers with the first delivery. The vertical cut sheets shall be laminated.
- 3. The manufacturer shall provide six (6) complete sets catalogue or manual for parts, repair and maintenance with the first delivery.
- 4. The manufacturer shall provide at no additional cost four (4) complete sets of assembly/disassembly tools with the first delivery of hydrants.
- 5. The manufacturer shall provide two (2) quarts of touch-paint or coating that is compatible with the factory applied coating with the first delivery.
- 6. The manufacturer shall provide training to Commission construction and maintenance staff every two (2) years. Training shall be by a factory trained representative at the Commission's Customer Service Office at 71 Colton Street, Springfield Massachusetts during normal business hours. The first training shall be provided within 30-days of the first delivery unless otherwise scheduled by the Commission.
- 7. The manufacturer and/or vendor shall provide the Commission with contact information for a factory trained representative who shall be responsible to respond to complaints from the Commission about defects in material, coatings, and workmanship under normal use of the product within ten (10) working days.



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3.11.13 Miscellaneous

1. All fasteners, excluding joint accessories, installed below the ground line shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
2. All fasteners installed above the ground line shall be made of medium carbon steel and supplied with a rust proof coating. Bolts shall be of medium carbon steel, per ASTM A193, grade B7. Nuts shall be heavy hex nuts made of medium carbon steel, ASTM A194, grade 2H. All bolts and nuts shall be Unified National Coarse (UNC) rolled thread. Bolts installed into castings shall be provided with one (1) medium carbon steel flat washer and nuts and bolts shall be provided with two (2) medium carbon steel flat washers so that the epoxy coating is not damaged. All the medium carbon steel bolts, nuts, and washers installed above the ground line shall be rust proof coated or plated. Nuts and/or bolts shall be provided with two (2) Grade B steel flat washers so that the epoxy coating is not damaged.
3. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
4. The exterior design of the bonnet and upper barrel shall be of the “traditional design” and must meet and be subject to the approval of the Commission’s aesthetic judgment.



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3.11.14 Hydrant Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. American Flow Control – B-84-B-5,
2. AVK – 2780,
3. Clow – Medallion – F2545,
4. Kennedy - Guardian – K81,
5. M & H – 6129,
6. Mueller – Super Centurion,
7. U.S. Pipe - Metropolitan 250 – Model M-94,
8. East Jordan Iron Works – Watermaster 5CD250, or
9. Equal provided the Hydrants are manufactured as per these specifications.



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3.11.15 Private Hydrants installed after a Back Flow Prevention Device

1. In addition to the Material Specifications for Public Hydrants Section 3.11.1 Private Hydrants installed after a back flow prevention device shall meet the following requirements:
2. Private Hydrants installed after a Back Flow Prevention Device shall be “two (2) way” and as follows:
 - (a) The upper barrel shall be equipped with (2) two each 2-1/2-inch hose nozzles, no greater than 180 degrees apart.
 - (b) The location of the center line of the upper barrel nozzles shall be at least 16-inches above the bury line so that a 15-inch wrench can freely turn 360-degrees without hitting the ground.
3. The upper barrel shall be fully epoxy coated by a fusion or thermal bonding, a polyester powder coat, or an epoxy wet or electro-disposition coat primer with a polyurethane top coat paint system in accordance with AWWA C502 and C-550, latest versions, and shall be applied to the interior and exterior of the upper barrel.
 - (a) The color shall be gloss red in accordance with Federal Standard 595 Paint Specification FS 11105 or RGB Hex Code B51F11.
 - (b) All threads and/or functional openings and surfaces shall be protected prior to coating and the barrel delivered without coating on the threads and/or functional openings and surfaces.
4. The rest of the components shall be coated as required in Section 3.11.11 of these Material Specifications.



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3.11.16 Private Hydrants installed before a Back Flow Prevention Device

1. In addition to the Material Specifications for Public Hydrants Section 3.11.1 Private Hydrants installed before a back flow prevention device shall meet the following requirements:
2. The upper barrel shall be fully epoxy coated by a fusion or thermal bonding, a polyester powder coat, or an epoxy wet or electro-disposition coat primer with a polyurethane top coat paint system in accordance with AWWA C502 and C-550, latest versions, and shall be applied to the interior and exterior of the upper barrel.
 - (a) The color shall be gloss red in accordance with Federal Standard 595 Paint Specification FS 11105 or RGB Hex Code B51F11.
 - (b) All threads and/or functional openings and surfaces shall be protected prior to coating and the barrel delivered without coating on the threads and/or functional openings and surfaces.
3. The rest of the components shall be coated as required in Section 3.11.11 of these Material Specifications.



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3.11.17 Vandal Proof Device for Operating Fire Hydrants

1. Vandal Proof Device for Operating Fire Hydrants provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Device Description
 - (a) A vandal proof device (Trade Name “Custodian”) to prevent unauthorized use of fire hydrants. The device shall readily attach to the existing fire hydrant housing or opening mechanism. Materials shall be strong enough to withstand acts of vandalism and weather extremes and still provide smooth fire hydrant operation. The device shall be unique in that only a special magnetic wrench can open or close the fire hydrant.
 - (b) The vandal proof device shall be made to be installed on any hydrant in the Springfield Water and Sewer Commission’s Service Area..
 - (c) The vandal proof device shall be made to order, for specific makes and models of hydrants.

3. Device Construction

An inner barrel constructed of high tensile manganese bronze shall be designed to fit over the existing fire hydrant operating nuts. An outer housing constructed of stainless steel shall be installed over the inner barrel so as to swivel freely until a special key wrench is used. Attachment of the outer housing shall be a special snap ring groove designed to withstand repeated blows by a sledge hammer without shearing.

4. Device Mating Collar

A mating collar shall be installed between the outer housing fire hydrant top for a weather seal and to prevent removal of the swivel housing by pry bars or other tools available to vandals. The mating collar shall extend up the sides of the swivel housing and to a height sufficient to provide added protection of the hydrant operating nut and to withstand repeated blows by sledge without failing.

5. Device Operating Wrench

A special magnetic operating wrench shall be constructed of an aluminum-magnesium alloy with handles extending from both sides for easy operation. The wrench shall incorporate a unique permanent magnet which will engage an activator located inside the outer housing. The magnet’s inductive magnet can engage the activator. Performance must not be affected by local environment



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temperature ranges or weather conditions. The special key wrench shall be the only means of opening or closing the hydrant. As an added convenience, the opposite side of the wrench shall contain a conventional 1-1/8" pentagon recess that will work on standard hydrant nuts.

6. The manufacturer/vendor/shipper must use care in preparing the vandal proof device for shipment and in handling during shipment and delivery, to insure that the vandal proof devices are delivered without damage. Damaged vandal proof devices will not be accepted.
7. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the vandal proof device and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
8. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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3.11.18 Diffusers for Fire Hydrants

1. Fire Hydrant Diffusers shall be provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Fire Hydrant Diffusers shall be for use with chemically treated (4 ppm or less chlorine/chloramine) potable water.
3. Fire Hydrant Diffusers shall be provided with 2-1/2-inch NPT Coupling that accepts any 2-1/2" NPT Male Iron Pipe Adapter.
4. Fire Hydrant Diffusers shall be 18-inches in length x 8-inches x 8-inches at the discharge
5. Fire Hydrant Diffusers shall weight 33-pounds.
6. Fire Hydrant Diffusers shall be used with 81% Sodium Sulfite tablets
7. Fire Hydrant Diffusers shall have an eleven (11) Tablet Capacity and use approximately one (1) Tablet per 2,500-gallons.
8. Fire Hydrant Diffusers shall be as currently manufactured by Pollardwater – Model LPD-250, or equal provided the Fire Hydrant Diffusers are manufactured as per these specifications.
9. The manufacturer/vendor/shipper must use care in preparing the above product for shipment and in handling during shipment and delivery, to insure that the products are delivered without damage. Damaged vandal proof devices will not be accepted.
10. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above product and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
11. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered



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- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product.



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3.11.19 Private Yard Hydrant

1. Private Yard Hydrants provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Formed shall mean metals rolled or pressed or machined to create a finished product,
 - (d) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (e) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (f) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished products.
4. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.
5. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the



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finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.

6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
8. The manufacturer and/or vendor shall furnish three (3) sets of 8-1/2-inch by 11-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the fittings showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Rated working pressure and hydrostatic test pressure of each finished product(s), and
 - (e) Country of origin for each component.
9. The manufacturer at the Commission's request shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
10. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
11. The manufacturer shall furnish a warranty for the finished Fittings that states that the Fittings shall be free from all defects in material and workmanship and from handling during delivery under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole coupling for a minimum one (1) year time period from time of delivery. Coating failures caused by Installer will not be a cause of coating failure



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12. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed Fittings have been made, and the results of all tests conform to the requirements of the appropriate ANSI/AWWA standard.
13. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
14. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.
15. Private Yard Hydrants shall be non-freezing type and provided so as to be self-draining and a depth of bury of 5-feet 6-inches minimum.
16. Private Yard Hydrants will be furnished with a 2" female iron pipe (FIP) inlet and a 2-1/2" national standard thread (NST) outlet.
17. Private Yard Hydrants shall have a non-turning operating rod and shall open to the left.
18. Private Yard Hydrants shall be painted red.
19. All working parts of Private Yard Hydrants shall be bronze to bronze design and be serviceable from above grade with no digging.
20. The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for



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interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

(a) Kupferle – #80WD, or

(b) Equal provided the products are manufactured as per these specifications.



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Section 3.12 FITTINGS

3.12.1 General

1. Fittings provided to the Springfield Water and Sewer Commission (Commission) or its Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Fittings shall be cast from of high strength ductile iron conforming to ASTM A-536 grade 70-50-05. The minimum tensile strength shall be 70,000-PSI, the minimum yield strength shall be 50,000-PSI, and the minimum elongation shall be 5%.
3. Fittings shall be NSF 61 certified.
4. Working Pressure:
 - (a) 4-inch though 24-inch shall be rated at 350-PSI. Test pressure shall be three (3) times the rated working pressure (1050-PSI).
 - (b) 30-inch though 48-inch shall be rated at 250-PSI. Test pressure shall be three (3) times the rated working pressure (750-PSI).
 - (c) 54-inch though 64-inch shall be rated at 150-PSI. Test pressure shall be three (3) times the rated working pressure (450-PSI).
5. Joints of Fittings:
 - (a) Fittings shall be restrained mechanical joint conforming to ANSI A21.11/AWWA C-111 and as specified in Section 3.16 of these Material Specifications, unless otherwise specified by the Springfield Water and Sewer Commission (Commission).
 - (b) Ductile Iron fittings with restrained mechanical joint, flange, plain end, or combination thereof may be allowed in accordance with appropriate ANSI/AWWA standard and as specified by Commission.
 - (c) The bolt holes shall be equal spaced and straddle the pipe center line.
 - (d) Push-on (Tyton), type joints are not acceptable.
6. Ductile Iron Fittings shall be interior lined and exterior coated as follows:
 - (a) All Fittings shall be lined with an double cement mortar lining and sealed (over the mortar lining) and with an approved asphaltic material seal coat in accordance with ANSI A21.4/AWWA C-104 of the latest revision.



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- (b) Provisions of ANSI A21.4/AWWA C-104, Section 4.11 relating to characteristics of asphaltic seal coat as to deleterious effect upon the quality, color, taste or odor imparted to potable water shall be strictly observed.
 - (c) The exterior coating all Fittings shall have a base layer of arc-applied, 99.99% pure zinc coating, having a mass of 200g/m² and shall comply with all applicable parts of ISO 8179 for zinc coatings.
 - (d) All Fittings shall have a finish layer of shop-applied bituminous paint in accordance with AWWA C-151 latest the revision and shall comply with all applicable parts of ISO 8179 for zinc coatings
7. Markings
- (a) Fittings shall be marked with the weight.
 - (b) Fittings shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of the openings, and the number of degree or fraction of the circle on all bends.
8. All tests shall be made in accordance with the methods prescribed by the appropriate ANSI/AWWA standards.
9. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall meet ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
10. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
11. Fittings shall be bid without accessories (glands, gland gaskets and bolts).



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12. Accessories shall be as specified in Section 3.16 of these Material Specifications.
13. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (c) North America shall mean the United States, Canada, and Mexico,
 - (d) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (e) Formed shall mean metals rolled or pressed or machined to create a finished product,
 - (f) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (g) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (h) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
14. Inspection:
 - (i) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (j) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished products.
15. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.
16. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.



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17. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.12.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 8-1/2-inch by 11-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the fittings showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Rated working pressure and hydrostatic test pressure of each finished product(s), and
 - (e) Country of origin for each component.
3. The manufacturer at the Commission's request shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish a warranty for the finished Fittings that states that the Fittings shall be free from all defects in material and workmanship and from handling during delivery under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole coupling for a minimum one (1) year time period from time of delivery. Coating failures caused by Installer will not be a cause of coating failure
6. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed Fittings have been made, and the results of all tests conform to the requirements of the appropriate ANSI/AWWA standard.



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7. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (f) Name of Municipality/Utility
 - (g) Total amount of product bid on and amount delivered
 - (h) Date the bid was accepted and date the product was delivered
 - (i) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
8. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (j) Approved means the contractor can supply the material as shown on the drawing(s).
 - (k) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (l) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.12.3 Ductile Iron Fittings - Compact (or Short) Body

1. Ductile Iron Fittings – Compact (or Short) Body provided to the Commission or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Ductile Iron Fittings – Compact (or Short) Body, as a minimum, meet all specifications as in Paragraphs 3.12.1, 3.12.2, and the following:
3. Ductile Iron Fittings Compact (or Short) Body shall at a minimum conform to ANSI 21.53/AWWA C-153 (most current revision).



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3.12.4 Ductile Iron Fittings – Standard (or Long) Body

1. Ductile Iron Fittings – Standard (or Long) Body provided to the Springfield Water and Sewer Commission (Commission) or its Contractors shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Ductile Iron Fittings – Standard (or Long) Body, as a minimum, meet all specifications as in in Paragraphs 3.12.1, 3.12.2, and the following:
3. Ductile Iron Fittings - Standard (or Long) Body shall at a minimum conform to ANSI 21.10/AWWA C-110 (most current revision).



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3.12.5 Hydrant Anchoring Tees

1. Hydrant Anchoring Tees provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Hydrant Anchoring Tees, as a minimum, meet all specifications as in in Paragraphs 3.12.1, 3.12.2, and the following:
3. Hydrant Anchoring Tees shall conform to ANSI A21/AWWA C-110 (most current revision).
4. Hydrant Anchoring Tees shall be restrained mechanical joint conforming to ANSI A21.11/AWWA C-111 and as specified in Section 3.16 of these Material Specifications, unless otherwise specified and the branch shall have a plain end with an integral gland and rotating mechanical joint gland and mechanical joint restraints to provide a restrained connection.



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3.12.6 Solid Sleeve

1. Solid Sleeves provided to the Springfield Water and Sewer Commission (Commission) or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Solid Sleeves, as a minimum, meet all specifications as in in Paragraphs 3.12.1, 3.12.2, and the following:
3. Solid Sleeves shall conform to ANSI A21/AWWA C-110 (most current revision).
4. Solid Sleeves shall be restrained mechanical joint conforming to ANSI A21.11/AWWA C-111 and as specified in Section 3.16 of these Material Specifications, unless otherwise specified.
5. Solid sleeves, at a minimum, shall be provided with a ¾” NPT test port with a lead free brass lug with standard square head. Proper use of this feature assures positive seal before putting the water main back in service.

3.12.7 Split Repair sleeve

1. Split Repair Sleeves provided to the Springfield Water and Sewer Commission (Commission) or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Split Repair Sleeves, as a minimum, meet all specifications as in in Paragraphs 3.12.1, 3.12.2, and the following:
3. Split Repair Sleeves shall conform to ANSI A21/AWWA C-110 (most current revision).
4. Split Repair sleeves for ductile iron shall be restrained mechanical joint conforming to ANSI A21.11/AWWA C-111 and as specified in Section 3.16 of these Material Specifications, unless otherwise specified.
5. Split Repair sleeves for cast iron shall be mechanical joint conforming to ANSI A21.11/AWWA C-111 and as specified in Section 3.16 of these Material Specifications, unless otherwise specified. When specified for cast iron pipe restraining glands are not required.
6. Split Repair sleeves, at a minimum, shall be provided with a ¾” NPT test port with a lead free brass lug with standard square head. Proper use of this feature assures positive seal before putting the water main back in service.
7. Split Repair sleeves shall be provided with split gland and body components.



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8. Split Repair sleeve side rubber gaskets shall be rectangular to cross-section and shall fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve. Gaskets shall be made of Nitrile (Buna-N).
9. Split Repair sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.

3.12.8 Fitting Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Ductile Iron Fittings – Compact and Standard Body
 - (a) American Cast Iron Pipe Co. – all fittings,
 - (b) Atlantic States Pipe (McWayne, Inc.) – all fittings,
 - (c) Griffon Pipe Products, Inc. – all fittings,
 - (d) Tyler Union – all fittings,
 - (e) U. S. Pipe and Foundry Co. – all fittings, or the equal product of another manufacturer.
2. Ductile Iron Fittings – Hydrant Anchoring Tees
 - (a) American Cast Iron Pipe Co.,
 - (b) Atlantic States Pipe (McWayne, Inc.),
 - (c) Griffon Pipe Products, Inc.,
 - (d) Tyler Union,
 - (e) U. S. Pipe and Foundry Co., or the equal product of another manufacturer.
3. Ductile Iron Fittings – Solid Sleeves
 - (a) American Cast Iron Pipe Co.,
 - (b) Atlantic States Pipe (McWayne, Inc.),
 - (c) Griffon Pipe Products, Inc.,



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- (d) Tyler Union,
 - (e) U. S. Pipe and Foundry Co., or the equal product of another manufacturer.
4. Ductile Iron Fittings – Split Repair Sleeves
- (a) American Cast Iron Pipe Co. – model 2800,
 - (b) Atlantic States Pipe (McWayne, Inc.),
 - (c) Griffon Pipe Products, Inc.,
 - (d) Mueller Co. – models H-785 and H-786
 - (e) Tyler Union - ,
 - (f) U. S. Pipe and Foundry Co., or the equal product of another manufacturer.



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Section 3.13 COUPLINGS

3.13.1 General

1. Couplings provided to the Springfield Water and Sewer Commission or its Contractors shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Couplings as a minimum shall conform to the most current American Water Works Association Standard C-219 and all addenda thereto.
3. Working pressure shall be rated at 200-PSI. Test pressure shall be 1.5 times the rated working pressure (375-PSI).
4. Couplings shall be provided with gaskets constructed of Styrene butadiene rubber (SBR) or Nitrile (Buna-N) compounds for water service, molded, not split and glued, and must meet or exceed ASTM D-2000 3 BA 715 and ANSI A21.11/AWWA C-111, latest revision.
5. The exterior coating all couplings shall be fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 of the latest revision and shall be applied to the interior and exterior of the fitting.
6. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
7. At the Commission's discretion, track-head or tee-head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel may be substituted. A request for the substitution must be submitted in writing to E&TS. Track head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel shall be in accordance AWWA C-111, ASTM A242, and/or ASTM A588 latest revisions. Nuts shall be in accordance with ASTM A194 grade 2H or ASTM A563 grade A latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) medium carbon steel flat washer and nuts and bolts shall be provided with two (2) medium carbon steel flat washers so that the epoxy coating is not damaged. All the non-stainless steel bolts, nuts, and washers shall be rust proof coated or plated.



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8. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
9. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Formed shall mean metals rolled or pressed or machined to create a finished product,
 - (d) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (e) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (f) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
10. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished products.
11. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity



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comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.

12. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.
13. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.13.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 8-1/2-inch by 11-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the hydrant showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Country of origin for each component.
3. The manufacturer at the Commission's request shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish a warranty for the finished couplings that states that the couplings shall be free from all defects in material and workmanship and from handling during delivery under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole coupling for a minimum one (1) year time period



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from time of delivery. Coating failures caused by Installer will not be a cause of coating failure

6. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed couplings have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-219.
7. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
8. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.13.3 Standard Range Couplings 4” – 24”

1. Standard Range Couplings 4” – 24” shall, as a minimum, meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Standard Range Couplings 4” – 24” shall have both center and end rings made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision.
3. Standard Range Couplings 4” – 24” shall have the center rings, end rings, and gaskets clearly labeled to show the diameter range it will cover.



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3.13.4 Wide Range Couplings 4” – 24”

1. Wide Range Couplings 4” – 24” shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Wide Range Couplings 4” – 24” shall have both center and end rings made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision.
3. Wide Range Couplings 4” – 24” shall have the center rings, end rings, and gaskets clearly labeled to show the diameter range it will cover.

3.13.5 Wide Range Two Bolt Couplings up to 12-inch

1. Wide Range Two Bolt Couplings shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Wide Range Two Bolt Couplings shall have center ring, end rings, and bolt guides made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision. Center ring shall include a handle to ease installation.
3. Wide Range Two Bolt Couplings shall be provided with preassembled wide range gaskets and one additional gasket to cover extra wide range. The gasket shall be clearly labeled to show the diameter range it will cover. A heavy gauge 304 stainless steel armor shall be installed on each gasket.

3.13.6 Wide Range Two Bolt Couplings 16-inch to 24-inch

1. Wide Range Two Bolt Couplings shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Wide Range Two Bolt Couplings shall have end rings made of high strength ductile iron ASTM A-536 grade 60-40-18 for 16-inch or medium carbon steel ASTM A-795 for 18-inch to 24-inch, latest revisions.
3. Wide Range Two Bolt Couplings shall have center ring, made of high strength medium carbon steel ASTM A53 grade A, latest revisions.
4. Wide Range Two Bolt Couplings shall be provided with preassembled wide range gaskets. The gasket shall be clearly labeled to show the diameter range it will cover. A heavy gauge 304 stainless steel armor shall be installed on each gasket.

3.13.7 Large Diameter Wide Range Couplings 16-inch to 24-inch

1. Large Diameter Wide Range Couplings 16” and larger shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:



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2. Large Diameter Wide Range Couplings 16" and larger coupling shall have both center and end rings made of shall have both center and end rings made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision.
3. Large Diameter Wide Range Couplings 16" and larger coupling shall be clearly labeled to show the diameter range it will cover.

3.13.8 Couplings 30" – 48"

1. Couplings 30" – 48" shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Couplings 30" – 48" shall have the center rings that are either beveled or flared and made of formed carbon steel per ASTM A-36 with minimum yield of 30,000 PSI.
3. Couplings 30" – 48" shall have end rings that are contoured rolled mill section carbon steel per AISI 1018-1020. End ring thickness shall be determined by pipe O.D. and pressure rating.
4. Vendor shall provide complete diameter range information on the couplings being bid.

3.13.9 Coupling with End Caps and Threaded Outlets up to 16-inch

1. Couplings with end caps and threaded outlets shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Couplings and end caps shall have the center ring, both end rings, and the end cap made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision.
3. End caps to be furnished with a 2" threaded NPT female outlet with plug.
4. Vendor shall provide complete diameter range information on the couplings being bid.

3.13.10 Coupling with End Caps and Threaded Outlets greater than 16-inch

1. Couplings with end caps and threaded outlets shall, as a minimum, shall meet all specifications as in Paragraphs 3.13.1, 3.13.2, and the following:
2. Couplings and end caps shall have the center rings that are either beveled or flared and made of formed carbon steel per ASTM A-36 with minimum yield of 30,000 PSI.



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3. Couplings with end caps shall have end rings that are contoured rolled mill section carbon steel AISI 1018-1020. End ring thickness shall be determined by pipe O.D. and pressure rating.
4. End caps to be furnished with a 2" threaded NPT female outlet with plug.
5. Vendor shall provide complete diameter range information on the couplings being bid.

3.13.11 Coupling Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Standard Range Couplings 4" – 24" shall be
 - (a) Dresser – Style 253 (up to 16-inch only),
 - (b) Ford – Style FC1,
 - (c) Romac - Style 501 couplings,
 - (d) Smith-Blair – OMNI 441A (up to 16-inch only), or
 - (e) Equal provided the products are manufactured as per these specifications.
2. Wide Range Couplings 4" – 24" shall be
 - (a) Dresser – Style 253,
 - (b) Mueller – Maxi-Range,
 - (c) Romac - Style XR501 couplings, or
 - (d) Equal provided the products are manufactured as per these specifications.
3. Wide Range Two Bolt Couplings up to 12-inch shall be
 - (a) Romac – Macro HP, or
 - (b) or the equal product of another manufacturer.
4. Wide Range Two Bolt Couplings 16-inch to 24-inch shall be
 - (a) Krause – Hymax, or



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- (b) the equal product of another manufacturer.
- 5. Couplings 30” – 48” shall be
 - (a) Dresser – Style 38 or 138,
 - (b) Ford – Style FC4,
 - (c) Romac style 400,
 - (d) Smith Blair 411A or 413A, or
 - (e) the equal product of another manufacturer.
- 6. Coupling with End Caps and Threaded Outlets up to 16-inch
 - (a) Romac Style EC501, or
 - (b) the equal product of another manufacturer.
- 7. Coupling with End Caps and Threaded Outlets greater than 16-inch
 - (a) Dresser – Style 38 or 138
 - (b) Ford Style FC4,
 - (c) Romac Style FC400
 - (d) Smith Blair Style 481A, or
 - (e) the equal product of another manufacturer.



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Section 3.14 CLAMPS

3.14.1 General

1. All Clamps in this section provided to the Springfield Water and Sewer Commission (Commission) or installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).
4. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
5. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at



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protecting the protective coating from damage. Damaged finished products and/or protective coatings will not be accepted.

3.14.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the clamp(s) showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. The manufacturer and/or vendor shall furnish a certified statement that all butterfly valves of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.



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8. The manufacturer and/or vendor shall furnish a warranty for the clamp(s) that states that the clamp(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole butterfly valve for a minimum ten (10) year time period from time of delivery.
9. The manufacturer and/or vendor shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a shell test and seal test to demonstrate the clamp(s) will hold pressure as required.
10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.14.3 Repair Clamps and Clamps with Outlets

1. Repair Clamps and Clamps with Outlets provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Repair Clamps and Clamps with Outlets shall, as a minimum, meet all specifications as in Paragraphs 3.14.1, 3.14.2, and the following:



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3. Repair clamps shall be single section up to 12-inch diameter and three sections for 16-inch through 24-inch diameter.
4. Shells shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel lugs and side bars welded to the shell.
5. Lugs and side bars shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel fasteners welded to the lugs and side bars.
6. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
7. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
8. All welds used in the construction of the repair clamps shall conform to all American Welding Society (AWS) codes. All welds shall be fully passivated in order to restore the stainless steel to its original corrosive resistant characteristics.
9. Repair clamps shall be provided with gaskets constructed of Styrene butadiene rubber (SBR) compound for water service and must meet or exceed ASTM-D-2000-AA-415.
10. Ranges must be clearly labeled on the package as well as on each clamp.
11. Clamps with outlets shall have Mueller CC thread.
12. Range diameter information must be provided from vendor on the clamps bid.



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3.14.4 Repair Clamp Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Single section clamps shall be:
 - (a) Cascade - Style CR1,
 - (b) Dresser – Style 364 (up to 12-inch diameter)
 - (c) Ford – Style FS1,
 - (d) Romac - SS1, or
 - (e) Equal provided the products are manufactured as per these specifications.
2. Three section clamps shall be,
 - (a) Cascade - Style CR3,
 - (b) Ford – Style FS3
 - (c) Romac – SS3, or
 - (d) Equal provided the products are manufactured as per these specifications.

3.14.5 Bell Joint Clamps

3. Bell Joint Clamps provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
4. Bell Joint Clamps shall, as a minimum, meet all specifications as in Paragraphs 3.14.1, 3.14.2, and the following:
5. Bell Joint Clamps shall have the bell and spigot rings made of high strength ductile iron ASTM A-536 grade 65-45-12, latest revision or formed carbon steel per ASTM A-36 with minimum yield of 30,000 PSI.
6. Bell Joint Clamps shall have a minimum pressure rating of 150-PSI.
7. The coating for bell joint clamps shall be fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 of the latest revision and shall be



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applied to the interior and exterior of the fitting, unless otherwise approved by the Commission.

8. Bell joint clamps shall fit rubber ring joint (Tyton), caulked joint (poured), or both for all classes of cast iron and ductile iron pipe.
9. Bell joint clamps shall be provided with gaskets constructed of Styrene butadiene rubber (SBR) compound for water service and must meet or exceed ASTM-D-2000-MBA 710.
10. The coating all bell joint clamps shall be fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 of the latest revision and shall be applied to the interior and exterior of the clamp.
11. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
12. At the Commission's discretion, track-head or tee-head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel may be substituted. A request for the substitution must be submitted in writing to E&TS. Track head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel shall be in accordance AWWA C-111, ASTM A242, and/or ASTM A588 latest revisions. Nuts shall be in accordance with ASTM A194 grade 2H or ASTM A563 grade A latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) medium carbon steel flat washer and nuts and bolts shall be provided with two (2) medium carbon steel flat washers so that the epoxy coating is not damaged. All the non-stainless steel bolts, nuts, and washers shall be rust proof coated or plated.
13. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.



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3.14.6 Bell Joint Clamp Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Bell joint clamps to fit rubber ring joint (Tyton) and caulked joint (poured) shall be:
 - (a) Dresser – Style 60 (up to 60-inch),
 - (b) Dresser – Style 160 (6-inch, 8-inch, 12-inch, & 16-inch)
 - (c) Romac - Style 516 (4-inch – 14-inch),
 - (d) Romac - Style 416 (12-inch – 24-inch, for pipe sizes greater than 24-inch specify Style 418 with pipe outside diameter (OD), bell OD, bell length, and maximum pressure),
 - (e) Ford - Style FBCF (14-inch – 36-inch, call for pipe sizes greater than 36-inch with pipe outside diameter (OD), bell OD, bell length, and maximum pressure),
or
 - (f) Equal provided the products are manufactured as per these specifications.
2. Bell joint clamps to fit caulked joint (poured) with stab joint bells (long tapered bell with no shoulder for anchoring a bell ring) shall be:
 - (a) Dresser – Style 60S,
 - (b) Romac - Style 418 (12” – 24”), or
 - (c) Equal provided the products are manufactured as per these specifications.



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3.14.7 Socket Clamps

1. 4-bolt Socket Clamps provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. 4-bolt Socket clamps shall meet all the requirements of National Fire Protection Association (NFPA) 24 (Installation of Private Fire Service Mains and Their Appurtenances).
3. 4-bolt Socket clamps shall be constructed of carbon steel per ASTM A36 with minimum yield strength of 36000-PSI or material of equal or greater minimum yield strength.
4. 4-bolt Socket Clamps shall be two (2) half bands with four (4) bolts (two (2) on each side).
5. Socket Clamps shall have the minimum following dimensions:
 - (a) 4-inch to 6-inch pipe: ½-inch by 2-inch
 - (b) 8-inch to 10-inch pipe: 5/8-inch by 2-1/2-inch
 - (c) 12-inch pipe: 5/8-inch by 3-inch
 - (d) 16-inch pipe: ¾-inch by 4-inch
6. Socket Clamp bolt hole diameters shall be a 1/16-inch larger than the bolt diameter.
7. Socket Clamp bolts shall have the minimum following dimensions:
 - (a) 4-inch to 6-inch pipe: 5/8-inch-11 by 3-1/2-inch
 - (b) 8-inch pipe: 5/8-inch-11 by 4-inch
 - (c) 10-inch pipe: 3/4-inch-10 by 4-inch
 - (d) 12-inch pipe: 7/8-inch-9 by 4-inch
 - (e) 16-inch: 1-inch by 4-1/2-inch
8. Socket Clamps shall be provided plain without a coating.
9. All fasteners provided with the Socket Clamps shall be made of 4140 chrome moly steel per ASTM A193 grade B7, medium carbon steel per ASTM A194 grade 2H,



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or high strength low alloy steel per ASTM A588 grade B with Unified National Coarse (UNC) rolled thread, as specified in the following paragraphs and sections.

10. Delivery shall be specified in terms of number of days from receipt of order.
11. The manufacturer/vendor/shipper must use care in preparing the above product for shipment and in handling, to insure that the products are delivered without damage. Particular attention must be directed at protecting the products from damage. Damaged products will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above product and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
13. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

3.14.8 Socket Clamp Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Socket Clamps shall be:
 - (a) PHD Manufacturing, Inc. - Figure 590,
 - (b) Anvil Company - Figure 595,
 - (c) Cooper B-Line - Figure B3134,
 - (d) Carpenter and Patterson - Figure 158DB, or



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(e) Equal provided the products are manufactured as per these specifications.



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3.14.9 Fabricated Steel Harness Assembly

1. Fabricated Steel Harness Assembly provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Fabricated Steel Harness Assembly shall be constructed of carbon steel per ASTM A36 with minimum yield strength of 36000-PSI.
3. Fabricated Steel Harness Assembly shall be provided plain without coating.
4. Fabricated Steel Harness Assembly shall be as manufactured by Ford – Style FR1, Dresser – Style 443, or equal product of another manufacturer.
5. Delivery shall be specified in terms of number of days from receipt of order.
6. The manufacturer/vendor/shipper must use care in preparing above product for shipment and in handling during shipment and delivery, to insure that the products are delivered without damage. Particular attention must be directed at protecting the product from damage. Damaged products will not be accepted.
7. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above product and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
8. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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3.14.10 Socket Clamp Washer

1. Socket clamp washers provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Socket clamp washers shall meet all the requirements of National Fire Protection Association (NFPA) 24 (Installation of Private Fire Service Mains and Their Appurtenances).
3. Socket Clamp Washer shall be cast iron, ductile iron, or low carbon steel and square or round.
4. Cast iron and ductile iron Socket Clamp Washers shall have the minimum following dimensions:
 - (a) 4-inch, 6-inch, 8-inch, and 10-inch pipe:
 - Square: 5/8-inch by 3-inch by 3-inch
 - Round: 5/8-inch by 3-inch diameter
 - (b) 12-inch pipe:
 - Square: 3/4-inch by 3-1/2-inch by 3-1/2-inch
 - Round: 3/4-inch by 3-1/2-inch diameter
 - (c) 16-inch pipe:
 - Square: 1-inch by 4-inch by 4-inch
 - Round: 1-inch by 4-inch diameter
5. Steel Socket Clamp Washers shall have the minimum following dimensions:
 - (a) 4-inch, 6-inch, 8-inch, and 10-inch pipe:
 - Square: 1/2-inch by 3-inch by 3-inch with 7/8-inch hole size
 - Round: 1/2-inch by 3-inch diameter with 7/8-inch hole size
 - (b) 12-inch and 16-inch pipe:
 - Square: 1/2-inch by 3-1/2-inch by 3-1/2-inch with 1-1/16-inch hole size
 - Round: 1/2-inch by 3-1/2-inch diameter with 1-1/16-inch hole size
6. Socket Clamp Washers shall be provided plain, with out a coating.



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7. Socket Clamps Washers shall be as provided by PHD Manufacturing, Inc. Figure 595, Anvil Company, Figure 594, Cooper B-Line, Figure B3134W, Carpenter and Patterson, Figure 258, or the equal product of another manufacturer.
8. Delivery shall be specified in terms of number of days from receipt of order.
9. The manufacturer/vendor/shipper must use care in preparing socket clamp washers for shipment and in handling during shipment and delivery, to insure that the socket clamp washers are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged bell joint clamps will not be accepted.
10. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the socket clamp washers and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
11. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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3.14.11 Bent Eye Bolts

1. Bent Eye Bolts provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Bent Eye Bolts shall meet all the requirements of National Fire Protection Association (NFPA) 24 (Installation of Private Fire Service Mains and Their Appurtenances).
3. Bent Eye Bolts diameters shall be:
 - (a) For ¾-inch threaded rod: ¾-inch diameter shank with a ¾-inch nominal inside diameter bolt hole.
 - (b) For 1-inch threaded rod: ¾-inch diameter shank with a 1-inch nominal inside diameter bolt hole.
4. Bent Eye Bolts shall be provided in the following minimum lengths:
 - (a) 4-inch thru 10-inch clamps shall be 4-inch minimum
 - (b) 12-inch and larger clamps shall be 5-inch minimum
5. Bent Eye Bolts shall be constructed of high strength low alloy steel, per ASTM A588, grade B, Unified National Coarse (UNC) rolled thread.
6. Bent Eye Bolts shall be provided with heavy hex nuts made of medium carbon steel, ASTM A194, grade 2H, and Unified National Coarse (UNC) thread.
7. Bent Eye Bolts shall have a minimum tensile strength of 50,000 PSI.
8. Bent Eye Bolts shall be as provided by PHD Manufacturing, Inc. - Figure 598B, Star National Products - Figures ¾"SST747 or ¾"SST757, Dresser Piping Specialties, Inc. – Style 442, or the equal product of another manufacturer.
9. Delivery shall be specified in terms of number of days from receipt of order.
10. The manufacturer/vendor/shipper must use care in preparing above product for shipment and in handling during shipment and delivery, to insure that the products are delivered without damage. Particular attention must be directed at protecting the products from damage. Damaged products will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the products and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.



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12. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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3.14.12 Threaded Rods

1. Threaded rods provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Threaded rods shall meet all the requirements of National Fire Protection Association (NFPA) 24 (Installation of Private Fire Service Mains and Their Appurtenances).
3. Threaded Rod diameters shall be:
 - (a) For 4-inch through 10-inch pipe: $\frac{3}{4}$ -inch diameter.
 - (b) For 12-inch through 16-inch pipe: 1-inch diameter.
4. Threaded Rods shall be provided in either 3-foot, 6-foot, or 12-foot lengths.
5. Threaded Rods shall be constructed of 4140-alloy steel, per ASTM A193, grade B7, Unified National Coarse (UNC) rolled thread.
6. Threaded Rods shall have a minimum tensile strength of 62,500 PSI.
7. Threaded Rods shall be provided with heavy hex nuts made of medium carbon steel, ASTM A194, grade 2H, and Unified National Coarse (UNC) thread.
8. Threaded Rods shall be provided with case hardened steel washers made of C1006 steel, grade 2, Rockwell hardness B55, with the following dimensions:

	Nominal Inside Diameter (In Inches)	Nominal Outside Diameter (In Inches)	Thickness (In Inches)
$\frac{3}{4}$ " Threaded Rod	13/16	2	.122 - .177
1" Threaded Rod	1	2-1/2	.136 - .192



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- Washers may be provided with cadmium plating, another plating, or unplated.
9. Delivery shall be specified in terms of number of days from receipt of order.
 10. The manufacturer/vendor/shipper must use care in preparing above product for shipment and in handling during shipment and delivery, to insure that the products are delivered without damage. Particular attention must be at protecting the products from damage. Damaged products will not be accepted.
 11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the threaded rods and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
 12. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 3.15 TAPPING SLEEVES

3.15.1 General

1. All Tapping Sleeves provided to the Springfield Water and Sewer Commission (Commission) or its Contractors shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. All Tapping Sleeves in this section shall have all parts cast and assembled in North America or meet the requirements of the American Iron and Steel (AIS) as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal(s) poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the finished product(s).
4. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
5. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at



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protecting the protective coating from damage. Damaged finished products and/or protective coatings will not be accepted.

6. All tapping sleeves shall be NSF 61 certified.
7. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
8. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.

3.15.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the gate valve showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying



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component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.

4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.
7. The manufacturer and/or vendor shall furnish a certified statement that all butterfly valves of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
8. The manufacturer and/or vendor shall furnish a warranty for the butterfly valves that states that the butterfly valves shall be free from all defects in material and workmanship under normal use of the product for a minimum ten (10) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole butterfly valve for a minimum ten (10) year time period from time of delivery.
9. The manufacturer and/or vendor shall furnish certified results of a proof of design test performed at an independent testing laboratory. Testing shall include a shell test and seat test to demonstrate the valve body and seat will hold pressure as required.
10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.15.3 Stainless Steel Tapping Sleeves

1. Tapping Sleeves shall, as a minimum, meet all specifications as in Paragraphs 3.15.1, 3.15.2, and the following:
2. Tapping sleeves shall be constructed of Grade 18-8, Type 304 stainless steel with removable stainless steel fasteners.
3. Tapping sleeves shall be provided with a ¾” NPT test port with a lead free brass lug with standard square head. Proper use of this feature assures positive seal before tapping.
4. Bolt Lugs shall be 3/16” minimum thickness.
5. Tapping sleeves shall be provided with gaskets made of gridded styrene butadiene rubber (SBR) or Nitrile (Buna-N) compounded for water service and shall meet ASTM D2000-80M 4AA607.
 - (a) The sleeve gasket shall provide 360 degree full circumferential support over the full length of the sleeve.
 - (b) The sleeve gasket shall have heavy gauge stainless steel armors, a minimum of 2-1/4” wide, bonded in place to span the gap between the tapping sleeve sections.
 - (c) The outlet gasket shall be made of Nitrile (Buna-N).
6. The flange shall be made of Grade 18-8, Type 304 Stainless Steel. The flange shall conform to AWWA C207 Class D ANSI 150 lb. The flange shall be recessed to accept standard AWWA tapping valves. The bolt holes shall straddle the pipe center line. Iron flanges shall not be accepted.



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7. Tapping sleeves shall be rated 150 PSI working pressure and 225 PSI minimum test pressure.
8. All welds used in the construction of the tapping sleeve shall conform to all American Welding Society (AWS) codes. All welds shall be fully passivated in order to restore the stainless steel to its original corrosive resistant characteristics.
9. Tapping sleeves shall be provided with a Grade 18-8, Type 304 Stainless Steel outlet. The outlet shall be double welded, at two places, the flange and the sleeve to provide maximum strength.

3.15.4 Ductile Iron Tapping sleeves

1. Tapping Sleeves shall, as a minimum, meet all specifications as in Paragraphs 3.15.1, 3.15.2, and the following:
2. Tapping sleeves shall be constructed of high strength ductile iron conforming to ASTM A-536 grade 65-45-12. The bolt holes shall straddle the pipe center line.
3. Tapping sleeves shall be mechanical joint conforming to ANSI A21.11/AWWA C-111, unless otherwise specified.
4. Tapping sleeves shall be provided with a $\frac{3}{4}$ " NPT test port with a lead free brass lug with standard square head. Proper use of this feature assures positive seal before tapping.
5. Tapping sleeves shall be provided with gland and body components made of grade 60-42-10 ductile iron conforming to ASTM A536-84.
6. Tapping sleeve outlet gasket shall be made of Nitrile (Buna-N).
7. The tapping sleeve outlet flange dimensions shall comply with ANSI B16.1 class 125 and with MSS SP-60. The flange shall be recessed to accept standard AWWA tapping valves.
8. Tapping sleeves shall be rated 150 PSI working pressure and 225 PSI minimum test pressure.
9. Exterior Coating shall be Fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 and shall be applied to the interior and exterior of the fitting.
10. Markings
 - (a) Fittings shall be marked with the weight.



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- (b) Fittings shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of the openings, and the number of degree or fraction of the circle on all bends.

11. Testing

All tests shall be made in accordance with the methods prescribed by the above mentioned AWWA standards judgment.

3.15.5 Stainless Steel Tapping Sleeves Makes and Models Approved for use by the Commission

The following stainless steel tapping sleeves have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Dresser Industries, Inc. - style 630,
2. Ford Meter Box Company - style FTSS,
3. Romac Industries, Inc. - style SSTIII,
4. Smith Blair – 622,
5. or the approved equal product of another manufacturer.

3.15.6 Ductile Iron Tapping Sleeves Makes and Models Approved for use by the Commission

The following ductile iron tapping sleeves have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Clow – Model F-5205,
2. Mueller – Models H-615 & H-616,
3. U.S. Pipe – Models H-615 & H-616,
4. or the approved equal product of another manufacturer.



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Section 3.16 JOINT ACCESSARIES

3.16.1 General

1. All Joint Accessories or Kits provided to the Springfield Water and Sewer Commission (Commission) or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the product(s).
4. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished product(s) will not be accepted.
5. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s)



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and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

3.16.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the product(s) showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each finished product(s), and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a certified statement that all the product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the product(s) that states that the product(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the product(s) for a minimum one (1) year time period from time of delivery.



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8. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
9. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

3.16.3 Delivery

1. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission’s service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.

3.16.4 Mechanical Joint Restraint for Ductile Iron Fittings and Valves

1. Mechanical Joint Restraint for Ductile Iron Fittings shall, as a minimum, meet all specifications as in Paragraphs 3.15.1, 3.15.2, and the following:
2. Mechanical Joint Restraint for Ductile Iron Fittings provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
3. Mechanical Joint Restraint for Ductile Iron Fittings and Valves shall conform to the American Water Works Association Standard C-111 (latest edition) for: “Rubber Gasket Joints for Ductile Iron Pipes and Fittings”.



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4. All Mechanical Joint Restraint for Ductile Iron Fittings and Valves shall be certified, by a third party, as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
5. Mechanical Joint Restraint for Ductile Iron Fittings shall be provided with gland and body components made of grade 60-42-10 ductile iron conforming to ASTM A536-84. The casting shall be flat, with no protrusions, where the torque limiting twist-off nuts actuates the restraining wedges.
6. Mechanical Joint Restraint for Ductile Iron Fittings shall be incorporated into the design of the follower gland. The restraining mechanism shall consist of individually actuated wedges that increase their resistance to pull out as pressure or external forces increase.
7. Mechanical Joint Restraint for Ductile Iron Fittings shall be capable of full mechanical joint deflection during assembly and the flexibility of the joint shall be maintained after burial.
8. The joint restraint ring and its wedging components shall be made of grade 60-42-10 ductile iron conforming to ASTM A536-84.
 - (a) The wedge shall be ductile iron, heat-treated to a minimum hardness of 370 B H N.
 - (b) The joint restraint ring shall be provided with torque limiting twist-off nuts of high strength, low alloy, corrosion resistant, Cor-Ten steel. The twist-off nuts made of high strength, low alloy, corrosion resistant, Cor-Ten steel shall be in accordance in accordance with ASTM A194 grade 2H or ASTM A563 grade A latest revision. Twist-off nuts shall be Unified National Coarse (UNC) rolled thread.
9. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell conforming to ANSI/AWWA C-111/AZ1.11 and ANSI/AWWA C-153/A21.53 of the latest revision. Torque limiting twist-off nuts shall be used to insure proper actuation of the restraining wedge.
10. Mechanical Joint Restraint for Ductile Iron Fittings shall be available in the four through forty-eight inch sizes.
11. Mechanical Joint Restraint for Ductile Iron Fittings shall have a rated working pressure as follows:
 - (a) 4-inch – 8-inch = 350 PSI



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- (b) 10-inch – 16-inch = 300 PSI
 - (c) 20-inch – 36-inch = 200PSI
 - (d) 42-inch – 48-inch = 175 PSI
12. Mechanical Joint Restraint for Ductile Iron Fittings shall be listed by Underwriters Laboratories up through the twenty-four-inch size and approved by Factory Mutual up through the twelve-inch size.
 13. Mechanical Joint Restraint for Ductile Iron Fittings shall be provided with tee-head bolts, washers, and nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel. Tee head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel shall be in accordance AWWA C-111, ASTM A242, and/or ASTM A588 latest revisions. Nuts shall be in accordance with ASTM A194 grade 2H or ASTM A563 grade A latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Nuts and bolts shall be provided with two (2) medium carbon steel flat washers so that the epoxy coating is not damaged.
 14. Mechanical Joint Restraint for Ductile Iron Fittings shall be individually packaged and contain proper size rubber gasket and bolts.

3.16.5 Flange Gasket and Hardware for Ductile Iron Pipe, Fittings, & Valves

1. Flange Gaskets and Hardware provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Flange gaskets for 12-in diameter flanges or less shall be Type E or “full-face” with bolt holes cut to match ANSI B16.1 drilling.
3. Flange gaskets 14-inch through 64-inch diameter shall be Type F or “ring gaskets” with inside and outside dimensions as specified in AWWA C115, Table A.1.
4. Flange gaskets shall be cut from sheet stock by a qualified gasket distributor to the dimensions included in AWWA C115, Table A.1. No field-cut or field-modified gaskets shall be allowed.
5. Flange gaskets for distribution system (operating pressure 150-psi or less) applications shall have documented physical properties, as follows:
 - (a) Flange gaskets shall be manufactured from premium quality red rubber made from natural rubber and styrene butadiene rubber (SBR) with a smooth finish.
 - (b) Thickness: 1/8-inch



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- (c) Hardness (Durometer) (Shore A) +/-5: 75
- (d) Minimum Tensile Strength (ASTM D142): 700-psi
- (e) Compression Set at 158°F (ASTM Method B): 22-hrs. 40% maximum
- (f) Pressure Rating max.: 250-psi
- (g) P x T min. (psi x T°F): 20,000
- 6. Flange gaskets for severe pressure (greater than 150-psi or as required by the Commission) applications shall have documented physical properties, as follows:
 - (a) Flange gaskets shall be manufactured from premium quality compressed sheet stock of non-asbestos aramid fibers with a Nitrile binder.
 - (b) Thickness: 1/8-inch
 - (c) Minimum Tensile Strength across grain (ASTM F152): 2000-psi
 - (d) Compressibility Range (ASTM F36): 8-16%
 - (e) Recovery (ASTM F36): 50%
 - (f) Creep Relaxation Range (ASTM F38): 20%
 - (g) Gasket Maintenance Factor Range – *m* (ASTM F586): 4.2
 - (h) Minimum Seating Stress Range – *y* (ASTM F586): 2931-psi
 - (i) Seal Initiation Stress Range, *G_b* (ROTT): 400-psi
 - (j) Gasket Stress/Tightness Ratio Range, *a* (ROTT): 0.35
 - (k) Unloading Gasket Stress Range, *G_s* (ROTT): 20-psi
 - (l) P x T min. (psi x T°F): 52,500
- 7. All flange bolts and nuts shall be provided with flat washers so that the epoxy coating is not damaged during installations.
- 8. Flange bolts for distribution system (operating pressure 150-psi or less) applications shall have documented physical properties, as follows:
 - (a) All flange bolts length shall be selected so that three full threads, as a minimum, protrude from the hex nut and washer after assembly,



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- (b) Bolts shall be Unified National Coarse (UNC) Class 2B rolled thread.
 - (c) Flange bolts shall be made of Type 304 stainless steel.
 - (d) Flange bolts shall be in accordance with ASTM A193 Grade B8, Class 2 all sizes, latest revision or ASTM F593C Condition CW1 sizes up to 5/8-inch or F593D Condition CW2 for sizes 3/4-inch and greater, latest revision,
 - (e) Minimum Tensile Strength (ASTM A193): 105 through 125-ksi
 - (f) Minimum Tensile Strength (ASTM F593): 85 through 150-ksi
 - (g) Minimum Yield Strength (ASTM A193): 65 through 100-ksi
 - (h) Minimum Yield Strength (ASTM F593): 45 through 65-ksi
 - (i)
9. Flange nuts for distribution system (operating pressure 150-psi or less) applications shall have documented physical properties, as follows:
- (a) Flange nuts shall be Unified National Coarse (UNC) Series Class 2B heavy-duty hex nuts.
 - (b) Flange nuts shall be made of Type 304 stainless steel.
 - (c) Flange nuts shall be in accordance with ASTM A194 Grade 8, Class 2 all sizes, latest revision or ASTM F594C Condition CW1 sizes up to 5/8-inch or F594D Condition CW2 for sizes 3/4-inch and greater, latest revision,
 - (d) Minimum Proof Stress (ASTM A194): 80-ksi
 - (e) Minimum Proof Stress (ASTM F594): 92 through 108-ksi
 - (f) Brinnell Hardness (ASTM A194): min. 126, max. 300
 - (g) Rockwell Hardness (ASTM F594): min. B80, max. C32
 - (h) At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling
10. Flat washers to be used with flange bolts and nuts for distribution system (operating pressure 150-psi or less) applications shall have documented physical properties, as follows:
- (a) Flat washers shall be made of Type 304 stainless steel, type A SAE or ASME



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11. Flange bolts, nuts, and flat washers shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers Type A SAE or ASME so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
12. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
13. To assist in assembly of flanged joints, an adhesive-backed flange gaskets may be used. Adhesive backing material shall be: 467MP High Performance Adhesive Transfer Tape, manufactured by 3M Industrial Adhesives and Tapes Division, St. Paul, Minnesota, or an approved equal.

3.16.6 Gasket Joint Restraint for Ductile Iron Pipe

1. Gasket Joint Restraint for Ductile Iron Pipe provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The Gasket Joint Restraint for Ductile Iron Pipe shall conform to AWWA C-111 (most current revision) for Rubber-Gaskets Joints for Ductile Iron Pressure Pipe and Fittings.
3. Gasket Joint Restraint shall be for rubber ring joint (Tyton).
4. The restraint provided shall be a boltless, integral retaining system, and shall be rated for 350 PSI.

3.16.7 Mechanical Joint Restraint Approved for use by the Commission

The following Mechanical Joint Restraints have been approved for use by the Commission. Any change in any component(s) of the Mechanical Joint Restraint that



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does not allow for interchangeability of the component(s) shall result in the Mechanical Joint Restraint no longer being approved and removed from this list.

1. EBAA Iron Sales, Inc. – Series 1100,
2. Ford Meter Box Company, Inc. – Series 1400,
3. Romac – Roma Grip,
4. Tyler/Union – TUF Grip, or
5. Equal provided the Mechanical Joint Restraint are manufactured as per these specifications.

3.16.8 Flange Gasket for Distribution System (operating pressure 150-psi or less) Applications Approved for use by the Commission

The following Flange Gaskets suppliers have been approved for use by the Commission. Any change in any component(s) of the flange gasket that does not allow for interchangeability of the component(s) shall result in the flange gasket no longer being approved and removed from this list.

1. 22-Red SBR rubber, manufactured by Garlock Sealing Technologies, Palmyra, New York,
2. Flange-Tyte SBR rubber, Manufactured by U.S. Pipe and Foundry Co., Birmingham, AL,
3. Toruseal by American Cast Iron Pipe Company, Birmingham, AL, or
4. Equal provided the Flange Gaskets are manufactured as per these specifications.

3.16.9 Flange Gasket for Severe Pressure (operating pressure greater than 150-psi) Applications Approved for use by the Commission

The following Flange Gaskets suppliers have been approved for use by the Commission. Any change in any component(s) of the flange gasket that does not allow for interchangeability of the component(s) shall result in the flange gasket no longer being approved and removed from this list.

1. Durlon 8500, manufactured by Gasket Resources, Inc., Exton, Pennsylvania,
2. Blue-Gard 3000, manufactured by Garlock Sealing Technologies, Palmyra, New York,
3. Klingersil 4430, manufactured by Thermoseal, Inc., Sidney, Ohio,



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4. SF3300 manufactured by Flexitallic, Ltd, Deer Park, Texas, or
5. Equal provided the Flange Gaskets are manufactured as per these specifications.

3.16.10 Gasket Joint Restraint Approved for use by the Commission

The following Mechanical Joint Restraints have been approved for use by the Commission. Any change in any component(s) of the Mechanical Joint Restraint that does not allow for interchangeability of the component(s) shall result in the Mechanical Joint Restraint no longer being approved and removed from this list. Gasket Joint Restraint for rubber ring joint (Tyton) shall be as manufactured by

1. United States Pipe and Foundry Company – Field Lok 350 Gasket (4” – 24”),
2. Specification Rubber Products, Inc. – Barracuda Gaskets (4” – 24”), or
3. Equal provided the Gasket Joint Restraint is manufactured as per these specifications.



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Section 3.17 ADAPTERS

3.17.1 Bolt-thru Mechanical Joint Restraint (Foster Adapter)

1. The bolt-thru mechanical joint restraint shall be made of ductile iron conforming to ASTM A536, 80-55-06.
2. The bolt-thru mechanical joint restraint shall connect valves and/or fittings at a linear distance not to exceed one and one-half (1-1/2) inches and without attachment to pipe.
3. The bolt-thru mechanical joint restraint shall be provided with an NSF 61 asphaltic seal coat in accordance with ANSI A21/AWWA C-110, Section 4.3 of latest the revision.
4. The bolt-thru mechanical joint restraint shall be provided with mechanical joint gaskets made of styrene butadiene rubber (SBR) compounded for water service and shall conform to the latest revision of AWWA C111/ ASTM f-477.
5. The bolt-thru mechanical joint restraint shall be provided with tee-head bolts, washers, and nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel. Tee head bolts made of high strength, low alloy, corrosion resistant, Cor-Ten steel shall be in accordance AWWA C-111, ASTM A242, and/or ASTM A588 latest revisions. Nuts shall be in accordance with ASTM A194 grade 2H or ASTM A563 grade A latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Nuts and bolts shall be provided with two (2) medium carbon steel flat washers so that the epoxy coating is not damaged.
6. The bolt-thru mechanical joint restraint may be ordered with longer bolt packs to restrain full bodied fittings and certain butterfly valves, etc. with thicker flanges.
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or



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- (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
- 8. Delivery shall be specified in terms of number of days from receipt of order.
- 9. The manufacturer/vendor/shipper must use care in preparing above product for shipment and in handling during shipment and delivery, to insure that the couplings are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged couplings will not be accepted.
- 10. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above product and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

11. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 3.18 ANTI-SEIZE LUBRICANTS

3.18.1 Anti-Seize Lubricants

1. Anti-seize lubricants provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Anti-seize lubricants shall be a nickel anti-seize compound capable of achieving the required bolt torque and sealing stress, and future disassembly with minimal manual input.
3. Anti-seize compound shall be as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing above products for shipment and in handling during shipment and delivery, to insure that the above product are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged products will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above product and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered



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- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 3.19 PROTECTIVE COATINGS

3.19.1 General

1. Protective primer, protective coating tape, and/or protective outer wrap shall be provided in accordance with ANSI/AWWA C-217 the latest the revision and these Material Specifications.
2. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
3. Delivery shall be specified in terms of number of days from receipt of order.
4. The manufacturer/vendor and/or shipper must use care in preparing the product(s) for shipment and in handling during shipment and delivery, to insure that the product(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged product(s) will not be accepted and returned to manufacturer/vendor at the manufacturer/vendor's cost.
5. The manufacturer/vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
6. References

The manufacturer/vendor shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:



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- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

3.19.2 Protective Primer

1. Protective Primer shall be a petrolatum based primer that exhibits preferential wetting capabilities to readily coat wet or dry surfaces and cavities prior to the application of protective wrap.
2. Protective Primer shall be provided in accordance with of ANSI/AWWA C-217 the latest the revision.
3. The Specific Gravity of the Protective Primer shall be 0.8 - 0.9.
4. Protective Primer is required be delivered in the following containers. At time of order the specific containers will be identified;
 - (a) cartons of 2 or 4 one gallon cans
 - (b) 12 one quart cans, or
 - (c) 5 gallon pails.
5. Protective Primer for below grade installations shall be Trenton Wax-Tape primer (Brown), Tapecoat Enviroprime, Denso Paste, or the equal product of another manufacturer.
6. Protective Primer for above ground, in chambers, or other facilities shall be Trenton Temcoat 3000 primer (Brown) or the equal product of another manufacturer.

3.19.3 Protective Coating Tape

1. Protective Coating Tape shall be a prefabricated petrolatum coating in tape form designed to protect wet or dry irregularly shaped metal surfaces.
2. Protective Coating Tape shall be provided in accordance with of ANSI/AWWA C-217 the latest the revision.
3. Protective Coating Tape shall be impervious to continuous moisture levels.



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4. Protective Coating Tape shall be for use with: bare metal, wood and concrete.
5. Protective Coating Tape shall be compatible with asphalt, coal tar, polyethylene, polypropylene, FBE and urethanes
6. Protective Coating Tape shall have a minimum thickness of 45-mils.
7. Protective Coating Tape shall be resistant to bacteria.
8. Protective Coating Tape shall be provided with a minimum shelf life of one (1) year.
9. Protective Coating Tape shall be delivered in the following size rolls. At time of order the specific size rolls will be identified;
 - (a) Protective Tape for Underground 2" x 9' rolls
 - (b) Protective Tape for Underground 4" x 9' rolls
 - (c) Protective Tape for Underground 6" x 9' rolls
 - (d) Protective Tape for Underground 6" x 18' rolls
 - (e) Protective Tape for Underground 9" x 18' rolls
 - (f) Protective Tape for Underground 12" x 18' rolls
 - (g) Protective Tape for Above ground 2" x 9' rolls
 - (h) Protective Tape for Above ground 4" x 9' rolls
 - (i) Protective Tape for Above ground 6" x 9' rolls
 - (j) Protective Tape for Above ground 6" x 18' rolls
 - (k) Protective Tape for Above ground 9" x 18' rolls
 - (l) Protective Tape for Above ground 12" x 18' rolls.
10. Protective Coating Tape for above ground and in chambers or other facilities shall harden as opposed to remaining pliable for below grade.
11. Protective Coating Tape for below grade installations shall be Trenton - # 1 Wax-Tape, TC - Envirotape, Denso – Denso Tape, or the equal product of another manufacturer.



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12. Protective Coating Tape for above ground and in chambers or other facilities shall be Trenton - # 2 Wax-Tape or the equal product of another manufacturer.

3.19.4 Protective Coating Outer Wrap

1. Protective Coating Outer Wrap shall be a clear flexible plastic film designed to provide extra mechanical protection for surfaces coated with protective coating tape.
2. Protective Coating Outer Wrap shall be provided in accordance with of ANSI/AWWA C-217 the latest the revision.
3. Protective Coating Outer Wrap shall have a minimum thickness of 1-mil.
4. Protective Coating Outer Wrap shall be delivered in the following size rolls. At time of order the specific size rolls will be identified;
 - (a) Protective Tape Outer wrap for Underground 4" x 50' rolls
 - (b) Protective Tape Outer wrap for Underground 6" x 50' rolls
 - (c) Protective Tape Outer wrap for Underground 9" x 50' rolls
 - (d) Protective Tape Outer wrap for Underground 12" x 50' rolls
5. Protective Coating Outer Wrap for below grade installations shall be Trenton Poly Ply, TC Envirostretchwrap, Denso – Densopol/Densoclad Tapes, or the equal product of another manufacturer.



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Section 3.20 FILL MATERIAL

3.20.1 Bank-run Gravel Aggregate

1. Bank run gravel shall be a granular material, well graded from fine to coarse with a maximum size of 3-inch and shall meet or exceed the Massachusetts Highway Department (MHD) specifications for Gravel Aggregate.
2. Bank-run gravel shall be obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
3. Bank-run gravel shall not contain vegetation, masses or roots, or individual roots more than 18" long or more than 1/2" in diameter.
4. Bank-run gravel shall be substantially free from loam and other organic matter, clay, frost, frozen lumps, clay, and other fine or harmful substances.
5. The gradation shall meet the grading requirements of the following table:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
3/8 inch	70 maximum
No. 10	50 maximum
No. 200	5 maximum



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3.20.2 Screened Gravel Aggregate

1. Screened gravel shall be a granular material, well graded with hard, durable, particles of proper size and gradation.
2. Screened gravel shall not contain vegetation, masses or roots, or individual roots.
3. Screened gravel shall be free from sand, loam and other organic matter, clay, excess fines and deleterious materials, frost, and frozen lumps.
4. The gradation shall meet the grading requirements of the following table:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1/2 inch	95 minimum
3/8 inch	40 - 70
No. 4	5 maximum



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3.20.3 Structural Gravel Aggregate

1. Structural gravel shall be gravel, sandy gravel, or gravely sand of proper size and gradation.
2. Structural gravel shall not contain vegetation, masses or roots, or individual roots.
3. Structural gravel shall be free from organic material, loam, wood, clay, trash, snow, ice, frost, frozen lumps, and other objectionable material.
4. The gradation shall meet the grading requirements of the following table:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
6-inch	100
No. 4	20 - 95
No. 40	0 - 60
No. 4	8 maximum



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3.20.4 Common Borrow/Fill

1. Common borrow/fill shall be inert, inorganic natural soils and/or rock, not having more than 5% by weight passing the No. 200 sieve.
2. Common borrow/fill shall have maximum stone size not greater than 6-inch and material shall be well graded throughout entire size range.
3. Common borrow/fill shall be free from clay, organic material, roots, leaves, trash, snow, ice, frozen soil, and other objectionable material that may be compressible or which cannot be compacted properly.
4. Common borrow/fill shall not contain broken concrete, masonry, rubble, asphalt pavement, ceramic tiles, or other similar materials.
5. Common borrow/fill shall be free of ice or frost and no aggregations of soil particles frozen.
6. Common borrow/fill shall have a moisture content within plus or minus 4% optimum moisture content at the borrow/fill source.
7. Common borrow/fill shall have physical properties, as approved by the Commission, such that it can be readily spread and compacted.
8. Common borrow/fill shall meet the grading requirements of the following table:

Sieve	Percent by Weight
Designation	Passing Square Mesh Sieve
½ inch	50 - 85
No. 4	40 - 55
No. 50	8 - 28
No. 200	0 - 10



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3.20.5 Select Common Borrow/Fill

Select common borrow/fill shall be as specified for Common Borrow/Fill except the material shall contain no stones larger than 2-inch in its largest dimension.



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3.20.6 Crushed Stone ¾-Inch

1. Crushed stone shall consist of sound, durable crushed rock or durable crushed gravel stone, angular in shape and free from structural defects, comparatively free of chemical decay, and free of any foreign material including, but not limited to ice, snow, sand, clay, loam, or other deleterious or organic material.
2. Crushed stone shall be maximum size passing a ¾-inch sieve and retained on a 3/8-inch sieve.



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3.20.7 Crushed Stone 2-Inch

1. Crushed stone shall consist of sound, durable crushed rock or durable crushed gravel stone, angular in shape and free from structural defects, comparatively free of chemical decay, and free of any foreign material including, but not limited to ice, snow, sand, clay, loam, or other deleterious or organic material.
2. Crushed stone shall be maximum size passing a 2-inch sieve and retained on a 1-inch sieve.



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3.20.8 Dense Grade Crushed Stone

1. Dense Grade Crushed Stone shall be crusher run coarse aggregates of crushed stone combined with fine aggregates uniformly premix with a predetermined quantity of water.
2. The crusher run coarse aggregates shall consist of hard, durable particles of stone. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used.
3. The crusher run coarse aggregates shall have a percentage of wear, by the Los Angeles test of not more than 45.
4. Fine aggregates shall consist of natural or crushed sand.
5. The composite material shall be free from clay, loam or other plastic material, and shall meet the grading requirements of the following table:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
2 inch	100
1-1/2 inch	70 - 100
¾ inch	50 - 85
No. 4	30 - 55
No. 50	8 - 24
No. 200	3 - 10



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3.20.9 Sand

1. Aggregate for sand shall consist of clean, inert, hard, durable grains of quartz or other hard durable rocks and free from vegetable matter, lumps or balls of clay and other deleterious substances.
2. Sand shall confirm to ASTM C33 for fine aggregate.
3. The gradation shall meet the grading requirements of the following table:

Sieve Designation	Percent by Weight Passing Square Mesh Sieve
1/2 inch	100
3/8 inch	85 - 100
No. 4	60 - 100
No. 16	35 - 80
No. 50	10 - 55
No. 200	2 - 10



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3.20.10 Excavatable Flowable Fill

1. Excavatable Flowable fill shall be 100 PSI maximum.
2. Excavatable Flowable shall consist of Portland cement conforming to ASTM C-150, Type II.
3. Excavatable Flowable may have coarse and fine aggregate consisting of well graded crushed stone.
4. Excavatable Flowable shall have **NO** fly ash.
5. Excavatable Flowable shall have clean water free from oils, acid, and organic matter.



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3.20.11 Non-Excavatable Flowable Fill

1. Non-Excavatable Flowable fill shall be 150 PSI minimum.
2. Non-Excavatable Flowable fill shall consist of Portland cement conforming to ASTM C-150, Type II.
3. Non-Excavatable Flowable fill may have coarse and fine aggregate consisting of well graded crushed stone.
4. Non-Excavatable Flowable fill shall have **NO** fly ash.
5. Non-Excavatable Flowable fill shall have clean water free from oils, acid, and organic matter.



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3.20.12 Concrete for Fill

1. Concrete shall be 2500 PSI
2. Concrete shall be of Portland cement conforming to ASTM C-150, Type II,
3. Concrete shall have coarse aggregate consisting of well graded crushed stone with a maximum size of 2-inch
4. Concrete shall have clean water free from oils, acid, and organic matter.



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3.20.13 Concrete for Thrust Blocks

1. Concrete shall be 4000 PSI
2. Concrete shall be of Portland cement conforming to ASTM C-150, Type II,
3. Concrete shall have coarse aggregate consisting of well graded crushed stone with a maximum size of $\frac{3}{4}$ -inch
4. Concrete shall have clean water free from oils, acid, and organic matter.



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CHAPTER 4 WATER SERVICES, AND APPURTANANCES,

Section 4.1 DUCTILE IRON PUSH-ON JOINT WATER SERVICE PIPE

1. Ductile Iron water service pipe shall be at least 6-inches in diameter.
2. Ductile Iron water service pipe, ductile iron valves, and ductile iron appurtenances shall be as specified in Section 3.1 of these Specifications.



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Section 4.2 COPPER TUBE WATER SERVICE PIPE

4.2.1 General

1. Copper tube water service pipe provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Copper tube water service pipe as a minimum shall conform to the most current American Water Works Association Standard C-800, all addenda thereto and American Section of the International Association for Testing Materials (ASTM) B88, all addenda thereto.
3. Copper tube water service pipe shall be seamless, type "K", and copper alloy UNS C12200.
4. Copper tube water service pipe shall be NSF 61 compliant.
5. Copper tube water service pipe shall be $\frac{3}{4}$ -inch, 1-inch, 1-1/4-inch, 1-1/2-inch, and 2-inch diameter.
 - (a) Please note $\frac{3}{4}$ -inch and 1-1/4-inch diameters are for repair work only.
 - (b) The minimum diameter for new service pipe is 1-inch
 - (c) 1-1/2 and 2-inch are for new service pipe.
6. Copper tube shall be delivered in the following lengths as required by the Commission at time of order:
 - (a) $\frac{3}{4}$ -inch and 1-inch shall be in 40-foot and/or 60-foot rolls
 - (b) 1-1/4-inch, 1-1/2-inch, and 2-inch shall be in 20-foot straights, 40-foot and/or 60-foot rolls
 - Please note that rolls of copper tube shall be soft copper and straights of copper tube shall be hard
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,



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- (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
8. Inspection:
- (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer with the provisions of the specifications, shall be paid for by the manufacturer, and shall be deductible from the price paid for the hydrants.
9. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
10. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished(s) will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

4.2.2 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:



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- (a) Cross sectional drawings of the hydrant showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight for each bury depth, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
 4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
 5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
 6. The manufacturer shall furnish a warranty for the copper tube that states that the copper tube shall be free from all defects in material and workmanship under normal use of the product for a minimum thirty (30) year time period from time of delivery. The manufacturer shall replace and/or repair defective copper tube for a minimum thirty (30) year time period from time of delivery.
 7. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed hydrant have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-502. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
 8. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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9. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.2.3 Copper Tube Approved for use by the Commission

The following manufacturers and products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Cambridge-Lee – Standard Tube
2. Cerro Flow – Cerro Tube
3. Great Lakes Copper – Great Lakes Tube
4. Mueller – Certified Tube
5. Equal provided the products are manufactured as per these specifications.



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Section 4.3 TAPPING SADDLES

4.3.1 General

1. Tapping saddles provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Tapping saddles as a minimum shall conform to the most current American Water Works Association Standard C-800, all addenda thereto and American Section of the International Association for Testing Materials (ASTM) A536 and ASTM A703, all addenda thereto
3. Bodies shall be constructed of high strength ductile iron per ASTM A536.
4. Tapping saddle outlets shall have Mueller CC thread.
5. Bands shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel lugs and sidebars welded to the band(s) per ASTM A703. Single bands shall be 3-1/4-inch minimum width and double bands shall be 2-inches minimum width each.
6. Lugs and sidebars shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel fasteners welded to the lugs and sidebars. A minimum of two (2) lugs per single side bar or one (1) lug per side bar, when tapping saddles are provided with two (2) side bars, shall be provided.
7. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 304 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 304 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
8. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.



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9. All welds used in the construction of the tapping saddles shall conform to all American Welding Society (AWS) codes. All welds shall be fully passivated in order to restore the stainless steel to its original corrosive resistant characteristics.
10. Tapping saddles shall be provided with gaskets constructed of Virgin STYRENE BUTADIENE RUBBER (SBR) compound for water service and must meet or exceed ASTM-D-2000-AA-415.
11. Ranges must be clearly labeled on the package as well as on each tapping saddle.
12. Range diameter information must be provided from vendor on the tapping saddle bid.
13. Coatings shall be fusion bonded epoxy (10 – 12 mils), nylon 11 (10 – 12 mils)
14. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
15. Delivery shall be specified in terms of number of days from receipt of order.
16. The manufacturer/vendor/shipper must use care in preparing tapping saddle for shipment and in handling during shipment and delivery, to insure that the tapping saddle are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged tapping saddle will not be accepted.
17. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the tapping saddle and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.



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4.3.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the hydrant showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight for each bury depth, and
 - (e) Country of origin for each component.
3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a warranty for the tapping saddles that states that the tapping saddles shall be free from all defects in material and workmanship under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective tapping saddles for a minimum one (1) year time period from time of delivery.
7. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed hydrant have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-800. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
8. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:



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- (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
9. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
- (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.3.3 Tapping Saddles Approved for use by the Commission

The following manufacturers and products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

- 1. Ford - FC202,
- 2. Mueller - DR2S,
- 3. Romac - 202NS
- 4. Smith Blair – 317A or,
- 5. Equal provided the products are manufactured as per these specifications.



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Section 4.4 WATER SERVICE APPURTENANCES

4.4.1 General

1. Water service appurtenances i.e. valves and fittings provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Water service appurtenances i.e. valves and fittings, shall conform to the most current American Water Works Association Standard C-800, all addenda thereto.
3. All valves and fittings, which come in contact with water, shall be made from Lead Free brass.
 - (a) This brass alloy is commercially called “Enviro Brass II”, “Federalloy”, “Selenium Free”, or “Red-Hed Lead Free Brass”
 - Enviro Brass II is a Lead Free copper alloy, UNS Copper Alloy C89520.
 - Federalloy is a Lead Free copper alloy, UNS Copper Alloy C89833.
 - Selenium Free Brass is a Lead Free copper alloy, UNS Copper Alloy C89836.
 - Red-Hed Lead Free Brass is a Lead Free copper alloy, UNS Copper Alloy, UNS - Copper Alloy C89833.
 - (b) Brass other than the above may be approved by the Springfield Water and Sewer Commission as an acceptable equal.
 - (c) Lead Free brass is defined as having the following content:

PRIMARY ELEMENTS	COMPOSITION % BY WEIGHT
Copper (Cu)	85.0-91.0
Tin (Sn)	4.0-7.0
Lead (Max) (Pb)	0-0.25
Zinc (Zn)	2.0-6.0
Bismuth (Bi)	1.6-3.5.2
Selenium (Se)	0.0-1.1
Nickel (Ni) (Including Cobalt)	0.9-1.0



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4. All castings shall be clearly identified as being cast from Lead Free Brass.
 - (a) “EB”, “EBII”, “NL”, or “LF” are acceptable identifiers, and must be cast in high relief or deeply engraved.
 - (b) Lead Free identifiers other than “EB”, “EBII”, “NL”, or “LF” are subject to Commission review and approval.
5. Brass parts not in contact with water may be made from copper alloy No. 83600, in accordance with ASTM B30, ASTM B62, or ASTM B584 and AWWA C-800 latest version containing 85% copper, 5% tin, 5% lead, and 5%.
6. All water service valves and fittings shall be certified, by a third party, as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
7. Valves and fittings shall be designed to withstand working pressure of a minimum of 150 PSI. The manufacturer shall factory test all valves and fittings (100%) to a minimum of 150 PSI.
8. Corporation Stop Valves may rotate 360 degrees in either direction or rotate ¼ turn only and **OPEN LEFT**, counter-clockwise.
9. Curb Stop Valves shall rotate ¼ turn only and **OPEN LEFT**, counter-clockwise.
10. Valves, fittings, and other service line materials shall be as manufactured by the manufacturers of equivalent products are specified in Section 3.2.10 Table of Equivalencies and Item Number Details or the approved equal of another manufacturer.
11. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or



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- (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
12. The manufacturer and/or vendor must use care in preparing materials for shipment and in handling during shipment and delivery, to insure receipt without damage. Damaged materials will not be accepted.

4.4.2 Ball Type Corporation Stops for New Installations (Items # 1, 2, 3, & 4)

1. Corporations shall include a Tee Head Adapter. Tee head adapters shall be secured to the corporation with a stainless steel set screw or rolled pin. Cotter pins are not acceptable.
2. Corporations shall have AWWA/CC (corporation cock) Taper Thread Inlet x Mueller 110 Compression Outlet.
3. The outlet thread (male) of compression joint must be capable of installation using a Mueller B-101 Drilling and Tapping Machine using an inserting tool for corporation stop, inside thread CTS Mueller 110 Conductive Compression Connection according to the following table:

INSERTING TOOL SIZE	MUELLER PART NUMBER
¾"	680600
1"	680601
1¼"	
1½"	680421
2"	680422

4. Equality of the outlet joint to the "Mueller 110 Compression" is mandatory. The "Quick Joint" (Ford), "McQuick Compression" (McDonald), and "CB Compression" (Cambridge) have been determined to be equal.
5. ALL corporations shall be subject to a sustained hydraulic pressure of 200 PSI and tested in both the open and closed positions for leakage and ease of turning.

4.4.3 Ball Type Curb Stops used at Property Line (Items # 5, 6, 7, & 8)

1. Curb stops shall have Mueller 110 Compression – both ends
2. Equality of the outlet joint to the "Mueller 110 Compression" is mandatory. The "Quick Joint" (Ford), "McQuick Compression" (McDonald), and "CB Compression" (Cambridge) have been determined to be equal.



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4.4.4 Ball Type Curb Stops for Service Replacements (Items # 9, 10, 11, & 12)

1. Curb stops shall have Female Iron Pipe Thread (FIP) Inlet x Mueller 110 Compression Outlet.
2. Equality of the outlet joint to the “Mueller 110 Compression” is mandatory. The “Quick Joint” (Ford), “McQuick Compression” (McDonald), and “CB Compression” (Cambridge) have been determined to be equal. (changed 08/11/03)

4.4.5 Straight Ball Meter Valves (Items # 13, 14, 15, & 16)

1. Straight ball meter valves shall have Mueller 110 Compression Inlet x Elliptical Meter Flange Outlet (Items 15 & 16) or Meter Swivel Nut (Items 13 & 14).
2. Equality of the outlet joint to the “Mueller 110 Compression” is mandatory. The “Quick Joint” (Ford), “McQuick Compression” (McDonald), and “CB Compression” (Cambridge) have been determined to be equal.
3. Straight ball meter valves shall be supplied with locking tabs.
4. Straight ball meter valves shall be provided with factory installed handles made of water works brass 85-5-5-5.

4.4.6 Straight Ball Meter Valves to Locate meter near wall (Items # 36, & 37)

1. Straight ball meter valves shall have Female Iron Pipe (FIP) X Elliptical Meter Flange (Items 36 & 37).
2. Straight ball meter valves shall be supplied with locking tabs.
3. Straight ball meter valves shall be provided with factory installed handles (85-5-5-5 brass).

4.4.7 Angled Ball Meter Valves (Items # 17, 18, 19, & 20)

1. Angled ball meter valves shall have Mueller 110 Compression Inlet x Meter Swivel Nut (Items 17 & 18) or Elliptical Meter Flange (Items 19 & 20).
2. Equality of the outlet joint to the “Mueller 110 Compression” is mandatory. The “Quick Joint” (Ford), “McQuick Compression” (McDonald), and “CB Compression” (Cambridge) have been determined to be equal.
3. Angled ball meter valves shall be supplied with locking tabs.
4. Angled ball meter valves shall be provided with factory installed handles (85-5-5-5 brass).



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4.4.8 Quick Joint Couplings (Items # 21, 22, 23, & 24)

1. Quick joint couplings shall have Mueller 110 Compression end – both ends
2. Equality of the outlet joint to the “Mueller 110 Compression” is mandatory. The “Quick Joint” (Ford), “McQuick Compression” (McDonald), and “CB Compression” (Cambridge) have been determined to be equal.

4.4.9 Handles for Meter Ball Valves (Items # 28, 29, 30 & 31)

1. Handles shall be water works brass 85-5-5-5.
2. Handle shall be provided with brass nut and bolt.
3. Meter Ball Valves the handle shall be a straight lever and a minimum of 4-1/4” long.

4.4.10 90-degree Elbows (Items # 32 & 33)

1. 90-degree elbow shall be 1-1/2-inch or 2-inch
2. 90-degree elbow shall have Mueller 110 Compression inlet x MIP on the outlet end
3. Equality of the outlet joint to the “Mueller 110 Compression” is mandatory. The “Quick Joint” (Ford), “McQuick Compression” (McDonald), and “CB Compression” (Cambridge) have been determined to be equal.

4.4.11 Elliptical Flange (Items # 34 & 35)

1. Elliptical Flange shall 1-1/2-inch or 2-inch.
2. Elliptical flange shall have FIP threads.



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4.4.12 Service Line Materials Table of Equivalencies

1. For lead free brass goods add the following to the listed Catalog Numbers below.
 - (a) Ford add “NL” as a suffix to the catalog number
 - (b) Red Hed supplies lead free only brass goods
 - (c) Mueller add “EB” as a suffix to the catalog number.
 - (d) McDonald add “7” as a prefix to the catalog number.
 - (e) Cambridge add “NL” as a prefix to the catalog number.



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SECTION	ITEM #	SIZE IN & OUT	CATALOG NUMBER					NOTES
			FORD	RED HED	MUELLER	MCDONALD	CAMBRIDGE	
4.2.2	1	1"	FB1000-4-Q-TA-NL	RHSB4382 1	B25008N	4104BQ 1"	311-A4H4	COMB CORP & CURB STOP CC x Q
	2		FB1000-5-Q-TA-NL	NA	NA	NA	NA	CC x Q
	3	1½"	FB1000-6-Q-TA-NL	RHSB4382 4	B25008N 1½"	4104BQ 1½"	311-A6H6	CC x Q
	4	2"	FB1000-7-Q-TA-NL	RHSB4382 5	B25008N 2"	4104BQ 2"	311-A7H7	CC x Q
4.2.3	5	1"	B44-444-Q-NL	RHSB4151 2	B25209N	6100Q 1"	202-H4H4	CURB STOP Q x Q
	6	1¼"	B44-555-Q-NL	RHSB4151 3	NA	6100Q 1¼" x 1"	202-H5H5	Q x Q
	7	1½"	B44-666-Q-NL	RHSB4151 4	B25209N 1½"	6100Q 1½"	202-H6H6	Q x Q
	8	2"	B44-777-Q-NL	RHSB4151 5	B25209N 2"	6100Q 2"	202-H7H7	Q x Q
4.2.4	9	1"	B41-444-Q-NL	RHSB4081 2	B25172N	6102Q 1"	202-H4F4	CURB STOP FIP x Q
	10	1¼"	B41-555-Q-NL	RHB40813	NA	NA	202-H5F5	FIP x Q
	11	1½"	B41-666-Q-NL	RHB40814	B25172N 1½"	6102Q 1½"	202-H6F6	FIP x Q
	12	2"	B41-777-Q-NL	RHB40815	B25172N 2"	6102Q 2"	202-H7F7	FIP x Q
4.2.5	13	1 x ¾"	B43-342W-Q-NL	NA	B24350N	6100MWQ 1"	NA	STR. METER VALVE Q x SWIVEL
	14	1¼ x 1"	B43-454W-Q-NL	NA	B24350N	NA	NA	Q x SWIVEL
	15	1½"	BF43-666W-QNL	NA	B24335N 1½"	6100MWQ 1½"	212-H6MF6H	Q x MTR FLGE
	16	2"	BF43-777W-QNL	NA	B24335N 2"	6100MWQ 2"	212-H7MF7H	Q x MTR FLGE
4.4.6	36	1½"	BF13-666W-NL	NA	B24337N 1½"	6101MW 1½"	212-F6MF6H	FIP x MTR FLGE
	37	2"	BF13-777W-NL	NA	B24337N 2"	6101MW 2"	212-F7MF7H	FIP x MTR FLGE
4.2.7	17	1 x ¾"	BA43-342W-QNL	NA	B24258N	4602BQ 1 x ¾"	210-H4T3H	ANGLE METER VALVE Q x SWIVEL
	18	1 x 1"	BA43-444W-QNL	NA	B24258N	4602BQ 1"	210-H4T4H	Q x SWIVEL
	19	1½"	BFA43-666W-QNL	NA	B24276N 1½"	4602BQ 1½"	210-H6MF6H	Q x MTR FLGE
	20	2"	BFA43-777W-QNL	NA	B24276N 2"	4602BQ 2"	210-H7MF7H	Q x MTR FLGE



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Section 4.5 WATER SERVICE BOXES

4.5.1 General

1. Water service boxes provided to the Commission or installer shall be Buffalo/slide style and manufactured, tested, inspected and delivered in full compliance with this Specification.
2. The Water service boxes shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 105 Class 35B strength of materials requirements.
3. Water service boxes shall be strong, durable, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
 - (a) An HS20 load rating is required.
 - (b) Cast iron shall conform to American Society of Testing and Materials (ASTM) A48, Class 35B.
 - (c) Water service boxes covers and seats shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
4. The Commission may require water service boxes be subjected to proof load testing as follows:
 - (a) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards.
 - (b) Water service boxes shall show no detrimental deformation or cracks when a proof load of 25,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (c) Permanent deformation shall not exceed 1/8-inch.
 - (d) All testing shall be at the supplier's expense.
5. Water service boxes top sections, bottom sections, covers, and enlarged bases shall be provided with individual permanent markings that are easily discernable and show the following:
 - (a) Name of the producing foundry and country of manufacture preceded by the words "Made in", such as "Made in USA"
 - (b) AASHTO designation or ASTM designation number



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- (c) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (d) Heat identification and cast date (MM/DD/YY),
 - (e) The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and location of the markings must meet and be subject to the approval of the Commission's aesthetic judgment.
6. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
- (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
7. All water service boxes tops, bottoms, and covers shall be coated with an approved petroleum asphaltic seal coat.
8. The manufacturer/vendor/shipper must use care in preparing valves boxes for shipment and in handling during shipment and delivery, to insure that the valves boxes are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged valves boxes will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the valve and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

4.5.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.



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2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the product(s) showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer and/or vendor of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.
4. The manufacturer and/or vendor shall furnish a letter certifying the product(s) meet all the requirements of the AIS, an explanation, in the letter, of how the product(s) meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor shall furnish a certified statement that all product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer and/or vendor shall furnish a warranty for the product(s) that states that the product(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer and/or vendor shall replace and/or repair defective parts or the whole product(s) for a minimum one (1) year time period from time of delivery.
8. The manufacturer and/or vendor shall furnish a certified statement that the required tests on the various materials and on the completed product(s) have been made, and the results of all tests conform to the requirements of the American Association of State Highway and Transportation Officials (AASHTO) M 105 Class 35B strength of materials requirements, American Society of Testing and Materials (ASTM)



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A48, Class 35B, and as the Commission may require the National Institute of Standards Technology (NIST) standards – Proof Load Testing.

9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.5.3 Buffalo Style Service Box (Items # 25, 26, 27, & 27a) for New and Existing Services

1. The Buffalo Style Service Box shall be heavy cast iron extension (adjustable) type, slide style, with arch pattern base and a recessed cover.
2. The Buffalo Style Service Box shall be 5-feet tall, with an approximate 24-inch top, an approximate 48-inch bottom, and weigh at least 41-pounds with top section, bottom section, and cover.
3. For $\frac{3}{4}$ -inch to 1-inch ball type corporations and ball type curb stops the arch shall be at least 5-inches tall with a 3-inch by 3-inch arch.
4. For 1-1/2-inch to 2-inch ball type corporations and ball type curb stops an enlarged base is be required and the arch shall be at least 7-inches tall with a 4-inch by 4-inch arch.



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5. The inside diameter of the upper section shall be at least 3-inches. The inside diameter of the bottom section shall be at least 2-1/2-inches.
6. The Buffalo Style Service Box shall be provided with a heavy duty, flush fit, cast iron cover that has a brass pentagon head nut, and the word “WATER” cast into the cover.
7. The Buffalo Style Service Box shall have a heavy coat of Asphalt-base paint.

4.5.4 Buffalo Style Water Service Boxes Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

8. Bibby Ste-Croix:
 - (a) Water Service Box complete: V042 (95E)
 - (b) Top section only: S201,
 - (c) Bottom section only: V213,
 - (d) Enlarged base: V313,
 - (e) Heavy duty cover: V243, and
 - (f) Brass bolt: V312
9. Bingham and Taylor:
 - (a) Water Service Box complete: 94-F (Fig. 4901)
 - (b) Top section only: F (Fig. 4901),
 - (c) Bottom section only: 94 (Fig. 4901),
 - (d) Enlarged base: 14-E (Fig. 4980)
 - (e) Heavy duty cover: 4901-B, and
 - (f) Brass bolt: 4951, or
10. Equal provided the products are manufactured as per these specifications.



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Section 4.6 Water Meters: 5/8-inch – 1-inch

4.6.1 General

1. Water Meters shall conform to the American Water Works Association Standard C-700 (latest edition) for: “Cold Water Meter—Positive Displacement Type, Bronze Main Case”.
 - (a) The register shall be supplied mounted to the meter body.
 - (b) Registers may be mechanical or solid state
2. The Water Meter shall be supplied and warranted as a complete assemble unit that include the meter body, encoder register, and 8-foot cord.
3. All water meters shall be certified, by a third party, as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
4. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
5. Inspection:
 - (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer and/or vendor with the provisions of



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the specifications, shall be paid for by the manufacturer and/or vendor, and shall be deductible from the price paid for the water meters.

6. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
7. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished product(s) will not be accepted.
8. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

4.6.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the Water Meters showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each finished product(s), and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation, primer (if applicable), type of coating(s), color of coating(s), manufacturer and/or vendor of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.



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4. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer and/or vendor shall furnish a certified statement that all Water Meters of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer and/or vendor shall furnish a certified statement, by an accredited third party certification organization, that the water meter is suitable for contact with drinking water in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
8. The manufacturer and/or vendor shall furnish a warranty for the water meters that states that the water meters shall be free from all defects in material and workmanship under normal use in accordance with the following requirements:
 - (a) Lead free bronze housing for a minimum twenty (20) year time period from time of delivery,
 - (b) Encoder registers which are supplied with the water meters for a minimum ten (10) year time period from time of delivery,
 - (c) The supplier of the Water Meter unit shall be fully responsible for all components and warranties of the Water Meter unit and shall replace and/or repair defective parts or the whole water meter.
9. The manufacturer and/or vendor shall furnish a warranty for the water meters accuracy that states that the water meters shall meet or exceed AWWA Standard C-700, latest edition, under normal use in accordance with the following requirements:
 - (a) 5/8-inch by 3/4-inch for a minimum five (5) year time period from time of delivery or 100,000-cubic feet (750,000-gallons), whichever occurs first,
 - (b) 1-inch for a minimum five (5) year time period from time of delivery or 133,333-cubic feet (1,000,000-gallons), whichever occurs first,
 - (c) The manufacturer and/or vendor shall replace and/or repair defective parts or the whole water meter.



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10. The manufacturer and/or vendor shall furnish a certified statement that the required tests on the various materials and on the completed water meter have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-700. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
11. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
12. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.6.3 Meter Body

1. The main meter body shall be rated for a minimum 150 psi continuous working pressure.
2. Measuring chamber shall be a nutating disc.
3. Coupling connections shall be standard National Pipe Thread (NPT) with the following connection types required:
 - (a) 5/8-inch by 3/4-inch: Male Thread Ends (MTE),
 - (b) 1-inch: MTE,



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4. A frost-protection type cast iron base plate is required for 5/8-inch and 1-inch meters and shall be attached with stainless screws.
 - (a) The base plate shall be coated with epoxy paint.
 - (b) A minimum of two (2) base screws will contain an eyelet suitable for inserting a wire tamper-evident seal.
5. All brass components which come in contact with water shall be made from Lead Free brass.
 - (a) This brass alloy is commercially referred to as “Enviro Brass II”, “Federalloy”, “Selenium Free”, or “Red-Hed Lead Free Brass”
 - Enviro Brass II is a Lead Free copper alloy, UNS Copper Alloy C89520.
 - Federalloy is a Lead Free copper alloy, UNS Copper Alloy C89833.
 - Selenium Free Brass is a Lead Free copper alloy, UNS Copper Alloy C89836.
 - Red-Hed Lead Free Brass is a Lead Free copper alloy, UNS Copper Alloy, UNS - Copper Alloy C89833.
 - (b) Brass other than the above may be approved by the Springfield Water and Sewer Commission as an acceptable equal.
 - (c) Lead Free brass is defined as having the following content:

PRIMARY ELEMENTS	COMPOSITION % BY WEIGHT
Copper (Cu)	85.0-91.0
Tin (Sn)	4.0-7.0
Lead (Max) (Pb)	0-0.25
Zinc (Zn)	2.0-6.0
Bismuth (Bi)	1.6-3.5.2
Selenium (Se)	0.0-1.1
Nickel (Ni) (Including Cobalt)	0.9-1.0

6. The meter body casting shall be clearly and deeply engraved with a unique 8 digit serial number which can be readily translated to determine the date of manufacture and shall be clearly identified as being cast from Lead Free Brass.



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- (a) “EB”, “EBII”, “NL”, or “LF” are acceptable identifiers, and must be cast in high relief or deeply engraved.
 - (b) Lead Free identifiers other than “EB”, “EBII”, “NL”, or “LF” are subject to Commission review and approval.
7. Brass parts not in contact with water may be made from copper alloy No. 83600, in accordance with ASTM B30, ASTM B62, or ASTM B584 and AWWA C-800 latest version containing 85% copper, 5% tin, 5% lead, and 5%.

4.6.4 Mechanical Register

- 1. The register shall be an encoder type with an encoded output, tamper-resistant (tamper-evident seal pin or seal wire screw), magnetically driven, and permanently sealed against moisture (1-100% operating humidity) and dirt.
- 2. Registers shall be a direct-read mechanical odometer wheel that registers in cubic feet.
 - (a) 5/8-inch through 1-inch shall be six (6) digits to the cubic foot decimal point with up to four (4) digits allowed after the decimal point.
- 3. Compatibility is required with any UI-1203 (such as provided by Sensus) protocol three (3) wire input devices.
- 4. The register shall have a minimum 8-foot encoded potted lead wire for attachment to external electronics.

4.6.5 Solid State Register

- 1. The register shall be a solid state LCD display tamper-resistant (tamper-evident seal pin or seal wire screw), magnetically driven, and permanently sealed against moisture and dirt.
- 2. The register shall have no internal battery.
- 3. Registers shall be direct-read LCD numeric; registering in cubic feet.
 - (a) 5/8-inch through 1-inch shall be six (6) digits to the cubic foot decimal point with up to four (4) digits allowed after the decimal point.
- 4. Compatibility is required with any UI-1203 (such as provided by Sensus) protocol three (3) wire input devices.
- 5. The register shall have a minimum 8-foot encoded potted lead wire for attachment to external electronics



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4.6.6 Manuals, Spare Parts, Tools, Training, Repairs

1. The requirements of this section are for Commission Price Agreements and are not for Commission Approved Contractors or Commission Capital Projects, unless specifically asked for in the project.
2. The manufacturer and/or vendor shall provide four (4) 24-inches by 36-inches (vertical) cut sheets showing all the water meter components, component material, and component part numbers with the first delivery. The vertical cut sheets shall be laminated.
3. The manufacturer and/or vendor shall provide six (6) complete sets catalogue or manual for parts, repair and maintenance with the first delivery.
4. The manufacturer and/or vendor shall provide at no additional cost four (4) complete sets of assembly/disassembly tools with the first delivery of meters.
5. The manufacturer and/or vendor shall provide training to Commission construction and maintenance staff every two (2) years. Training shall be by a factory trained representative at the Commission's Customer Service Office at 71 Colton Street, Springfield Massachusetts during normal business hours. The first training shall be provided within 30-days of the first delivery unless otherwise scheduled by the Commission.
6. The manufacturer and/or vendor shall provide the Commission with contact information for a factory trained representative who shall be responsible to respond to complaints from the Commission about defects in material, coatings, and workmanship under normal use of the product within ten (10) working days.

4.6.7 Water Meter Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Badger Meter, Inc.:
 - (a) 5/8-inch by 3/4-inch w/ MTE: Model 25 w/ HR-E Encoder Register,
 - (b) 1-inch w/ MTE: Model 55 w/ HR-E Encoder Register,
2. Neptune:
 - (a) 5/8-inch by 3/4-inch w/ MTE: T-10 Pro Read Register,



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- (b) 1-inch w/ MTE: T-10 Pro Read Register,
 - (c) 5/8-inch by 3/4-inch w/ MTE: w/ E-CODER Solid State Register
 - (d) 1-inch w/ MTE: w/ E-CODER Solid State Register
3. Equal provided the products are manufactured as per these specifications.

Section 4.7 Single Jet Water Meters – 5/8-inch X 3/4-inch, 1-inch, 1-1/2-inch, 2-inch, 3-inch, and 4-inch and Replacement Registers

4.7.1 General

1. Water Meters shall conform to the American Water Works Association Standard C-712 (latest edition) for: “Cold-Water Meters-Single-jet Type” and the following.
2. The Water Meter shall be supplied and warranted as a complete assembled unit that includes the meter body, liquid crystal display (LCD) register and 3-foot cord or longer with an Itron connector compatible with Encoder-Receiver-Transmitters (ERT).
3. Water meters shall operate accurately with no requirements for straight runs of pipe before or after the meter.
4. Water meters shall operate without any leakage or damage to any part at a minimum continuous working pressure of 230-PSI (16-Bar).
5. Water meters shall be bid without strainers. The water meter operations shall be unaffected by sand or other particulate in the flow path. The manufacturer must warranty the meter operation and accuracy with no strainer installed.
6. All water meters shall be certified, by a third party, as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal poured into a mold to create Casting(s) for a finished product,



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- (c) Incidental parts may be purchased/obtained from other counties to provide a finished product, in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
8. Inspection:
- (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer and/or vendor with the provisions of the specifications, shall be paid for by the manufacturer and/or vendor, and shall be deductible from the price paid for the water meters.
9. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
10. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished product(s) will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

4.7.2 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. The manufacturer and/or vendor and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All



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components shall be provided in accordance to these drawings. The drawings shall show the following:

- (a) Cross sectional drawings of the Water Meters showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Rated working pressure and hydrostatic test pressure of each finished product(s), and
 - (e) Country of origin for each component.
- 3. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
 - 4. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
 - 5. The manufacturer and/or vendor shall furnish a certified statement that all Water Meters of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
 - 6. The manufacturer and/or vendor shall furnish a certified statement, by an accredited third party certification organization, that the water meter is suitable for contact with drinking water in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
 - 7. The manufacturer and/or vendor shall furnish a warranty for the water meters that states that the water meters shall be free from all defects in material and workmanship under normal use in accordance with the following requirements:
 - (a) Lead free bronze main case for a minimum twenty (20) year time period from time of delivery,
 - (b) Registers which are supplied with the water meters for a minimum five (5) year time period from time of delivery,
 - (c) All other components which are supplied with the water meter for a minimum of five (5) year time period from time of delivery,



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- (d) The supplier of the Water Meter unit shall be fully responsible for all components and warranties of the Water Meter unit and shall replace and/or repair defective parts or the whole water meter.
- 8. The manufacturer and/or vendor shall furnish technical documentation for the water meters performance and accuracy that states that the water meters shall meet or exceed AWWA Standard C-712, latest edition, under normal use in accordance with Table 1, below.
 - (a) The manufacturer and/or vendor shall furnish a warranty for the 5/8-inch X 3/4-inch, 1-inch, 1-1/2-inch, 2-inch, 3-inch, and 4-inch water meters accuracy that states that the water meters shall meet or exceed AWWA Standard C-712, latest edition, and in accordance with Table 1 below for a minimum five (5) year time period from time of delivery,
 - (b) The manufacturer and/or vendor shall replace and/or repair defective parts or the whole water meter.
- 9. The manufacturer and/or vendor shall furnish a certified statement that the required tests on the various materials and on the completed water meter have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-712. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
- 10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
- 11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification, if applicable, “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the material as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.



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- (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.7.3 Meter Body – Main Case

1. The meter body shall be lead free brass as defined elsewhere in these specifications.
 - (a) 5/8-inch X 3/4-inch meters shall have composite meter chamber.
 - (b) 1-inch and larger shall have all brass meter chambers.
2. The meter body case shall have the meter serial number, size, an arrow indicating direction of flow, and identification of the main case as being lead free permanently cast, etched, or stamped on the main case.
 - (a) The unique multi digit serial number shall be readily translated to determine the date of manufacture.
 - (b) The size and an arrow indicating direction of flow shall be cast in raised characters on the main case.
3. The main case shall be of top loading design to facilitate meter access.
 - (a) 5/8-inch X 3/4-inch meters shall have the cover fastened to the main case by standard torx head bolts such that standard tools can be used to remove the cover.
 - (b) 1-inch and larger meters shall have the cover fastened to the main case by standard hex-head bolts such that standard tools can be used to remove the cover.
4. Meters shall utilize only one (1) measuring element, which shall be an impeller style, to achieve the performance required in the table below.
 - (a) No meters using two (2) or more measuring elements, such as combination meters or compound meters shall be accepted.
 - (b) 100% of water flow must be directly measured by the single-jet element to achieve performance in above table.
 - (c) Propeller type or proportional meters shall not be accepted.
5. Meters must meet the performance specifications summarized below as well as all defined by the AWWA 712, latest edition. These requirements are summarized in Table 1;



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Table 1

ITEM	Meter Size	Register Type/ telemetry type	Low Flow GPM at least at 95% accuracy	Accuracy Range 98.5-101.5%	Maximum Pressure Loss Over Accuracy Range	Max Lay Length in Inches (including spool or extension if needed)
1	5/8 X 3/4 inch	LCD/900 MHZ RF	1/8 gpm	0.25-22 gpm	15 PSI	7.5 INCH
2	5/8 X 3/4 inch	LCD/INTEGRAL CELLULAR	1/8 gpm	0.25-22 gpm	15 PSI	7.5 INCH
3	5/8 X 3/4 inch (extended flow range)	LCD/ REMOTE CELLULAR***	1/16 gpm	0.125 - 30 gpm	15 PSI	7.5 INCH
4	5/8 X 3/4 inch (extended flow range)	LCD/900 MHZ RF plus REMOTE Register with onboard CELLULAR	1/16 gpm	0.125 - 30 gpm	15 PSI	7.5 INCH
5	1 inch	LCD/900 MHZ RF	1/8 gpm	0.5-70 gpm	15 PSI	10.75 INCH
6	1 inch	LCD/INTEGRAL CELLULAR	1/8 gpm	0.5-70 gpm	15 PSI	10.75 INCH
7	1 inch	LCD/ REMOTE CELLULAR***	1/8 gpm	0.5-70 gpm	15 PSI	10.75 INCH
8	1-1/2 inch	LCD/900 MHZ RF	1/4 gpm	0.5-105 gpm	15 PSI	8 INCH
9	1-1/2 inch	LCD/INTEGRAL CELLULAR	1/4 gpm	0.5-105 gpm	15 PSI	8 INCH
10	1-1/2 inch	LCD/ REMOTE CELLULAR***	1/4 gpm	0.5-105 gpm	15 PSI	8 INCH
11	1-1/2 inch	LCD/900 MHZ RF	1/4 gpm	0.5-105 gpm	15 PSI	13 INCH*
12	1-1/2 inch	LCD/INTEGRAL CELLULAR	1/4 gpm	0.5-105 gpm	15 PSI	13 INCH*
13	1-1/2 inch	LCD/ REMOTE CELLULAR***	1/4 gpm	0.5-105 gpm	15 PSI	13 INCH*
14	2 inch	LCD/900 MHZ RF	1/4 gpm	0.75-165 gpm	15 PSI	10 INCH
15	2 inch	LCD/INTEGRAL CELLULAR	1/4 gpm	0.75-165 gpm	15 PSI	10 INCH
16	2 inch	LCD/ REMOTE CELLULAR***	1/4 gpm	0.75-165 gpm	15 PSI	10 INCH
17	2 inch	LCD/900 MHZ RF	1/4 gpm	0.75-165 gpm	15 PSI	17 INCH*
18	2 inch	LCD/INTEGRAL CELLULAR	1/4 gpm	0.75-165 gpm	15 PSI	17 INCH*
19	2 inch	LCD/ REMOTE CELLULAR***	1/4 gpm	0.75-165 gpm	15 PSI	17 INCH*
20	3 inch	LCD/900 MHZ RF	1/2 gpm	0.75-350 gpm	15 PSI	12 INCH
21	3 inch	LCD/INTEGRAL CELLULAR	1/2 gpm	0.75-350 gpm	15 PSI	12 INCH
22	3 inch	LCD/ REMOTE CELLULAR***	1/2 gpm	0.75-350 gpm	15 PSI	12 INCH
23	3 inch	LCD/900 MHZ RF	1/2 gpm	0.75-350 gpm	15 PSI	17 INCH**
24	3 inch	LCD/INTEGRAL CELLULAR	1/2 gpm	0.75-350 gpm	15 PSI	17 INCH**
25	3 inch	LCD/ REMOTE CELLULAR***	1/2 gpm	0.75-350 gpm	15 PSI	17 INCH**
26	4 inch	LCD/900 MHZ RF	3/4 gpm	1.5-500 gpm	15 PSI	14 INCH
27	4 inch	LCD/INTEGRAL CELLULAR	3/4 gpm	1.5-500 gpm	15 PSI	14 INCH
28	4 inch	LCD/ REMOTE CELLULAR***	3/4 gpm	1.5-500 gpm	15 PSI	14 INCH
29	4 inch	LCD/900 MHZ RF	3/4 gpm	1.5-500 gpm	15 PSI	20 INCH**
30	4 inch	LCD/INTEGRAL CELLULAR	3/4 gpm	1.5-500 gpm	15 PSI	20 INCH**
31	4 inch	LCD/ REMOTE CELLULAR***	3/4 gpm	1.5-500 gpm	15 PSI	20 INCH**
32	universal ****	LCD Cellular Network equipped register with mounting bracket and housing only				
33	universal ****	LCD Cellular Network equipped register with mounting bracket and housing only with 3' Itron ERT Connector				
34	universal ****	LCD Cellular Network equipped register with mounting bracket and housing only with wired remote antenna (15 to 25 ft); length at customer's request				

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35	universal ****	LCD Cellular Network equipped register with mounting bracket and housing only with wired remote antenna (15 to 25ft); length at customer's request and also with a two wire configurable (SCADA compatible) pulse output
36	universal ****	universal IV REMOTE Register for attachment to 3 wire industry standard AMR encoded meter output
37	universal ****	15ft to 50ft (length at customer's request) LCD Cellular Network equipped register only
38	universal ****	universal mounting bracket and housing for register
39	various	mounting plate and housing for register specific for Badger M series meters

* Spool pieces for 1 1/2 and 2 inch meters will have a 1" NPT test port (with plug) built in

** Spool pieces for 3 and 4 inch meters will have a 2" NPT test port (with plug) built in

***Remote is a wired Transmission Endpoint with at least a 15 foot cord and up to 25 foot as requested

**** will work at least on any size Metron model d or newer top loading spectrum and enduro meter and on badger M25 or M70 Series Bases

6. Coupling connections shall be standard National Pipe thread (NPT) with the following connection types required:

(a) 5/8-inch X 3/4-inch: Male Thread Ends (MTE)

(b) 1-inch: MTE

7. Coupling connections shall be casing flanges with the following connection types required:

(a) 1-1/2-inch: Two (2) bolt oval flange ends,

(b) 2-inch: Two (2) bolt oval flange ends,

(c) 3-inch: Four (4) bolt round flanged ends, and conform to ANSI B16.24 for copper alloy

(d) 4-inch: Eight (8) bolt round flanged ends, and conform to ANSI B16.24 for copper alloy

8. Water meters shall be supplied with flange gaskets and all fasteners necessary for installation.



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9. All fasteners shall be made of Grade 316 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 316 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 316+ stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
10. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
11. All brass components which come in contact with water shall be made from Lead Free brass.
 - (a) This brass alloy is commercially referred to as “Enviro Brass II”, “Federalloy”, “Selenium Free”, “Red-Hed Lead Free Brass”, or “Silicon Red Brass”
 - Enviro Brass II is a Lead Free copper alloy, UNS Copper Alloy C89520.
 - Federalloy is a Lead Free copper alloy, UNS Copper Alloy C89833.
 - Selenium Free Brass is a Lead Free copper alloy, UNS Copper Alloy C89836.
 - Red-Hed Lead Free Brass is a Lead Free copper alloy, UNS Copper Alloy, UNS - Copper Alloy C89833.
 - Silicon Red Brass is a Lead Free copper alloy, UNS Copper Alloy C69430.
 - (b) Brass other than the above may be approved by the Springfield Water and Sewer Commission as an acceptable equal.
 - (c) Lead Free brass is defined in Table 2 as having the following elemental content(s):



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Table 2

PRIMARY ELEMENTS	COMPOSITION % BY WEIGHT
Copper (Cu)	81.75-91.0
Tin (Sn)	0.0-7.0
Lead (Max) (Pb)	0-0.25
Zinc (Zn)	2.0-14.0
Bismuth (Bi)	0.0-3.5
Selenium (Se)	0.0-1.1
Nickel (Ni) (Including Cobalt)	0.9-1.0
Silicon (Si)	0.0-4.0

12. The meter body casting shall clearly identify the casting as being Lead Free Brass.
- (a) “EB”, “EBII”, “NL”, or “LF” are acceptable identifiers, and must be cast in high relief or deeply engraved.
 - (b) Lead Free identifiers other than “EB”, “EBII”, “NL”, or “LF” are subject to Commission review and approval.
13. Brass parts not in contact with water may be made from copper alloy No. 83600, in accordance with ASTM B30, ASTM B62, or ASTM B584 and AWWA C-800 latest version containing 85% copper, 5% tin, 5% lead, and 5%.

4.7.4 Registers

1. The registers shall be a solid state liquid filled crystal display (LCD) or solid state LCD with built-in cellular technology for reading data upload to a web based cloud environment and in accordance with these Material Specifications.
2. The registers housing and lid, if applicable, shall be made of bronze or polymer.
3. The registers shall be sealed permanently against moisture and dirt with an IP68 rating.
4. The registers shall be a solid state electronic LCD type.
5. The registers shall be magnetically driven. No intermediate gearing shall be allowed.



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6. The registers shall be tamper proof and secured to the main case in such a manner that tampering can be easily determined.
7. The registers shall be configurable for either cubic feet or gallons upon request before or after being installed by the manufacturer or the Commission.
8. The registers lens window shall be polycarbonate plastic and in accordance with the following:
 - (a) The lens window shall be break resistant and scratch resistant,
 - (b) No liquid filled registers shall be accepted,
 - (c) UV rated cure adhesive for sealing,
 - (d) Self-healing dielectric gel is required for all wire connections (potting),
 - (e) The registers shall be able to withstand 100% humidity (submersible), and
 - (f) The display shall have a minimum range of -4-degrees Fahrenheit (F) to +176-degrees F with an Extended Range Option available.
9. The registers shall have on-board data logging with programmable intervals from 1-minute to 1-hour and on-board memory of at least 32,000-data points.
10. The registers shall be field serviceable without interruption of the meter's operation
11. The register box must be securely attached to the main case and be securely held in place.
12. The name of the manufacturer and the units of measure shall be clearly visible and identifiable and located on the exterior of the register, register box or lid.
13. The register shall be supplied mounted to the meter body.
14. All internal components shall be of non-corrosive materials as described in AWWA C712 standard.
15. The Registers output for radio frequency (RF) shall be compatible with ITRON-60W Encoder Receive Transmitter (ERT) and unless requested or otherwise approved come with a 15-foot or longer cord terminating with an Itron connector, as indicated in Table 1 above.
16. Registers with two-way cellular based communications shall allow for data log retrieval by a device connecting by either IrDA, Bluetooth, or equal in the event that the cellular data is not available, as indicated in Table 1 above.



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(g) Such device to be available from and supported by the meter manufacturer for a period of at least 10-years.

(h) Upon request a second output for either pulse or 4-20ma shall be available, as indicated in Table 1 above.

17. The maximum indications of the digits on the first display number and the minimum capacity of the register shall be as indicated in Table 3

Table 3

Meter Size	Maximum Allowable Indication of Initial Dial		Minimum allowable Capacity of Register (In million cubic-feet and million gallons)	
	Cubic Feet	Gallons	Cubic Feet	Gallons
5/8-inch X 3/4-inch	0.1	1.0	1.0	10
1-inch	0.1	1.0	1.0	10
1-1/2-inch	10	100	10	100
1-1/2-inch	10	100	10	100
2-inch	10	100	10	100
2-inch	10	100	10	100
3-inch	10	100	10	100
3-inch	10	100	10	100
4-inch	100	1000	10	100
4-inch	100	1000	10	100

4.7.5 Manuals, Spare Parts, Tools, Training, Repairs

1. The requirements of this section are for Commission Price Agreements and are not for Commission Approved Contractors or Commission Capital Projects, unless specifically asked for in the project.



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2. The manufacturer and/or vendor shall provide four (4) 24-inches by 36-inches (vertical) cut sheets showing all the water meter components, component material, and component part numbers with the first delivery. The vertical cut sheets shall be laminated.
3. The manufacturer and/or vendor shall provide six (6) complete sets catalogue or manual for parts, repair and maintenance with the first delivery.
4. The manufacturer and/or vendor shall provide at no additional cost four (4) complete sets of assembly/disassembly tools with the first delivery of meters.
5. The manufacturer and/or vendor shall provide training to Commission construction and maintenance staff every two (2) years. Training shall be by a factory trained representative at the Commission's Customer Service Office at 71 Colton Street, Springfield Massachusetts during normal business hours. The first training shall be provided within 30-days of the first delivery unless otherwise scheduled by the Commission.
6. The manufacturer and/or vendor shall provide the Commission with contact information for a factory trained representative who shall be responsible to respond to complaints from the Commission about defects in material, coatings, and workmanship under normal use of the product within ten (10) working days.



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4.7.6 Water Meter Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Metron-Farnier.:
 - (a) 5/8-inch X 3/4-inch w/ NPT MTE: Model - S-30-D (Brass)
 - (b) 1-inch w/ NPT MTE; Model – Spectrum S-50-DL
 - (c) 1-1/2-inch w/ Two bolt oval flange ends: Model - Spectrum S-88-D,
 - (d) 2-inch w/ Two bolt oval flange ends: Model Spectrum S-130-D,
 - (e) 3-inch w/ Four bolt round flange ends: Model Spectrum S-175-D,
 - (f) 4-inch w/ Eight bolt round flange ends: Model Spectrum S-500-D, or
2. Equal provided the products are manufactured as per these specifications.



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Section 4.8 Single Jet Water Meters – 6-inch and 8-inch

4.8.1 General

1. Water Meters shall conform to the American Water Works Association Standard C-712 (latest edition) for: “Cold-Water Meters-Single-jet Type” and the following.
2. The Water Meter shall be supplied and warranted as a complete assembled unit that includes the meter body, liquid crystal display (LCD) register and 3-foot cord or longer with an Itron connector compatible with Encoder-Receiver-Transmitters (ERT).
3. Water meters shall operate accurately with no requirements for straight runs of pipe before or after the meter.
4. Water meters shall operate without any leakage or damage to any part at a minimum continuous working pressure of 230-PSI (16-Bar).
5. Water meters shall be bid without strainers. The water meter operations shall be unaffected by sand or other particulate in the flow path. The manufacturer must warranty the meter operation and accuracy with no strainer installed.
6. Water meters for dual fire and domestic applications shall be Factory Mutual (FM) approved.
7. All water meters shall be certified, by a third party, as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
8. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or



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- (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
9. Inspection:
- (a) All finished product(s) furnished shall be subject to inspection by the Commission at the place of manufacture and shall be subject to inspection after delivery to the Commission.
 - (b) Cost of re-inspection of materials or fabricated finished product(s) caused by the non-compliance of the manufacturer and/or vendor with the provisions of the specifications, shall be paid for by the manufacturer and/or vendor, and shall be deductible from the price paid for the water meters.
10. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission's service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload.
11. The manufacturer/vendor/shipper must use care in preparing finished product(s) for shipment and in handling during shipment and delivery, to insure that the finished(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged finished product(s) will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the finished product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications and the applicable AWWA Standards.

4.8.2 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. The manufacturer and/or vendor and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the Water Meters showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,

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- (d) Rated working pressure and hydrostatic test pressure of each finished product(s), and
 - (e) Country of origin for each component.
3. The manufacturer and/or vendor shall furnish a letter certifying the product meets all the requirements of the AIS, an explanation, in the letter, of how the products meets the AIS requirements, and signed by the Owner or President of the Company.
 4. The manufacturer and/or vendor shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
 5. The manufacturer and/or vendor shall furnish a certified statement that all Water Meters of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
 6. The manufacturer and/or vendor shall furnish a certified statement, by an accredited third party certification organization, that the water meter is suitable for contact with drinking water in accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.
 7. The manufacturer and/or vendor shall furnish a warranty for the water meters that states that the water meters shall be free from all defects in material and workmanship under normal use in accordance with the following requirements:
 - (a) Lead free bronze main case for a minimum twenty (20) year time period from time of delivery,
 - (b) Registers which are supplied with the water meters for a minimum five (5) year time period from time of delivery,
 - (c) All other components which are supplied with the water meter for a minimum of five (5) year time period from time of delivery,
 - (d) The supplier of the Water Meter unit shall be fully responsible for all components and warranties of the Water Meter unit and shall replace and/or repair defective parts or the whole water meter.
 8. The manufacturer and/or vendor shall furnish technical documentation for the water meters performance and accuracy that states that the water meters shall meet or exceed AWWA Standard C-712, latest edition, under normal use in accordance with Table 1, below.
 - (a) The manufacturer and/or vendor shall furnish a warranty for the 6-inch and 8-inch water meters accuracy that states that the water meters shall meet or exceed



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AWWA Standard C-712, latest edition, and in accordance with Table 1 below for a minimum five (5) year time period from time of delivery,

- (b) The manufacturer and/or vendor shall replace and/or repair defective parts or the whole water meter.
- 9. The manufacturer and/or vendor shall furnish a certified statement that the required tests on the various materials and on the completed water meter have been made, and the results of all tests conform to the requirements of the American Water Works Association Standard Specification C-712. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
- 10. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
- 11. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification, if applicable, “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (e) Approved means the contractor can supply the material as shown on the drawing(s).
 - (f) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
 - (g) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

4.8.3 Meter Body – Main Case

- 1. The meter body shall be lead free brass as defined elsewhere in these specifications and shall have all brass meter chambers.
- 2. The meter body case shall have the meter serial number, size, an arrow indicating direction of flow, and identification of the main case as being lead free permanently cast, etched, or stamped on the main case.

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- (a) The unique multi digit serial number shall be readily translated to determine the date of manufacture.
- (b) The size and an arrow indicating direction of flow shall be cast in raised characters on the main case.
- 3. The main case shall be of top loading design to facilitate meter access and shall have the cover fastened to the main case by standard hex-head bolts such that standard tools can be used to remove the cover.
- 4. Meters shall utilize only one (1) measuring element, which shall be an impeller style, to achieve the performance required in the table below.
 - (a) No meters using two (2) or more measuring elements, such as combination meters or compound meters shall be accepted.
 - (b) 100% of water flow must be directly measured by the single-jet element to achieve performance in above table.
 - (c) Propeller type or proportional meters shall not be accepted.
- 5. Meters must meet the performance specifications summarized below as well as all defined by the AWWA 712, latest edition. These requirements are summarized in Table 1;



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Table 1

ITEM	Meter Size	Register Type/ telemetry type	Low Flow GPM at least at 95% accuracy	Accuracy Range 98.5-101.5%	Maximum Pressure Loss Over Accuracy Range	Max Lay Length in Inches (including spool or extension if needed)
1	6 inch	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector	5 gpm	6 - 2800 gpm	7 PSI	24 INCH
2	6 inch (SCADA)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector and a two wire pulse output for SCADA and similar systems	5 gpm	6 - 2800 gpm	7 PSI	24 INCH
3	6 inch (extended flow range)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector	15 gpm	15 - 3500 gpm	7 PSI	24 INCH
4	6 inch (extended flow range) (SCADA)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector and a two wire pulse output for SCADA and similar systems	15 gpm	15 - 3500 gpm	7 PSI	24 INCH
5	8 inch	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector	5 gpm	6 - 2800 gpm	7 PSI	24 INCH
6	8 inch (SCADA)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector and a two wire pulse output for SCADA and similar systems	5 gpm	6 - 2800 gpm	7 PSI	24 INCH
7	8 inch (extended flow range)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector	15 gpm	15 - 3500 gpm	7 PSI	24 INCH
8	8 inch (extended flow range) (SCADA)	LCD/ REMOTE CELLULAR ANTENNA*** as well as with an AMR three wire output to a 3 foot cord terminating with an Itron ERT Connector and a two wire pulse output for SCADA and similar systems	15 gpm	15 - 3500 gpm	7 PSI	24 INCH

***Remote is a wired Cellular Transmission Antenna Endpoint with at least a 15-foot cord and up to 25-foot as requested

- 6-inch and 8-inch meters shall have a 2-inch NPT test port (with plug) tapped in to the main body.



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7. Cellular devices shall include ten (10) years of pre-paid cellular service.
8. Coupling connections shall be casing flanges with the following connection types required:
 - (a) 6-inch: Eight (8) bolt round flanged ends, and conform to ANSI B16.24 for copper alloy
 - (b) 8-inch: Eight (8) bolt round flanged ends, and conform to ANSI B16.24 for copper alloy
9. Water meters shall be supplied with flange gaskets and all fasteners necessary for installation.
10. All fasteners shall be made of Grade 316 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 316 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 316+ stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
11. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
12. All brass components which come in contact with water shall be made from Lead Free brass.
 - (a) This brass alloy is commercially referred to as “Enviro Brass II”, “Federalloy”, “Selenium Free”, “Red-Hed Lead Free Brass”, or “Silicon Red Brass”
 - Enviro Brass II is a Lead Free copper alloy, UNS Copper Alloy C89520.
 - Federalloy is a Lead Free copper alloy, UNS Copper Alloy C89833.
 - Selenium Free Brass is a Lead Free copper alloy, UNS Copper Alloy C89836.
 - Red-Hed Lead Free Brass is a Lead Free copper alloy, UNS Copper Alloy, UNS - Copper Alloy C89833.



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- Silicon Red Brass is a Lead Free copper alloy, UNS Copper Alloy C69430.
- (b) Brass other than the above may be approved by the Springfield Water and Sewer Commission as an acceptable equal.
- (c) Lead Free brass is defined in Table 2 as having the following elemental content(s):



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Table 2

PRIMARY ELEMENTS	COMPOSITION % BY WEIGHT
Copper (Cu)	81.75-91.0
Tin (Sn)	0.0-7.0
Lead (Max) (Pb)	0-0.25
Zinc (Zn)	2.0-14.0
Bismuth (Bi)	0.0-3.5
Selenium (Se)	0.0-1.1
Nickel (Ni) (Including Cobalt)	0.9-1.0
Silicon (Si)	0.0-4.0

13. The meter body casting shall clearly identify the casting as being Lead Free Brass.
- (a) “EB”, “EBII”, “NL”, or “LF” are acceptable identifiers, and must be cast in high relief or deeply engraved.
- (b) Lead Free identifiers other than “EB”, “EBII”, “NL”, or “LF” are subject to Commission review and approval.
14. Brass parts not in contact with water may be made from copper alloy No. 83600, in accordance with ASTM B30, ASTM B62, or ASTM B584 and AWWA C-800 latest version containing 85% copper, 5% tin, 5% lead, and 5%.

4.8.4 Registers

1. The registers shall be a solid state liquid filled crystal display (LCD) or solid state LCD with both a built in RF output to a three (3) wire AMR standard setup and built-in cellular technology with either an onboard or wired remote antenna for reading data upload to a web based cloud environment and in accordance with these Material Specifications.
2. The registers housing and lid, if applicable, shall be made of bronze or polymer.
3. The registers shall be sealed permanently against moisture and dirt with an IP68 rating.
4. The registers shall be a solid state electronic LCD type.



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5. The registers shall be magnetically driven. No intermediate gearing shall be allowed.
6. The registers shall be tamper proof and secured to the main case in such a manner that tampering can be easily determined.
7. The registers shall be configurable for either cubic feet or gallons upon request before or after being installed by the manufacturer or the Commission.
8. The registers lens window shall be polycarbonate plastic and in accordance with the following:
 - (a) The lens window shall be break resistant and scratch resistant,
 - (b) No liquid filled registers shall be accepted,
 - (c) UV rated cure adhesive for sealing,
 - (d) Self-healing dielectric gel is required for all wire connections (potting),
 - (e) The registers shall be able to withstand 100% humidity (submersible), and
 - (f) The display shall have a minimum range of -4-degrees Fahrenheit (F) to +176-degrees F with an Extended Range Option available.
9. The registers shall have on-board data logging with programmable intervals from 1-minute to 1-hour and on-board memory of at least 32,000-data points.
10. The registers shall be field serviceable without interruption of the meter's operation
11. The register box must be securely attached to the main case and be securely held in place.
12. The name of the manufacturer and the units of measure shall be clearly visible and identifiable and located on the exterior of the register, register box or lid.
13. The register shall be supplied mounted to the meter body.
14. All internal components shall be of non-corrosive materials as described in AWWA C712 standard.
15. The Registers output for radio frequency (RF) shall be compatible with ITRON-60W Encoder Receive Transmitter (ERT) and unless requested or otherwise approved come with a 15-foot or longer cord terminating with an Itron connector, as indicated in Table 1 above.



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16. Registers with two-way cellular based communications shall allow for data log retrieval by a device connecting by either IrDA, Bluetooth, or equal in the event that the cellular data is not available, as indicated in Table 1 above.
- (g) Such device to be available from and supported by the meter manufacturer for a period of at least 10-years.
- (h) Upon request a second output for either pulse or 4-20ma shall be available, as indicated in Table 1 above.
17. The maximum indications of the digits on the first display number and the minimum capacity of the register shall be as indicated in Table 3

Table 3

Meter Size	Maximum Allowable Indication of Initial Dial		Minimum allowable Capacity of Register (In million cubic-feet and million gallons)	
	Cubic Feet	Gallons	Cubic Feet	Gallons
6-inch	100	1000	99	999
8-inch	100	1000	99	999



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4.8.5 Manuals, Spare Parts, Tools, Training, Repairs

1. The requirements of this section are for Commission Price Agreements and are not for Commission Approved Contractors or Commission Capital Projects, unless specifically asked for in the project.
2. The manufacturer and/or vendor shall provide four (4) 24-inches by 36-inches (vertical) cut sheets showing all the water meter components, component material, and component part numbers with the first delivery. The vertical cut sheets shall be laminated.
3. The manufacturer and/or vendor shall provide six (6) complete sets catalogue or manual for parts, repair and maintenance with the first delivery.
4. The manufacturer and/or vendor shall provide at no additional cost four (4) complete sets of assembly/disassembly tools with the first delivery of meters.
5. The manufacturer and/or vendor shall provide training to Commission construction and maintenance staff every two (2) years. Training shall be by a factory trained representative at the Commission's Customer Service Office at 71 Colton Street, Springfield Massachusetts during normal business hours. The first training shall be provided within 30-days of the first delivery unless otherwise scheduled by the Commission.
6. The manufacturer and/or vendor shall provide the Commission with contact information for a factory trained representative who shall be responsible to respond to complaints from the Commission about defects in material, coatings, and workmanship under normal use of the product within ten (10) working days.



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4.8.6 Water Meter Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Metron-Farnier.:
 - (a) 6-inch w/ Eight bolt round flange ends: Model Enduro E-2800-D,
 - (b) 8-inch w/ Eight bolt round flange ends: Model Enduro E-2800-D, or
2. Equal provided the products are manufactured as per these specifications.



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Section 4.9 Encoder-Receiver-Transmitters

4.9.1 General

1. Encoder Receiver Transmitters (ERT) shall conform to the American Water Works Association Standard C-712 (latest edition) for: “Cold-Water Meters-Single-jet Type” and the following.
2. All devices must be readable by drive by systems we have including the following Itron Mobile Collection (MC) devices:
3. MC3 with MV-RS v8.0 or higher and FCS with v2.2 or higher MC Lite with MV-RS v8.1 or higher and FCS with v2.3 or higher
4. All devices must have data logging capability to store at least 30 days of hourly consumption information that can be read either by mobile or fixed network.
5. The read data information must be presented in a manner it can be handled by Itron's MV-RS and/or FCS applications.
6. Transmission Parameters:
7. Data message:
8. Transmissions of meter register value cut cable and or communication error tamper(s), reverse flow, and leak status messages, as well as low battery indicator must be transmitted in an interval not greater than ten seconds in mobile mode.
9. All the information above and at least the last 6 time synchronized consumption intervals must transmit at least every five minutes.
10. A 12 bit message that contains a single, cumulative meter reading value along with the meter serial number, commodity type and checksum and tamper flags must be transmitted every 60 seconds in fixed network mode
11. Transmitter frequencies:
 - (a) 908 - 924 MHz in Mobile drive by mode
 - (b) 903 - 926.8 MHz in fixed network mode
12. Must operate in bubble-up mode and not require a license from the Federal Communications Commission FCC Part 15.247



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13. Operating temperature for basement applications must be -40°C to +60°C
Humidity limits: 0 to 100% (submersible)
14. Compatibility: Badger Meter s with ADE Registers, Siemens Mag Meters, Master Meter Octave and other "Sensus Protocol" Meters
15. Warranty: 100% for minimum of 10 years



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Section 4.10 CONCRETE METER VAULTS

4.10.1 General

1. Concrete Meter Vaults provided to the Commission or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. All vaults interior dimensions must allow a clear working space around the meters of at least 18-inches.
3. All vaults must be adequately reinforced to bear traffic and have an H-20 load rating per AASHTO HS-20-44.
4. All vaults shall be constructed with shiplap joints.
5. All vaults shall be watertight and sealed with butyl rubber gaskets as follows:
 - (a) Seal bell and spigot joints of vault sections with butyl rubber flexible rope-like gasket material.
 - (b) Butyl rubber flexible rope-like gasket material shall conform to ASTM C990.
 - (c) Butyl rubber flexible rope-like gasket material shall be produced from blends of butyl rubber, refined hydro carbons, resins, and plasticized compounds reinforced with inert mineral filler and be solvent free.
 - (d) Each gasket shall have a self-adhesive nature.
 - (e) Each gasket shall be 1-inch diameter.
 - (f) Each gasket shall be furnished in coils.
6. All vaults shall have two (2) removable tops with lift rings made with ¾-inch galvanized rebar and have a 3-inch loop. The lift rings shall be located at the four (4) corners of each top piece.
7. All vaults shall have manhole rungs installed under each manhole opening.
8. Manhole rungs shall be made of reinforced steel, copolymer polypropylene, and 14-inch wide. Copolymer polypropylene shall conform to ASTM D4101 Classification PP0344 B33534 Z02. Steel reinforcing shall be 1/2-in diameter, conforming to ASTM A615, Grade 60 and shall be continuous throughout rung. Manhole rungs shall meet all OSHA requirements.



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9. All vaults shall have manhole rungs installed 12-inches apart, so that the top foothold is within 12-inches of the manhole cover, the bottom foothold is within 12-inches of the vault floor, and the footholds are 7-inches from the vault wall.
10. All vaults shall have an adequate floor sump beneath one of the manhole openings. The sump shall be 12 through 14-inches diameter by 3-inches deep.
11. The sump/drain shall not be connected to a sewer.
12. All vault floors shall be pitched to the drain.
13. Delivery shall be specified in terms of number of days from receipt of order.
14. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
15. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

16. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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4.10.2 Standard Concrete Meter Vault for Ductile Iron Water Service Pipe

1. Standard Concrete Meter Vaults for ductile iron water service pipes shall, as a minimum, meet all specifications as in Paragraphs 4.10.1 and the following:
2. Standard Concrete Meter Vaults for ductile iron water service pipes shall be provided in accordance with Standard **Meter Vault for Ductile Iron Water Service Pipe Detail (W-13.3)**, of these Material Specifications.
3. Concrete Meter Vaults for 8-inch service pipe shall be provided with inside dimensions of 10-feet long, 6-feet wide, and 6.5-feet tall.
4. Knockouts for the pipe shall be provided on each end shall be tapered with the center at least 2-feet above the floor and 2-feet from the same wall.
5. The knockout diameter shall be at least 12-inches.
6. Two (2) 30-inch manhole openings shall be provided and each shall be located on the same side of the top at each end across from the knockouts.
7. The walls, top, and bottom shall be 6-inches thick.
8. The Standard Concrete Meter Vaults shall be delivered in four (4) sections, as follows:
 - (a) Bottom riser with monolithic floor; 3-feet-9-inches high.
 - (b) Upper riser (without a top); 3-feet-3-inches high.
 - (c) Two-piece top; 6-inches high.



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4.10.4 Oversize Concrete Meter Vault for Ductile Iron Water Service Pipe

1. Oversize Concrete Meter Vaults for ductile iron water service pipes shall, as a minimum, meet all specifications as in Paragraphs 4.9.1 and the following:
2. Oversize Concrete Meter Vaults for ductile iron water service pipes shall be provided in accordance with **Oversize Meter Vault for Ductile Iron Water Service Pipe Detail (W-13.3)**, of these Material Specifications.
3. Oversize Concrete Meter Vaults for ductile iron water service pipe shall be provided with inside dimensions of 11-feet, 2-inches long, 8-feet wide, and 6.5-feet tall.
4. Two (2) tapered knockouts for the pipes shall be provided on each end with the centers at least 2-feet above the floor and 2-feet from the outer walls of the pit.
5. The knockout diameter shall be at least 12-inches.
6. Two (2) 30-inch manhole openings shall be provided and each shall be located on the same side of the top at each end across from the knockouts.
7. The walls and bottom shall be 6-inches thick. The top shall be 8-inches thick.
8. The Oversize Concrete Meter Vaults shall be delivered in four (4) sections, as follows:
 - (a) Bottom riser with monolithic floor; 3-feet-9-inches high.
 - (b) Upper riser (without a top); 3-feet-3-inches high.
 - (c) Two-piece top; 8-inches high.



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4.10.6 Concrete Meter Vaults Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Standard Concrete Meter Vault:

- (a) Arrow Concrete Products. – Standard 6-feet x 10-feet x 6.5-feet, or
- (b) Equal provided the products are manufactured as per these specifications.

2. Oversize Concrete Meter Vault:

- (a) Arrow Concrete Products. – Oversize 8-feet x 11.17-feet x 6.5-feet, or
- (b) Equal provided the products are manufactured as per these specifications.



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Section 4.11 MANHOLE FRAMES AND COVERS FOR WATER VAULTS

4.11.1 General

1. Manhole frame and covers provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. The manhole frame and cover shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 306 Drainage, Sewer, Utility, and Related Casting Specification and M 105 Class 35B strength of materials requirements.
3. Manhole frames and covers shall be strong, durable, even grained cast iron, ductile iron, or Fiber Reinforced Polymer smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
 - (a) An HS20 load rating is required.
 - (b) Cast iron shall conform to American Society of Testing and Materials (ASTM) A48, Class 35B.
 - (c) Ductile iron shall conform to ASTM A 536 Grade 80-55-06.
 - (d) Fiberglass Reinforced Polymer shall conform to ASTM C 1028.
 - (e) Manhole covers and frame seats shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
4. The Commission requires that the Manhole Frame and Covers be subjected to proof load testing as follows:
 - (a) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards.
 - (b) The Manhole Frame and Covers shall show no detrimental deformation or cracks when a proof load of 40,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (c) Permanent deformation shall not exceed 1/8-inch.
 - (d) All testing shall be at the supplier's expense.
5. Manhole covers shall have a diamond pattern cast on the top.



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6. Manhole Frame and Cover shall be provided with individual permanent markings that are easily discernable and show the following:
 - (a) Name of the producing foundry and country of manufacture preceded by the words “Made in”, such as “Made in USA”
 - (b) AASHTO designation or ASTM designation number
 - (c) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (d) Heat identification and cast date (MM/DD/YY),
 - (e) The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and location of the markings must meet and be subject to the approval of the Commission’s aesthetic judgment.
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create casting(s) for a finished product,
 - (c) Manufactured shall mean raw material formed into a finished product,
 - (d) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (e) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (f) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement govern.
8. Delivery shall be specified in terms of number of days from receipt of order.
9. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission’s service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.



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10. The manufacturer/vendor/shipper must use care in preparing products for shipment and in handling during shipment and delivery, to insure that the water meters are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged manhole frame and covers will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the manhole frame and cover and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AASHTO and ASTM Standards.

4.11.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All finished product(s) shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the finished product(s) showing overall dimensions,
 - (b) Material specifications for each component of the finished product(s),
 - (c) Coating applied to each component of the finished product(s), if applicable,
 - (d) Weight of each component and total weight for each finished product(s), and
 - (e) Country of origin for each component.
3. If applicable, the manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying type of coating, color of coating, manufacturer of coating, part number of the coating, and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the finished product(s) meets all the requirements of the AIS, an explanation, in the letter, of how the finished product(s) meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.



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6. The manufacturer shall furnish a certified statement that all finished product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the finished product(s) that states that the finished product(s) shall be free from all defects in material, coatings, and workmanship under normal use of the product from time of delivery for a minimum ten (10) year time period.
8. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed product(s) have been made, and the results of all tests conform to the requirements of the AASHTO M105 35B, ASTM A48 35B, and NIST. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product(s), in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the finished product(s) as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the finished product(s) as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct finished product(s) to be used.

4.11.3 Standard Manhole Frame 32-inch by 8-inch

1. Standard Manhole Frame 32-inch by 8-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department

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of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Standard Manhole Frame 32-inch by 8-inch shall, as a minimum, meet all specifications as in Paragraphs 4.11.1 and 4.11.2, and the following:
3. Standard Manhole Frame 32-inch by 8-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 32-inch by 8-inch shall have a minimum dimensions shall be in accordance with **32" X 8" Water Frame Only Detail (W-13.6)**.
5. Standard Manhole Frame 32-inch by 8-inch shall have a minimum 30-inch diameter access opening.
6. Standard Manhole Frame 32-inch by 8-inch shall have a maximum height of 8-inches.

4.11.4 32-inch Standard Water Manhole Cover

1. 32-inch Standard Water Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. 32-inch Standard Water Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 4.11.1 and 4.11.2, and the following:
3. 32-inch Standard Water Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 32-inch Standard Water Manhole Cover shall have a minimum dimensions shall be in accordance with **32" Standard Water Manhole Cover Detail (W-13.7)**.
5. The words "SPRINGFIELD WATER & SEWER COMMISSION" and the Commission Logo shall be raised relief.
6. The word "WATER" shall be raised relief.
7. 32-inch Standard Water Manhole Cover shall have two (2) penetrating pick-holes on each opposite side and one (1) 1-1/4-inch diameter penetrating pick-hole shall offset a minimum of 4-inches from the center, a 31-3/4-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-3/4-inch thick (plus or minus 1/16-inch).



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8. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

4.11.5 24-inch Replacement Water Manhole Cover

1. 24-inch Replacement Water Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. 24-inch Replacement Water Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 4.11.1 and 4.11.2, and the following:
3. 24-inch Replacement Water Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 24-inch Replacement Water Manhole Cover shall have a minimum dimensions shall be in accordance with **24" Replacement Water Cover Detail (W-13.8)**.
5. The words "SPRINGFIELD WATER & SEWER COMMISSION" and the Commission Logo shall be raised relief.
6. The word "WATER" shall be raised relief.
7. 24-inch Replacement Water Manhole Cover shall have two (2) penetrating pick-holes on each opposite side and one (1) 1-1/4-inch diameter penetrating pick-hole shall offset a minimum of 4-inches from the center, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-1/4-inch thick (plus or minus 1/16-inch).
8. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

4.11.6 Replacement 26-inch Water Manhole Cover

1. 26-inch Replacement Water Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. 26-inch Replacement Water Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 4.11.1 and 4.11.2, and the following:



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3. 26-inch Replacement Water Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 26-inch Replacement Water Manhole Cover shall have a minimum dimensions shall be in accordance with **26" Replacement Water Cover Detail (W-13.9)**.
5. The word "WATER" shall be raised relief.
6. 26-inch Replacement Water Manhole Cover shall have two (2) non-penetrating pick bars on each side that are approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, a 26-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-1/8-inch thick (plus or minus 1/16-inch).
7. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

4.11.7 Composite Locking 24-inch or 32-inch Water Cover

1. Composite Locking Manhole Covers provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Composite Locking Manhole Covers shall, as a minimum, meet all specifications as in Paragraphs 4.11.1 and 4.11.2, and the following exceptions and additions:
3. Composite Locking Manhole Covers provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
4. Composite Locking Manhole Covers shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 306 Drainage, Sewer, Utility, and Related Casting Specification and M 105 and have a HS20 load rating.
5. Composite Locking Manhole Covers shall be strong, durable, even from fiber reinforced polymer (FRP). It shall consist of a FRP matrix consisting of between 45% to 70% fiber reinforcement by weight. Fiber reinforcement shall consist of fiberglass, carbon, aramid, basalt and/or natural fibers. The polymer matrix shall be thermoset consisting of a polyester, vinylester, epoxy, polyurethane, and/or hybrid chemical composition. The resin matrix must be thermoset. Composite Locking 24-inch Manhole Covers shall be smooth, free from scale, lumps, blisters, sand holes and defects of any kind.



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6. Composite Locking Manhole Covers shall be of uniform quality, with a dimensional tolerance of 1/16 of an inch. The finished product will feature a strength to weight ratio of 750:1. There shall be no possibility of corrosion welding between the cover and the frame, preventing damage to the infrastructure when opening. Gasket system shall be integrated to reduce traffic shock and abatement of noise and malodors. Static Coefficient of Friction shall be 0.6 or greater, as described in ASTM C1028 Standard, in both wet and dry applications.
7. Composite Locking Manhole Covers shall be shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
8. The Commission requires that the Composite Locking 24-inch Manhole Covers shall be subjected to proof load testing as follows:
 - (d) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards.
 - (e) Composite Locking Manhole Covers shall be shall show no detrimental deformation or cracks when a proof load of 50,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (f) Permanent deformation shall not exceed 1/8-inch.
 - (g) All testing shall be at the supplier's expense.
9. Composite Locking 24-inch Manhole Covers shall have a non-slip pattern cast on the top.
10. Composite Locking Manhole Covers shall be provided with individual permanent markings that are easily discernable and show the following:
 - (h) Name of the producing manufacturer and country of manufacture preceded by the words "Made in", such as "Made in USA"
 - (i) AASHTO designation or ASTM designation number
 - (j) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (k) Manufacturing date (MM/DD/YY),
11. The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and location of the markings must meet and be subject to the approval of the Commission's aesthetic judgment.



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12. The word “WATER” shall be raised relief.
13. Composite Locking 24-inch Manhole Cover shall fit any of the Standard 24-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
14. Composite Locking 24-inch Manhole Cover dimensions shall be in accordance with **24” Composite Locking Water Cover Detail (W-13.10)**.
15. The Composite Locking 24-inch Manhole Cover shall have one (1) non-penetrating pick bar on one side that is approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, one (1) 1-1/4-inch diameter penetrating pick-hole, two ¼-turn penta head latches on each side of the cover, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-inches thick (plus or minus 1/16-inch).
16. Composite Locking 32-inch Manhole Cover shall fit any of the Standard 32-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
17. Composite Locking 32-inch Manhole Cover dimensions shall be in accordance with **32” Composite Locking Water Cover Detail (W-13.11)**.
18. The Composite Locking 32-inch Manhole Cover shall have one (1) non-penetrating pick bar on one side that is approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, one (1) 1-1/4-inch diameter penetrating pick-hole, two ¼-turn penta head latches on each side of the cover, a 1-1/2-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-inches thick (plus or minus 1/16-inch).
19. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

4.11.8 Coatings

No coatings are required for manhole frame and covers or covers.

4.11.9 Water Manhole Frame and Covers Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the



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component(s) shall result in the product no longer being approved and removed from this list.

1. East Jordan Iron Works

(a) Standard MHF 32-inch by 8-inch, Part #: 2008 11

(b) Standard MHC 32-inch, Part #: 2006 81

(c) Replacement MHC 24-inch, Part #: 1246 75

(d) Replacement MHC 26-inch, Part #: 2110 24

(e) Composite Locking MHC 24-inch, Part #: COM 2401 __

(f) Composite Locking MHC 32-inch, Part #: COM 2401 __

2. Approved equal of another manufacturer provided the product(s) are manufactured as per these specifications.



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Section 4.12 PLASTIC PIT METER SETTER FOR COLD CLIMATES

1. Plastic Pit Meter Setters provided to the Commission or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Plastic Pit Meter Setters shall be constructed of 20-inch or 36-inch diameter high quality, high-density polyethylene pipe. Unless otherwise approved by the Commission, pit dimensions for the following meter sizes shall be:
 - (a) 5/8-inch meter; shall be 20-inch diameter by 48-inches deep.
 - (b) 5/8-inch by 3/4-inch meter; shall be 20-inch diameter by 48-inches deep.
 - (c) 3/4-inch meter; shall be 20-inch diameter by 48-inches deep.
 - (d) 3/4-inch by 1-inch meter; shall be 20-inch diameter by 48-inches deep.
 - (e) 1-1/2-inch meter; shall be 36-inch diameter by 48-inches deep.
 - (f) 2-inch meter; shall be 36-inch diameter by 48-inches deep.
3. Plastic Pit Meter Setters inlet valve shall be a lead free meter angle valve.
 - (a) 5/8-inch to 1-inch meters require a quick connection on the outlet side of the meter valve.
 - (b) 1-1/4-inch to 2-inch require a flange connection on the outlet side of the meter valve.
4. Plastic Pit Meter Setters outlet valve shall be a lead free angle cartridge dual check valve.
 - (a) 5/8-inch to 1-inch meters require a quick connection on the inlet side of the check valve.
 - (b) 1-1/4-inch to 2-inch require a flange connection on the inlet side of the check valve.
5. Plastic Pit Meter Setters shall include copper tube, K type risers.
6. Plastic Pit Meter Setters shall include a male iron pipe connection on both the inlet and outlet connection of the risers.
7. Delivery shall be specified in terms of number of days from receipt of order.



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8. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

10. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 4.13 FRAME AND LIDS FOR PLASTIC METER PIT SETTER

1. Frame

- (a) Frames shall be made of cast iron or ductile iron and have a 25,000 PSI tensile strength.
- (b) Frames for plastic meter setters for 5/8-inch through 1-inch shall have tile size of 20-inches and a lid size of 12-inches.
- (c) Frames for plastic meter setters for 1-1/2-inch through 2-inch shall have tile diameter of 36-inches and a lid diameter of approximately 12-1/2-inches.
- (d) Frames shall be provided with double lids.
- (e) Frames shall provide a recessed lip to allow the top lid to remain flush with the top of the frame.

2. Lids

- (a) Inner lids shall be plastic.
- (b) Inner lids shall be approximately 11-1/2-inches in diameter.
- (c) Top lids shall be plastic.
- (d) Top lids shall be approximately 12-1/2-inches in diameter.
- (e) Top lids shall be provided with a worm type locking device.
- (f) Top lids shall be provided with a standard 27/32-inch brass pentagon nut.
- (g) Top lids shall be provided with a 2-inch hole and plug for an automatic meter reading device.
- (h) Top lids shall have "WATER METER" printed clearly on them. The printings shall be permanently made on to the lids.

3. Delivery shall be specified in terms of number of days from receipt of order.

4. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.

5. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and



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all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

6. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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CHAPTER 5 CROSS CONNECTION DEVICES,

Section 5.1 BACKFLOW PREVENTERS

5.1.1 General

1. Cross Connection Devices provided to the Springfield Water and Sewer Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with the Commission's Specifications.
2. The Cross Connection Devices shall conform to AWWA C-110 (most current revision) Standard for Double Check Valve Backflow Prevention Assembly and/or AWWA C-511 (most current revision) Standard for Reduced Pressure Principle Backflow Preventer.
 - (a) Devices are the back flow preventer only.
 - (b) Assemblies are from the manufacturer and include two shut off valves and the back flow preventer.
3. Devices may have either bronze, stainless steel, cast iron or ductile iron bodies.
 - Ductile and Cast Iron bodies shall be epoxy coated
4. All devices and assemblies shall be lead free.
5. All shut off valves shall be slow closing, have tamper switches, and open close indicators in accordance with National Fire Protection Association (NFPA) 13.
6. All devices and assemblies shall be rated for a minimum of 175-PSI.
7. Devices installed on hot water lines with elevated temperatures shall be approved for hot water use.
8. Cross Connection Devices shall be delivered with proof of testing by the University of California (USC) and/or the American Society of Sanitary Engineering (ASSE), as set forth in Massachusetts Drinking Water Regulations 310 CMR 22.22.
9. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), or meet the requirements of the Buy American Act (BAA),as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metal poured into a mold to create Casting(s) for a finished product,



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- (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the BAA language, and all guidance issued by the Government Accountability Office (GAO), or
 - (f) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
10. Delivery shall be specified in terms of number of days from receipt of order.
11. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
13. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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5.1.2 Fire Systems

1. Fire Systems without Chemicals Added

- (a) At a minimum, based on the degree of health hazard, a double check valve device or assembly is required on all new systems and shall be provided in accordance with Section 5.1.1 and with the following:
 - Devices and assemblies 2-inches and larger require a double check valve detector assembly (DCDA).
 - Devices and assemblies less than 2-inches do not require a detector meter.
- (b) The DCDA or device shall be provided with a water meter that reads in cubic feet and a double check in the bypass line.
- (c) Up to 2-inch assemblies may be provided with bronze or stainless steel ball valves or butterfly valves.
 - The valves and device may have all flange or grooved (Victaulic) connections, or some combination of both.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with bronze ball type test cocks or plugs.
- (d) 3-inch and larger assemblies may be provided with Ductile Iron Outside Spindle and Yoke (OS&Y) Gate Valves in accordance with Section 3.6.4 of these Specifications or ductile iron butterfly valves.
 - The valves and device may have all flange or grooved (Victaulic) connections, or some combination of both.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with bronze ball type test cocks or plugs.

2. Fire Systems with Chemicals Added

- (a) A reduced pressure zone (RPZ) backflow preventer device or assembly is required on all new systems with chemicals added and shall be provided in accordance with Section 5.1.1 and with the following:
 - Devices and assemblies 2-inches and larger require a RPZ detector assembly (RPDA).
 - Devices and assemblies less than 2-inches do not require a detector meter.
- (b) The RPDA or device shall be provided with a water meter that reads in cubic feet and a RPZ in the bypass line.



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- (c) Up to 2-inch assemblies may be provided with bronze or stainless steel ball valves or butterfly valves.
 - The valves and device may have all flange or grooved (Victaulic) connections, or some combination of both.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with bronze ball type test cocks or plugs.
- (d) 3-inch and larger assemblies may be provided with Ductile Iron Outside Spindle and Yoke (OS&Y) Gate Valves in accordance with Section 3.6.4 of these Specifications or butterfly valves.
 - The valves and device may have all flange or grooved (Victaulic) connections, or some combination of both.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with ball type test cocks or plugs.
- (e) The RPZ backflow preventer shall be provided with two independent check valves with an intermediate relief valve.
- (f) The RPZ backflow preventer shall be provided with a drain sized to the manufacturer's discharge rate list.



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5.1.3 Irrigation Systems

1. At a minimum, a testable pressure vacuum breaker device or assembly is required on all new systems and shall be provided in accordance with Section 5.1.1 and with the following:
 - (a) Pressure Vacuum breakers may be rated for 150-PSI or greater.
 - (b) Up to 2-inch assemblies may be provided with bronze or stainless steel ball valves or butterfly valves.
 - The valves shall have FIP threads.
 - Threaded outlets on the shut off valves for testing the back flow assemblies shall be provided with ball type test cocks.
 - (c) The pressure vacuum breaker shall be provided with a bronze body with MIP threads.
 - (d) The pressure vacuum breaker shall be provided with a stainless steel spring loaded single float and disc with an independent first check.
 - (e) The pressure vacuum breaker shall be provided with shut-off valves and ball type test cocks. The shut-off handles may be brass or stainless steel.
2. A double check valve assembly is also acceptable and shall be provided in accordance with Section 5.1.2 above. If the service is metered no detector meter is required.
3. A reduced pressure zone (RPZ) backflow preventer is also acceptable and shall be provided in accordance with Section 5.1.2 above. If the service is metered no detector meter is required.



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5.1.4 Metered Process, Commercial, or Industrial Systems

1. At a minimum, reduced pressure zone (RPZ) backflow preventer device or assembly is required on all new systems and shall be provided in accordance with the General Section above and with the following:
 - (a) Detector meters are not required on metered connections.
 - (b) Up to 2-inch assemblies may be provided with bronze or stainless steel ball valves or butterfly valves.
 - The valves and device shall have all threaded connections.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with bronze ball type test cocks or plugs.
 - (c) 3-inch and larger assemblies shall be provided with Ductile Iron Outside Spindle and Yoke (OS&Y) Gate Valves in accordance with Section 3.6.4 of these Material Specifications.
 - The valves and device shall have all flange connections.
 - Threaded outlets on the shut off valves for testing the back flow assemblies are allowed and shall be provided with ball type test cocks or plugs.
 - (d) The RPZ backflow preventer shall be provided with two independent check valves with an intermediate relief valve.
 - (e) The RPZ backflow preventer shall be provided with a drain.

5.1.5 Threaded Connections

1. All threaded connections shall be provided with a hose connection vacuum breaker.
 - (a) The hose connection vacuum breaker shall be provided with a single check valve with an atmospheric vacuum breaker vent.



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5.1.6 Backflow Preventers Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

Assembly Description	Watts	Ames	FEBCO
Assemblies without Detector			
Up to 2" Double Check Assembly (Bronze Body)	007	2000B	850
Up to 2" Double Check Assembly	719	200B	
Up to 2" Reduced Pressure Zone Assembly	009	4000B	825Y
Up to 2" Reduced Pressure Zone Assembly	919	400B	860
1" or 2" Testable Vacuum Breaker	800M4QT	A200	765
Double Check Assemblies with Detector			
2" Double Check Detector Assembly (Bronze Body)	007DCDA	3000B	
2-1/2" - 3" Double Check Detector Assembly (Iron Body)	007DCDA		858
3" - 10" Double Check Detector Assembly (Iron Body)	709DCDA		806YD & 856
2-1/2" - 8" Double Check Detector Assembly w/ B-fly	757 BF	M300 BF Maxim & C300 BF Colt	
2-1/2" - 8" Double Check Detector Assembly w/ B-fly	757N BF	M300N BF Maxim & C300N BF Colt	
2-1/2" - 10" Double Check Detector Assembly	757	M300 Maxim & C300 Colt	
2-1/2" - 10" Double Check Detector Assembly	757N	M300N Maxim & C300N Colt	
2-1/2" - 12" Double Check Detector Assembly	774DCDA	3000SS Silver Bullet	
Reduced Pressure Zone Assemblies with Detector			
2-1/2" - 10" Reduced Pressure Zone Detector Assembly	909RPDA	4000CIV	826YD
2-1/2" - 6" Reduced Pressure Zone Detect. Ass. w/ B-fly	957RPDA BF	M400 BF Maxim & C400 BF Colt	
2-1/2" - 6" Reduced Pressure Zone Detect. Ass. w/ B-fly	957NRPDA BF	M400N BF Maxim & C400N BF Colt	
2-1/2" - 6" Reduced Pressure Zone Detect. Ass. w/ B-fly	957ZRPDA BF	M400Z BF Maxim & C400Z BF Colt	
2-1/2" - 10" Reduced Pressure Zone Detector Assembly	957RPDA	M400 Maxim & C400 Colt	
2-1/2" - 10" Reduced Pressure Zone Detector Assembly	957NRPDA	M400N Maxim & C400N Colt	
2-1/2" - 10" Reduced Pressure Zone Detector Assembly	957ZRPDA	M400Z Maxim & C400Z Colt	
2-1/2" - 10" Reduced Pressure Zone Detector Assembly	994RPDA	4000SS	

2. Or the approved equal of another manufacturer provided the product(s) are manufactured as per these specifications.



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5.1.7 Enclosures – Permanent

1. Enclosures shall meet all American Society of Sanitary Engineers (A.S.S.E.) 1060 requirements.
2. Enclosures shall be kept in dry shipping containers until installation.
3. Acceptable materials for enclosures shall be aluminum or fiberglass for small enclosures.
4. Insulation thickness for enclosures shall be sufficient to withstand freezing.
5. Adhesive applied stock or material secured by mechanical fasteners may be cause for rejection.
6. Structural members for enclosures shall be aluminum, or fiberglass. Wood or particleboard shall not be allowed.
7. The roof, walls, and access panels for enclosures shall be constructed of specified materials in specified thickness.
8. Heaters shall be provided with heaters and sized to prevent freezing of backflow preventers, meters, valves, and/or piping.
9. Enclosures shall allow the device(s) to be installed at least three (3) to four (4) feet above the floor, eighteen (18) inches from any wall, ceiling, or other device and with clear access to the BFP and/or meter if installed in same enclosure.
10. Delivery shall be specified in terms of number of days from receipt of order.
11. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.
13. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

(a) Name of Municipality/Utility



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- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

5.1.8 Enclosures – Seasonal

1. Enclosures shall be kept in dry shipping containers until installation.
2. Acceptable materials for enclosures including structural members for enclosures may be epoxy coated steel, aluminum, polyethylene, or fiberglass. Wood or particleboard shall not be allowed.
3. Insulation is not required as these are seasonal water services.
4. The enclosures shall be forest green.
5. The enclosures may be attached to the pad with minimum 1-inch angle iron frame and at least four (4) 3/8-inch by 5-inch L anchors or two lockable steel latches on each end of the enclosure flange.
6. A drain with animal proof screen shall be provided.
7. The enclosures shall be a minimum size of 48-inches long, 24-inches wide, and 32-inches high, a maximum of 54-inches long, 44-inches wide, and 38-inches high, or as otherwise approved by SWSC during the submittal process. Please note the enclosures submitted must fit on the pads and must enclose the complete meter and backflow preventer assembly described herein.
8. Enclosure shall be lockable and may be hinged.
9. The roof, walls, and access panels for enclosures shall be constructed of specified materials in specified thickness.
10. Delivery shall be specified in terms of number of days from receipt of order.
11. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.



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13. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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CHAPTER 6 TEMPORARY BYPASS PIPE AND APPURTENANCES

Section 6.1 TEMPORARY WATER MAINS, VALVES, FITTINGS, AND SERVICES

6.1.1 General

1. Temporary water mains, valves, fittings, water service hose, and hose fittings provided to the Commission or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Temporary water mains, valves, water service hose, and hose fittings shall be suitable for potable water, and certified to NSF 61 standards.
3. Temporary water mains, fittings, and valves shall be galvanized steel, polyvinylchloride (PVC) plastic, or polyethylene (PE) of the highest quality, and suitable for all conditions of use, unless otherwise approved by the Engineer or SWSC.
4. PVC used to make temporary PVC water mains, couplings, and fittings shall meet or exceed the minimum requirements of ASTM D 1784, and the following:
 - (a) PVC shall be 1120 defined as type 1, grade 1, class 12454-B
 - (b) Tensile strength: 7,000-PSI minimum
 - (c) Modulus of Elasticity: 400,000-PSI minimum
 - (d) Impact Strength (Izod): 0.65-ft-lbs per 1-inch of notch
 - (e) Deflection Temperature: 158-degrees F minimum
 - (f) Flammability: self-extinguishing
5. Temporary water service hose, and hose fittings shall be rated for 200 PSI.
6. All joints shall be non-permanent restrained either groove and spine or Victaulic, unless otherwise approved by the E&TS. Glued joints are not allowed unless approved by the E&TS. All joints shall be water tight.
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,



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- (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
8. The manufacturer/vendor/shipper must use care in preparing temporary water mains, valves, hydrants, water service hose, and hose fittings for shipment and in handling during shipment and delivery, to insure that the product(s) are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged product(s) will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the product(s) and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AWWA Standards.

6.1.2 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All components shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the product(s) showing overall dimensions,
 - (b) Material specifications for each component,
 - (c) Coating applied to each component, if applicable,
 - (d) Weight of each component and total weight, and
 - (e) Country of origin for each component.
- 3. The manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying component surface preparation,



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primer (if applicable), type of coating(s), color of coating(s), manufacturer of coating(s), part number of the coating(s), and a sample on a 3-inch by 5-inch chip.

4. The manufacturer shall furnish a letter certifying the product(s) meet all the requirements of the AIS, an explanation, in the letter, of how the product(s) meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.
6. The manufacturer shall furnish a certified statement that all product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the product(s) that states that the product(s) shall be free from all defects in material and workmanship under normal use of the product for a minimum one (1) year time period from time of delivery. The manufacturer shall replace and/or repair defective parts or the whole product(s) for a minimum one (1) year time period from time of delivery.
8. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed product(s) have been made, and the results of all tests conform to the requirements of the American Association of State Highway and Transportation Officials (AASHTO) M 105 Class 35B strength of materials requirements, American Society of Testing and Materials (ASTM) A48, Class 35B, and as the Commission may require the National Institute of Standards Technology (NIST) standards – Proof Load Testing.
9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.



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- (a) Approved means the contractor can supply the material as shown on the drawing(s).
- (b) Approved as Noted means the contractor can supply the material as shown on the drawing(s), but with the changes as noted.
- (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct materials to be used.

6.1.3 Temporary PVC Water Mains

- 1. Temporary PVC water mains shall be a restrained joint type/spline connected, high impact polyvinyl chloride (PVC) with grooved ends to be connected with specially designed couplings, splines, and O-ring seals. Couplings, splines, and O-ring seals shall be supplied with the pipe.
- 2. Temporary PVC water mains shall be designed to meet or exceed the minimum requirements of ASTM D 2241.
- 3. Temporary PVC water mains shall be a minimum Standard Dimension Ratio (SDR) 17 and rated for 250 PSI.
- 4. Temporary PVC water mains shall be provided in 20-foot length, minimum.
- 5. Temporary PVC water mains shall be provided with the following dimensions::

Nominal Diameter in inches	Actual Outside Diameter in inches	Minimum Wall Thickness in inches	Weight in lbs/foot
2-inch	2.375	0.140	0.69
4-inch	4.5	0.265	2.5
6-inch	6.625	0.390	5.18

6.1.4 Temporary PVC Couplings

- 1. Temporary PVC water mains shall be provided with PVC couplings that are designed to meet or exceed the minimum requirements of ASTM D 3139, and the following:



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- (a) PVC couplings shall provide joint restraint by means of a nylon spline inserted into a space created when a groove on the pipe and a groove in the coupling are aligned.
 - (b) PVC couplings shall be a minimum Standard Dimension Ratio (SDR) 17 and rated for 250 PSI.
 - (c) PVC couplings shall contain a non-permanent pre-lubricated O-ring seal on each end.
 - (d) PVC couplings shall be NSF-61 listed.
- 2. O-ring seals shall meet or exceed ASTM F-477 and made from either Nitrile Butadiene Rubber (NBR) or Polyisoprene Rubber (IR).
 - 3. Splines shall be nylon, round, and for 2-inch temporary pipe, couplings, fittings, and valves the diameter of the spline shall be 0.188-inches. For 4-inch and 6-inch temporary pipe, couplings, fittings, and valves the diameter of the nylon splines shall be 0.25-inches.

6.1.5 Temporary Couplings for Plain End PVC Mains

- 1. Temporary couplings for used to join plain end PVC water mains shall be a bolted mechanical assembly rated for a minimum of 250-PSI.
- 2. The body of the coupling shall be ductile iron in accordance with ASTM A-536, grade 65-45-12.
- 3. The body shall have integral gripping teeth that provide connection to the pipe.
- 4. The body shall be painted with enamel paint.
- 5. The rubber gasket shall be pre lubricated and be a grade T nitrile compound conforming to ASTM D-2000, designation 5BG615A14B24.
- 6. Bolts and nuts shall be provided with flat washers. The hardware shall be Zinc plated carbon steel. Minimum tensile strength of bolts shall 110,000- PSI.

6.1.6 Temporary PVC Fittings

- 1. Temporary PVC fittings shall be designed to meet or exceed the minimum requirements of ASTM D 3139, and the following:
- 2. PVC fittings shall be provided with spline grooved ends for use with temporary PVC water mains and PVC couplings.



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3. PVC fittings shall be a minimum Standard Dimension Ratio (SDR) 17 and rated for 250 PSI.
4. PVC fittings shall be NSF-61 listed.
5. Other ends may be allowed and must be approved by E&TS before purchase.

6.1.7 Temporary Valves

1. Temporary valves for PVC water mains shall be butterfly valves rated for 250-PSI.
2. The body of the valve shall be PVC 1120 defined as type 1, grade 1, class 12454-B meet or exceed the minimum requirements of ASTM D 1784.
3. The vane/disc shall be enclosed in a ductile iron housing in accordance with ASTM A-536, grade 65-45-12.
4. The vane/disc shall be ductile iron in accordance with ASTM A-536, grade 65-45-12.
5. The vane/disc shall be rubber encapsulated with grade T nitrile compound conforming to ASTM D-2000, designation 5BG615A14B24.
6. The valves shall have removable handles.

6.1.8 Temporary Water mains, Couplings, Fittings, and Valves, and Model Numbers Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. Aquamine, LLC (A Victaulic Company)
 - (a) 2-inch water main: 290021725
 - (b) 4-inch water main: 290041725
 - (c) 6-inch water main: 290061725
 - (d) 2-inch coupling: 290400002
 - (e) 4-inch coupling: 290400004
 - (f) 6-inch coupling: 290400006



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- (g) 2-inch butterfly valve: 295000002
 - (h) 4-inch butterfly valve: 295000004
 - (i) 6-inch butterfly valve: 295000006
 - (j) 2-inch X 2-inch X 2-inch tee: 291700002
 - (k) 4-inch X 4-inch X 4-inch tee: 291700004
 - (l) 6-inch X 6-inch X 6-inch tee: 291700006
 - (m) 4-inch X 4-inch X 2-inch reducing tee: 291800442
 - (n) 6-inch X 6-inch X 2-inch reducing tee: 291800662
 - (o) 6-inch X 6-inch X 4-inch reducing tee: 291800664
 - (p) 4-inch X 2-inch reducer: 291900042
 - (q) 6-inch X 2-inch reducer: 291900062
 - (r) 6-inch X 4-inch reducer: 291900064
 - (s) 2-inch end caps: 291500002
 - (t) 4-inch end caps: 291500004
 - (u) 6-inch end caps: 291500006
 - (v) 2-inch 90-degree bend: 291000002
 - (w) 4-inch 90-degree bend: 291000004
 - (x) 6-inch 90-degree bend: 291000006
 - (y) 2-inch 45-degree bend: 291200002
 - (z) 4-inch 45-degree bend: 291200004
 - (aa) 6-inch 45-degree bend: 291200006
2. Certa-lok, Yelomine Pipe
- (a) 2-inch water main: 216213
 - (b) 4-inch water main: 218217



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- (c) 6-inch water main: 219214
- (d) 2-inch coupling: 715020
- (e) 4-inch coupling: 715044
- (f) 6-inch coupling: 715068
- (g) 2-inch butterfly valve: NOT AVAILABLE (NA)
- (h) 4-inch butterfly valve: NA
- (i) 6-inch butterfly valve: NA
- (j) 2-inch X 2-inch X 2-inch tee: _____
- (k) 4-inch X 4-inch X 4-inch tee: _____
- (l) 6-inch X 6-inch X 6-inch tee: _____
- (m) 4-inch X 4-inch X 2-inch reducing tee: _____
- (n) 6-inch X 6-inch X 2-inch reducing tee: _____
- (o) 6-inch X 6-inch X 4-inch reducing tee: _____
- (p) 4-inch X 2-inch reducer: _____
- (q) 6-inch X 2-inch reducer: _____
- (r) 6-inch X 4-inch reducer: _____
- (s) 2-inch end caps: _____
- (t) 4-inch end caps: _____
- (u) 6-inch end caps: _____
- (v) 2-inch 90-degree bend: _____
- (w) 4-inch 90-degree bend: _____
- (x) 6-inch 90-degree bend: _____
- (y) 2-inch 45-degree bend: _____
- (z) 4-inch 45-degree bend: _____



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(aa) 6-inch 45-degree bend: _____

3. Equal provided the products are manufactured as per these specifications.



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CHAPTER 7 SEWER MAINS AND APPURTENANCES

Section 7.1 SEWER PIPE

7.1.1 Polyvinyl Chloride (PVC) Sewer Pipe

1. Pipe provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. All pipe furnished shall be either in 13-foot, 18-foot or 20-foot lengths. Straight pipe shall be furnished in lengths according to ASTM D3034.
3. All pipe and fittings furnished shall be clearly marked on the outside indicating name, manufacturer, nominal diameter, ASTM, schedule, and/or pipe or pressure class designation.
4. PVC pipe provided for depths between 4-feet and 15-feet shall be:
 - (a) sizes 4-inch to 15-inch shall conform with ASTM D3034 for solid wall PVC. The PVC pipe shall have an SDR ratio of 35 and a pipe stiffness of 46 psi.
 - (b) 18-inch and above shall conform with ASTM F679 for large diameter pipes. The PVC pipe shall have an SDR ratio of 35 and a pipe stiffness of 46 psi.
5. PVC pipe provided for depths between 16-feet and 30-feet shall be:
 - (a) sizes 4-inch to 15-inch shall conform with ASTM D3034 for solid wall PVC. The PVC pipe shall have an SDR ratio of 26 and a pipe stiffness of 115 psi.
 - (b) 18-inch and above shall conform with ASTM F679 for large diameter pipes. The PVC pipe shall have an SDR ratio of 26 and a pipe stiffness of 115 psi.
6. The pipe manufacturer shall be required to meet all the requirements for PVC Solid Wall Pipe as stated in ASTM D3034 or ASTM F679 whichever is applicable. Specifically, the manufacturer shall perform stiffness, deflection, acid resistances and joint and fitting tightness tests on PVC sanitary sewer pipe and will be required to show certification for such test(s) and at the option of Commission. The pipe manufacturer will be required to perform such test(s) in the presence of the Commission's representative.
7. PVC pipe shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139 or ASTM D3212.



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8. Sewer lines shall be green in color or as approved by the Commission.
9. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
10. Delivery shall be specified in terms of number of days from receipt of order.
11. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
12. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
13. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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7.1.2 Polyvinyl Chloride (PVC) Sewer Fittings

1. Polyvinyl Chloride (PVC) fittings provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. In addition to Section 7.1.1 of these Material Specifications, PVC fittings shall be provided as follows:
3. PVC wyes shall be furnished in lengths of not more than 3-ft. Saddle wyes are not allowed.
4. PVC fittings and accessories for sewers shall have bell and/or spigot configurations compatible with the pipe. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139 or ASTM D3212.
5. Delivery shall be specified in terms of number of days from receipt of order.
6. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
7. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
8. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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7.1.3 Sewer Service Connections

1. Sewer Service Connections, when not connected to a sewer manhole or wye, may be provided to the Commission or Installer, and shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. In addition to Section 7.1.1 of these Material Specifications, Sewer Service Connections shall be provided as follows:
3. Sewer Service Connections shall consist of a PVC hub, rubber sleeve and stainless steel band.
4. Sewer Service Connection shall be a compression fit into the cored wall of a mainline pipe. Hub shall be made from heavy-duty PVC material.
5. Sewer Service Connection shall be provided with a stainless steel clamping assembly and shall be made from minimum 301 grade stainless steel.
6. Sewer Service Connections gaskets shall be installed by the manufacturer. The manufacturer shall use a water-based solution during assembly. Pipe lube is not allowed.
7. The Sewer Service Connection's rubber sleeve and gasket, when applicable, shall meet the requirements of ASTM F477, ASTM D3139 or ASTM D3212.
8. Sewer Service Connections shall be manufactured by Inserta Tee or acceptable equivalent product.
9. Delivery shall be specified in terms of number of days from receipt of order.
10. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
12. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

(e) Name of Municipality/Utility



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- (f) Total amount of product bid on and amount delivered
- (g) Date the bid was accepted and date the product was delivered
- (h) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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7.1.4 Ductile Iron Push-on Joint for Sewer Pipe

1. Ductile Iron (DI) Pipe provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. In addition to Section 3.1.1 of these Material Specifications, DI Pipe shall be provided as follows:
3. Ductile iron pipe shall conform to AWWA C151 standards and shall be supplied in industry 18-foot and 20-foot lengths.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product.

7.1.5 Ductile Iron Fittings for Sewer Pipe

1. Ductile Iron (DI) fittings provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. In addition to Section 3.12.1 of these Material Specifications, DI fittings shall be provided as follows:



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3. Pipe fittings shall be ductile iron with pressure rating of 350 PSI for 24-in and smaller piping and 250 PSI for 30-in and larger piping.
4. Fittings shall meet the requirements of AWWA C110 or AWWA C153 as applicable.
5. PVC fittings and accessories for sewers shall have bell and/or spigot configurations compatible with the pipe. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139 or ASTM D3212.
6. Delivery shall be specified in terms of number of days from receipt of order.
7. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
8. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
9. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 4.1 SANITARY SEWER MANHOLES

4.1.1 General

1. Pre-cast Concrete Manholes provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by the Commission at either place of manufacture or at work site.
3. Materials will be examined for compliance with ASTM standards, these Materials Specifications, and approved manufacturer's drawings. The Commission will also take note regarding appearance, dimensions, blisters, cracks and other anomalies, if any.
4. The Commission reserves the right to reject any manhole or structure that fails to meet any requirements specified herein. Rejection may occur at place of manufacture, at work site, or following installation and will not cause the Commission to incur any additional costs.
5. Minor repairs to pre-cast concrete sections, if required, are not accepted unless authorized by the Commission.
6. Materials and equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
7. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create Casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or



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- (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement governs.
- 8. Delivery shall be specified in terms of number of days from receipt of order.
- 9. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
- 10. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
- 11. References
- 12. The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

4.1.4 Pre-cast Concrete Manholes

- 1. Pre-cast concrete shall be manufactured with concrete that meets the following requirements:
 - (a) Minimum compressive strength shall be 5,000 PSI at 28 days.
 - Pre-cast concrete sections shall not be shipped until after concrete has attained a minimum 5,000 PSI compressive strength.
 - (b) Maximum water-to-cement ratio shall be 0.40 by weight.
 - (c) Minimum cement content shall be 600 lbs of cement per cubic yard of concrete.
 - (d) Shall conform to American Concrete Institute (ACI) 318 and ACI 350R.



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- (e) When "fy" exceeds 40,000 psi, "z" (ACI 318) shall not exceed 95 kips/in, "fs" shall be completed and shall not exceed 50 percent of "fy".
- (f) Products shall be designed to support their own weight, weight of soil at 130-PCF, and a live load equal to AASHTO HS-20 applied to top slab.
- 2. Lifting lugs or holes in each pre-cast section shall be provided for proper handling. Lifting lugs shall be provided for the top and bottom slab.
- 3. Pre-cast concrete manholes base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478.
- 4. Pre-cast concrete manholes bottom slab thickness, riser wall thickness, shall be as follows:

Diameter (feet)	Wall Thickness (inches)	Base Thickness (inches)	Max Pipe* (RCP) Diameter Allowed (inches)	Max Pipe* (DI/PVC) Diameter Allowed (inches)
4	5	6	18	24
5	6	8	30	36
6	7	8	36	48

* Pipe diameter may vary depending on number of penetrations.

- 5. Pre-cast concrete manholes top section shall be eccentric cone where cover over pipe exceeds 4-ft. Top section shall be a flat slab where cover over top of pipe is 4-ft or less.
- 6. Pre-cast concrete manholes base, riser and transition top sections shall have bell and spigot or joints tongue and groove joints.
- 7. Pre-cast concrete manhole base, riser, transition top, flat slab top and grade ring shall be designed for a minimum H-20 loading plus earth load. Earth load is 130 Pounds per Cubic Foot (PCF).
- 8. Pre-cast concrete manhole shall be marked on the inside of each pre-cast section with the date of manufacture, name and trademark of manufacturer.
- 9. Pre-cast concrete manhole sections shall have a formed, tapered circular opening larger than the intended pipe size (outside diameter).
- 10. Base slab and walls shall be cast together to form a monolithic base section.



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11. Structure walls shall be designed for a lateral pressure based on an equivalent fluid unit weight of 90-Pounds per Cubic Foot (PCF). Pressure diagram shall originate at finished ground surface. Lateral pressure from vehicles shall be included in accordance with AASHTO.
12. Discontinuities in structures produced by openings and joints shall be considered in the design. Additional reinforcing around openings shall be provided. Frame openings shall carry full design loads to support walls.
13. Manhole shall be designed against flotation with ground water level at finished ground surface. Flotation prevention shall be achieved by dead weight of manhole and soil load above it. Skin friction, soil friction, or weight of equipment in manhole, if any, cannot be considered in the design against flotation.
14. Manhole shall be designed with a minimum number of joints. Maximum number of structure sections, including top slab, shall be four.
15. Pre-cast concrete manholes shall be constructed with a bell and spigot or tongue and groove joint.
16. Access openings, wall sleeves, and knockouts shall be provided at locations where indicated by the Commission or shown on Design Drawings and as follows:
 - (a) Integrally cast knockout panels shall be sized for intended pipe sizes. Knockout panels shall have no steel reinforcing.
 - (b) Pre-cast manhole sections shall have a formed, tapered circular opening larger than the intended pipe size (outside diameter).
 - (c) Horizontal wall joints shall be located 18-inches minimum from horizontal centerline of wall openings.
17. Manhole rungs shall be reinforced steel, copolymer polypropylene, 14-in wide, M.A. Industries Inc, PF Series or equal. Copolymer polypropylene shall conform to ASTM D4101 Classification PP0344 B33534 Z02. Steel reinforcing shall be 1/2-in diameter, conforming to ASTM A615, Grade 60 and shall be continuous throughout rung. Manhole rungs shall meet all OSHA requirements.
18. Wall sleeves shall be provided by the pre-cast concrete manufacturer.



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Section 7.2 DAMP PROOF COATING

1. Damp proofing provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Damp proofing shall be of bituminous material and shall conform to ASTM D449
3. Damp proofing shall be Hydrocide 648 by Sonneborn Building Products; Dehydratine 4 by W.R. Grace and Company; Meadows Trowel Mastic (Type 3), or equal products of another manufacturer.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 7.3 BRICK MASONRY

7.3.1 General

1. Bricks for masonry provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Bricks for masonry shall be sound, hard, uniformly burned, regular and uniform in shape and size. Under burned or salmon brick are not acceptable. Only whole brick shall be used.
3. Bricks for masonry shall be clay, shale, or similarly naturally occurring earthy substance and subjected to a heat treatment process at elevated temperatures.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

7.3.2 Bricks for Channels and Shelves

1. Bricks for channels and shelves shall conform to ASTM C32, Grade SS.



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2. Bricks for channels and shelves tested so that the mean of five tests for absorption shall not exceed 8 percent and no individual brick exceed 11 percent.

7.3.3 Bricks for Frame and Cover Adjustment

Bricks intended for use in raising manhole frames to finished grade shall conform to ASTM C62.



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Section 7.4 MORTAR

1. Mortar provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. Mortar shall be composed of 1 part Portland cement, 2 parts sand, and hydrated lime not to exceed 10-lbs to each bag of cement.
3. Portland cement shall be ASTM C150, Type II; hydrated lime shall conform to ASTM C207.
4. Sand shall be washed, cleaned, screened, well graded with all particles passing a No. 4 sieve and conform to ASTM C33.
5. Delivery shall be specified in terms of number of days from receipt of order.
6. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
7. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
8. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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Section 7.5 MANHOLE FRAMES AND COVERS FOR SANITARY SEWERS

7.5.1 General

1. Manhole frame and covers provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. The manhole frame and cover shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 306 Drainage, Sewer, Utility, and Related Casting Specification and M 105 Class 35B strength of materials requirements.
3. Manhole frames and covers shall be strong, durable, even grained Cast iron, Ductile iron, or Fiber Reinforced Polymer smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
 - (a) An HS20 load rating is required.
 - (b) Cast iron shall conform to American Society of Testing and Materials (ASTM) A48, Class 35B.
 - (c) Ductile iron shall conform to ASTM A 536 Grade 80-55-06.
 - (d) Fiber Reinforced Polymer shall conform to ASTM C 1028
 - (e) Manhole covers and frame seats shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
4. The Commission requires that the Manhole Frame and Covers be subjected to proof load testing as follows:
 - (a) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards.
 - (b) The Manhole Frame and Covers shall show no detrimental deformation or cracks when a proof load of 40,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (c) Permanent deformation shall not exceed 1/8-inch.
 - (d) All testing shall be at the supplier's expense.
5. Manhole covers shall have a diamond pattern cast on the top.



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6. Manhole Frame and Cover shall be provided with individual permanent markings that are easily discernable and show the following:
 - (a) Name of the producing foundry and country of manufacture preceded by the words “Made in”, such as “Made in USA”
 - (b) AASHTO designation or ASTM designation number
 - (c) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (d) Heat identification and cast date (MM/DD/YY),
 - (e) The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and location of the markings must meet and be subject to the approval of the Commission’s aesthetic judgment.
7. The product(s) shall have all parts cast or manufactured and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create casting(s) for a finished product,
 - (c) Manufactured shall mean raw material formed into a finished product,
 - (d) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (e) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (f) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement govern.
8. Delivery shall be specified in terms of number of days from receipt of order.
9. Delivery shall be made by truck in minimum truckload quantity to locations designated in the Commission’s service area in and near Springfield, Massachusetts. The low bidder shall notify the Commission of the quantity comprising a minimum truckload. The Commission reserves the right to mix depth of buries to reach a full truckload.



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10. The manufacturer/vendor/shipper must use care in preparing products for shipment and in handling during shipment and delivery, to insure that the water meters are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged manhole frame and covers will not be accepted.
11. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the manhole frame and cover and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable AASHTO and ASTM Standards.

7.5.2 Submittals

1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
2. The manufacturer and/or vendor shall furnish three (3) sets of 24-inch by 36-inch certified shop drawings for all materials to be used. All finished product(s) shall be provided in accordance to these drawings. The drawings shall show the following:
 - (a) Cross sectional drawings of the finished product(s) showing overall dimensions,
 - (b) Material specifications for each component of the finished product(s),
 - (c) Coating applied to each component of the finished product(s), if applicable,
 - (d) Weight of each component and total weight for each finished product(s), and
 - (e) Country of origin for each component.
3. If applicable, the manufacturer shall furnish three (3) sets of coating specification(s) of each component that has a coating applied identifying type of coating, color of coating, manufacturer of coating, part number of the coating, and a sample on a 3-inch by 5-inch chip.
4. The manufacturer shall furnish a letter certifying the finished product(s) meets all the requirements of the AIS, an explanation, in the letter, of how the finished product(s) meets the AIS requirements, and signed by the Owner or President of the Company.
5. The manufacturer shall furnish one (1) complete catalogue or manual for parts, repair, and maintenance.



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6. The manufacturer shall furnish a certified statement that all finished product(s) of the same make and model bid, regardless of the year of manufactured, shall have interchangeable component parts and that the parts availability and delivery shall remain firm for ten (10) years.
7. The manufacturer shall furnish a warranty for the finished product(s) that states that the finished product(s) shall be free from all defects in material, coatings, and workmanship under normal use of the product from time of delivery for a minimum ten (10) year time period.
8. The manufacturer shall furnish a certified statement that the required tests on the various materials and on the completed product(s) have been made, and the results of all tests conform to the requirements of the AASHTO M105 35B, ASTM A48 35B, and NIST. The records of the tests shall be furnished for the individual parts with respect to physical and chemical properties.
9. The manufacturer and/or vendor shall furnish references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product(s), in the last two (2) years. The listing is to include:
 - (a) Name of Municipality/Utility
 - (b) Total amount of product bid on and amount delivered
 - (c) Date the bid was accepted and date the product was delivered
 - (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
10. The Springfield Water and Sewer Commission will mark one (1) set of plans and coating specification “Approved”, “Approved as Noted”, or “Rejected-Resubmit” and return to the manufacturer and/or vendor.
 - (a) Approved means the contractor can supply the finished product(s) as shown on the drawing(s).
 - (b) Approved as Noted means the contractor can supply the finished product(s) as shown on the drawing(s), but with the changes as noted.
 - (c) Rejected – Resubmit means the contractor must resubmit three (3) sets of new shop drawings for correct finished product(s) to be used.

7.5.3 Standard Manhole Frame 24-inch by 4-inch

1. Standard Manhole Frame 24-inch by 4-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department

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of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Standard Manhole Frame 24-inch by 4-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Standard Manhole Frame 24-inch by 4-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 24-inch by 4-inch shall have a minimum dimensions shall be in accordance with **24" X 4" Sewer Frame Only Detail (S-02.51)**.
5. Standard Manhole Frame 24-inch by 4-inch shall have a minimum 21-3/4-inch diameter access opening.
6. Standard Manhole Frame 24-inch by 4-inch shall have a maximum height of 4-inches.

7.5.4 Standard Manhole Frame 24-inch by 6-inch

1. Standard Manhole Frame 24-inch by 6-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Standard Manhole Frame 24-inch by 6-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Standard Manhole Frame 24-inch by 6-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 24-inch by 6-inch shall have a minimum dimensions shall be in accordance with **24" X 6" Sewer Frame Only Detail (S-02.52)**.
5. Standard Manhole Frame 24-inch by 6-inch shall have a minimum 21-3/4-inch diameter access opening.
6. Standard Manhole Frame 24-inch by 6-inch shall have a maximum height of 6-inches.

7.5.5 Standard Manhole Frame 24-inch by 8-inch

1. Standard Manhole Frame 24-inch by 8-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department



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of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Standard Manhole Frame 24-inch by 8-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Standard Manhole Frame 24-inch by 8-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 24-inch by 8-inch shall have a minimum dimensions shall be in accordance with **24" X 8" Sewer Frame Only Detail (S-02.53)**.
5. Standard Manhole Frame 24-inch by 8-inch shall have a minimum 21-3/4-inch diameter access opening.
6. Standard Manhole Frame 24-inch by 8-inch shall have a maximum height of 8-inches.

7.5.6 Replacement Manhole Frame 26-inch by 6-inch

1. Replacement Manhole Frame 26-inch by 6-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Replacement Manhole Frame 26-inch by 6-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Replacement Manhole Frame 26-inch by 6-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Replacement Manhole Frame 26-inch by 6-inch shall have a minimum dimensions shall be in accordance with **26" X 6" Sewer Frame Only Detail (S-02.54)**.
5. Replacement Manhole Frame 26-inch by 6-inch shall have a minimum 24-inch diameter access opening.
6. Replacement Manhole Frame 26-inch by 6-inch shall have a maximum height of 6-inches.

7.5.7 Standard Manhole Frame 32-inch by 6-inch

1. Standard Manhole Frame 32-inch by 6-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department

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of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Standard Manhole Frame 32-inch by 6-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Standard Manhole Frame 32-inch by 6-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 32-inch by 6-inch shall have a minimum dimensions shall be in accordance with **32" X 6" Sewer Frame Only Detail (S-02.55)**.
5. Standard Manhole Frame 32-inch by 6-inch shall have a minimum 30-1/4-inch diameter access opening.
6. Standard Manhole Frame 32-inch by 6-inch shall have a maximum height of 6-1/2-inches.

7.5.8 Standard Manhole Frame 32-inch by 8-inch

1. Standard Manhole Frame 32-inch by 8-inch provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Standard Manhole Frame 32-inch by 8-inch shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Standard Manhole Frame 32-inch by 8-inch shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. Standard Manhole Frame 32-inch by 8-inch shall have a minimum dimensions shall be in accordance with **32" X 8" Sewer Frame Only Detail (S-02.56)**.
5. Standard Manhole Frame 32-inch by 8-inch shall have a minimum 30-inch diameter access opening.
6. Standard Manhole Frame 32-inch by 8-inch shall have a maximum height of 8-inches.

7.5.9 24-inch Standard Sewer Manhole Cover

1. 24-inch Standard Sewer Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department



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of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. 24-inch Standard Sewer Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. 24-inch Standard Sewer Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 24-inch Standard Sewer Manhole Cover shall have a minimum dimensions shall be in accordance with **24" Standard Sewer Cover Detail (S-02.61)**.
5. The words "SPRINGFIELD WATER & SEWER COMMISSION" and the Commission Logo shall be raised relief.
6. The word "SEWER" shall be raised relief.
7. 24-inch Standard Sewer Manhole Covers shall have two (2) penetrating pick-holes on each opposite side and one (1) 1-1/4-inch diameter penetrating pick-hole shall offset a minimum of 4-inches from the center, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-1/4-inch thick (plus or minus 1/16-inch).
8. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

7.5.10 32-inch Standard Sewer Manhole Cover

1. 32-inch Standard Sewer Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. 32-inch Standard Sewer Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. 32-inch Standard Sewer Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 32-inch Standard Sewer Manhole Cover shall have a minimum dimensions shall be in accordance with **32" Standard Sewer Cover Detail (S-02.62)**.
5. The words "SPRINGFIELD WATER & SEWER COMMISSION" and the Commission Logo shall be raised relief.



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6. The word “SEWER” shall be raised relief.
7. 32-inch Standard Sewer Manhole Cover shall have two (2) penetrating pick-holes on each opposite side and one (1) 1-1/4-inch diameter penetrating pick-hole shall offset a minimum of 4-inches from the center, a 31-3/4-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-3/4-inch thick (plus or minus 1/16-inch).
8. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

7.5.11 26-inch Replacement Sewer Manhole Cover

1. 26-inch Replacement Sewer Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
2. 26-inch Replacement Sewer Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. 26-inch Replacement Sewer Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 26-inch Replacement Sewer Manhole Cover shall have a minimum dimensions shall be in accordance with **26” Replacement Sewer Cover Detail (S-02.63)**.
5. The word “SEWER” shall be raised relief.
6. 26-inch Replacement Sewer Manhole Cover shall have two (2) non-penetrating pick bars on each side that are approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2inch long, a 26-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 1-1/8-inch thick (plus or minus 1/16-inch).
7. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

7.5.12 30-inch Replacement Sewer Manhole Cover

1. 30-inch Replacement Sewer Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.



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2. 30-inch Replacement Sewer Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. 30-inch Replacement Sewer Manhole Cover shall be strong, durable, even grained Cast iron or Ductile iron smooth, free from scale, lumps, blisters, sand holes and defects of any kind.
4. 30-inch Replacement Sewer Manhole Cover shall have a minimum dimensions shall be in accordance with **30" Replacement Sewer Cover Detail (S-02.64)**.
5. The word "SEWER" shall be raised relief.
6. 30-inch Replacement Sewer Manhole Cover shall have two (2) penetrating pick-holes on each opposite side and one (1) 1-1/4-inch diameter penetrating pick-hole at the center, a 29-3/4-inch (plus or minus 1/16-inch) diameter cover, the rim shall be 2-inch thick (plus or minus 1/16-inch).
7. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.

7.5.13 Composite Locking 24-inch or 32-inch Sewer Cover

1. Composite Locking Manhole Covers provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Composite Locking Manhole Covers shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following exceptions and additions:
3. Composite Locking Manhole Covers provided to the Commission or Installers shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.
4. Composite Locking Manhole Covers shall be certified to meet American Association of State Highway and Transportation Officials (AASHTO) M 306 Drainage, Sewer, Utility, and Related Casting Specification and M 105 and have a HS20 load rating.
5. Composite Locking Manhole Covers shall be strong, durable, even from fiber reinforced polymer (FRP). It shall consist of a FRP matrix consisting of between 45% to 70% fiber reinforcement by weight. Fiber reinforcement shall consist of fiberglass, carbon, aramid, basalt and/or natural fibers. The polymer matrix shall be thermoset consisting of a polyester, vinylester, epoxy, polyurethane, and/or hybrid chemical composition. The resin matrix must be thermoset. Composite



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Locking 24-inch Manhole Covers shall be smooth, free from scale, lumps, blisters, sand holes and defects of any kind.

6. Composite Locking Manhole Covers shall be of uniform quality, with a dimensional tolerance of 1/16 of an inch. The finished product will feature a strength to weight ratio of 750:1. There shall be no possibility of corrosion welding between the cover and the frame, preventing damage to the infrastructure when opening. Gasket system shall be integrated to reduce traffic shock and abatement of noise and malodors. Static Coefficient of Friction shall be 0.6 or greater, as described in ASTM C1028 Standard, in both wet and dry applications.
7. Composite Locking Manhole Covers shall be machined to a true surface so that the cover does not rock in the frame no matter the position of the cover.
8. The Commission requires that the Composite Locking Manhole Covers shall be subjected to proof load testing as follows:
 - (a) Testing shall be in accordance with the National Institute of Standards Technology (NIST) standards.
 - (b) Composite Locking Manhole Covers shall show no detrimental deformation or cracks when a proof load of 50,000-pounds is concentrated on an 9-inch by 9-inch area at the center of the cover for a 1-minute period of time.
 - (c) Permanent deformation shall not exceed 1/8-inch.
 - (d) All testing shall be at the supplier's expense.
9. Composite Locking Manhole Covers shall have a non-slip pattern cast on the top.
10. Composite Locking Manhole Covers shall be provided with individual permanent markings that are easily discernable and show the following:
 - (a) Name of the producing manufacturer and country of manufacture preceded by the words "Made in", such as "Made in USA"
 - (b) AASHTO designation or ASTM designation number
 - (c) Class by a number followed by a letter indicating the minimum tensile strength and size of test bar,
 - (d) Manufacturing date (MM/DD/YY),
11. The above markings are required, but the Commission will allow some variation in how the above markings are provided on the finished product. The design and



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location of the markings must meet and be subject to the approval of the Commission's aesthetic judgment.

12. The word "SEWER" shall be raised relief.
13. Composite Locking Manhole Cover shall fit any of the Standard 24-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
14. Composite Locking 24-inch Manhole Cover dimensions shall be in accordance with **24" Composite Locking Sewer Cover Detail (S-02.65)**.
15. The Composite Locking 24-inch Manhole Cover shall have one (1) non-penetrating pick bar on one side that is approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, one (1) 1-1/4-inch diameter penetrating pick-hole, two 1/4-turn penta head latches on each side of the cover, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-inches thick (plus or minus 1/16-inch).
16. Composite Locking 32-inch Manhole Cover shall fit any of the Standard 32-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
17. Composite Locking 32-inch Manhole Cover dimensions shall be in accordance with **32" Composite Locking Sewer Cover Detail (S-02.66)**
18. The Composite Locking 32-inch Manhole Cover shall have one (1) non-penetrating pick bar on one side that is approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, one (1) 1-1/4-inch diameter penetrating pick-hole, two 1/4-turn penta head latches on each side of the cover, a 1-1/2-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-inches thick (plus or minus 1/16-inch).
19. The dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.



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7.5.14 Gasketed 24-inch Sewer Cover

1. Gasketed 24-inch Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Gasketed 24-inch Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:
3. Gasketed 24-inch Manhole Cover shall fit any of the Standard 24-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
4. The words “SPRINGFIELD WATER & SEWER COMMISSION” and the Commission Logo shall be raised relief.
5. The word “SEWER” shall be raised relief.
6. The Gasketed 24-inch Manhole Cover shall have two (2) non-penetrating pick bars on each side that are approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-1/4-inch thick (plus or minus 1/16-inch).
7. The Gasketed 24-inch Manhole Cover shall also include a continuous, self-sealing gasket cemented in a machine groove on the underside of the cover or as otherwise approved by the Commission.
8. The Gasketed 24-inch Manhole Frame shall have a minimum 21-3/4-inch diameter access opening.

7.5.15 Gasketed 32-inch Sewer Cover

1. Gasketed 32-inch Manhole Cover provided to the Springfield Water and Sewer Commission (Commission) or its Contractors or the Springfield Department of Public Works shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Gasketed 32-inch Manhole Cover shall, as a minimum, meet all specifications as in Paragraphs 7.5.1 and 7.5.2, and the following:



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3. Gasketed 32-inch Manhole Cover shall fit any of the Standard 24-inch Manhole Frames and the dimensions of the cover must match existing frames and covers such that parts are interchangeable with both the new and existing manhole frame and covers.
4. The words “SPRINGFIELD WATER & SEWER COMMISSION” and the Commission Logo shall be raised relief.
5. The word “SEWER” shall be raised relief.
6. The Gasketed 32-inch Manhole Cover shall have two (2) non-penetrating pick bars on each side that are approximately 1-inch by 1-1/2-inch with the slot/channel approximately 1-1/2-inch wide by 4-1/2-inch long, a 23-3/4-inch (plus or minus 1/16-inch) diameter cover, and the rim shall be 1-1/4-inch thick (plus or minus 1/16-inch).
7. The Gasketed 32-inch Manhole Cover shall also include a continuous, self-sealing gasket cemented in a machine groove on the underside of the cover or as otherwise approved by the Commission.
8. The Gasketed 32-inch Manhole Frame shall have a minimum 21-3/4-inch diameter access opening.

7.5.16 Pressure (locking) Manhole Frame and Cover 26-inch by 7-inch

1. Pressure (locking) Manhole Frame and Covers 24-inch by 8-inch shall meet all the requirements of the Gasketed Manhole Frame and Covers 24-inch by 8-inch with the following exceptions:
2. The 26-inch Pressure (locking) Manhole Frame shall have a seat cast in the frame to support the cover.
3. The 26-inch Pressure (locking) Manhole Frame shall have a self-sealing gasket cemented in a machine groove on the topside of the frame or as otherwise approved by the Commission.
4. Cam locks or J-bar locks shall be provided to secure the cover to the frame.
5. If cam locks are provided the 26-inch Pressure (locking) Manhole Frame shall have a minimum of three (3) cam lock supports cast into the frame. Each cam lock shall be provided with stainless steel cams, nuts, and bolts to secure cover to the frame.
6. If cam locks are provided the 26-inch Pressure (locking) Manhole Cover shall have a rabbit cast or machined around the outer diameter of the cover to allow the cam locks to secure the cover to the frame.



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7. If J-bar locks are provided the 26-inch Pressure (locking) Manhole Cover shall have a minimum of three (3) J-bar locks cast into the frame. Each J-bar lock shall be provided with stainless steel J-bars, nuts, and bolts to secure cover to the frame.
8. The 26-inch Pressure (Locking) Manhole Frame shall have a minimum 24-inch diameter access opening.

7.5.17 Pressure (locking) Manhole Frame and Cover 32-inch by 7-inch

1. Pressure (locking) Manhole Frame and Covers 32-inch by 7-inch shall meet all the requirements of the Gasketed Manhole Frame and Covers 32-inch by 7-inch with the following exceptions:
2. The 32-inch Pressure (locking) Manhole Frame shall have a seat cast in the frame to support the cover.
3. The 32-inch Pressure (locking) Manhole Frame shall have a self-sealing gasket cemented in a machine groove on the topside of the frame or as otherwise approved by the Commission.
4. Cam locks or J-bar locks shall be provided to secure the cover to the frame.
5. If cam locks are provided the 32-inch Pressure (locking) Manhole Frame shall have a minimum of three (3) cam lock supports cast into the frame. Each cam lock shall be provided with stainless steel cams, nuts, and bolts to secure cover to the frame.
6. If cam locks are provided the 32-inch Pressure (locking) Manhole Cover shall have a rabbit cast or machined around the outer diameter of the cover to allow the cam locks to secure the cover to the frame.
7. If J-bar locks are provided the 32-inch Pressure (locking) Manhole Cover shall have a minimum of three (3) J-bar locks cast into the frame. Each J-bar lock shall be provided with stainless steel J-bars, nuts, and bolts to secure cover to the frame.
8. The 32-inch Pressure (Locking) Manhole Frame shall have a minimum 30-inch diameter access opening.



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7.5.18 Coatings

No coatings are required for manhole frame and covers or covers.

7.5.19 Sewer Manhole Frame and Covers Makes and Models Approved for use by the Commission

The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.

1. East Jordan Iron Works
 - (a) MHF 24-inch by 4-inch, Part #: 1244 11
 - (b) MHF 24-inch by 6-inch, Part #: 1246 11
 - (c) MHF 24-inch by 8-inch, Part #: 1248 11
 - (d) MHF 26-inch by 6-inch, Part #: 2266 11
 - (e) MHF 32-inch by 6-inch, Part #: 1322 13
 - (f) MHF 32-inch by 8-inch, Part #: 2008 11
 - (g) Standard MHC 24-inch, Part #: 1246 74
 - (h) Standard MHC 32-inch, Part #: 2006 62
 - (i) Replacement MHC 26-inch, Part #: 2111 23
 - (j) Replacement MHC 30-inch, Part #: 2308 22
 - (k) Replacement MHC Composite Locking 24-inch, Part # COM 2401 29
 - (l) Replacement MHC Composite Locking 32-inch, Part # COM 3200 __
2. Approved equal of another manufacturer provided the product(s) are manufactured as per these specifications.



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- (m) Gasketed MHF&C 24-inch by 8-inch, Part #: 00124674C03GS
- (n) Gasketed MHF&C 32-inch by 8-inch, Part #: 00200662C03GS
- (o) Gasketed MHF&C 24-inch by 8-inch, Part #: 00124674C03GS
- (p) Gasketed MHF&C 32-inch by 8-inch, Part #: 00200662C03GS
- (q) Gasketed MHC 24-inch, Part #: 00124811GS
- (r) Gasketed MHC 32-inch, Part #: 00200662GS
- (s) Pressure (locking) MHF&C 26-inch by 7-inch, Part #: 42339048W01
- (t) Pressure (locking) MHF&C 32-inch by 7-inch, Part #: 41420041W01



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Section 7.6 FLEXIBLE MANHOLE SLEEVES/SEALS

7.6.1 General

1. Manhole sleeves, gaskets, and sealants for Pre-cast Manholes provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Manhole sleeves, gaskets, and sealants for Pre-cast Manholes shall be furnished complete with lubricants, stainless steel stops, inserts, clamps, etc.
3. Manhole sleeves, gaskets, and sealants for Pre-cast Manholes shall assure water tightness and permanent seal.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product

7.6.2 Flexible Sleeve/Seals from Pre-cast Concrete Manhole Manufacturer

Flexible sleeves/seals from Pre-cast Concrete Manhole Manufacturer shall be New Lok Joint Flexible Sleeve by Interpace, A-Lok Manhole sleeve by L & L Concrete Products, Press Wedge II by Pre-Seal Basket Corporation, or equal products of another manufacturer.

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7.6.3 Flexible Sleeve/Seals Field Applied

Flexible sleeves/seals Field Applied shall be K or N Seal boot, or equal products of another manufacturer.



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Section 7.7 NON-SHRINK GROUT

1. Non-Shrink Grout provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
2. Grout shall be non-shrink and waterproof.
3. Grout shall be Hallemite, Waterplug, Embeco or approved equal. Plastic pipes shall have a water-stop gasket secured to pipe with a stainless steel clamp.
4. Delivery shall be specified in terms of number of days from receipt of order.
5. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
6. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
7. References

The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:

- (a) Name of Municipality/Utility
- (b) Total amount of product bid on and amount delivered
- (c) Date the bid was accepted and date the product was delivered
- (d) Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product



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CHAPTER 8 SEWER PUMP STATIONS

Section 8.1 SUBMERSIBLE SEWAGE PUMP STATIONS

8.1.1 General

1. The submersible pumping station shall include all materials, equipment and incidentals required to install wastewater pumping stations with all related interior piping and electrical works as specified herein and in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)**, unless otherwise approved by the Commission.
2. Pumps shall be designed for use in wastewater non-clog submersible pumping stations.
3. Reference to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and not to be considered proprietary.
4. One complete spare pump with motor, power and signal cable, attachments to the guide rails, and pipe connection adaptor for the wastewater pumping station is required.
5. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other countries to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
 - (e) The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement govern.
- 6.



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8.1.2 Submersible Sewage Pumps – Quality Criteria

1. The system shall be furnished by a single supplier who shall be responsible for the coordination of the system design and who shall assume complete responsibility for the proper installation and operation of the system. All parts shall be properly stamped for identification and location. Nameplates giving the name of the manufacturer, the rated capacity, head, speed and all other pertinent data shall be attached to each pump and motor.
2. All equipment furnished shall be new and unused, shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of 5 years.
3. All the equipment specified herein is intended to be standard equipment for pumping all material found in domestic wastewater.

8.1.3 Submersible Sewage Pumps and Pumping System

1. The design characteristics of the pump station shall be and in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)**, and as specified herein, unless otherwise approved by the Commission.
2. Two non-clog submersible pumps shall be installed in the pumping station wet well. The two pumps shall be programmed to operate in an alternating lead/lag mode.
3. Pumps shall be automatically started from high level switch and automatically stopped from a low level switch. An alternating switch shall be provided in the control panel such that the operation of one pump shall switch the next automatic start to the other pump. The pumps shall also be capable of manual operation from the control panel.
4. Each of the two pumps shall be sized to handle the maximum flows, thus the pumping system shall provide 100% redundancy.
5. At least one pump shall be equipped with a backwash valve or flush valve. The flush valve shall be designed to allow a minimum of 30 seconds circulation of wastewater in the wet well to re-suspend and de-sludge settled solids.
6. The non-clog pumps and motors shall be designed and manufactured so they can operate completely submerged in the sewage and wastewater. Pump motors shall run indefinitely without overheating with motors un-submerged.



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7. The centrifugal pump impeller unit shall be attached to a common motor and pump shaft of stainless steel. Pump and motor housings shall be high quality gray iron castings. Impeller shall be single vane cast iron.
8. All fasteners, excluding joint accessories, shall be made of Grade 316 stainless steel. Bolts shall be in accordance with ASTM A193 grade B8, latest revision. Nuts shall be in accordance with ASTM A194 grade 8, latest revision. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts installed into castings shall be provided with one (1) Grade 316 stainless steel flat washer and nuts and bolts shall be provided with two (2) Grade 316 stainless steel flat washers so that the epoxy coating is not damaged. At a minimum, nuts shall be coated with fluorocarbon, epoxy, zinc, or other anti-corrosion coating to help prevent galling.
9. To prevent galling; all stainless steel bolts shall be coated on the outside of all threads and the stainless steel nuts or castings on the inside of all threads at the factory, with an anti-seizing material such as provided by Henkel Technologies, Rocky Hill, Connecticut - product name: Loctite Nickel Anti-Seize Lubricant; Chesterton Technical Products, Stoneham, Massachusetts – product name: Chesterton 772 Premium Nickel Anti-Seize Compound; Permatex Inc. Hartford, Connecticut – product name: Permatex Nickel Anti-Seize Lubricant or equal product of another manufacturer and as specified in Section 3.18 of these Specifications.
10. The pump-motor shaft shall be sealed by two mechanical tungsten carbide faced seals within an oil filled chamber to provide clean, constant lubrication. The shaft shall be supported by an upper ball radial and thrust bearing and a two row angular contact lower bearings both grease lubricated. The upper bearing shall be supported by an O-ring sealed, movable cap so that impeller clearance may be adjusted externally for most efficient operation.
11. The motor winding and rotor shall be mounted in a sealed, submersible type housing which is able to transmit heat from motor winding to outer housing. Motor winding shall be Class F insulated and securely held in the housing with machine screws so that it may be removed in the field without the use of heat or a press.
12. Pump motors shall be air filled and shall have cooling characteristics suitable to permit continuous operation in a totally, partially or non-submerged condition. Jacket water-cooling shall not be required. The pump and motor shall be capable of running without damage for extended periods. Pump and motor shall be explosion-proof, suitable for Class 1, Division 1, Group C or D applications. Motor shall be provided with pilot thermal sensors embedded in the stator windings. Pumps shall have factory installed moisture detectors (seal failure probes) in the seal chamber.



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13. The impellers shall be of the semi-open, single vane, non-clog type with the forward ends of the blades generously rounded to avoid catching trash. The blades shall be tapered toward the periphery of the impeller to generate the maximum possible shutoff head, and the outer tips of the blades shall occupy only a negligible portion of the area of the impeller throat or periphery. The impellers shall be accurately balanced before assembling.

8.1.4 Pumps Station Chambers – Wet Well and Valve Vault

1. The Wet Well and Valve Vault of the pump station shall be and in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)**, and as specified herein, unless otherwise approved by the Commission.
2. The underground pump station chambers shall of reinforced concrete construction.
3. Pre-cast concrete barrel sections and pre-cast bases shall conform to ASTM C478, and shall meet the following requirements.
4. No pump station chamber shall be less than 72-inches in diameter.
5. The wall thickness shall not be less than:

Diameter (inches)	72	84	96
Wall Thickness (inches)	7	8	9

6. Structure walls shall be designed for an equivalent water pressure of 90 Pounds per Square Foot (PSF). Pressure diagram shall originate at finished ground surface. Lateral pressure from vehicles shall be included in accordance with AASHTO.
7. Barrel sections shall have tongue and groove gasketed joints.
8. All sections shall be cured and shall not be shipped nor subjected to loading until after 5 days after fabrication and/or repair, or when the concrete compressive strength has attained 5,000 PSI, whichever is longer.
9. Pre-cast concrete barrel sections with pre-cast top slabs shall be designed for a minimum of H-20 loading plus the weight of the soil above. Cracked and/or chipped slabs will not be accepted unless manufacturer's proposed repair methods and manufacturer's guarantees are reviewed and approved by the Commission.
10. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on the inside of each pre-cast section.



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11. Pre-cast concrete base shall be constructed and installed as recommended by the manufacturer and/or detailed by the design engineer. However, the thickness of the bottom slab of the pre-cast base shall not be less than the manhole barrel sections or the top slab, whichever is greater. Bolting of the structure to the base slab shall be with Type 304 stainless steel bolts.
12. The pre-cast base shall be firmly anchored to a reinforced concrete slab designed such that the pumping station is able to fully resist flotation when the groundwater elevation is at the finished ground surface level.
13. The design shall resist flotation and shall account for the dead weight of the structure and base in addition to soil load above the structure. Accounting for skin friction, soil friction, or weight of equipment in the structure is not allowed. Flotation safety factor shall be not less than 1.15.
14. Entrance hatches for the concrete chambers (both wet well and valve vault) shall be aluminum single leaf 30-in by 48-in, complete with upper guide holder, chain holder, and cable holder for pumps. Hatches shall be designed with lift assisting springs for easy opening and closing, and with hold-open arm with red vinyl grip handle that automatically locks cover in the open position against weight and wind. Hatches shall be equipped with a locking mechanism that can be unlocked only by the operator.
15. Hatches shall be designed for H-20 loading.
16. Manhole rungs shall be reinforced steel, copolymer polypropylene, 14-in wide, M.A. Industries Inc, PF Series or equal. Copolymer polypropylene shall conform to ASTM D4101 Classification PP0344 B33534 Z02. Steel reinforcing shall be 1/2-in diameter, conforming to ASTM A615, Grade 60 and shall be continuous throughout rung. Manhole rungs shall meet all OSHA requirements. No rungs shall be allowed in the wet well chamber.
17. The wet well chamber shall be supplied with pump mounting plates with upper and lower rail supports attached to the concrete with stainless steel expansion bolts. Two (2) 2-inch stainless steel pipe or fiberglass I-beam rails shall be installed between the mounting plates. The rails shall be used to raise and lower the pumps into the stations. A stainless steel lifting cable shall be attached to the top of each station chamber and to the top of each pump assembly.
18. The valve vault shall be designed with a minimum internal vertical clearance of 7-feet.



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8.1.5 Pumps Station Controls and Ancillary Equipment

1. Sealed tilt type switches shall be supplied to control wet well level and alarm signal. The mercury switches shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have a heavy Neoprene jacket. A weight shall be attached to each cord above the float to hold each switch in place in the wet well. The weight shall be placed above or inside the float to effectively prevent sharp bends in the cord when the float operates. The float switches shall hang in the wet well supported only by the cord. Four float switches shall be used to control and signal level; one for high level alarm, one for pump turn-on, one for pump turn-off and one for low-level alarm.
2. The Commission may approve an alternate wet well level control set up utilizing an ultrasonic level transducer and one tilt type switch for high level alarm. The Commission may consider this method if the Commission is satisfied that physical and hydraulic conditions in the wet well do not impede the accuracy of the ultrasonic transducer readings. The Commission reserves the right to reject this method at its own discretion.
3. Level settings shall be as designed to ensure a minimum pumping cycle of 15 minutes under maximum flows.
4. Power cables shall be suitable for submersible pump and Class 1, Division 1, Group C or D applications. Cable sizing shall conform to National Electrical Code specifications for pump motors. Cable entry to each pump motor shall be designed for submersible pump applications. The cable entry junction box and motor shall be separated by a stator load sealing gland which shall isolate the motor interior from foreign materials gaining access through the pump top. The electrical power cords shall be sealed by use of a cord grip, with individual conductors additionally sealed into the cord cap assemblies with epoxy sealing compound.
5. The cord grip shall have a male tapered pipe thread, threaded into a female tapered pipe thread in a cord cap. The cord cap shall be sealed into the motor housing with an O-ring. The pumps shall be supplied with a sufficient length of cord to connect to junction boxes inside the station.
6. Level settings shall be as follows:
 - (a) On wet well level rise, the "pump OFF" level mercury switch shall be energized. When the level reaches the "pump ON" level switch, it shall be energized and send a signal to the control panel and automatically turn on a pump. One pump shall operate until the wet well level drops down to the "pump off" and the switch automatically turns the pump off. Under normal operation, the duty and standby pumps shall alternate service after each pump cycle is complete and the in-service pump called to stop.



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- (b) If wet well level rises to the high water level or falls to the low water level, the alarm level switches shall be energized with an alarm signal that there is a malfunction at the Pumping Station. Upon high water level alarm, the duty pump shall be called to stop and the standby pump shall be started in its place. The high water alarm shall also disable the alternation circuit to prevent re-starting of the faulty pump. A momentary contact pushbutton shall be provided and mounted within the control panel to reset the alternator circuit once both pumps have become operational.
 - (c) Should the duty pump fail to start, the standby pump shall be automatically started after a one minute time delay, the failed duty pump shall be locked out, an alarm transmitted and the standby pump shall continue to operate through every cycle. Both pumps shall not be capable of running at the same time when operating in the automatic mode. Each pump shall be capable of being operated manually from the control panel. All level switches shall be adjusted for level setting from the surface.
7. Each float switch shall have a sufficient length of cord, be intended for submersible service and Class 1, Division 1, Group C or D applications, such that the switches can be connected to junction boxes inside the station.

8.1.6 Pumps Station Control Panels

1. The control panels shall be housed in the emergency generator building.
2. Unless approved by the Commission, power supply to the control panels shall be 480 Volts, 3-Phase, 60 Hz. A combination motor circuit protector / disconnect switch and magnetic starter with Class 10 overload protection, and two NO, two NC contacts shall be provided for each pump.
3. The motor circuit protector disconnect switch shall have short circuit rating of 22,000 AIC and shall be interlocked with the door handle of the control panel. An interlock relay shall be provided to automatically re-connect the control circuit in case of circuit breaker trip on one pump. Each pump control circuit shall be supplied with an H-O-A switch, on-off lights LED Type Cluster and running time meter.
4. An automatic alternator shall be provided to alternate the sequence of operation of the pumps on the completion of each pumping cycle. Terminal strips shall be provided for connecting pump and control wires. Additional terminals shall be provided to connect alarms. A transformer shall be supplied to provide 24-volt power to the control circuit. An essentially safe barrier relay shall be provided between each float level switch and the terminal strip in the pump control panel. Relays shall be GEM Safe-Pac Division of Delaval or equal.



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5. Lockout-Tag out provision shall be provided. At a minimum, provisions shall be provided to padlock unit disconnect handles in the OFF position with up to three padlocks.
6. The following control panel mounted indicating lights and nameplates shall be included:
 - (a) High Level
 - (b) Low Level
 - (c) Moisture in Motor No. 1
 - (d) Moisture in Motor No. 2
 - (e) Over-heating - Motor No. 1
 - (f) Over-heating - Motor No. 2
7. All alarms shall be common to an output contact rated 5 amperes at 120 VAC. See SCADA requirements in Section---

8.1.7 Pumps Station Communication System

1. The pump station shall be equipped with radio contact and SCADA system for relay of alarms and monitoring signals to pump station operator.
2. Radio/SCADA systems must be compatible with the Springfield Water and Sewer Commission Operator's system, namely United Water (UW). Contact UW at (413) 732-0293 for coordination of design/procurement of communications equipment.

8.1.8 Pumps Station Piping and Valves

1. Ductile iron (DI) pipe shall be used for sewer pump station piping and shall be in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)** and as specified herein, unless otherwise approved by the Commission.
2. DI pipe shall conform to AWWA C151, and shall in accordance with the Commission's Material Specifications for Water Pipe – Flanged Ductile Iron Pipe, unless otherwise approved by the Commission.
3. Gaskets shall be full-face rubber ethylene propylene diene Monomer (EPDM) rubber in accordance with [ASTM](#) standard D-1418 with cloth insertion, 1/8-in thick and shall conform to the dimensions shown in Table A.1 of AWWA C115, unless otherwise approved by the Commission.



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4. Flanged joints shall be supplied with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same standard as the flange. Low carbon steel bolts and nuts shall conform to ASTM A307, Grade B.
5. Fittings shall be ductile iron, shall have the same pressure rating as the DI pipe, shall be in accordance with the Commission's Material Specifications for Ductile Iron Pipe Fittings and provided in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)** and as specified herein, unless otherwise approved by the Commission Fittings.
6. All pipe and fittings shall have a double thick cement mortar lining and bituminous seal coat on the inside, in accordance with AWWA C104.
7. All pipe and fittings shall have a bituminous seal coat on the outside, in accordance with AWWA C104.
8. The valves for isolation shall be flanged gate valves, and shall be in accordance with the Commission's Material Specifications for Gates Valves for pressure class 250, and provided in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)** and as specified herein, unless otherwise approved by the Commission
9. The check valves required for prevention of backflow shall be flanged, 250 psi working pressure, bronze-mounted, with bronze seat ring and bronze gate ring. Check valves shall comply with the applicable portions of AWWA Standard for Gate Valves. Valves shall be fitted with an extended hinge arm with outside lever and spring.
10. Sleeve type couplings for exposed ductile iron pipe shall be of steel construction and shall be in accordance with the Commission's Material Specifications for Couplings, and provided in accordance with the **Pre-cast Wet Well and Valve Vault Detail (S-06.0)** and as specified herein, unless otherwise approved by the Commission. Gaskets shall be of a composition resistant to wastewater components.

8.1.9 Pressure Gauges

1. Pump Station Pressure Gauges shall have a 4-1/2-in nominal diameter black case with phosphor bronze Bourdon tubes (beryllium copper bellows), 1/4-in NPT male connections, stainless steel rack and pinion movement micro-adjustment for calibration, white dials and black figures and threaded ring case. All gauges shall be furnished with factory mounted protective diaphragm attachment suitable for wastewater service. Gauges shall read 0 to 50 PSI unless otherwise required by design conditions and as approved by the Commission.



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2. Pump Station Pressure Gauges shall be provided with copper nipples complete with "T"-handle cocks. Nipples shall be at least 2-in long and provided with elbows for easy installation and reading of the gauges.
3. Gauges shall be manufactured by U.S. Gauge, Feasterville, PA; Crosby-Ashton, Wrentham, MA; or approved equal.

8.1.10 Vent

1. Vent shall be Steel Schedule 40, ASTM A53, hot-dipped galvanized with threaded, 150 lb, hot-dipped galvanized malleable iron fittings.
2. Vent shall be provided with a stainless steel bug screen.
3. The Commission may consider an alternate, such as Schedule 80 PVC for material depending on Pump Station location, site accessibility and proximity to traffic. Approval of this alternative is at the sole discretion of the Commission.

8.1.11 Emergency Power Generation

1. Pump station shall be equipped with a stand-by emergency power generation source.
2. Power generators shall be provided to supply adequate power required to energize the pumps at full flow capacity, and the pump station electrical and incidental systems.
3. Type of fuel, storage capacity, and storage location shall be approved by the City of Springfield Fire Department.
4. Power generators shall be Cummins, Caterpillar, or approved equal.

8.1.12 Housing for the Emergency Power Generation

1. The housing shall be pre-cast concrete building and sized and configured to adequately house all equipment and incidentals specified herein including, but not limited to, the emergency power generator, pump station control panels, transfer switch, generator controls, heaters, SCADA and communication equipment, and anything else incidental to the pump station design and as required by the design engineer.
2. The building shall meet American Concrete Institute (ACI) 318-02, the Building Code Requirements for Structural Concrete IBC 2003, and City of Springfield Code Enforcement requirements, all the latest versions,
3. Minimum design criteria:



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- (a) Floor live load: as required by weight of generator. Minimum 150 psf
 - (b) Roof live load: 60 psf unless otherwise directed by the design engineer
 - (c) Wind Load: 130 mph
 - (d) Load factors: Live = 1.7; Dead = 1.4
 - (e) Concrete minimum compressive strength: 5,000 psi @ 28 days, reinforcing steel shall meet ASTM A615, Grade 60
- 4. The housing shall be suitable for securing the power generator unit; shall provide weather and sound attenuation; and shall be designed to meet the cooling air flow, heat exchange, exhaust air, sound muffling, space heating and all else required by the emergency generator unit manufacturer.
 - 5. The housing façade shall be brick, wood, vinyl, or other type of siding as approved by the Commission. The Commission shall select the building façade type that is most similar to the pump station area houses/buildings.
 - 6. Roof shall consist of weather proof shingles and UV blockers, shall be resistive to cracking and splitting and shall be non-combustible providing a UL Class A fire rating.
 - 7. Prefabricated housing units may be proposed for the Commission's consideration. The Commission reserves the right to approve or reject this alternative at its sole discretion.

8.1.13 Pump Station Site

Pump station site shall be in accordance with the Commission's Guidelines and Policies.

8.1.14 Submittals

- 1. Submittals are required at time of bid award, at time of purchase, or as required by the Commission's Purchasing Agent.
- 2. Shop drawings detailing all materials, equipment performance information, and design drawings including structural, architectural, mechanical, civil and general. All design drawings shall be stamped by a professional engineer registered in the Commonwealth of Massachusetts.
- 3. Pumps manufacturer shall include rating curves and details of pump construction. The curves shall indicate head, discharge rate, pump efficiency, and horsepower characteristics throughout the full operating range.



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4. Stand-by power generator manufacturer shall include generator unit dimensions, weight, fuel consumption rates, radiator cooling air requirement, combustion air volume, heat radiated to room, noise level, and all else required for completing the pump station design.
5. A pump station testing, startup, and operation plan listing name of qualified pump station operator(s) who is responsible of testing, operating, maintaining, and monitoring the pump station.



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CHAPTER 9 LOW PRESSURE SANITARY SEWER SYSTEMS

Section 9.1 Low Pressure Sanitary Sewer (LPSS) Systems

9.1.1 Low Pressure Sanitary Sewer – General

1. The Low Pressure Sanitary Sewer System shall include all materials, equipment and incidentals required to install the low pressure system, the low pressure lateral, and the grinder pump station with all related piping, structures, boxes, pump stations, and electrical works as specified herein and in accordance with the **Low Pressure Sanitary Service / Main 2-1/2-inch Valve Box in Non-Paved Areas Detail (S-09.1)**, **Low Pressure Sanitary Sewer Pipe Trench Detail (S-09.2)**, **Low Pressure Sanitary Sewer Service Lateral Detail (S-09.3)**, **Low Pressure Sanitary Sewer Main Inline Flushing Structure Detail (S-09.4)**, and **Low Pressure Sanitary Sewer Terminal flushing Structure Detail (S-09.5)**, unless otherwise approved by the Commission.
2. Pumps shall be designed for use in wastewater non-clog submersible pumping stations.
3. Reference to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and not to be considered proprietary.
4. One complete spare pump with motor, power and signal cable, attachments to the guide rails, and pipe connection adaptor for the wastewater pumping station is required.
5. The product(s) shall have all parts cast and assembled in North America or meet the requirements of the American Iron & Steel (AIS), as follows;
 - (a) North America shall mean the United States, Canada, and Mexico,
 - (b) Cast shall mean molten metals poured into a mold to create casting(s) for a finished product,
 - (c) Incidental parts may be purchased/obtained from other counties to provide a finished product , in accordance with these Material Specifications, and
 - (d) Assembled shall mean castings and sourced parts are put together to build a finished product, or
6. The finished product shall meet all the requirements of the AIS language, and all guidance issued by the EPA. For any Massachusetts State Revolving Fund (SRF) project this requirement govern.



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7. Delivery shall be specified in terms of number of days from receipt of order.
8. The manufacturer/vendor/shipper must use care in preparing the above items for shipment and in handling during shipment and delivery, to insure that the above items are delivered without damage. Damaged items will not be accepted.
9. The manufacturer and/or vendor, on request, shall provide the purchaser with an affidavit for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the applicable requirements of these specifications to include the applicable ASTM Standards.
10. References
 - (a) The Supplier shall provide references, on request, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - Name of Municipality/Utility
 - Total amount of product bid on and amount delivered
 - Date the bid was accepted and date the product was delivered
 - Reference person with address and desk top phone number whom the Commission has authorization to contact regarding the product
11. This specification section is intended to establish the minimum criteria and requirements for private grinder pump stations to be installed on private property for sewer service for a location which cannot be served by gravity sewer.
12. The Commission is not responsible for the design, procurement, delivery, installation, and maintenance of grinder pump station units.
13. Each grinder pump station shall conform to all state, federal, and local regulations, and meet accepted standards for plumbing equipment for use near residences. It shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the National Sanitation Foundation seal.
14. Sewage grinder pump stations and appurtenances are private structures that are to be owned, operated, and maintained by the property Owner.
15. The grinder pump station supplier, or manufacturer, and project Engineer of Record shall participate in the installation and start-up testing of the grinder pump station.



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9.1.2 Low Pressure Sanitary Sewer – Mains < 3 inch Diameter

1. Pipe provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 9.1.1 of these Material Specifications.
2. Pipe provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.
3. All pipe and fittings furnished shall be clearly marked on the outside indicating name, manufacturer, nominal diameter, ASTM, schedule, and/or pipe or pressure class designation.
4. All materials used for the pressure portion of these systems must be pressure rated at a minimum of 160 psi operating pressure and suitable for the wastewater environment and resistant to corrosion.
5. All pipe and fittings shall be 100 percent hydrostatically tested to 150 psi in the factory.
6. All metal components and hardware shall be 304 stainless steel unless otherwise specified herein or approved by the SWSC.
7. Pipe and fitting material shall be one of the following SDR-21 PVC, Sch 40 PVC, or SDR-11 HDPE per ASTM D 3035. Final determination of the type and size is the responsibility of the project owner's consulting engineer (MA P.E.) and must be approved by the SWSC.

9.1.3 Low Pressure Sanitary Sewer – Mains < 3 inch Diameter – Pre-Insulated

1. Pre-Insulated Pipe provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 9.1.1 and Section 9.1.2 of these Material Specifications.
2. The insulation shall be a foamed in place closed cell polyurethane which completely fills the annular space between the carrier pipe and the exterior casing. The insulation shall have the following physical properties:
 - (a) Minimum Density (lb./cu. ft.) 2.0 ASTM D-1621
 - (b) Closed Cell ASTM D-2856
 - (c) "K" Factor BTU/Hr. sq. ft. °F/in. 147 ASTM C-177
3. The exterior casing shall be High Density Polyethylene (H.D.P.E.) ASTM D-1248 with the following physical properties:



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- (a) ASTM D-3350...Resin Type III, Grade P34
 - (b) ASTM D-638...Ultimate Elongation 850%
 - (c) ASTM D-638...Tensile Yield Strength 3300 psi
 - (d) ASTM D-790...Tangent Flexural Modules 175,000 psi
4. The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.
- (a) Urecon Pre-Insulated Pipe,
 - (b) Perma Pipe,
 - (c) Tricon, or
 - (d) Approved equal product of another manufacture provided the product(s) are manufactured as per these Material Specifications.

9.1.4 Low Pressure Sewer System – Engineered Thermoplastic Fittings

- 1. Plastic fitting components provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with all applicable ASTM standards, this Specification, and Section 9.1.1 of these Material Specifications.
- 2. All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split-collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

9.1.5 Low Pressure Sewer System – Service Lateral Kit

- 1. The Service Lateral Kit provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 9.1.1 of these Material Specifications.
- 2. The Service Lateral Kit shall prevent backflow from the sewer main and into the grinder pump station.
- 3. The Service Lateral Kit shall be sized to match LPSS main pipe diameter.



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4. The Service Lateral Kit (exclusive of piping) shall consist of three (3) compression fittings, one (1) combination curb stop/check valve assembly and one (1) curb box.
5. The Curb Stop and Check Valve Assembly shall be 316 stainless steel and have a two-piece cast 316 stainless steel housing, creating a unilateral body. All plastic compression fittings are to be molded from polypropylene and shall be tested for resistance to aging, pressure rating, tensile strength, and flexural strength. All components shall incorporate compression fitting connections for easy, reliable installation of piping. The lateral kit shall be rated for 150 psi service.
6. Curb Stop and Check Valve Assembly shall be designed for use with HDPE and PVC pressure sewer piping.
7. Curb Stop and Check Valve Assembly shall be an integrated stainless steel ball valve curb stop and check valve and be fully field serviceable with a top service port that allows access to check valve and hinge pin.
8. Curb Stop and Check Valve Assembly shall be designed and tested to 235 psi service pressure.
9. Curb Stop and Check Valve Assembly shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions.
10. Curb Stop and Check Valve Assembly check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.
11. The following products have been approved for use by the Commission. Any change in any component(s) of the product that does not allow for interchangeability of the component(s) shall result in the product no longer being approved and removed from this list.
 - (a) Uni-Lateral E/One assembly — NB0184PXX or NC0193GXX, or
 - (b) Approved equal product of another manufacture provided the product(s) are manufactured as per these Material Specifications.

9.1.6 Terminal Flushing Structure

1. The Terminal Flushing Structure provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 9.1.1 of these Material Specifications.



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2. The Terminal Flushing Structure shall be standard pre-cast barrel section combinations of 1', 2', 3' or 4' lengths as needed.
3. Pre-cast reinforced concrete manhole sections conforming to ASTM c478.
4. Pre-cast reinforced manhole sections shall have design loading per AASHTO HS20-44, ACI 318-83; ASTM c478-82, c890-82, c913-71.
5. Pre-cast reinforced manhole sections shall be either tongue and groove joints or bell and spigot joints with the following gaskets:
 - (a) Tongue & groove gasket shall be o-ring rubber gasket conforming to ASTM c443
 - (b) Bell & spigot gasket shall be butyl rubber gasket joints conforming to ASTM c990
6. The Terminal Flushing Structure shall be provided with (2) coats of bituminous damp proofing.
7. Pre-cast reinforced concrete manhole concrete and reinforcing shall conform to the following:
 - (a) Pre-cast concrete shall be 5,000 psi @ 28 days.
 - (b) Admixtures, air & plasticizers per ASTM c233-82.
 - (c) Reinforcing per ASTM a615 for wire fabric.
8. The Terminal Flushing Structure shall be provided with one (1) 316 stainless steel fully ported quarter turn ball valve, with a corrosion resistant handle and installed inside the manhole and the following:
 - (a) A 1-inch MPT 316 stainless steel flushing connection and cap.
 - (b) The LPSS pipe, fittings, and valves shall be restrained every 18-inches with $\frac{3}{4}$ -inch threaded rod 1-1/2-inch wide X 1/8-inch thick anchor straps.

9.1.7 Inline Flushing Structure

1. The Inline Flushing Structure provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Sections 9.1.1 and 9.1.6 of these Material Specifications.



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2. The Inline Flushing Structure shall be provided with two (2) 316 stainless steel fully ported quarter turn ball valve, with a corrosion resistant handle and installed inside the manholes.

9.1.8 Sanitary Sewer Manhole

1. The Sanitary Sewer Manhole provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 7.5 of these Material Specifications.
2. Frame shall be a standard 32-inch by 8-inch in accordance with **Sewer Frame and Cover Detail (S-02.56 and 02.62)**

9.1.9 Detectable Warning Tape

1. Detectable Warning Tape provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification and Section 9.1.1 of these Material Specifications.
2. Detectable warning tape shall meet the following requirements:
 - (a) "Caution Buried Force Main Below", green color for sewer
 - (b) Minimum thickness of 5-mil, with a solid aluminum foil core.
 - (c) Construction is 2-mil clear film, reverse print laminated to aluminum foil to 2-mil clear fill making the film permanently printed.
 - (d) Minimum width of 3 inches
 - (e) Color coded green for sewer
 - (f) Tensile strength of 35 lfs/in (15,000psi)
 - (g) Elongation of 80%
 - (h) Adhesives with a value of Morton 548 or higher
 - (i) Bottom layer of virgin PE
 - (j) Top layer of virgin PET printability value of 45 dynes
 - (k) Rated for direct burial
 - (l) Proline part #103123083 or approved equal



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9.1.10 LPSS Service Lateral Valve Box

1. LPSS Service Lateral Valve Box provided to the Commission or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification, Section 4.5, and Section 9.1.1 of these Material Specifications.
2. LPSS Service Lateral Valve Box shall have the word “SEWER” cast into cover.

