TOWN OF EAST LONGMEADOW
DEPARTMENT OF PUBLIC WORKS
60 CENTER SQUARE
EAST LONGMEADOW, MA 01028

Felix S. Vachon, Water & Sewer Administrator *felix.vachon@eastlongmeadowma.gov*
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Water and Sewer Specifications

Any additions, substitutions, or changes are at the discretion of the Department of Public Works.

CHAPTER 1 WATER MAINS AND APPURTANANCES,
Section 1 WATER PIPE

1.1 Ductile Iron Push-on Joint Water Pipe

1. Ductile Iron Pipe provided to the Town or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Design and Manufacture

(a) 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
(b) Ductile Iron Pipe shall have rated water working pressure as indicated in Paragraph 10 of these Specifications based on AWWA C-151 standard laying condition: Type #2.

3. 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.

4. Exterior Coating

All pipe shall be coated with an approved petroleum asphaltic seal coat in accordance with ANSI A21/AWWA C-110, Section 4.3 of latest the revision.

5. Markings

The pressure rating, metal thickness class, net weight of pipe without lining,

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length of pipe, date of manufacture and the name of the manufacturer

6. Length

The maximum length shall be twenty (20) feet

7. Joints

(a) Pipe to have push-on type joints conforming to ANSI A21.11/AWWA C-111. Rubber gasket joints to be complete with gasket and lubricant.
(b) Gaskets and lubricant shall be standard for the pipe used and approved by The Town. Rubber gaskets and lubricant for the joints shall be shipped in bags.
(c) The Town 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 2.8 of these Specifications and as required by the Town.

8. Wedges

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

9. Metal Thickness and Pressure Class

Metal thickness and pressure Class shall be as shown in following table:

Size	**Class**	**Metal Thickness**
4"	350	0.25
6"	350	0.25
8"	350	0.25
10"	350	0.26
12"	350	0.28
16"	350	0.34
20"	300	0.36
24"	300	0.40
30"	250	0.42
36"	200	0.42
42”	200	0.47
48”	200	0.52

10. Care and Handling

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

1.2 Flanged Ductile Iron Pipe

1. Flanged Ductile Iron-Pipe shall, as a minimum, shall meet all specifications in Paragraph 2.1.1 and the following:

2. Flanged Ductile Iron Pipe and Fittings provided to the Town or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

3. Flanged Ductile Iron-Pipe, as a minimum, shall conform to the most current ANSI A21.l5/AWWA C-115 and all addenda thereto.

4. 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

5. Flanges shall be ductile iron.

GATE VALVES

1.3 Class 150B - Resilient Seated 4" - 16" Gate Valves and Resilient Seated 4" – 16" Tapping Valves

1. Class 150B - Resilient – Seated Gate Valves and Tapping Valves provided to the Town or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Class 150B - Resilient – Seated Gate Valves and Tapping Valves shall conform to AWWA C-509 (most current revision) for Resilient – Seated Gate Valves for Water Service or AWWA C-515, (most current revision) for Reduced – Wall, Resilient – Seated Gates Valves for Water Service.

3. Class 150B - Resilient – Seated Gate Valves and Tapping Valves shall be of high strength cast iron ASTM A-126 Class B or of high strength ductile iron ASTM A-536 GR 65-45-12.

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4. Class 150B - Resilient – Seated Gate Valves and Tapping Valves maximum working pressure shall be 150-PSI static pressure. Valves provided under Class 150B shall be shell tested at 300-PSI minimum with the gate in the open position. Valves provided under Class 150B shall be seat tested at 150-PSI minimum with the gate in the closed position on each side of the seat.

5. Class 150B - Resilient – Seated Gate Valves and Tapping Valves shall be as provided by American Flow Control – Model 2500, Clow – Model F6100, Kennedy – Model 8571, M&H – Model 4067, Mueller – Model A2360 or A2361, US Pipe – Metropolitan, or the equal product of another manufacturer.

6. Valves that meet the Class 250B specifications also meet or exceed the Class 150B specifications.

7. 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.

8. The valve body markings shall include the manufacturers name or mark, pressure rating, material (C.I. or D.I.), and year of manufacture and be cast into the body.

9. 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.

10. Valves to be provided with a minimum of two (2) O-ring stem seals.

11. Valves shall be of the non-rising stem (NRS) design.

12. Valves shall be wrench- nut operated with a 2-inch square-operating nut made of ductile iron and **counterclockwise** to open.

13. 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

- 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

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- 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 ½", 5 ½", 7 ½", 9 ½", and 11 ½".

14. 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.

15. The resilient-seat shall be made of an elastomer compound that complies with Section 4.2.2.9 of AWWA Standard C-509, (most current revision), or Section 4.2.2.7 of AWWA Standard C-515, (most current revision).

16. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel.

17. To prevent galling nuts shall be coated, inside and out, 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.

18. Valve stems and stem nuts shall be made of a copper alloy or stainless steel that have a minimum yield strength of 40,000-PSI.

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

20. Accessories shall be as specified in Section 3.12 of these Material Specifications.

21. The manufacturer/vendor/shipper must use care in preparing valves for shipment and in handling during shipment and delivery, to insure that the above products are delivered without damage. Particular attention must be directed at protecting the protective coatings from damage. Damaged valves will not be accepted.

1.4 Class 250B - Resilient Seated 4" - 16" Gate Valves and Resilient Seated 4" – 16" Tapping Valves

1. Class 250B - Resilient – Seated Gate Valves and Tapping Valves provided to the Town or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Class 250B - Resilient Seated Gate Valves and Tapping Valves shall conform to AWWA C-515, (most current revision) for Reduced – Wall, Resilient – Seated Gates Valves for Water Service.

3. Class 250B - Resilient Seated Gate Valves and Tapping Valves bodies shall be of high strength ductile iron ASTM A-536 GR 65-45-12.

4. Class 250B - Resilient Seated Gate Valves and Tapping Valves maximum working pressure shall be 250-PSI static pressure. Valves provided under Class 250B shall be shell tested at 500-PSI minimum with the gate in the open position. Valves provided under Class 250B shall be seat tested at 250-PSI minimum with the gate in the closed position on each side of the seat.

5. Class 250B - Resilient Seated Gate Valves and Tapping Valves shall be as provided by American Flow Control – Series 2500, Kennedy – Model 7571, M & H Series 7000, Mueller – Model A2360 or A2361, US Pipe – Model Metropolitan, or the equal product of another manufacturer.

6. 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.

7. The valve body markings shall include the manufacturers name or mark, pressure

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rating, material (D.I.), and year of manufacture and be cast into the body.

8. 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.
9. Valves to be provided with a minimum of two (2) O-ring stem seals.

10. Valves shall be of the non-rising stem (NRS) design.

11. Valves shall be wrench- nut operated with a 2-inch square-operating nut made of ductile iron and **counterclockwise** to open

12. 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

- 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 ½”, 5 ½”, 7 ½”, 9 ½”, and 11 ½”.

13. 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

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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.

14. The resilient-seat shall be made of an elastomer compound that complies with Section 4.2.2.9 of AWWA Standard C-509, (most current revision), or Section 4.2.2.7 of AWWA Standard C-515, (most current revision).

15. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel.

16. To prevent galling nuts shall be coated, inside and out, 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.

17. Valve stems and stem nuts shall be made of a copper alloy or stainless steel that have a minimum yield strength of 40,000-PSI.

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

19. Accessories shall be as specified in Section 3.12 of the se Material Specifications.

20. The manufacturer/vendor/shipper must use care in preparing valves for shipment and in handling during shipment and delivery, to insure that the above products are delivered without damage. Particular attention must be directed at protecting the protective coatings from damage. Damaged valves will not be accepted.

BUTTERFLY VALVES

1.5 Class 150B - Butterfly Va lves

1. Class 150B - Butterfly Valves (BV) provided to the Town or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. All BV shall conform to AWWA Standard for Rubber-seated Butterfly Valves C-

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504, latest revision.

3. All BV shall be rubber-seated, tight closing against stainless steel. BV shall be designed for direct bury service.
4. All BV bodies shall be of high strength cast iron ASTM A-126 Class B or of high strength ductile iron ASTM A-536 GR 65-45-12.

5. All BV body ends shall be mechanical joint conforming to ANSI A21.11/AWWA C-111, unless otherwise specified.

6. 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.

7. 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.

8. All BV manual actuators shall be of the traveling nut design rated for 450 footpounds 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.

9. Unless otherwise specified, all BV shall be left hand to open (clockwise). The operating nut shall be painted red.

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

11. Accessories shall be as specified in Section 3.12 of these Material Specifications.

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 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 Buna-N compound, unless otherwise specified.

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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 304, 316, and/or ASTM A564 stainless steel and shall be sized per AWWA Standard for Rubber-seated Butterfly Valves C-504, latest revision.

16. 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.

17. Shaft seals shall be of the chevron or O-ring type.

18. All fasteners, excluding joint accessories, shall be made of Grade 304 stainless steel.

19. To prevent galling nuts shall be coated, inside and out, 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.

20. 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. Each Class 150 valve shall be shop tested and certified for leakage with the disc in the horizontal plane, in accordance with AWWA C504.

21. Butterfly Valves Class 150B shall be as currently manufactured by Henry Pratt Company, Mueller Valve Company, DeZurik, M & H, Val-Matic, or equal provided the BV are provided as per these specifications.

22. The manufacturer/vendor/shipper must use care in preparing valves for shipment and in handling during shipment and delivery, to insure that the above products are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged products will not be accepted.

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1.6 Class 250B - Butterfly Valves

1. Class 250B - Butterfly Valves (BV) provided to the Town or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. All BV shall conform to AWWA Standard for Rubber-seated Butterfly Valves C-504, latest revision.

3. All BV shall be rubber-seated, tight closing against stainless steel. BV shall be designed for direct bury service.

4. All BV bodies shall be of high strength ductile iron ASTM A-536 GR 65-45-12.

5. All BV body ends shall be mechanical joint conforming to ANSI A21.11/AWWA C-111, unless otherwise specified.

6. 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.

7. 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.

8. All BV manual actuators shall be of the traveling nut design rated for 450 footpounds 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.

9. Unless otherwise specified, all BV shall be right hand to open (clockwise). The operating nut shall be painted red.

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

11. Accessories shall be as specified in Section 3.12 of these Material Specifications.

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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 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 Buna-N compound, unless otherwise specified.

14. All BV seats sha ll 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 304, 316, and/or ASTM A564 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.

20. To prevent galling nuts shall be coated, inside and out, 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.

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21. 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. Each Class 250B valve shall be shop tested and certified for leakage with the disc in the horizontal plane, in accordance with AWWA C504.
22. Butterfly Valves Class 250B BV shall be as currently manufactured by Henry Pratt Company, Mueller Valve Company, DeZurik, M & H, Val-Matic, or equal provided the BV are provided as per these specifications.

23. The manufacturer/vendor/shipper must use care in preparing valves for shipment and in handling during shipment and delivery, to insure that the above products are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged products will not be accepted.

Section 1.7 VALVE BOXES General

1. Valve Boxes provided to the Town or installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Valve boxes shall be telescopic in design, Cast Iron, heavy pattern, adjustable type top section, bottom section, and cover.

3. The total weight of the valve box assembly (top, cover and bottom sections) shall be 105 pounds minimum.

4. 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

5. All valve box tops, bottoms, and covers shall be coated with an approved petroleum asphaltic seal coat in accordance with ANSI A21/AWWA C-110, Section 4.3 of latest the revision.

6. 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.

7. All castings will be manufactured in North America

Two Piece Valve Boxes and Covers

1. In addition to the General Section above the following shall be provided:

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2. 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.

3. The bottom section shall have:
   (a) A belled base and ha ve an inside diameter of 5-¼"
   (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.

4. The valve box cover shall have:
   (a) A 5-¼" diameter by 2" deep drop lid.
   (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.

Three Piece Valve Boxes and Covers

1. In addition to the General Section above the following shall be provided:

2. 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.

3. The bottom section shall have:
   (a) A belled base and have an inside diameter of 5-¼".
   (b) A bottom flange of sufficient bearing that will fit onto a number six base.

4. The number six base section shall have:
   (a) At the top opening a minimum inside diameter of 5-¼".
   (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.

5. The valve box cover shall have:
   (a) A 5-¼" diameter by 2" deep drop lid.
   (b) The valve box cover shall weigh no less than 13 pounds

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(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.

Section 1.8 HYDRANTS
Dry Barrel Fire Hydrants

1. Hydrants provided to the Town or its Contractors 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 150 PSI. All iron parts shall be made of ductile iron, except for the traffic safety flange and coupling.

4. Hydrant valve opening 5-1/4" minimum as sized by seat ring internal opening.

5. Hydrant nozzle details shall be "three (3) way" and as follows:
(a) Hydrant shall be equipped with two each 2-1/2" hose nozzles 180 degrees apart; NFPA No. 194 National (American) Standard Fire Hose Coupling Screw Threads.
(b) Hydrant shall be equipped with one each 4-1/2" pumper nozzle on the same plane and in between the 2-1/2" hose nozzles; 4-1/2" National Standard Pumper Hose Thread.
(c) Nozzle caps shall be provided with 1-1/8" (point to flat) pentagon and shall be not less than 1" high.

6. Operating Nut: Open Left. (counterclockwise)
(a) 1-1/8" (point to flat) pentagon and shall be not less than 1" high.
(b) Operating nut shall function as both an operating nut and weather shield.
(c) Operating nut shall be made of ductile iron.
(d) The direction to open (right/clockwise) shall be cast with an indicating arrow into the operating nut and weather shield or into the bonnet.

7. Hydrant shall open Left (counterclockwise).

8. Inlet connection shall be a 6" mechanical joint. The hydrant inlet inside surface

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and valve bottom plate shall be fully epoxy coated by a fusion or thermal bonding process per AWWA C-550. Bronze valve bottom plates do not have to be epoxy coated.

9. Hydrants shall be bid without accessories (glands, gland gaskets and bolts).

10. Accessories shall be as specified in Section 3.12 of these Material Specifications.

11. Hydrant shall be for 6'-0" bury, unless otherwise specified by the Commission.

12. Hydrant shall be of the full compression design, opening aga inst and closing with ressure.

13. 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.

14. Main Valve Assembly.
(a) The main valve assembly shall have a bronze sub-seat and a bronze seat ring.
(b) The threaded sub-seat of the hydrant shall be constructed of bronze, and be an integral part of the boot or elbow.
(c) The seat ring shall also be of bronze and shall be a working component of the main valve assembly.
(d) Seal between seating and sub-seat shall consist of “o” rings located in machined grooves, above and below the drainage channel.
(e) There shall be a minimum of two drain ports one hundred and eighty degrees apart.
(f) All "O" rings shall seal against bronze.

15. Traffic Safety Flange.
(a) The hydrant ground line construction design (traffic safety flange) shall be of the split flange or split coupling type, designed to permit rotary movement of the upper barrel without shutting down service or removing the flange bolts and nuts.
(b) Break-away bolts, break-away barrel, lugs or individual metal keeper devices are not acceptable.

16. Upper Operating Assembly.
(a) Hydrant operating assembly shall be housed in a compact seal plate with ntegral lubrication chamber.
(b) "O"-rings (two) shall be used to seal the chamber from water in the hydrant barrel.

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(c) 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.
(d) 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 standpipe when the hydrant is in service, and "O"-ring seals (two) shall be used to prevent water under pressure from entering the lubricating chamber.
(e) The moving surface against which these two "O"-rings bear upon to create the seal must be of bronze.
(f) A travel stop nut or similar device shall be used to limit main valve travel and to prevent putting main stem into over compression.

20. Hydrant Paint and Colors shall be Yellow.

21. Hydrants shall be currently manufactured Waterous Pacer type or Mueller Centurion or an approved equal.

1.9 Ductile Iron Fittings - Compact (or Short) Body

1. All Ductile Iron fittings provided to the Town or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. The Ductile Iron Fittings shall conform to ANSI 21.53/AWWA C-153 (most current revision).

3. Fittings shall be bid without accessories (glands, gland gaskets and bolts).

4. Accessories shall be as specified in Section 3.12 of these Material Specifications.

5. Body of Fittings
(a) Push-on (Tyton), type joints are not acceptable.
(b) Mechanical joint fittings in sizes 4-inch through 24- inch shall be ductile iron compact fittings and rated for 350 PSI working pressure conforming to ANSI 21.53/AWWA C-153.
(c) All fittings shall be compact body Ductile Iron class 350 mechanical joint, conforming to ANSI 21.53/AWWA C-153.

6. Joints of Fittings
(a) Fittings are required to be equipped with mechanical joint restraint as specified in Section 3.12 of these Material Specifications, unless otherwise

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specified by the Springfield Water and Sewer Commission.
(b) Ductile Iron fittings shall be mechanical joint, flange, plain end, or combination thereof in accordance with ANSI 21.53/AWWA C-153, as specified by the Springfield Water and Sewer Commission.

7. Ductile Iron Fittings shall be cement lined
(a) All fittings shall be lined with an approved 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.

(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.

8. Exterior Coating
(a) The preferred coating for fittings is Fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 and shall be applied to the interior and exterior of the fitting.
(b) All fittings shall be coated with an approved petroleum asphaltic seal coat in accordance with ANSI 21.53/AWWA C-153, Section 4.3 of the latest revision.

9. 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.

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

1.10 Ductile Iron Fittings – Standard (or Long) Body

1. All Ductile Iron fittings provided to the Town or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. The Ductile Iron Fittings shall conform to ANSI A21.10/AWWA C-110 (most current revision).

3. Fittings shall be bid without accessories (glands, gland gaskets and bolts).

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4. Accessories shall be as specified in Section 3.12 of these Material Specifications.

5. Body of Fittings
   (a) Push-on (Tyton), type joints are not acceptable.
   (b) Mechanical joint fittings in sizes 4-inch through 24- inch shall be ductile iron compact fittings and rated for 350 PSI working pressure conforming to ANSI 21.10/AWWA C-110.
   (c) All fittings shall be standard body Ductile Iron class 350 mechanical joint, conforming to ANSI 21.10/AWWA C-110.

6. Joints of Fittings
   (a) Fittings are required to be equipped with mechanical joint restraint as specified in Section 3.12 of these Material Specifications, unless otherwise specified by the Springfield Water and Sewer Commission.
   (b) Ductile Iron fittings shall be mechanical joint, flange, plain end, or combination thereof in accordance with ANSI A21.10/AWWA C-110, as specified by the Springfield Water and Sewer Commission.

7. Ductile Iron Fittings shall be cement lined
   (a) All fittings shall be lined with an approved 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.
   (b) Provisions of ANSI A21.4/AWWA C-104, Section 4.11 relating tocharacteristics of asphaltic seal coat as to deleterious effect upon the quality,color, taste or odor imparted to potable water shall be strictly observed.

8. Exterior Coating
   (c) The preferred coating for fittings is Fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 and shall be applied to the interior and exterior of the fitting.
   (d) All fittings shall be coated with an approved petroleum asphaltic seal coat in accordance with ANSI A21.10/AWWA C-110, Section 4.3 of the latest revision.

9. Markings
   (e) Fittings shall be marked with the weight.
   (f) 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.

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10. Testing

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

11. Delivery sha ll be specified in terms of number of days from receipt of order.

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

1.11 Hydrant Anchoring Tees

1. Hydrant Anchoring Tees provided to the Town or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. The Hydrant Anchoring Tees shall conform to ANSI A21/AWWA C-110 (most current revision).

3. Hydrant Anchoring Tees shall be bid without accessories (glands, gland gaskets and bolts).

4. Accessories shall be as specified in Section 3.12 of these Material Specifications.

5. Hydrant Anchoring Tees are required to be equipped with mechanical joint restraint as specified in Section 3.12 of these Material Specifications, unless otherwise specified by the Springfield Water and Sewer Commission.

6. Hydrant Anchoring Tees shall have mechanical joints and be provided in sizes 4-inch through 12- inch.

7. Hydrant Anchoring Tees shall be ductile iron, and conform to Section 3.8.2 of these Material Specifications.

8. 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.

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

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1.12 COUPLINGS General Requirements

1. Couplings provided to the Town or its Contractors shall be manufactured, tested, inspected and delivered in fullcompliance with this Specification.

2. Couplings shall be provided with gaskets constructed of Styrene butadiene rubber (SBR) or 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..

3. Exterior Coating:
   (a) The preferred coating for couplings is Fusion-bonded epoxy coating in accordance with ANSI A21.16 / AWWA C116 and shall be applied to the interior and exterior of the fitting.
   (b) All couplings shall be coated with an approved petroleum asphaltic seal coat in accordance with ANSI A21.10/AWWA C-219, Section 4.3 of the latest revision.

4. All fasteners shall be made of Grade 304 stainless steel. Bolt s and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts, washers, nuts and steel shall meet ANSI A21.11, latest revision. Tee-head bolts/track-head bolts, washers, and nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel conforming to ASTM A588, with Unified National Coarse (UNC) rolled thread may be substituted at the Commission's discretion.

5. To prevent galling nuts shall be coated, inside and out, 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.

6. The manufacturer/vendor/shipper must use care in preparing couplings 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.

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1.13 Standard Range Couplings 4" – 24"

1. Standard Range Couplings 4" – 24" shall, as a minimum, shall meet all specifications as in Paragraph 1of 1.12 and the following:

2. Standard Range Couplings 4" – 24" shall be Dresser – Style 253, Ford – Style FC1, Romac - Style 501 couplings, or the equal product of another manufacturer.
3. Standard Range Couplings 4" – 24" shall have both center and end rings made of ductile iron and shall meet or exceed ASTM-A-538, latest revision.

4. Standard Range Couplings 4" – 24" shall have the center rings, end rings, and gaskets clearly labeled to show the diameter range it will cover

Wide Range Couplings 4" – 24"

1. Wide Range Couplings 4" – 24" shall, as a minimum, shall meet all specifications as in Paragraph 1 of 1.12 and the following:

2. Wide Range Couplings 4" – 24" may be Dresser – Style 253, Ford – Style FC2W, Romac - Style XR501 couplings, or the equal product of another manufacturer.

3. Wide Range Couplings 4" – 24" shall have both center and end rings made of ductile iron and shall meet or exceed ASTM-A-536, latest revision.

4. Wide Range Couplings 4" – 24" shall have the center rings, end rings, and gaskets clearly labeled to show the diameter range it will cover.

3.9.4 Large Diameter Wide Range Couplings 16" and larger

1. Large Diameter Wide Range Couplings 16" and larger shall, as a minimum, shall meet all specifications as in Paragraph 1of 1.12 and the following:

2. Large Diameter Wide Range Couplings 16" and larger coupling may be Total Pipe Solutions Large Diameter Hymax Coupling – 2000 Series, or the equal product of another manufacturer.

3. Large Diameter Wide Range Couplings 16" and larger coupling shall have both center and end rings made of ductile iron and shall meet or exceed ASTM-A-538, latest revision.

4. Large Diameter Wide Range Couplings 16" and larger coupling shall have the center rings, end rings, and gaskets clearly labeled to show the diameter range it

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will cover.

1.14 Repair Clamps and Clamps With Outlets

1. Repair Clamps and Clamps with Outlets provided to the Town or its Contractors shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Repair clamps shall be Romac SS1 (4" - 12" one section) or Romac SS3 (16" - 24" three section) or equal product of another manufacturer.

3. Shells shall be constructed of Grade 18-8, Type 304 stainless steel with stainless steel lugs and side bars welded to the shell.

4. 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.

5. All fasteners shall be made of Grade 304 stainless steel.

6. To prevent galling nuts shall be coated, inside and out, 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.

7. 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.

8. 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.

9. Ranges must be clearly labeled on the package as well as on each clamp.

10. Clamps with outlets shall have Mueller CC thread.

11. The manufacturer/vendor/shipper must use care in preparing repair clamp for shipment and in handling during shipment and delivery, to insure that the repair

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clamp are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged repair clamps will not be accepted.

1.15 Bent Eye Bolts

1. Bent Eye Bolts provided to the Town 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 bolthole.
   (b) For 1- inch threaded rod: ¾- inch diameter shank with a 1- inch nominal inside diameter bolthole.

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. 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.

1.16 Threaded Rods

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1. Threaded rods provided to the Town 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: ¾- 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.

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 products are delivered without damage. Particular attention must be at protecting the products from damage. Damaged products will not be accepted.

1.17 TAPPING SLEEVES

Only Stainless steel tapping sleeves are allowed by the Town.

1. Tapping Sleeves shall be the style 630 as manufactured by Dresser Industries, Inc., the style FTSS as manufactured by the Ford Meter Box Company, the style SSTIII as manufactured by Romac Industries, Inc., or the approved equal product of another manufacturer.

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

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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 Buna-N compounded for water service and shall meet ASTM D2000-80M 4AA607. The sleeve gasket shall provide 360 degree full circumferential support over the full length of the sleeve. 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. The outlet gasket shall be made of 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 accept standard AWWA tapping valves. The bolt holes shall straddle the pipe center line. Iron flanges shall not be accepted.

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.

1.18 Mechanical Joint Restraint for Ductile Iron Fittings

1. Mechanical Joint Restraint for Ductile Iron Fittings provided to the Town or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Mechanical Joint Restraint for Ductile Iron Fittings shall be the Series 1100 as manufactured by EBAA Iron, Inc or the approved equal product of another manufacturer.

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3. 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.

4. 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.
5. 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.

6. The joint restraint ring and its wedging components shall be made of grade 60-42-10 ductile iron conforming to ASTM A536-84. The wedge shall be ductile iron, heat-treated to a minimum hardness of 370 B H N. The joint restraint ring shall be provided with torque limiting twist-off nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel conforming to ASTM A588.

7. 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.

8. Mechanical Joint Restraint for Ductile Iron Fittings shall be available in the four through forty-eight inch sizes

9. Mechanical Joint Restraint for Ductile Iron Fittings shall have a rated working pressure as follows:
   (a) 4-inch – 8-inch = 350 PSI
   (b) 10-inch – 16-inch = 300 PSI
   (c) 20-inch – 36-inch = 200PSI
   (d) 42-inch – 48-inch = 175 PSI

10. 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.

11. Mechanical Joint Restraint for Ductile Iron Fittings shall be provided with teehead bolts, washers, and nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel conforming to ASTM A588. Bolts and nuts shall be Unified National Coarse (UNC) rolled thread and heavy-duty hex nuts. Bolts, washers,

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nuts and steel shall meet ANSI A21.11/AWWA C-111, latest revision.

12. Mechanical Joint Restraint for Ductile Iron Fittings shall be individually packaged and contain proper size rubber gasket and bolts.

13. The manufacturer/vendor/shipper must use care in preparing Mechanical Joint Restraint for Ductile Iron Fittings for shipment and in handling during shipment and delivery, to insure that the Mechanical Joint Restraint for Ductile Iron Fittings are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged Mechanical Joint Restraint for Ductile Iron Fittings will not be accepted.

1.19 Gasket Joint Restraint for Ductile Iron Pipe

1. Gasket Joint Restraint for Ductile Iron Pipe provided to the Town or Installer shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. Gasket Joint Restraint for rubber ring joint (Tyton) shall be as manufactured by United States Pipe and foundry Company – Field Lok 350 Gasket (4" – 24") or equal product of another manufacturer.

3. 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.

4. The restraint provided shall be a boltless, integral retaining system, and shall be rated for 350 PSI.

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

ADAPTERS

1.20 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.

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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/track-head bolts, washers, and nuts of high strength, low alloy, and corrosion resistant Cor-Ten steel conforming to ASTM A588, with Unified National Coarse (UNC) rolled thread. Bolts, washers, nuts and steel shall meet ANSI A21.11/AWWA C-111, latest revision.

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 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.

CHAPTER 2 COPPER TUBE WATER SERVICE PIPE

2.1

1. Copper tube water service pipe shall be American manufactured.

2. Copper tube water service pipe shall be type "K".

3. Copper tube water service pipe shall be minimum 1- inch diameter

4. 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 tapping saddle are delivered without damage. Particular attention must be directed at protecting the protective coating from damage. Damaged products will not be accepted.

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2.2 TAPPING SADDLES

1. Tapping saddles provided to the Town or Installer shall be manufactured, tested, inspected, and delivered in full compliance with this Specification.

2. Tapping saddles shall be Ford FC202, Mueller DR2S, Romac 202N or, equal product of another manufacturer.

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). 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 shall be made of Grade 304 stainless steel.

8. To prevent galling nuts shall be coated, inside and out, 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.

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.

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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 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.

2.3 General

1. Water service appurtenances i.e. valves and fittings, shall conform to AWWA Standard C800 latest version.

2. 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 (Proprietary number at this time until patent approval).

(b) Brass other than the above may be approved by the Springfield Water and Sewer Commission as an acceptable equal.

3. 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.

4. Brass parts no t 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%.

5. 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

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accordance with ANSI/NSF 61-8, Drinking Water System Components – Health Effects.

6. 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.

7. Corporation Stop Valves may rotate 360 degrees in either direction or rotate ¼ turn only and **OPEN LEFT,** counter-clockwise.

8. Curb Stop Valves shall rotate ¼ turn only and **OPEN LEFT,** counter-clockwise

2.4 Ball Type Curb Stops used at Property Line

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.

2.5 Quick Joint Couplings

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.

2.6 Buffalo Style Service Box

1. The Buffalo Style Service Box shall be heavy cast iron extension (adjustable) type, slide style, with arch pattern base and a recessed cover.
(a) For installations in the street the service box shall be 3-1/2- feet tall, with a 24-inch top and an approximate 36-inch bottom
(b) For installations in the treebelt the service box shall be 5- feet tall, with a 24-inch top and an approximate 48-inch bottom

2. The arch pattern base shall accommodate 1-1/2" to 2- inch ball type corporations and ball type curb stops.

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3. 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.

4. The Buffalo Style Service Box shall be provided with a cast iron cover that has a brass pentagon head nut, and the word "WATER" cast into the cover.

5. The Buffalo Style Service Box shall have a heavy coat of Asphalt-base paint.

CHAPTER 3 SEWER MAINS AND APPURTENANCES

ALL SEWER PIPE LOCATED IN THE ROADWAY AND SERVICE LINES UP TO THE PROPERTY LINE WILL BE ENCAPSULATED WITH ¾" WASHED STONE SIX INCHES (6") IN ALL DIRECTIONS SURROUNDING THE PIPE WORK. IN SANDY OR SILTY SOILS THE STONE WILL BE COVERED WITH A FILTER FABRIC. ALL SEWER PIPE MUST HAVE A METALIC DETECTION TAPE LABELED "SEWER" PLACED EIGHTEEN INCHES (18") ABOVE THE SEWER PIPE.

ALL NEWLY INSTALLED SEWER MAINS LOCATED IN NEW DEVELOPMENTS WILL BE AIR TESTED TO 4 PSI FOR FIVE MINUTES, NO DROP IN PRESSURE IS ALLOWED. ALL NEWLY INSTALLED MANHOLES WILL BE VACUUM TESTED AND INSPECTED BY A TOWN INSPECTOR AND HAVE A FULL REPORT OF THE FINDINGS DELIVERED TO THE TOWN FROM THE TESTING COMPANY. ALL SEWER MAINS WILL BE CAMERA INSPECTED FOR DEFECTS, CRACKS, DIPS AND SLOPE ISSUES BEFORE THE MAIN WILL BE ACCEPTED. THE TOWN CAN PROVIDE THIS SERVICE (if Town equipment and personnel are available) AT A COST OF $1000.00 OR THE CONTRACTOR CAN HIRE A PRIVATE COMPANY AND PROVIDE THE TOWN WITH A DIGITAL COPY. ALL SANITARY SEWER INVERTS WILL BE RED, FIRED CLAY BRICK MADE FOR INVERTS. INVERTS WILL BE INSPECTED BY A TOWN INSPECTOR, IF FOUND DEFICIENT, THE INVERT WILL NOT BE ACCEPTED AND WILL NEED TO BE REBUILT.

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No public, main line, gravity sewers shall be less than eight (8) inches in diameter.

3.1 Polyvinyl Chloride (PVC) Sewer Pipe

1. Pipe provided to the Town 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. 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.
7. Sewer lines shall be green in color or as approved by the Town.

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

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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.

3.2 Polyvinyl Chloride (PVC) Sewer Fittings

1. Polyvinyl Chloride (PVC) fittings provided to the Town or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

2. In addition to Section 6.1.1 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. 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.

Section 4 SANITARY SEWER MANHOLES

4.1 General

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1. Pre-cast Concrete Manholes provided to the Town 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 Town 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 Town will also take note regarding appearance, dimensions, blisters, cracks and other anomalies, if any.

4. The Town 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 Town to incur any additional costs.

5. Minor repairs to pre-cast concrete sections, if required, are not accepted unless authorized by the Town.

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.

4.2 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.

(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".

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(f) Products shall be designed to support the ir 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 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.

5. Pre-cast concrete manholes base, riser and transition top sections shall have bell and spigot or joints tongue and groove joints.

6. 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.

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. Floatation 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 floatation.

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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 Town 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

19. 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.

4.3 DAMP PROOF COATING

1. Damp proofing provided to the Town 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. 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

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items are delivered without damage. Damaged items will not be accepted.

4.4 BRICK MASONRY

1. Bricks for masonry provided to the Town 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.

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

4.4.1 Bricks for Channels and Shelves

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

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.

4.4.2 Bricks for Frame and Cover Adjustment

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

Section 5 MANHOLE FRAMES AND COVERS FOR SANITARY SEWERS

1. Manhole frame and covers provided to the Town or Installers shall be manufactured, tested, inspected and delivered in full compliance with this

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Specification.

2. Manhole frames and covers shall be strong, durable, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection.

3. The manhole frame and cover shall be certified to meet AASHTO 35 strength of materials requirements. Cast iron shall conform to ASTM A48, Class 30.

4. Manhole covers shall be cast iron, have a diamond pattern, pick holes and have the words "SEWER" in raised relief.

5. All manholes frame and covers shall meet the following dimension requirements:

(a) New manhole frame and covers shall have a 30-inch diameter access opening and a 32- inch diameter cover in accordance with **32" X 8" Sewer Frame and Cover**.
(b) Existing manhole frame and covers shall have a 22-inch diameter access opening and a 24-inch diameter cover in accordance with **26" X 6" Sewer Frame and Cover**.

6. Pick holes shall include two blind non-penetrating pick holes on the side.

7. Manhole frame and covers seats shall be machined to a true surface.

8. Manhole frame and covers shall be manufactured by LeBaron Foundry or approved equal of another manufacturer. Acceptable manhole frames and covers shall be manufactured in North America; all others are deemed inferior and are not accepted.

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.

5.1 GASKETS FOR PRE-CAST MANHOLES

General

1. Gaskets for Pre-cast Manholes provided to the Town or Installers shall be manufactured, tested, inspected and delivered in full compliance with this Specification.

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2. The gaskets shall assure water tightness and permanent seal.

3. 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.

5.2 Gaskets for Bell and Spigot Joints

1. Seal bell and spigot joints of pre-cast manhole sections with butyl rubber flexible rope-like gasket material.

2. Butyl rubber flexible rope-like gasket material shall conform to ASTM C990

3. 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.

4. Each gasket shall have a self-adhesive nature.

5. Each gasket shall be 1- inch diameter.

6. Each gasket shall be furnished in coils

5.3 Gaskets for Tongue and Groove Joints

1. Seal tongue and Groove joints of pre-cast manhole sections with O-ring gaskets.

2. O-ring gaskets shall conform to ASTM C443.

3. Each gasket shall be a continuous ring of round solid cross section having smooth surfaces free from blisters, porosity, and/or other defects.

4. The tensile strength shall be 1200-PSI.

5. The elongation shall such that a 2- inch gauge mark shall not exceed 9- inches.

5.4 FLEXIBLE MANHOLE SLEEVES/SEALS

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General

1. Manhole sleeves, gaskets, and sealants for Pre-cast Manholes provided to the Town 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. 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.

5.4.1 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.

5.4.2 Flexible Sleeve/Seals Field Applied

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