
Lowell Regional Water Utility

Standards and
Specifications for
Water Main and
Service Materials

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I. Water Mains and Materials

A. General: Water Mains and Materials

1. Materials of Construction

- a. Water mains four (4) inches and greater in diameter shall be constructed of cement lined ductile iron meeting or exceeding the Product Specifications below;
- b. In the absence of a recognized and/or approved industry standard for such hardware, the Lowell Regional Water Utility (LRWU) shall be the final judge as to the acceptability of miscellaneous hardware used in the installation of water mains;
- c. All seal coating (exterior and interior) shall be NSF approved for potable water applications;
- d. All materials must be certified compliant by United Laboratories (UL) and Factory Mutual (FM) in applicable configurations.

2. Delivery

- a. All materials shall be free on board (F.O.B.) to the destination specified by the LRWU within the City of Lowell;
- b. All materials shall be delivered to the appropriate site(s) at 815 Pawtucket Boulevard, Lowell, MA unless otherwise specified at the time of order;
- c. All materials shall be delivered within 14 days of order.

B. Product Specifications: Water Mains and Materials

1. Ductile Iron Water Main:

- a. AWWA Standard C151, double-thickness cement lined;
- b. AWWA Standard C111, push-on joint;
- c. AWWA Standard C104, seal coat;
- d. Class 52 wall thickness
- e. Nominal laying length shall be greater than or equal to 18-feet.

2. Ductile Iron Mechanical Joint Fittings:

- a. Conform in all respect to ductile iron water main;
- b. AWWA Standard C153/ANSI A-21.53 compact ductile iron class 350 through 24-inch diameter;
- c. Mechanical joint nuts and bolts shall be low carbon steel unless otherwise specified;
- d. All mechanical joint fittings shall be supplied with wedge-type mechanical joint restraints and accessory packs including rubber gasket, nuts and bolts at a minimum. Nuts and bolts shall conform to 2c, above.
- e. Compact style mechanical joint restraints shall be bolt through design Foster Adaptor® or equivalent.

3. **Wedge-type Mechanical Joint Restraints:**
 - a. Pressure rating of 350-psi through 16-inch diameter, 250-psi for diameters above 16-inches. Test pressure shall be twice the working pressure rating;
 - b. Equipped with standard mechanical joint gaskets meeting AWWA Standard C111/ANSI A121.11;
 - c. Acceptable restraints:
 1. MegaLug® Series 1100 manufactured by EBAA Iron, Inc.;
 2. RomaGrip® by Romac Industries;
 3. Ford Meter Box 1400 Series or equivalent.

4. **Integral Joint Restraints:**
 - a. Pressure rating of 250-psi through 24-inch diameter, AWWA C111 for diameters above 24-inches. Test pressure shall be twice the working pressure rating;
 - b. The restraining system shall be rated in accordance with the performance requirements of AWWA Standard C111/ANSI A121.11 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings;
 - c. Integral joint restraints shall not be used without prior written approval by the LRWU;
 - d. Grip ring and special MJ glands shall be manufactured of ductile iron conforming to ASTM A536-80;
 - e. Acceptable restraints:
 1. MJ Field-Lok® by US Pipe or equivalent.

5. **Bell-Joint Clamps:**
 - a. Manufactured for use with ductile iron and cast iron pressure pipe;
 - b. Acceptable clamps:
 1. Smith Blair 274 Bell-Joint Leak Clamp or equivalent.

6. **Flexible Couplings:**
 - a. Acceptable for repairs only;
 - b. Straight or transition type couplings shall be constructed entirely of ductile iron in accordance with ASTM A536;
 - c. AWWA Standard C219;
 - d. Acceptable couplings:
 1. Romac Model 501 or equivalent.

7. **Wide-Range, Two-Bolt Couplings**
 - a. Acceptable couplings shall be sleeve type design consisting of center sleeve, with one end ring per end equipped with a multi-range, two-layered EPDM gasket with stainless steel spanner and one 304 stainless steel nut and bolt;
 - b. AWWA Standard C219-01;
 - c. Acceptable couplings:
 1. Romac Macro;
 2. Hymax 2000 series;
 3. Smith Blair Model 421.

8. Repair Clamps:

- a. 304 stainless steel shell and armors per ASTM A240. Shell hemmed to strengthen engagement with lugs;
- b. Lugs cast from ductile iron per ASTM A536;
- c. 304 stainless steel nuts and bolts;
- d. AWWA Standard C230;
- e. Acceptable couplings:
 - 1. Romac CL-Series;
 - 2. Smith Blair 22x-Series
 - 3. Ford Meter Box F-series.

9. Mechanical Joint Resilient Wedge Gate Valves:

- a. Manufactured in the USA;
- b. AWWA Standard C515;
- c. The body, bonnet and seal plate shall be epoxy coated in accordance with AWWA Standard C550 certified to NSF 61G or NSF 372, as applicable;
- d. The manufacturer's name, valve size, year of manufacture, pressure rating ("250W"), C515 and "DI" shall be cast on the valve;
- e. All valve body and bonnet bolts shall be high-strength 304 stainless steel;
- f. The valve stem shall be non-rising with a 2-inch square operating nut and open right;
- g. Acceptable valves:
 - 1. ACIPCO – AFC 2500, C515 resilient wedge gate valve;
 - 2. Mueller – A236x, C515 resilient wedge gate valve;
 - 3. Clow Model 2638, C515 resilient wedge gate valve.
- h. The use of any valves other than those specified above shall require prior written approval by the LRWU.

10. Tapping Valves:

- a. Tapping valves shall conform to all requirements for mechanical joint valves identified in 9, above.

11. Stainless Steel Tapping Sleeves with Mechanical Joint Flange:

- a. Split-sleeve (2-piece) type 304 (18-8) stainless steel per ASTM A240 body and lugs;
- b. Mechanical joint outlet: type 304(18-8) stainless steel per ANSI 21.11;
- c. Bolts and nuts: type 304 (18-8) stainless steel per ASTM A193 and A194;
- d. ¾-inch test plug of 304 stainless steel in the body of the sleeve for pressure testing before tapping the pipe;
- e. Acceptable sleeves:
 - 1. Powerseal Model 3490MJ;
 - 2. Mueller Model H-304MJ;
 - 3. Romac SSTIII-MJ.

12. Fire Hydrants:

- a. Manufactured in the USA;
- b. AWWA Standard C502;

- c. Available for bury depths between 5'-0" and 7'-0" in 6-inch increments;
- d. Equipped with working drain holes;
- e. Traffic-type with a replaceable breakaway flange;
- f. Main valve opening of 5-1/4 inches;
- g. Mechanical joint shoe with a D150 MJ type 6.90 to 7.10 OD, able to accommodate A B & C D class of pipe;
- h. 7-inch minimum inside diameter of standpipe;
- i. 1-1/2 inch pentagon operating nut, open right;
- j. Two (2) 2-1/2 inch nozzles and one (1) 4-1/2 inch pumper nozzle with national standard threads;
- k. Nozzle caps to be equipped with rubber gaskets and chains;
- l. Color red;
- m. The manufacturer's name, barrel size, year of manufacture, and operating direction shall be cast on the hydrant;
- n. The hydrant shall be UL and FM compliant;
- o. LRWU accepts the following hydrants only:
 - 1. American Darling B-84 B5;
 - 2. Kennedy Guardian K-81D/V;
 - 3. Clow Medallion F-2545.

13. Valve Boxes:

- a. Manufactured in North America;
- b. Cast iron, two-piece, sliding type with top flange and minimum inside shaft diameter of 5-inches;
- c. Bottom section minimum 36-inch length with belled base. The base shall be integral to the bottom section;
- d. Top section minimum 26-inch length designed to slide over the base;
- e. Cover shall be 2-inch heavy, drop type, not tilting cast/ductile iron unit that is recessed into the box top to prevent plow breakage. The cover shall be provided with two pick holes for easy removal and have the word "WATER" clearly cast into the cover;
- f. All components shall be coated with a bituminous coating in accordance with AWWA C110.

II. Water Services and Materials

A. General: Water Services and Materials

1. Materials of Construction

- a. Water service from the water main to the water meter shall be 1-inch or greater Type K copper meeting or exceeding the product specifications below;
- b. Material sizing shall be determined by the LRWU based on the information provided by the customer on the Application for Service;
- c. In the absence of a recognized and/or approved industry standard for such hardware, the Lowell Regional Water Utility (LRWU) shall be the final judge as to the acceptability of miscellaneous hardware used in the installation of water services;
- d. All materials must be certified compliant by United Laboratories (UL) and Factory Mutual (FM) in applicable configurations;
- e. 150 psi working pressure;
- f. NSF 61G or NSF 372, lead free.

2. Delivery

- a. All materials shall be free on board (F.O.B.) to the destination specified by the LRWU within the City of Lowell;
- b. All materials shall be delivered to the appropriate site(s) at 815 Pawtucket Boulevard, Lowell, MA unless otherwise specified at the time of order;
- c. All materials shall be delivered within 14 days of order.

B. Product Specifications: Water Services and Materials

1. Copper Tubing:

- a. Manufactured in North America;
- b. Type "K" seamless tubing;
- c. AWWA Standard C800, Appendix A;
- d. ASTM B88;
- e. Soft annealed tubing supplied in 60 or 100 foot coiled rolls;

2. Corporations:

- a. Teflon coated ball stop only. The use of plug-type corporations is prohibited;
- b. CC (tapered) thread by "Quick-Joint" compression. "Pack-Joint" compression outlets are prohibited;
- c. Supplied with appropriate tapping/inserting machine adapter for Mueller tapping machine;
- d. Acceptable models:
 1. Ford Meter Box FB1000-x-Q-NL;
 2. AY McDonald 74101BCAPO-NL;
 3. Red Hed RHSB4382x or equivalent;

3. Curb Stops:

- a. Teflon coated ball stop only. The use of plug-type stops is prohibited;
- b. "Quick-Joint" compression by "Quick-Joint" compression. "Pack-Joint" compression connections are prohibited;
- c. Quarter turn, open right with drain;
- d. Acceptable models:
 - 1. Ford Meter Box BC44-xxxSW-Q-NL;
 - 2. AY McDonald 76070Q-NL;
 - 3. Red Hed RHB4161x or equivalent;

4. Cellar Valves:

- a. Teflon coated ball stop only.
- b. One-piece, fully-ported, quarter-turn, open right Female Iron Pipe (FIP) x FIP
- c. Supplied with handles;
- d. Acceptable models:
 - 1. Ford Meter Box B11-xxx-NL;
 - 2. AY McDonald 76100-55-NL;
 - 3. Cambridge Brass 202NL-FxFxH or equivalent;

5. Brass Goods:

- a. Iron pipe thread, meter connection or "Quick Joint" style compression thread only;
- b. Acceptable manufacturers, all other manufacturers require written approval by the LRWU:
 - 1. Ford Meter Box;
 - 2. AY McDonald;
 - 3. Cambridge Brass;
 - 4. RedHed Manufacturing;
 - 5. Mueller Co.

6. Service Saddles:

- a. Epoxy or Nylon coated, double u-bolt;
- b. AWWA taper, CC thread outlet;
- c. Acceptable service saddles:
 - 1. Romac 202NU;
 - 2. Mueller DRA2A;
 - 3. AY McDonald 4825A;
 - 4. Ford Meter Box F202 or equivalent.

7. Service Boxes:

- a. Manufactured in North America;
- b. Buffalo-Style 2-1/2 inch inside diameter
- c. Slide-type
- d. Locking cover with brass pentagon nut;
- e. All components shall be coated with a bituminous coating in accordance with AWWA C110.

III. Water Meters – Cold Water, Nutating Disc (5/8 x 3/4 to 1-inch):

A. General: Nutating Disc Water Meters

1. Materials of Construction

- a. NSF 61 or NSF 372, certified no lead;
- b. Produced from an ISO 9001 manufacturing facility and be certified to the National Conference on Weights and Measures (NCWM) regulatory standards. Manufacturer shall provide a copy of the National Type Evaluation Program (NTEP) Certificate of Conformance (COC) certifying and listing the meter size and register type as legal for trade and the NTEP COC shall list the meter size and register type being supplied as approved for use in utility billing, commercial metering, and legal sub-metering applications. In the absence of a recognized and/or approved industry standard for such hardware, the Lowell Regional Water Utility (LRWU) shall be the final judge as to the acceptability of miscellaneous hardware used in the installation of water services;
- c. Meters and meter parts shall be manufactured, assembled and tested within the United States. Manufacturers may be required to provide proof of where and what percentage of the meter register, chamber and maincase is manufactured in the United States;
- d. All meters shall be furnished with a manufacturer's warranty to cover the following:
 1. All meters shall be covered to meet AWWA standards for Accuracy for 5 years from installation date.
 2. Meter maincase shall be warranted against defects for 25 years from installation date.
 3. Register shall be warranted for performance, materials, and workmanship for 10 years from the installation date.

2. Delivery

- a. All materials shall be free on board (F.O.B.) to the destination specified by the LRWU within the City of Lowell;
- b. All materials shall be delivered to the appropriate site(s) at 815 Pawtucket Boulevard, Lowell, MA unless otherwise specified at the time of order;
- c. All materials shall be delivered within 14 days of order.

B. Product Specifications: Small Water Meters (Less than 1-inch)

1. Small Meters Acceptable Manufacturers:

- a. Meter suppliers must have been manufacturing meters for at least 20 years. Manufacturers not complying with the field or production experience shall submit their meters for endurance testing evaluation.
- b. Meters and meter parts shall be manufactured, assembled and tested within the United States. Manufacturers may be required to provide proof of where and what

percentage of the meter register, chamber and maincase is manufactured in the United States.

- c. Meters shall be compatible with the City of Lowell's existing R450 Fixed Network AMR reading system by Neptune Technology Group.
- d. Meters and registers shall be fabricated by the same manufacturer.
- e. Meters and registers shall be compatible with future upgrades of the manufacturer's product.
- f. Meter data shall be in a format suitable for upload to the City's MUNIS billing system.

2. Residential Meters General:

- a. All meters, 5/8 x 3/4-inch to 1-inch, furnished shall meet or exceed the performance required by the "Standard Specifications for Cold Water Meters" – C700, latest version issued by AWWA or as otherwise stated, herein. Meters shall conform minimally to current AWWA C-700, current revision, test flows, headloss and accuracy standards.
- b. Meters shall meet the performance Technical Specifications outlined in Table 1. Bidder shall submit technical documentation to support performance claims.

Table 1 – AWWA Meter Flow Rate Requirements

METER SIZE	Minimum Flow Rate	Maximum Flow Rate
5/8" x 3/4"	1/4 GPM	20 GPM
3/4"	1/2 GPM	30 GPM
1"	3/4 GPM	50 GPM

3. Residential Meters Type:

- a. Magnetically driven, nutating disc with positive displacement and floating chamber shall be provided. Piston type positive displacement, Electromagnetic, Fluidic Oscillator, and Ultrasonic meters are unacceptable. The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision.
- b. Registers shall be secured to the maincase by means of a plastic tamper proof seal to allow for inline service replacement. Register seal screws are only acceptable when supplied with attached sealing wire to at least one bottom cap bolt with seal wire holes of not less than 3/32" in diameter.
- c. All meters must be adaptable to a field programmable absolute encoder register without interruption of the customer's service.

4. Residential Meters Lay Length:

- a. AWWA Standard C700 (latest revision)

5. Residential Meters Maincase:

- a. All lead free maincases shall be guaranteed free from manufacturing defects in workmanship and material for the life of the meter.

- b. The meter maincase and cover shall be cast from NSF/ANSI 61, Annex G and Annex F certified lead free alloy containing a minimum of 85 percent copper. The serial number should be stamped between the inlet or outlet port of the maincase and the register. Maincase markings shall be cast raised and shall indicate size, model, direction of flow, and NSF 61 certification. Plastic maincases are not acceptable.
- c. Maincases for 5/8 x 3/4", and 1" meters shall be of the removable bottom cap type with the bottom cap secured by four(4) bolts on 5/8 x 3/4" sizes and six (6) bolts on the 1" size. Meters with a frost plug, a screw-on design, or no bottom cap shall not be accepted in 5/8 x 3/4" - 1" sizes.

6. Small Meters Bolts:

- a. 300 series non-magnetic stainless steel

7. Small Meters Measuring Chamber:

- a. The measuring chamber shall be of a two-piece, snap-joint type with no fasteners allowed. The chamber shall be made of a non-hydrolyzing synthetic polymer.
- b. The control block shall be the same material as the measuring chamber and be located on the top of the chamber. The control block shall be located after the strainer.
- c. The measuring chamber outlet port shall be sealed to the maincase outlet port by means of an O-ring gasket.
- d. The flat nutating disc shall be a single piece made from non-hydrolyzing synthetic polymer and shall contain a type 316 stainless steel spindle. The nutating disc shall be equipped with a synthetic polymer thrust roller located within the disc slot. The thrust roller head shall roll on the buttressed track provided by the diaphragm.
- e. The chamber shall be warranted for ten (10) years against freeze damage if the meter has been equipped with a frostproof cast iron or synthetic polymer bottom cap.

8. Small Meters Encoder Register Unit:

- a. All meters shall be equipped with encoder remote registers per AWWA C707.
- b. All registers shall be calibrated to display cubic foot unit of measure.
- c. All registers shall be direct mounting self-contained solid state metering systems with electromagnetically encoded measuring elements feeding an electronic solid state odometer.
- d. Registers shall provide a nine-digit visual reading at the meter on a LCD display capable of testing the meter and an eight-digit meter reading through transmission.
- e. Registers shall be capable of detecting leaks, tampering and reverse flow both visually on the register and through communication with the MTU. Flow rate shall be, at a minimum, visually indicated on the register.
- f. Registers shall be offered in two (2) model types: one (1) that is suitable for interior installations and one (1) that is fully weatherproof and suitable for submerged pit installation.
- g. Encoder registers shall be solid state incorporating an application specific integrated circuit and firmware designed for accurate measurement verification and information transmission.

- h. Register shall be updated to the manufacturer's latest firmware version at the time of installation.
- i. Register shall be warranted for performance, materials, and workmanship for 10 years from the installation date.

9. Small Meters Strainers:

- a. Meters that require non-integral strainers are not acceptable.
- b. All meters shall contain a removable polypropylene plastic strainer screen. The strainer shall be located near the maincase inlet port before the measuring chamber. The strainer shall also function as the device that holds the measuring chamber in place within the maincase. Straps or other types of fasteners shall not be acceptable.

IV. Water Meters – Cold Water Large (Greater than 1-inch):

A. General: Large Water Meters

1. Materials of Construction

- a. NSF 61 or NSF 372, certified no lead;
- b. Meters and meter parts shall be manufactured, assembled and tested within the United States. Manufacturers may be required to provide proof of where and what percentage of the meter register, chamber and maincase is manufactured in the United States;
- c. All meters shall be furnished with a manufacturer's warranty to cover the following:
 - 1. All meters shall be covered to meet AWWA standards for Accuracy for 5 years from installation date.
- d. All meters shall be furnished with a test spool for installation that adjusts lay length to conform with AWWA C702.

2. Delivery

- a. All materials shall be free on board (F.O.B.) to the destination specified by the LRWU within the City of Lowell;
- b. All materials shall be delivered to the appropriate site(s) at 815 Pawtucket Boulevard, Lowell, MA unless otherwise specified at the time of order;
- c. All materials shall be delivered within 14 days of order.

B. Product Specifications: Large Water Meters

1. Large Meters Acceptable Manufacturers:

- a. Meter suppliers must have been manufacturing meters for at least 20 years. Manufacturers not complying with the field or production experience shall submit their meters for endurance testing evaluation.
- b. Meters and meter parts shall be manufactured, assembled and tested within the United States. Manufacturers may be required to provide proof of where and what

percentage of the meter register, chamber and maincase is manufactured in the United States.

- c. Meters shall be compatible with the City of Lowell's existing R450 Fixed Network AMR reading system by Neptune Technology Group.
- d. Meters and registers shall be fabricated by the same manufacturer.

2. Single Jet Type:

- a. Metron Farnier Spectrum, Enduro, or equivalent.

3. Magnetic Type:

- a. Mueller HbMAG or equivalent.

4. Compound Type:

- a. Neptune Tru/Flo Compound, or equivalent.

V. Water Meter Transmitting Units (MTUs):

A. General: MTUs

1. Proprietary Notification:

- a. The Owner has determined that it is in the Public interest to include in the Specifications for the Project, the requirement that various materials, as described in this section, be proprietary items. The reason for this determination is that the City has installed a Fixed Network Automatic Meter Reading System (FNAMRS), which is programmed with a dedicated FCC licensed frequency. Meter Transmission Units (MTUs) must be manufactured by the same manufacturer as the FNAMRS for compatibility purposes. The proprietary equipment is as follows (refer to PART 2 – PRODUCTS for additional information):
 - 1. Meter Transmission Unit: Neptune R450 Meter Interface Unit, manufactured by Neptune Technology Group.