

**City of Milwaukee**  
**Department of Public Works**

**Milwaukee Water Works**

**Material Specifications for**  
**Pipe, Polyvinyl Chloride (PVC) for Water**  
**Sizes 4" Through 16"**



City of Milwaukee Specification No. 30-D-6  
Revised September 22, 2011

- I. **GENERAL REQUIREMENTS:** Vendors bidding through the Department of Administration - Business Operations Division, Procurement Services Section shall comply with the latest version of City of Milwaukee Specification No. 70b-D-7, except as modified herein. **MATERIALS FURNISHED UNDER THIS SPECIFICATION SHALL BE MANUFACTURED IN THE UNITED STATES.**
- II. **TECHNICAL REQUIREMENTS**
- A. **Description:** Polyvinyl Chloride (PVC) plastic water pipe, as described herein, shall consist of PVC resin combined with heat stabilizers, lubricants and other ingredients to make PVC compounds that can be extruded into pipe. The pipe shall have an integral bell designed for a push-on rubber gasket joint or a plain end for a fusible joint.
- B. **NSF 61 Approval:** All materials furnished to the Milwaukee Water Works and which will be in direct or indirect contact with potable drinking water shall be in compliance with NSF 61 Drinking Water System Components - Health Effects.
- C. **Standards:** PVC pipe shall conform to the latest revision of the following American Water Works Association Standards (AWWA), except as modified or supplemented herein:
1. AWWA C605, Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
  2. AWWA C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100mm Through 300mm), for Water Distribution.
  3. AWWA C905, Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48" (350mm Through 1200mm), for Water Distribution and Transmission.
  4. AWWA C909, Molecularly Oriented Polyvinyl Chloride (PVCO) pressure Pipe, 4 In. through 24 In. (100 mm through 300 mm), for Water Distribution.
  5. AWWA M23, Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition
- D. **Design Features:**
1. Laying Length – 20' nominal length for bell-spigot joint, 40' nominal length for plain end fusible joint unless otherwise specified.
  2. Diameter – As stated on the bid form or plans. Pipe shall have a cast iron pipe equivalent outside diameter (CIOD).

3. Thickness – Pipe shall be Pressure Class 235 with a dimension ratio of 18.
4. Fusible PVC – The pipe shall be manufactured under the trade name Fusible C-900®, C-905®, FPVC®, for Underground Solutions, Inc. Poway, CA, (858) 679-9551. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
5. Service Connections / Air Vents – All tapping of PVC pipe shall be done with the use of a saddle.
6. Tracer Wire
  - a. In open cut installations, #12 HMWPE blue jacket copper wire suitable for underground burial shall be provided by the contractor.
  - b. In directional bore installations, #10 or #8 HMWPE blue jacket copper wire suitable for underground burial shall be provided by the contractor.
7. Color/Marking – The pipe shall be blue in color and indelibly factory marked in accordance with Section 6.1.2 of AWWA C900 and AWWA C905. Fusible PVC markings shall also include “Extrusion production record code” and “Cell Classification 12454 and/or PVC material code 1120”. Improper, illegible, or incomplete markings will be cause for rejection of the pipe.

**E. Certification by Manufacturer.** The vendor or furnishing contractor shall submit records of manufacturer’s quality control tests required in accordance with Section 5.1 of AWWA C900 and AWWA C905. The test records shall be submitted in duplicate to the Superintendent of Milwaukee Water Works.

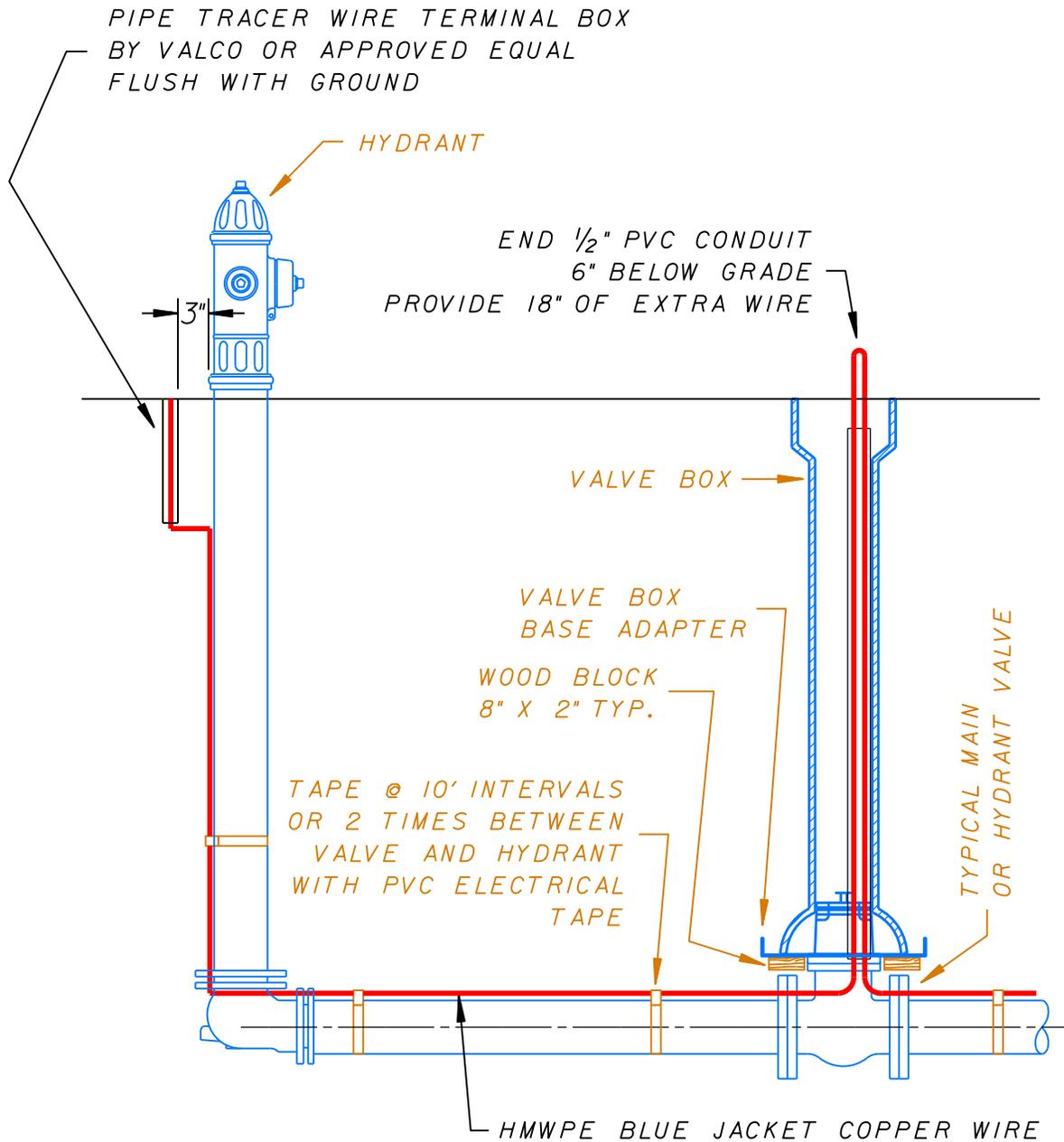
**Installation Practices** – All installation shall comply with the City of Milwaukee Water Main Installation Specifications date January 2, 1987 except as modified herein:

1. Fusion process shall be as patented by Underground Solutions, Inc., Patent No. 6,982,051.
  - a. Unless otherwise specified, fusible PVC pipe lengths shall be assembled in the field with butt-fused joints. Each fusion joint shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine.
  - b. Fusion technician shall be qualified by the pipe supplier to install fusible PVC pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.
  - c. Where fusible PVC pipe is installed by pulling in tension, the recommended maximum safe pulling force, established by the pipe supplier, shall not be exceeded.

2. Tracer Wire Installation
  - a. In open cut installations, the contractor shall lay insulated #12 HMWPE blue jacket copper wire directly over the water main. The wire must be attached to the pipe at regular intervals to ensure it stays in place during backfill. Blue identification ribbon shall be installed at approximately 1-2' above the water main.
  - b. In directional bore installations, #10 or #8 HMWPE blue jacket copper wire must be attached to the main.
  - c. At each valve and hydrant, the wire shall be brought to ground level as shown in Milwaukee Water Works Specification Drawing No. PVC-3. At valves, the wire shall be brought to one foot below ground level on the inside of the valve box and the wire looped and knotted to keep this elevation. The wire is to have 12 inches minimum of loop inside of the valve box riser.
  - d. Any splices shall be soldered and taped with mastic electrical splicing tape, Scotch® 23 or equivalent.
  - e. The Contractor must ensure that the wire is intact by performing a continuity test after installation is completed.

### III. QUALITY ASSURANCE / INSPECTION

- A. The pipe or fitting manufacturer's production facilities shall be open for inspection with a reasonable advanced notice.
- B. No polyethylene pipe or fittings shall be accepted for use in the Milwaukee Water Works after one year from the date of manufacture.
- C. All records required under Section II.D. shall be submitted before any pipe will be inspected.
- D. The Water Engineering Division shall be notified at least four (4) working days prior to installation for material inspection.
- E. The Superintendent of Milwaukee Water Works or a duly authorized representative will inspect all materials furnished under this specification.
- F. Any material found not conforming to this specification will be rejected.
- G. Replacement materials shall conform to all the requirements of this specification.

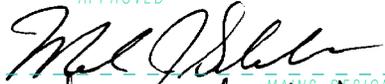


POLYETHYLENE WRAP FOR DUCTILE  
MAIN INSTALLATION IS NOT SHOWN

**NOTES:**

1. LOCATING WIRE SHALL BE INSTALLED AT ALL HYDRANTS AND VALVES
2. TRACER WIRE MUST BE TAPED TO POLYETHYLENE WRAPS FOR DUCTILE IRON INSTALLATIONS

NOT TO SCALE

APPROVED  ENGINEER	DATE 6-11-12	Milwaukee <b>Water Works</b> Department of Public Works	<b>Water Engineering</b>		
CHIEF DESIGN  ENGINEER	6-11-12			<b>TRACER WIRE DETAIL</b>	
 SPECIAL DEPUTY COMMISSIONER OF PUBLIC WORKS	6-11-12	CHECKED BY T.A.M.	DRAWN BY S. MILLER		