

# NORTH MARIN WATER DISTRICT

## STANDARD SPECIFICATIONS

### SECTION 15000 GENERAL PIPING SYSTEM AND APPURTENANCES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

This section describes the requirements and procedures for piping systems (pressure pipe and gravity sewer pipe) and appurtenances that apply to a number of other complimentary Specification Sections. The items are listed in this section to avoid repetition in sections elsewhere. This section includes, but is not limited to, temporary pipeline, hot taps, flexible pipe couplings, grooved and shouldered end couplings, joint restraint system, field touch up, bolts, nuts, polyethylene wrap, warning/identification tape, tracer wire, valve riser and extension stems, meter boxes, abandonment and removal of existing facilities, salvage, and disposal.

##### 1.02 REFERENCE STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWWA C111	- Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C200	- Steel Water Pipe – 150 mm (6”) and Larger
AWWA C203	- Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied
AWWA C213	- Fusion-Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines
AWWA C606	- Grooved and Shouldered Joints
AWWA C900	- PVC Pressure Pipe, four (4) inches through twelve (12) inches for Water Distribution
AWWA M11	- Steel Pipe - A Guide for Design and Installation
AWWA	- Guidelines for Distribution of Non-potable Water
AWWA M23	- PVC Pipe - Design and Installation
ASTM A 36/A 36M	- Standard Specification for Carbon Structural Steel
ASTM A 47/A 47M	- Standard Specification for Ferritic Malleable Iron Castings
ASTM A 53	- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 108	- Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 183	- Standard Specification for Carbon Steel Track Bolts and Nuts
ASTM A 283/A 283M	- Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
ASTM A 307	- Standard Specification for Carbon Steel Bolts and Studs
ASTM A 325/A 325M	- Standard Specification for High-Strength Bolts for Structural Steel Joints
ASTM A 510/A 510M	- Standard Specification for General Requirements for Wire Rods and Course Round Wire, Carbon Steel
ASTM A 512	- Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing

ASTM A 536	-	Standard Specification for Ductile Iron Castings
ASTM A 568/A 568M	-	Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality and Cold Rolled
ASTM D 2000	-	Standard Classification System for Rubber Products in Automotive Applications
ASTM F 593	-	Specifications for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	-	Specification for Stainless Steel Nuts
ANSI B1.1	-	Unified Inch Screw Threads
ANSI B1.2	-	Gages and Gaging for Unified Inch Screw Threads
NSF	-	National Sanitation Foundation
SSPWC	-	Standard Specifications for Public Works Construction ("Greenbook") California Administrative Code, Title 22
California Administrative Code, Title 22		

### **1.03 RELATED WORK SPECIFIED ELSEWHERE**

NMWD Standard Drawings  
 NMWD Standard Specifications 02223, 03000, 13110, and all of Division 15.

### **1.04 LINING CONTAMINATION PREVENTION**

Volatile organic compounds present in the linings of items in contact with potable water or recycled water shall not exceed concentrations allowed by the latest requirements of the State Office of Drinking Water and California Department of Public Health (CDPH). Some products and materials may also require proof of NSF certification on the lining materials to be used.

### **1.05 TEMPORARY PIPELINES**

Temporary pipelines where shown on the Approved Plans or required by the District Engineer, shall be furnished, installed, disinfected, connected, maintained, and removed by the Contractor. The District shall perform bacteriological sampling and testing. The contractor shall provide a submittal to the District showing pipe layout, materials, sizing, flow calculations, schedule and duration of use, and disinfection for all high line piping. The submittal shall be reviewed and approved by the District Engineer prior to ordering or delivery of any materials.

### **1.06 PIPE TAPPING (HOT TAP)**

All pipe tap (hot tap) connections to existing pipelines, whether for mainline extensions or service laterals, shall be performed by the District. The Contractor shall provide materials and labor to excavate, pour thrust block, backfill, compact, and repair pavement as indicated in this Section. In some cases, the contractor may perform the hot tap, only with prior approval of the District Engineer, in accordance with Appendix D (Hot Tapping Guidelines).

### **1.07 JOINT RESTRAINT SYSTEM**

Joint Restraint Systems may be used for PVC or ductile-iron pipe when shown on the Approved Plans or with prior approval of the District Engineer. Contractor shall submit shop drawings, calculations, and catalog data for joint restraint systems in accordance with Section 01000.

Splined gaskets, also known as joint restraint gaskets, may be used for PVC or ductile-iron pipe located within casings, or for PVC pipe casings, only with prior approval of the District Engineer.

### **1.08 POLYETHYLENE ENCASEMENT (NOT USED)**







2. Purple (recycled water)
  3. Green (sanitary sewer)
- B. Wire splices (at pipe tees, crosses and laterals) shall be accomplished using a direct bury silicone-filled capsule tube with standard wire nut or silicone-filled wire nut connectors of the appropriate size selected from the Approved Materials List.

## 2.10 VALVE RISERS

Risers shall be as indicated below in accordance with the Approved Materials List.

- A. Valve riser size and material shall be as follows:
- 6-inch PVC pipe, DMV cellular core, Schedule 40.
1. PVC valve risers for use in recycled water system applications shall be purple.
  2. PVC valve risers for use in potable water system applications shall be white or blue.
- B. Valve riser lids shall be as indicated below in accordance with the Approved Materials List.
1. Valve riser lids shall be circular cast-iron, and shall include a skirt for a close fit inside the upper portion of the valve riser. Lids shall be cast with the "NMWD".
  2. Lid size shall be as follows:

Valves

All valves  
(Std. Dwg. No. 2)

Valve Riser Lid

6-inch cast iron valve cover marked 'NMWD'

## 2.11 VALVE STEM EXTENSIONS

Stem extensions shall be complete with operating nut, location ring, and lower socket to fit valve-operating nuts. The configuration of the extension stem socket shall match that of the valve it operates.

- A. Steel stem extensions may be round or square hot-dipped galvanized steel tubing of solid design (no pinned couplings permitted) with guides.

## 2.12 METER BOXES

Meter boxes shall be high density reinforced type boxes with lids selected from the Approved Materials List.

- A. Meter box sizes shall be as follows per NMWD Std. No. 15 and as shown in the Approved Material List. Use traffic rated lids where specified:
- B. Meter box lids for use in potable water system applications shall be gray.
- C. Meter box lids for use in recycled water system applications shall be purple.

## 2.13 RECYCLED WATER IDENTIFICATION

Materials used to identify pipe and appurtenances used for recycled water and not manufactured in purple color shall be as described in Section 15151.

## **PART 3 EXECUTION**

### **3.01 TEMPORARY PIPELINES**

- A. All temporary piping, fittings, and service connections shall be furnished, installed, and maintained by the Contractor, and the Contractor shall make connections to a water source designated by the District Engineer.
- B. All pipe, valves, fittings, hose and connections furnished by the Contractor shall be of good quality, clean, and suitable for conveying potable water in the opinion of the District Engineer.
- C. The temporary pipe shall be installed in such a manner that it will not present a hazard to traffic and will not interfere with access to homes and driveways along its route.
- D. Valves shall be installed at two-hundred (200) foot intervals or as directed by the District Engineer. The use of pressure reducing valves (PRV) may be required as directed by the District Engineer.
- E. The Contractor shall be responsible for disinfecting all pipe, connections, flushing, and assisting the District in taking water samples for bacteriological testing in accordance with Section 15041.
- F. Following disinfection and acceptance of the temporary pipe as a potable water system, the Contractor shall maintain continuous service through the temporary piping to all consumers normally served both directly and indirectly by the pipeline.
- G. Upon completion of the work, the Contractor shall remove the temporary piping and appurtenances.
- H. If progress in making repairs to the temporary pipeline is inadequate, the District Engineer may order necessary corrective measures. Corrective measures may consist of directing District personnel or another contractor to complete the work. All costs for corrective measures shall be borne by the Contractor.

### **3.02 CONNECTION TO EXISTING FACILITIES (HOT TAPS AND CUT-IN INSTALLATIONS)**

Unless otherwise indicated on the Approved Plans or specifically directed by the District Engineer, all connections to existing facilities, including hot taps on active pipelines and cut-in installations, shall be performed by District personnel. When the Approved Plans indicate hot taps or cut-in installations are to be performed by Contractor, or when Contractor has the specific written permission of the District Engineer to perform hot taps or cut-in installations, such work shall be performed in strict accordance with the following procedures. In addition, hot taps shall be performed in accordance with Appendix D. The District Engineer must approve all work performed by Contractor prior to allowing access to the work site by District personnel.

When required by the District, the Contractor shall furnish the tapping sleeve or tee, valves and all other materials as called for in the Standard Specifications in accordance with the Approved Materials List. The Contractor shall provide all equipment and labor required for the excavation and installation of the connection including but not limited to thrust blocks, backfill and pavement replacement. In certain circumstances the Contractor may be required to provide a water truck, high line, and fittings as part of the equipment for making the connections. In addition, the Contractor shall assist the District in alleviating any hardship incurred during a shutdown for connections. Emergency standby equipment or materials may be required of the Contractor by the District Engineer.

Hot taps or cut-in tee and valve installations shall be performed as follows:

- A. Prior to construction, Contractor shall pothole the existing pipe at the location of the proposed connection. The District shall inspect the pothole prior to Contractor's repair of trench. Refer to Section 01000 for protection of existing facilities. Contractor shall record the following information on as-built drawings:
  - 1. Pipe size, outside diameter.
  - 2. Pipe type such as ACP, PVC, Ductile-Iron or Steel.
  - 3. Pipe class and/or pressure rating.
  - 4. Elevation, grade, and alignment.
  - 5. Location of collars, pipe bells, fittings or couplings, if found.
  - 6. Potential conflicts with existing utilities.
  - 7. Pothole in two (2) locations to obtain alignment and confirm depth.
- B. To facilitate the proposed connection and allow for slight adjustments in alignment, the Contractor shall leave a maximum seventeen (17) foot gap between the new pipe installation and the proposed connection point at the existing water main. The Contractor shall leave a gap longer than seventeen (17) feet if conditions warrant, or if directed by the District Engineer.
- C. The new pipeline shall have successfully passed pressure testing in accordance with Section 15044 and disinfection and bacteriological testing in accordance with Section 15041 prior to proceeding with the connection to the existing pipeline.
- D. After the District Engineer has given approval to proceed with the connection, the Contractor shall schedule with the District Engineer for the hot tap or cut-in installation.
  - 1. Shutdowns will be scheduled at the convenience of the District. Shutdowns may be scheduled for nights or weekends if required.
  - 2. The Contractor shall give the District Engineer a minimum of five (5) working days notice prior to any proposed excavation or shutdown of existing mains or services. Scheduling shall be subject to approval by the District Engineer.
  - 3. The District Engineer may postpone or reschedule any shutdown operation if, for any reason, the District Engineer believes that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection.
  - 4. If progress in completing the connection within the time specified is inadequate, the District Engineer may order necessary corrective measures. Corrective measures may consist of directing District personnel or another contractor to complete the work. All costs for corrective measures shall be borne by the Contractor.
- E. Contractor may proceed with excavation only when pothole has been completed, materials have been approved and delivered, hot tap or cut-in installation has been scheduled and a copy of the approved traffic control plan has been supplied to the District Engineer.

1. The Contractor shall saw-cut pavement, excavate and provide and install shoring and steel plating, when necessary, one day prior to the hot tap or cut-in installation.
2. The Contractor shall provide lights, barricades and traffic control in accordance with the agency of jurisdiction and as deemed necessary for the excavation by the District Engineer.
3. The Contractor shall de-water existing mains where cut-in installations are required in the presence of the District Engineer and in accordance with Section 15041 and 02223. The Contractor shall be prepared to deal with leaking valves and water from those valves to complete the shutdown. Only District personnel are authorized to operate existing valves. The Contractor shall be responsible for any and all damage resulting from unauthorized operation of existing District facilities.
4. In areas where cut-ins are to be performed the Contractor shall line the bottom of the trench with twelve (12) to eighteen (18) inches of  $\frac{3}{4}$  inch rock and install a twelve (12) to sixteen (16) inches deep sump for dewatering the trench bottom.
5. The District shall perform the following work for hot taps and cut-in installations:
  - a. Hot taps: Disinfect and install the tapping saddle and tapping valve and perform tapping operations in accordance with Appendix D.
  - b. Cut-ins: Cut and remove portions of existing mains, and disinfect and install tees, valves, couplings, and appurtenances required to complete the closure. The Contractor shall discard pipe and appurtenances removed from service in accordance with this Section.
6. After the District has performed tapping or cut-in operations, and the District Engineer has given approval to proceed, the Contractor shall complete the installation as shown on the Approved Plans in accordance with the Standard Specifications including, but not limited to:
  - a. Disinfecting and installing the pipe section(s) necessary to make the closure to the new system.
  - b. Installing and setting the valve riser(s) in accordance with the Standard Drawings.
  - c. Installing thrust and anchor blocks in accordance with Section 03000.
  - d. Completing all backfill and compaction of the trench in accordance with Section 02223.
  - e. Repairing or replacing pavement as necessary in accordance with agency of jurisdiction requirements.

### **3.03 FLEXIBLE PIPE COUPLINGS**

Flexible pipe couplings shall be installed in accordance with the manufacturer's recommendations and as described below:

- A. Use plain-end pipe with flexible couplings per AWWA C200. Provide joint harnesses per AWWA M11 for aboveground applications or where indicated on the Approved Plans.

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- B. Flexible couplings may be used only where indicated on the drawings.
- C. Clean oil, scale, rust, and dirt from the pipe ends and touch-up the epoxy coating and allow time for curing before installing the coupling. Clean the gaskets before installing.
- D. Follow the manufacturer's recommendations for installation and bolt torque using a properly calibrated torque wrench.
- E. Lubricate the bolt threads with graphite prior to installation.

### **3.04 GROOVED-END OR SHOULDERED COUPLINGS FOR DUCTILE-IRON OR STEEL PIPE**

Grooved-end or shouldered couplings shall be installed in accordance with the manufacturer's recommendations and as described below:

- A. Grooved-end or shouldered joint couplings shall be installed per AWWA C606 and the manufacturer's recommendations.
- B. Clean loose scale, rust, oil, grease, and dirt from the pipe or fitting groove and touch-up the epoxy coating as necessary, allowing time for curing before installing the coupling.
- C. Clean the gasket before installation. Apply a lubricant selected from the Approved Materials List to the gasket exterior including lips, pipe ends, and housing interiors.
- D. Fasten the coupling alternately and evenly until the coupling halves are seated. Follow the manufacturer's recommendations for bolt torque using a properly calibrated torque wrench.

### **3.05 JOINT RESTRAINT SYSTEM**

Joint Restraint Systems shall be installed in accordance with the manufacturer's recommendations and as described below:

- A. Length of pipe to be restrained on each side of bends, tees, reducers and other fittings shall be determined in accordance with AWWA design manuals or manufacturer of the restraint device.
- B. Split ring joint restraint systems for bell and spigot joints shall be ductile-iron and shall consist of two split-ring restraints with machined (not cast) serrations on the inside diameter and connecting bolts, and shall be selected from the District's Approved Materials List. One clamping ring shall be installed on the spigot pipe, and with the necessary restraining rods and nuts, connected to a second clamping ring located on the pipe barrel immediately behind the gasket bell. Restraint devices may be installed prior to lowering pipe into the trench only with the approval of the District Engineer. All joint restraint devices shall be installed in accordance with the manufacturers' instructions.
- C. Split ring restraint for mechanical joints shall be ductile-iron and shall consist of two split-ring restraints with machined (not cast) serrations on the inside diameter and connecting bolts, and shall be selected from the District's Approved Materials List and installed per manufacturer specifications.
- D. Split ring joint restraint for push-on valves or push by flange adapter shall be ductile-iron and shall consist of two split-ring restraints with machined (not cast) serrations on the inside diameter and connecting bolts, and shall be selected from the District's Approved Materials List and installed per manufacturer specifications. Split ring restraints for push-on valve or push by flange adapter shall not be used in applications larger than eight inches (8") in diameter.



- C. Tracer wire shall be secured to the pipe at ten (10) foot intervals with plastic adhesive tape, duct tape or plastic tie straps. The wire may alternately be secured to the pipe by looping the tracer wire around itself such that tracer wire remains continuous atop the pipe during backfill operations.
- D. Tracer wire shall be terminated at the valve riser unless noted otherwise in the drawings.
- E. Wire shall extend into the valve riser and terminate with a coiled twenty-four (24) inch length of wire.
- F. Splices shall be installed only when necessary and shall be made using a wire connector selected from the Approved Materials List.
- G. The Contractor shall test tracer wire for electrical continuity in the presence of the District Engineer prior to the installation of any paving over atop pipelines or appurtenances. Testing shall be accomplished using a Progressive Electronics 77M tone generator, or similar device, and a testing telephone handset.

### 3.9 VALVE RISERS AND STEM EXTENSIONS

Valve risers shall be installed as shown on the Standard Drawings and as described below.

- A. Valve risers shall be installed with lids flush with the final surface. No more than two, one (1) inch adjustment rings shall be used. Valve risers and adjustment rings shall be accurately cut perpendicular to the length of the piping used.
- B. Valve risers shall be color coated to identify the type and use of the valve installed.
  - 1. The inside portion of the valve riser lid and interior portion of PVC valve riser shall be identified with a minimum two (2) inch diameter painted identification marking. Paint color shall be as follows:
 

<u>Color</u>	<u>Valve Riser Lid and PVC Valve Riser for:</u>
Red	Normally Closed System Valves (NCV)
  - 2. The top exterior portion of the valve riser lid and ring shall be coated in accordance with Std. Dwg. No. 22.
- C. Valve Stem Extensions shall be installed when the valve-operating nut is more than five (5) feet below grade. Stem extensions shall be of sufficient length to bring the operating nut to a point between twelve (12) inches and eighteen (18) inches below the valve riser lid. Valve stem extensions shall be installed in accordance with the Standard Drawings.

### 3.10 METER BOX INSTALLATION

Meter boxes shall be installed at the elevations and locations shown on the Approved Plans and in accordance with the Standard Drawings. Near the completion of the project, a final meter box adjustment to finish grade may be required. Water meters shall not be installed until final adjustments are made to the meter box and approved by the District.

### 3.11 INSTALLATION OF TEMPORARY END CAPS TO MAINTAIN SERVICE

Before excavating for new mains that are to replace existing pipes or services, it may be necessary to install temporary end caps on existing pipes that are later to be abandoned or connected to in order to maintain service to customers of fire protection during construction. When indicated on the Approved Plans or when directed by the District Engineer, Contractor shall





- B. Existing service laterals or appurtenances shall be connected to new pipelines as shown on the Approved Plans or as directed by the District Engineer in accordance with the Standard Drawings.

### **3.15 DISPOSAL**

All materials removed during construction operations and not identified by the District Engineer as salvage shall be legally disposed of in accordance with all applicable Local, State, and Federal requirements.

Disposal of Asbestos-Cement Pipe requires special handling and attention, including but not limited to, encapsulation within airtight packaging, submittal of certification letters and/or waste profile statements, and the use of a Cal-OSHA registered asbestos abatement contractor to transport and dispose of such wastes. District shall be provided with copies of all applicable documentation regarding the transportation and disposal of Asbestos-Cement pipe. Contractor shall comply with all applicable regulations and all requirements of the disposal site. Contractor is responsible for all costs associated with disposal of materials, specifically including any materials that may contain asbestos.

END OF SECTION 15000