



**SPECIAL PROVISIONS  
FOR  
DOMESTIC WATER DISTRIBUTION SYSTEM**

**Story County  
BR-810-0(93)--7A-85**

**Effective Date  
November 17, 2009**

**THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**090013.01 GENERAL**

**A. Description**

Construct water mains and building service pipes.

**B. Submittals**

1. Manufacturer's instructions for installation for all pipe and fittings utilized.
2. Construction sequencing.
3. Catalog cuts, samples, manufacturer's data, and listing of applicable standards for special, unique or proposed substitute materials if requested by the Engineer.
4. Joint restraint system.
5. Project Record Documents.
6. Upon request, the Contractor shall provide material certifications to the Engineer.

**C. Delivery, Storage and Handling**

1. Store materials in a protected environment, on pallets or lagging. Keep exposed pipe ends of stocked pipe closed with rodent-proof end gates.
2. Pipe and fittings contaminated with mud and surface water shall be removed from the site and not used in construction unless thoroughly cleaned, inspected, and approved by the Engineer.
3. Handle materials to avoid damage. Replace damaged materials. Remove damaged materials from the site.

### **C. Conflicts**

1. Expose potential conflicts such as utility lines and drainage structures in advance of construction. Verify elevations and locations and verify clearance for proposed construction.
2. Complete elements of work which can affect line and grade in advance of sanitary sewer construction unless noted on plans.
3. Notify the Engineer of conflicts discovered or changes needed to accommodate unknown conditions.

## **090013.02 MATERIALS**

### **A. Water Main Pipe**

1. Ductile Iron Pipe 4 inches to 24 inches:
  - a. Ductile iron pipe per ANSI/AWWA C 151/A21.51.
  - b. Special Thickness Class 52.
  - c. Joint Type: Mechanical joint per ANSI/AWWA C111/A21.11.
  - d. Glands: Replace standard glands with set screw type locking retainer glands.
    1. Tyler Union Retainer Gland, Ebaa Iron 1100 Megalug, or approved equal.
    2. Gaskets: Per ANSI/AWWA C111/A21.11.
  - e. Cement-mortar lined, per ANSI/AWWA C104/A21.4 with asphaltic seal coat.
  - f. External coating: asphaltic.
  - g. Markings on Pipe: Cast or metal-stamped on pipe (often on the end of the bell.):
    1. Name of manufacturer.
    2. Country of casting.
    3. Year produced.
    4. "DI" or "Ductile"
    5. Weight, thickness class, or nominal thickness (marked on pipe by other means).
2. Ductile Iron Pipe 30 inches and larger:
  - a. Ductile iron pipe per ANSI/AWWA C 151/A21.51.
  - b. Pressure Class 250.
  - c. Joint Type: Push joint with locking joint.
    1. American Flex-Ring, Griffin Snap-Lok, Clow Super-Lock, or US Pipe HP-Lok.
    2. Only models using locking ring factory welded to pipe are acceptable. Field welds are not acceptable. Joints using teeth embedded in rubber rings are not acceptable.
    3. Gaskets: Per ANSI/AWWA C111/A21.11.
  - d. Cement-mortar lined, per ANSI/AWWA C104/A21.4 with asphaltic seal coat.
  - e. External coating: asphaltic.
  - f. Markings on Pipe: Cast or metal-stamped on pipe (often on the end of the bell.)
    1. Name of manufacturer.
    2. Country of casting.
    3. Year produced.
    4. "DI" or "Ductile"
  - g. Marked on pipe by other means: weight, thickness class, or nominal thickness.
3. Polyethylene Pipe 4 inches and larger:
  - a. PE 3608 or 4710 HDPE as manufactured by CP Chem Performance Pipe.
  - b. Minimum Thickness: DR 11.
  - c. Pipe shall be ductile iron pipe size (DIPS), black with three equally spaced pairs of blue stripes.
  - d. Pipe shall meet AWWA C906.

- e. Joints shall be made with proper butt weld fusion joints or electrofusion couplings. All joints shall be made according to manufacturer's recommendations.
  - f. CP Chem Performance Pipe Driscoplex 4000.
4. Polyethylene Pipe 2 inches and 3 inches
- a. PE 3608 or 4710 HDPE as manufactured by CP Chem Performance Pipe.
  - b. Minimum Thickness: DR 11.
  - c. Pipe shall be iron pipe size (IPS), black.
  - d. Pipe shall meet AWWA C901, ASTM D 3035.
  - e. Joints shall be made with proper butt weld fusion joints or electrofusion couplings. All joints to be made to manufacturer's specifications.
  - f. CP Chem Performance Pipe Driscoplex 4100.

#### **B. Bolts for Water Main Pipe and Fittings**

1. Bolts for chilled water mains for all mechanical and set screw joints shall be T bolts meeting AWWA C111.
2. Bolts shall be Cor-ten with Ceramic filled baked on fluorocarbon resin coating. Uncoated Cor-Ten steel bolts are not allowed.
3. NSS Industries Cor-Blue or approved equal

#### **C. Fittings**

1. For Ductile Iron Pipe (all sizes):
  - a. Ductile iron fittings per ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 (Compact fittings).
  - b. Pressure rating : 4 to 24 inches 350 psig, 30 to 36 inches 250 psig.
  - c. Joint Type: Mechanical joint per ANSI/AWWA C111/A21.11 (all fittings shall be mechanical joint).
  - d. Glands: Replace standard glands with set screw type locking retainer glands.
    1. Tyler Union Retainer Gland, Ebaa Iron 1100 Megalug, or approved equal.
    2. Gaskets: Per ANSI/AWWA C111/A21.11.
  - e. Cement-mortar lined per ANSI/AWWA C 104/A21.4 with asphaltic seal coat.
  - f. External coating: asphaltic.
  - g. Markings on fittings: (to be cast on outside of fitting).
    1. Name of manufacturer.
    2. Country of casting.
    3. Pressure rating.
    4. AWWA standard number.
    5. "DI" or "Ductile"
2. Buttweld Fittings for Polyethylene Pipe 2 inch to 8 inch:
  - a. Fittings to be molded butt weld fittings conforming to ASTM D 2513, ASTM D 3261, and AWWA C906.
  - b. Fittings to be same resin as pipe being fused.
  - c. Fittings to be pressure Class 150.
3. Buttweld Fittings for Polyethylene Pipe 10 inches and larger:
  - a. Fittings shall be factory fabricated segmented butt weld fittings conforming to ASTM D 2513 and AWWA C906.
  - b. Fittings shall be same resin as pipe being fused.
  - c. Fittings to be pressure Class 150.
4. Electrofusion couplings for Polyethylene Pipe:

- a. Fittings to be Frialen DIPS electrofusion fittings as manufactured by Friatec, or approved equal.
- b. Fittings to be same resin as pipe being fused.

#### **D. Special Fittings**

1. Flanges:
  - a. Flanged Ductile Iron Pipe:
    1. Where flanges are required on ductile pipe, use ductile pipe with a factory installed flange.
    2. Solid back threaded flange per AWWA C115 shall be factory installed.
    3. Gaskets: Rubber or approved composition; 0.125-inch thick; full face.
  - b. Flange Adapter:
    1. Only where specifically noted on drawings as a separate adapter, a flange adapter may be used.
    2. Manufacturer: Dresser Manufacturing Division, Bradford, Pennsylvania.
    3. Model: Style 227 or approved equal for 3 inch to 12 inch, Style 128 or approved equal for 14 inch to 24 inch.
2. Solid Sleeve:
  - a. Utilize mechanical joint sleeves as per AWWA C-153 where a connection is to be made to the existing piping. Used to allow connection into system after hydrostatic test and disinfection.
  - b. Manufacturer: Tyler 5-644 or equal, short or long as required.
3. Field retrofit Restrained Joints:
  - a. All joints are to be restrained joints unless specifically noted otherwise.
  - b. Existing push joint pipes that need to be restrained may be cut out and replaced or retrofit with a restraint kit.
  - c. Restraint kit shall be set screw split rings connected by rods.
  - d. Manufacturer: Ebaa Iron.
  - e. Model: Series 1100HD or approved equal.
  - f. To be used only where specifically indicated.
4. Polyethylene to Ductile connections:
  - a. DIPS MJ Adapter meeting AWWA C906.
  - b. Stainless Steel stiffener to be used on all pipes 6 inches and greater.
  - c. Adapter to be same resin and SDR as pipe being fused to.
  - d. Adapter shall consist of a butt weld joint to the PE pipe on one end and a raised ring to engage the gland ring on the MJ joint of the ductile iron pipe on the other end, providing a restrained joint.
  - e. As manufactured by Performance Pipe or approved equal.
  - f. This fitting to be used to connect PE pipe to MJ valves.

#### **E. Valves**

1. General:
  - a. Valves shall be manufactured in the United States.
  - b. Same size as pipeline in which it is installed, unless noted otherwise on drawings.
  - c. Manufacturer's name or initial and working pressure cast on valve body.
  - d. Open when turned counter clockwise.
  - e. Factory tested to twice the rated working pressure.
  - f. Buried service: Mechanical joints.
  - g. All valve operators to be supplied by valve supplier.
2. Gate Valves, Buried Service 2 inch to 12 inch

- a. Type: Non-rising stem, resilient seat.
  - b. Pressure rating: 150 psi working pressure, minimum.
  - c. Comply with: ANSI/AWWA C509.
  - d. Body and Bonnet: Ductile Iron ASTM A 536.
  - e. Interior and Exterior finish: Epoxy coating conforming to AWWA C550.
  - f. Ends: Mechanical Joint with set screw locking glands.
  - g. Wedge: Iron wedge fully encapsulated with molded rubber; no exposed iron.
  - h. Shaft seals: Double O-rings permanently lubricated between seals. Lubricant certified for use in potable water.
  - i. Exposed bolts and hex nuts: Type 304 stainless steel.
  - j. Operator: 2 inch square nut.
  - k. Manufacturer: Mueller A-2362, Clow Model 2639 F-6100, or approved equal.
3. Butterfly Valves, Buried Service 14 inches and larger:
- a. Type: High performance resilient seat.
  - b. Pressure rating: 150 psi working pressure, minimum.
  - c. Comply with: ANSI/AWWA C504.
  - d. Body, Bonnet and Discs: Cast iron ASTM A 126.
  - e. Ends: Mechanical Joint with set screw locking glands.
  - f. Seat and Disc: Disc to be epoxy coated. Seat to be fully rubber encapsulated with stainless steel reinforcing ring. Shaft and disc to be offset.
  - g. Shaft seals to be maintenance free type: Double O-rings permanently lubricated between seals with lubricant certified for use in potable water or chevron type.
  - h. Exposed bolts and hex nuts: Type 304 stainless steel (usually special order)
  - i. Operator: 2 inch square nut on an underground rated gear operator.
  - j. Interior and Exterior finish: Epoxy coating conforming to AWWA C550 (usually special order).
  - k. Manufacturer: Mueller Linesal III Fig 11.3, Clow 4500 or 1450, or approved equal.

## F. Appurtenances

1. Valve Box:
- a. Applicability: For all buried gate or butterfly valves.
  - b. Type: screw extension.
  - c. Material: Cast iron.
  - d. Cover: Cast iron, labeled "WATER", logo minimum 2 inches high.
  - e. Wall thickness: 3/16 inch, minimum.
  - f. Inside diameter: 5.25 inches, minimum.
  - g. Length: Adequate to bring top to ground surface. Two piece construction for depths 5 to 7 feet. Greater than 7 feet may require extension.
  - h. Factory finish: Asphalt coating.
  - i. Manufacturer: Tyler 6850, or equal.
2. Post Indicator Valve Boxes (PIV)
- a. Post indicator for mounting to gate valve with 2 inch operating nut.
  - b. Height of post to be field adjustable near grade.
  - c. Indicator window shall read "Open" or "Shut" and shall be adjusted for the number of turns required for the valve it is mounted on.
  - d. Post shall be lockable with a padlock. Padlock will be furnished by the Contracting Authority.
  - e. Furnish with standard tamper switch.
  - f. Manufacturer: Mueller Indicator Post A-20806 or approved equal.

## G. Fire Hydrant

1. Material: Conform to ANSI/AWWA C510 and C502, as modified herein.

2. Manufacturers: Clow 2500.
3. Features:
  - a. Break-away stem coupling.
  - b. Operating nut: Pentagonal, 1.5 inch.
  - c. Inlet nominal size: 6 inch.
  - d. Inlet connection type: 6 inch mechanical joint with locking retaining glands.
  - e. Hose nozzles: two 2.5 inch.
  - f. Steamer nozzle: one 4.5 inch.
  - g. Nozzle Threads: National Standard nozzle threads.
  - h. Nominal bury length: Match water main depth, but not less than 5 feet.
  - i. Foot valve size: 5.25 inch.
  - j. Direction of opening: CCW.
4. Substitutions: None, unless approved in writing by the Contracting Authority.
5. Bury length: Refer to plans.
6. Painting:
  - a. Shop coating; per ANSI/AWWA C502.
  - b. Field coating above grade; Exterior coating, type and color selection by the Contracting Authority.
7. Exposed Bolts And Hex Nuts: Stainless steel.

#### **H. Disinfection Agent - Chlorine**

1. Calcium Hypochlorite, per ANSI/AWWA B300.
2. Chlorine containers must have AWWA stamp.

#### **I. Water Meter**

1. Compound meter for cold water applications
2. Badger Compound Series Meter provided by the Contracting Authority.

#### **J. Wall Penetration Seals**

1. Modular interlocking elastomeric mechanical seals.
2. Manufacturers: Thunderline Link-Seal or approved equal.
3. Standard Service Applications:
  - a. Temperature Range : -40°F to +250°F
  - b. Material : EPDM Rubber conforming to ASTM D2000
  - c. Color: Black
  - d. Bolts and nuts: Steel with Zinc Coating

### **090013.03 CONSTRUCTION REQUIREMENTS**

#### **A. General Pipe and Valve Installation**

1. Install only approved materials.

2. Protect pipe joints and valves from damage while handling and storing.
3. Use no deformed, defective, gouged, or otherwise damaged pipe or fittings.
4. Excavate and prepare trench as outlined in Standard Specifications.
5. Contractor shall expose existing pipe at the new pipe connection point sufficiently to evaluate exact termination point of new pipe.
6. Prepare the trench bottom with sufficient exactness so that only minor movement of the pipe will be necessary after installation.
7. Clean pipe interior prior to placement in the trench. Do not allow any foreign material to enter pipe during installation.
8. Install pipe with fittings and valves to the lines and grades shown in the plans, with a maximum allowable variation of 3 inches.
9. Provide uniform bearing along the full length of the pipe barrel. Provide bell holes.
10. Clean joint surfaces thoroughly and apply lubricant approved for use with potable water.
11. Make joints according to pipe manufacturer's recommendations and these specifications.
12. Limit joint deflections to one degree less than pipe manufacturer's recommended maximum limit.
13. Tighten bolts in a joint evenly around the pipe.
14. Install remaining pipe bedding in accordance with Standard Specifications.
15. Do not install pipe in water. Keep trench free of water. Refer to ANSI/AWWA C651 for wet trench installation procedures, if such installation is approved by the Engineer.
16. Close ends of installed pipe with water main cap or plug and secure bolts on joints during nights, non-working days, and during all rain events when pipe installation is not actively occurring in a dewatered trench.
17. Do not allow any water from the new pipeline to enter existing distribution system piping.
18. Calcium hypochlorite granules shall be placed at the beginning of main and in each section of pipe, in the following amounts (note that this exceeds AWWA C651 minimums). In HDPE, granules shall be placed prior to facing the pipe for fusion.

| Pipe diameter<br>Inches | Amount of Calcium Hypochlorite granules |                 |
|-------------------------|---|-----------------|
|                         | Beginning of main                       | Per pipe length |
| 4                       | 0.5 ounces                              | 0.02 ounces     |
| 6                       | 1.0 ounces                              | 0.04 ounces     |
| 8                       | 2.0 ounces                              | 0.08 ounces     |
| 10                      | 3.0 ounces                              | 0.18 ounces     |
| 12                      | 4.0 ounces                              | 0.16 ounces     |
| 16                      | 8.0 ounces                              | 0.32 ounces     |

19. Prior to testing, contractor shall install tapped MJ caps or MJ plugs on the pipe ends as shown in the appropriate detail. The cap will require an MJ adpter for PE pipe. Fusion welded PE caps are not acceptable. For lines smaller than 12 inches, connect 3/4 inch soft

copper piping to the tap and extend above finish grade. Terminate line with a 3/4 inch ball valve above grade for testing. On lines 12 inches diameter and larger, the tap and test line shall be 2 inch copper or threaded galvanized steel piping brought above grade with a 2 inch ball valve above grade.

20. The Contracting Authority shall fill line, test for chlorine residual, and conduct hydrostatic and bacteriologic tests per AWWA C651 and section 3.8.
21. The Contracting Authority shall remove caps and plugs and connect new pipe to existing pipe tap after hydrostatic and bacteriologic tests have been passed unless otherwise indicated.
22. In addition to trench backfill, Contractor shall backfill area where connection to existing piping is to be made. Contractor will only responsible for one backfill. The Engineer may choose to have the Contractor backfill immediately after pipe installation, or after final connection by the Contracting Authority. Coordinate with the Engineer. If Contractor is directed to backfill immediately after installation, the Contracting Authority will be responsible for re-excavation and backfill for final Contracting Authority installed connection.
23. Contractor shall set tops of valve boxes to finish grade.
24. Contractor shall check the working order of all valves by opening and closing through entire range.

**B. Additional Requirements for Ductile Iron Pipe Installation**

1. Install in accordance with AWWA C600.
2. Cut pipe perpendicular to pipe barrel. Do not damage cement lining. Bevel cut ends for push-on joints according to AWWA C600.

**C. Additional Requirements for Polyethylene Pipe Installation**

1. Fittings may be butt weld or electrofusion.
2. Follow manufacturers instructions for chosen welding procedure.
3. Install pipe per manufacturer's instructions.

**D. Fire Hydrant Installation**

1. Fire hydrant shall be installed with a shut-off valve that is directly coupled to the hydrant by using an anchor pipe with locking glands on the mechanical fittings. Concrete shall not be used to restrain or support the hydrant.
2. Position auxiliary valve at least 15 inches (clearance) from fire hydrant.
3. One cubic yard of 3/4 inch washed river rock shall be placed under the hydrant to allow drainage of the hydrant barrel. Install layer of 6 mil poly sheeting over river rock before backfill.
4. Separated excavation material shall be used to backfill around the hydrant.
5. Fire Hydrant Depth Setting:
  - a. Height of fire hydrant nozzle to match standard detail.

- b. Use adjacent finish grade to determine setting depth. Nozzle height to match detail. Adjust barrel length, or add or remove extensions as required.
- c. If finish grade is not to be obtained during the current project, consult with the Engineer for proper setting dimension.

6. Coordinate installation with tracer wire installation.
7. Refer to Plans for location.
8. Orient fire hydrant nozzles as directed by the Engineer.

**E. Locate Wire System**

Install a locate wire system as per the contract documents.

**F. Structure Penetrations: Wall Sleeves:**

1. Install wall penetration seals where pipe passes through building wall.
2. Wall penetration hole diameters shall conform to the manufacturer's tabulated recommendations.
3. See appropriate detail on drawings.
4. Install per manufacturer's recommendation.

**G. Service Taps and Connections**

1. The Contracting Authority shall provide service tap and connection as shown on the plans.
2. The Contracting Authority shall connect to tap using solid sleeve and a short piece of pipe after all tests have passed.

**H. Testing and Flushing**

1. After the installation is complete with tapped caps on each end, the Contracting Authority shall connect to the riser from the tapped cap and fill the system with water.
2. The Contracting Authority shall purge air from the system, with the Contractor remedying any trapped air bubbles.
3. The Contracting Authority shall close the valve used to fill the line and the system.
4. The Contracting Authority shall isolate the pipe and perform a hydrostatic test of the system.
5. The Contractor may witness the test, and the Contracting Authority will provide the Contractor with the results.
6. The system shall be pressurized to 150 psig for a minimum of two hours. System pressure shall drop no more than 5 psig during the 2 hour test while no water is being added to the system.
7. After the hydrostatic test, the system shall sit idle for 24 hours.
8. The project inspector shall coordinate to have Utilities take a water sample at the furthest location if the system from a contractor provided tap locations.

9. After 24 hours Utilities will test the water to check for a minimum free chlorine residual of 25 mg/L. If the chlorine residual passes, the Contracting Authority's utilities department will flush the new main through the tapped caps.
10. After the test for chlorine residual is passed and the line flushed, Utilities shall take two samples for bacteriological testing, at least 24 hours apart. Samples cannot be taken from hydrants or through hoses.
11. Utilities shall notify the project inspector when this is done. Results from the bacteriological tests take 48 hours each to pass.
12. The new line shall not be connected to the system until the tests pass.
13. At least 5 working days should be anticipated for hydrostatic testing, chlorination, and bacteriological testing.

**090013.04 METHOD OF MEASUREMENT**

Measurement will be according to Article 2554.04 of the Standard Specifications.

**090013.05 BASIS OF PAYMENT**

Basis of payment will be according to Article 2554.05 of the Standard Specifications.