

SECTION 9 WATER CONSTRUCTION STANDARDS

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9.02 PURPOSE

This section states the requirements and standards for materials to be supplied, welding methods and procedures, and installation of water facilities.

The pipes, fittings and valves making up the distribution system, including but not limited to fire hydrants, must comply with this Standard in addition to the American Water Works Association (AWWA) Standards. If there is a conflict between the two the more conservative shall apply. Consult with the TMWA engineer and inspector in the event of a conflict.

9.03 MATERIAL TO BE FURNISHED

The following materials shall be used for proposed improvements unless otherwise specified on the drawings or specifications:

- Polyethylene Service Pipe (PE)
- Ductile Iron Pipe (DI)
- Polyvinyl Chloride Pipe (PVC)
- Casing Spacers and End Seals
- Meters and/or Meter Provisions (Boxes, Vaults, Setters, etc.)
- Valves

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Valve Boxes and Conductor Pipe
 Fittings (Elbows, Tees, Reducers, etc.)
 Metallic Warning Tape
 Pressure Testing Supplies
 Cathodic Protection and Insulating Materials
 Miscellaneous Items (Nuts, Bolts, Gaskets, etc.)

9.04 DESCRIPTION AND INSTALLATION OF PIPE

9.04.01 Polyethylene Service Tubing (PE)

All service tubing shall meet or exceed the most current version of AWWA Standard C901 and shall be purchased from approved manufacturers. All tubing shall have a Standard Dimension Ratio (SDR) of nine (9). The following is a table describing service pipe specifications:

SIZE/ MATERIAL	PRESSURE RATING	ROLL LENGTH	O.D.
1" CTS PE 3608	200 PSI	100'	1.125"
1 ¼" CTS PE 3608	200 PSI	100'	1.375"
1 ½" CTS PE 3608	200 PSI	100'	1.625"
2" CTS PE 3608	200 PSI	100'	2.125"

9.04.02 Ductile Iron Pipe (DI)

All ductile iron pipe shall meet or exceed the most current version of AWWA Standard C151 and be purchased from an approved manufacturer. The following table describes ductile iron pipe specifications:

SIZE/ MATERIAL	PRESSURE RATING	LAYING LENGTH	O.D.
4" DI	350 PSI	18'	4.80"
6" DI	350 PSI	18'	6.90"
8" DI	350 PSI	18'	9.05"
10" DI	350 PSI	18'	11.10"
12" DI	350 PSI	18'	13.20"

Installation of all ductile iron pipes shall be in compliance with these Standards and the most current version of AWWA C600. If there is a conflict between the two the more conservative shall apply. Consult with the TMWA engineer and inspector in the event of a conflict.

9.04.03 Polyvinyl Chloride Pipe (PVC)

All polyvinyl chloride pipe shall meet or exceed the most current version of AWWA Standard C900 and be purchased from an approved manufacturer. All pipe

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shall be 235 psi pressure rated, DR 18 unless specifically noted on the plans. The following table describes PVC pipe specifications:

SIZE/ MATERIAL	PRESSURE RATING	LAYING LENGTH	O.D.
4" PVC	235 PSI	20'	4.80"
6" PVC	235 PSI	20'	6.90"
8" PVC	235 PSI	20'	9.05"
10" PVC	235 PSI	20'	11.10"
12" PVC	235 PSI	20'	13.20"

Installation of all PVC pipes shall be in compliance with these Standards, the most current version of AWWA C605. If there is a conflict between the two the more conservative shall apply. Consult with the TMWA engineer and inspector in the event of a conflict.

9.05 PIPELINE CLEANING

All open ends of pipe lowered into a trench shall be properly closed to prevent entry of any foreign matter. At the end of each working day, the open ends of the pipeline shall be properly closed to prevent foreign matter from entering the pipe. Should foreign matter enter the pipeline due to lack of proper care by the Contractor, the Inspector shall require the Contractor to clean the line by swabbing or pigging at the Contractor's expense and to the satisfaction of the Inspector.

If required by the Inspector, the interior length of every section of pipe shall be swabbed before it is welded or fused to the adjoining length to ensure that it is free of dirt or obstructions of any kind.

9.06 FIELD WELDING METHODS AND PROCEDURES FOR STEEL WATER PIPE

9.06.01 Scope

This standard covers field welding procedures utilizing arc welding of butt, lap-welded slip joint and fillet welds in carbon and low-alloy steel piping used in the construction of water transmission, distribution, pumping facilities, casings and related appurtenances.

The welding shall be done by shielded metal-arc welding (SMAW). The welds shall be produced by position or roll welding.

This standard also covers the acceptance standards to be applied to production welds tested to destruction and non-destructive testing, including visual inspection,

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hydrostatic testing, and inspection by radiography, magnetic particle testing procedures, vacuum box test or other means approved by TMWA.

Processes other than those noted above will be considered by TMWA.

All welding on steel pipe used in water transmission, distribution, pumping facilities, casings and related facilities must be performed by qualified welders (see definition below) using the approved welding procedures and specifications required by TMWA according to the methods and procedures described herein, in the latest edition of API Standard 1104, *Welding of Pipelines and Related Facilities*, and ANSI/AWWA Standard C206, *Field Welding of Steel Water Pipe*.

9.06.02 References

American Petroleum Institute (API) Standard 1104, *Welding of Pipelines and Related Facilities*, latest edition.

American Water Works Association (AWWA) C206, *Field Welding of Steel Water Pipe*, latest edition.

American Welding Society (AWS).

American National Standards Institute (ANSI)

9.06.03 Definitions

The welding Terms and Definitions used in this standard are as defined in the American Welding Society (AWS) A3.0, and the definitions and modifications noted in this section.

The term *shall* indicates a mandatory requirement.

The term *should* indicates a recommended practice.

Contractor includes the primary contractor and any subcontractors engaged in work covered by these Methods and Procedures.

Essential Variables. A set of criteria, as defined in API Standard 1104, that are used to determine a welding procedure.

Welding Procedure is an established and approved method consisting of essential variables necessary for performing sound welding of piping and related facilities.

Inspector. For welding inspection purposes, an inspector is one who is qualified to perform visual inspection or non-destructive testing requirements of this section.

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Weld refers to the completed weld joining two sections of pipe, a section of pipe to a fitting, or two fittings.

A *welder* is a person who performs a manual, semiautomatic or automatic welding operation.

A *qualified welder* is a welder who has demonstrated his ability to produce welds that meet the requirements of Section 9.06.06 below and the *Qualification of Welders* Section of API Standard 1104.

Position Welding is welding in which the pipe or assembly is held stationary.

Roll welding is welding in which the pipe or assembly is rotated while the weld metal is deposited at or near the top center.

The *root bead* is the first or stringer bead that initially joins the two sections of pipe, a section of pipe to a fitting or two fittings.

A *repair* is any rework on a completed weld that requires welding to correct a fault in the weld that has been discovered by visual or nondestructive testing and is beyond this standard's limits of acceptability.

A *radiographer* is a person who performs radiographic operations.

Automatic welding refers to arc welding with equipment that performs the entire welding operation without manual manipulation of the arc or electrode other than guiding or tracking, and without a manual welding-skill requirement of the operator.

Semiautomatic welding refers to arc welding with equipment that controls only the filler-metal feed. The advance of the welding is manually controlled.

SMYS - Specified Minimum Yield Strength. For steel pipe manufactured in accordance with a listed specification, the minimum yield strength specified in that specification. For steel pipe manufactured with an unknown or unlisted specification, the yield strength is assumed to be twenty-four thousand (24,000) psi.

9.06.04 Equipment

Welding equipment shall be of a size and type suitable for the work and shall be maintained in a condition that ensures acceptable welds, continuity of operation and safety of personnel. Arc welding equipment shall be operated within the amperage and voltage ranges given in the qualified welding procedure. Equipment that does not meet these requirements shall be repaired or replaced.

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All materials and equipment to be used in welding must be inspected for usability prior to beginning welding. Materials and equipment include welding torch, piping, fittings, filler metal and shielding gases.

Electrodes shall be stored and handled in accordance with manufacturer's recommendations. Electrodes in open container shall also be protected from deterioration and damage. Deteriorated materials shall be discarded. Electrodes should remain in their containers at all times until they are to be used, including while in warming cabinets or ovens.

9.06.05 Materials

Materials used in the welding of steel pipe, fittings and appurtenances shall conform to the following specifications.

- A. **API Specification 5L**
- B. **Applicable ASTM specifications**
- C. **AWS 5.1, Covered Carbon Steel Arc Welding Electrodes**
- D. **AWS 5.5 Low Alloy Steel Covered Arc Welding Electrodes**

9.06.06 Welding Procedure Qualification

Pipeline welding procedures and welding specifications must be qualified by following the *Qualification of Welders* Section of API Standard 1104 in order to establish the procedure that will produce welds having suitable mechanical properties and soundness. The required information and test results shall be recorded on a Coupon Test Report (Form 2313). Completed specifications shall be recorded on a Welding Procedure Specification (Form 2315), along with sketches and tabulations.

Completed Welding Procedure Specification forms and Weld Test Reports shall be maintained in files by TMWA Distribution, Operations and Maintenance as a permanent part of the procedure qualification.

The following welding procedures are approved by the TMWA for use in pipeline welding of steel pipe for the types of welds noted below. Any changes or additions to welding procedures shall be approved by the Truckee Meadows Water Authority. Original procedures are maintained in Distribution Operations.

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TRUCKEE MEADOWS WATER AUTHORITY
 STEEL PIPE WATER TRANSMISSION, DISTRIBUTION
 AND PUMPING WELDING PROCEDURES

BUTT WELDS

PIPE OD. (IN)	SMYS (psi x 103)	WALL THK (IN)	COMMENTS	PROCEDURE
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe	SM-01B
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe/Horizontal Position. Multiple Cap	SM-03B
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe, Rolled Position	SM-05B
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe, Uphill Cap	SM-7B
12.75-18.00	≤ 42	0.188-0.750	Stock Pipe, Large Diameter – 2 Welders Req'd.	SM-06B
≥ 12.75	≤ 42	0.188-0.750	Stock Pipe, Large Diameter, Multiple Caps	SM-11B
≥ 12.75	≤ 42	0.188-0.750	Stock Pipe, Large Diameter, Multiple Caps & Interior Back Weld	SM-12B
2.375-18.00	≤ 42	0.188-0.750	Butt Weld Repair	RSM-01B
≥ 18.00	≤ 42	0.188-0.750	Butt Welds, ASTM A283 Grades B, C, D & X42 of API 5LX	ASTM C206- latest edition

FILLET WELDS

PIPE OD. (IN)	SMYS (psi x 103)	WALL THK (IN)	COMMENTS	PROCEDURE
< 2.375	≤ 42	<0.188	Stock Pipe, Small Sizes & Fittings	SM-01F
< 2.375	≤ 42	<0.188	Stock Pipe, Small Beveled Fittings	SM-05F
2.375-12.75	≤ 42	<0.188	Stock Pipe, Tapping Connections	SM-03F
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe, Large beveled Fittings	SM-06F
2.375-12.75	≤ 42	0.188-0.750	Stock Pipe, Stop-Offs, Branches	SM-04F
2.375-18.00	≤ 42	0.188-0.750	Fillet Weld Repair	RSM-02
≥ 18.00	≤ 42	0.188-0.750	Lap Welds, ASTM A283 Grades B, C, D & X42 of API 5LX	ASTM C206- latest edition

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9.06.07 Essential Variables

Essential variables are criteria, as defined in API Standard 1104 and listed below, that are used to determine a welding procedure.

Note: A welding procedure must be re-established as a new procedure specification and must be completely requalified when any of the essential variables are changed.

Welding Process – A change from one welding process to any other process or combination of welding processes.

Base Material – A change from one group to another as listed below:

- Less than or equal to thirty-three thousand (33,000) psi – Specified Minimum Yield Stress (SMYS).
- Greater than thirty-three thousand (33,000), but less than forty-two thousand (42,000) psi SMYS (X42 grade of plate under API = 5LX).

Pipe Diameter – A change from one outside diameter group to another as listed below:

- Two and three eighths (2-3/8) inch to twelve and three quarters (12-3/4) inch (2.375”-12.75”)
- Over twelve and three quarters (12-3/4) inch (12.75”)

Joint Design – A major change in joint design (for example, from V groove to U groove). Minor changes in the angle of bevel or the land of the welding groove are not essential variables.

Position – A change in position from roll to fixed or vice versa.

Wall Thickness – A change in minimal pipe wall thickness from one group to another group in inches are:

- Three sixteenths (3/16) inch (0.188”, or 4.78 millimeters) to three quarters (3/4) inch (0.75”, or 19.05 millimeters).
- Greater than three quarters (3/4) inch (0.75” or 19.05 millimeters).

Filler Metal – A change from one filler-metal group to another as listed in Section 2 of API 1104.

Electrical Characteristics – A change from DC electrode positive to DC electrode negative or vice versa, or a change in current from DC to AC or vice versa.

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Time Between Passes – An increase in maximum time between completion of root bead and start of second bead.

Direction of Welding – A change in the direction of welding from vertical downhill to vertical uphill or vice versa.

Shielding Gas and Flow Rate – A change from one shielding gas to another or from one mixture of gas to another. A major increase or decrease in the range of flow rates from the shielding gas.

Shielding Flux – A change in shielding flux as provided in Section 2 of API 1104.

Speed of Travel – A change in the range for speed of travel.

9.06.08 Welder Qualification

A. Initial Qualification of Welders

Welders must meet the requirements of this section and the *Qualification of Welders* Section of API Standard 1104 to qualify to weld on any TMWA water pipeline facility. Prior to welding on the TMWA water facility, a welder must successfully complete the following qualification tests: Welders shall have proof of qualifications and shall be required to present such proof when requested.

For shielded metal arc, API 1104, Multiple Qualifications Section:

- Butt Weld on twelve and three quarters (12-3/4) inch per TMWA welding procedure SM-03B and the *Multiple Qualification, Qualification of Welders* Section of API Standard 1104, and
- Fillet/Branch Weld on twelve and three quarters (12-3/4) inch by twelve and three quarters (12-3/4) inch per TMWA welding procedure SM-03F and the *Qualification of Welders* Section of API Standard 1104.

Upon failure to pass the above qualification test, a retest for the failed procedure may be performed after a one-week interval. Any welder failing to qualify in three consecutive tests shall show evidence of further instruction and training before attempting to qualify a fourth time.

TMWA reserves the right to test any welder a Contractor intends to use on a project before the welder is allowed to work on the project. If any weld fails to meet the TMWA specifications, TMWA reserves the right to disqualify the welder from performing any welding on the project.

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The Contractor shall be responsible for all expenses incurred in the testing of welders and any expenses resulting from the failure of any welder to qualify.

B. Maintaining Qualification

All welders shall follow all approved welding process and procedures. When applicable, a welder may provide alternate proof of successful completion of the branch weld. The butt welding test shall still be performed and qualified prior to production welding. All welder qualifications shall be reviewed and approved by Distribution Operations prior to production welding.

Qualified welders may retain qualification by having one or more welds tested and found acceptable under *Qualification of Welders* Section or *Acceptance Standards for Nondestructive Testing* Sections of API Standard 1104 at least once every six (6) months. If a welder’s certification expires, the welder must requalify by successfully completing qualification tests as specified in “Initial Qualification of Welders” in this procedure.

C. Documentation of Welder Qualification

A Coupon Test Report (Form 2313) is to be completed each time a welder is tested. A Welder Certification Card (Form 2314) shall be issued to each welder and updated when appropriate. These records shall become a part of each welder’s personal records and shall be maintained by Distribution Operations, who shall also maintain a list of qualified welders and the procedures in which they are qualified to perform.

9.06.09 Performing Welding

A. General

All welding shall be performed by qualified welders using applicable and approved TMWA welding procedures for the application. Any deviation from and established welding process must be reviewed prior to welding to determine if one or more essential variables may be affected, resulting the need to create a new welding procedure.

B. Protection from Weather during Welding

Except for emergency situations, welding shall not be performed when the quality of the completed weld would be impaired by the prevailing weather conditions, including, but not limited to airborne moisture, blowing sands, or high winds. If welding must be performed, the operation shall be

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protected by an appropriate method and approved by the foreman, inspector, or person in charge of the welding operation. Defective welds shall be repaired at no additional cost to TMWA.

C. Pre-heating Pipe or Welding

Preheating may be required for any of the following conditions:

- When welding fitting-to fitting or pipe-to-fitting components.
- When repairing a defective weld.

Preheating for welding on pipe used in replacements, or on new construction is to be in accordance with the qualified welding procedure being used.

D. Preparation of Steel Pipe for Welding

Surface Condition – Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, all dirt, paint, pipe coating, rust, or other foreign substances must be removed from both inside and outside the pipe. The surface to be welded shall be smooth, uniform and free of slag.

Bevel – Pipe ends shall be prepared with all bevels conforming to the joint design in the welding procedure specification to be used. The bevel end shall be clean, smooth, uniform, free of lamination, tear, scale, slag, grease, paint, and other deleterious material which might adversely affect the welding. Beveled ends must be cleaned by grinding and all torch cuts beveled and smoothed by grinding. If the ends of the pipe are bent or damaged the bent or damaged section shall be removed prior to welding so that proper alignment can be obtained.

Alignment – The pipe or component ends must be aligned so that any dimensional variation is equally distributed around the circumferences of the pipe. For pipe of the same nominal wall thickness, the offset shall not exceed 1/16 inch. This alignment must be preserved while the root bead is being deposited.

If larger offset is caused by dimensional variations, it shall be equally distributed around the circumference of the pipe.

Hammering of the pipe to obtain proper lineup shall be held to a minimum.

Longitudinal-seam pipe must be aligned so that the seams are not abutting, but staggered at least three (3) inches apart. When practicable, longitudinal

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seams should be positioned on the top quadrant of the pipe. Successive lengths of pipe shall be rotated to avoid aligning longitudinal seams.

Line-up Clamp – A line-up clamp shall be used when practicable on pipe with diameter three (3) inches or larger to ensure proper alignment of the pipe. The clamp shall be left in place until the first pass or root bead is at least fifty percent (50%) completed in equally spaced segments.

Welding Dissimilar Material Grades – When pipes or components of dissimilar material grades are to be joined by welding, they must be prepared according to a procedure specific for the joining of those two dissimilar grades.

Miter Joints – A miter joint shall be used only where the change in pipe direction is eleven (11) degrees or less, or where the use of an elbow is impractical. Normally, a change in pipe direction should be made with an elbow or bend in accordance with AWWA Standard C208-latest edition *Dimensions for Fabricated Steel Water Pipe Fittings*.

Miter joints shall be made by cutting equal amounts from both pipe ends which are to be joined, assuring a proper fit-up for welding. No more than two (2) miter joints are allowed for each deflection. The miter joints shall not be closer than one (1) pipe diameter from each other as measured from the crotch of each joint. Miter joints shall not be made by welding a mitered pipe end directly to a fitting.

Field Fabrication –Unless otherwise specified, field fabrication is not allowed unless approved by the TMWA inspector.

9.06.10 Repair and Removal of Welding Defects

General – Any Fillet weld found to have a defect or crack, or any butt weld found to have a crack, shall be removed. A butt weld found to have a defect other than a crack can either be removed or repaired to meet the standards of acceptability specified in *Repair and Removal of Defects* Section of API Standard 1104.

Preparation – Before a repair is made, defects must be entirely removed by grinding to sound metal. All slag and scale must be removed and the welding surfaces must be clean and free of any material that may be detrimental to the weld. The pipe or component must be aligned to provide the most favorable condition for depositing the root pass. Reforming clamps will be utilized where necessary to achieve this. This alignment must be preserved while the root pass is being deposited.

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Method of Repair – Repair of any defect in a previously repaired area must be performed according to TMWA’s Welding Procedure Specifications, or another qualified procedure. All other repairs shall be made by grinding or fill welding.

When grinding to eliminate a defect, the entire defect must be removed and the grinding must be smoothly contoured to the pipe to eliminate all possible points of stress.

When grinding and fill welding, the repair area must be ground clean and fill weld metal must penetrate the base material.

Inspection and Testing – To insure that the final weld repair meets the minimum mechanical properties specified for the welding procedure used to make the original weld, the repaired area must be re-radiographed or inspected by the same means previously used according to Section 9.06.11 below.

Remedial Action – Prompt remedial action must be taken to correct any deficiencies found during inspection and testing of the weld repair.

9.06.11 Inspection and Testing of Welds

A. Inspector Requirements

All welds shall be inspected by means of visual, destructive or non-destructive methods, or any combination thereof as determined by TMWA. All visual inspection of welds shall be conducted by TMWA. Non-destructive testing of welds shall be conducted by a welding inspector qualified in accordance with the *Inspection and Testing of Production Welds* Section of API Standard 1104, or a commercial testing facility designated by TMWA.

B. Visual Inspection – All Welds

A visual inspection must be performed on all welds to assure that welding is performed in accordance with the applicable welding procedure and that each weld is acceptable according to the *Acceptance Standards for Nondestructive Testing* Section of API Standard 1104.

C. Hydrostatic Test – All Welds

Tests for leaks in all types of completed welded joints shall be made by hydrostatically testing the entire pipeline, unless the procedures, frequency of tests, and standards for acceptance or rejection of an alternative non-destructive method are approved by TMWA. If leakage exceeds the amount allowed in TMWA’s Construction Specification, leaks shall be located and

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the weld repaired in accordance with Section 9.06.10, contained in this document.

D. Non-destructive Testing Requirements

Non-destructive testing must be performed on all water facilities as defined in the contract documents and as required by the Inspector or Engineer. Pipe with a nominal diameter of less than six (6) inches need not be non-destructively tested if visually inspected and approved by a qualified welding inspector and the section of pipe passes the hydrostatic test.

Non-destructive testing may include one or more of the following:

- Field-butt joints may be tested by one hundred percent (100%) radiograph of ten percent (10%) of the joints, using methods and acceptance criteria in API Standard 1104.
- Single-welded fillet weld lap joints may be tested using magnetic particle testing procedures and acceptance criteria as set forth in ANSI/AWS D.1.1, Section 6.14.5, Table 6.1. Radiographic testing of lap joints shall not be allowed.
- Double-welded fillet weld lap joints can be tested in accordance to the procedures outlined in AWWA C206, Section 5.2.2.2.

Non-destructive testing must be performed by a commercial test facility having written nondestructive testing procedures for the proper interpretation of each non-destructive weld test to ensure the acceptability of the weld in accordance with the *Acceptance Standards for Nondestructive Testing* requirements Section of API Standard 1104. Personnel must be trained and qualified in the established procedures and equipment.

E. Non-Acceptance of a Weld

TMWA reserves the right to order sections of the line including a weld to be cut out and tested at any time. The Contractor shall immediately remove the designated section and deliver it to the Inspector. If any test fails in the weld metal, the entire weld shall be considered as failing to meet TMWA specification. The Contractor shall prepare all welds for test at his own expense and to the satisfaction of the Inspector.

An Inspector may reject any weld which appears to not meet the requirements of the *Acceptance Standards for Nondestructive Testing*

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Section of API Standard 1104 if, in the inspector's opinion, the depth of a discontinuity may be detrimental to the weld.

F. Pipeline Strains

Whenever the Inspector has reason to believe there is a strain on a section of pipeline that has been installed in the trench, the Contractor shall sever the pipe. If the two ends of the pipe pull apart, the Contractor shall, at his own expense, reconnect the two ends with no strain upon the pipeline and wrap, coat, line or otherwise provide protection of the new field joint to the satisfaction of the Inspector. If the ends of the pipe do not pull apart, TMWA shall assume the expense of severing the pipe, rewelding the pipe together and wrapping the field joint.

G. Remedial Action

Each weld that is unacceptable must be repaired or removed according to the portion of this section entitled, *Repair and Removal of Welding Defects*. In addition, when an Inspector determines that a welder's work is not of adequate quality to leave in the pipeline system, the Inspector may sample check the welder's previous welds on the project to ensure acceptability.

The Contractor shall, at his own expense, remove and/or replace any weld failing to meet TMWA specifications. For each weld tested that meets TMWA's specification, TMWA shall pay the contractor the actual cost of removal, testing and replacement of weld, excluding consequential damage. TMWA shall determine the type and number of weld tests to be performed.

H. Documentation

A Weld Test Report is to be completed for each non-destructive test conducted. The following information, shown by engineering station or geographic feature, must be included in the report.

1. Number of girth welds made.
2. Number of non-destructively tested welds.
3. Number of rejected welds.
4. Disposition of the rejected welds.

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I. Record Keeping

Each Weld Test Report shall be submitted to the TMWA Project Representative and will be retained in accordance with TMWA's Record Retention Schedule.

1. Welding procedure specification(s) recorded in detail. Form No. 2315, Welding Procedure Specification or equivalent.
2. Qualifying test results for each welding procedure specification. Form No 2313, Coupon Test Report or equivalent.
3. Welder qualification results for each welder for each applicable welding procedure. Form No. 2313, Coupon Test Report or equivalent.
4. Non-destructive testing procedures and interpretation methods.
5. Issuance of Welder Certification Cards to qualifying welders, file copy. Form No. 2314, Welder Certification Card.
6. List of qualification of persons performing inspection or testing (i.e. inspectors, commercial testing facility personnel, etc).
7. Current list of eligible contracted welders.

9.07 TAPPING

All four (4) inch and larger hot taps required for any improvement shall be performed by TMWA. However, the contractor shall install all valves, fittings, and other appurtenances required for making the hot taps. All hot taps from one (1) inch up to and including two (2) inches required for any improvement, shall be performed by the contractor, unless otherwise noted on the approved improvement plans.

9.08 CASING INSTALLATION

All necessary casings and casing appurtenances shall be furnished and installed by the contractor in accordance with these standards, the standard casing detail included as part of the approved improvement plans and to the satisfaction of the Inspector.

9.09 THRUST BLOCKS

The contractor shall install thrust blocks as specified in Section 1.1.13 of TMWA's Engineering & Construction and Design Standards. Thrust block requirements are detailed in

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Appendix 10L, detail 10L-2. Refer to the approved water plan drawing for appropriate thrust block sizing.

9.10 TIES TO EXISTING FACILITIES

The contractor shall make all required ties to existing facilities as specified on the approved water plan drawings unless otherwise directed by the TMWA Inspector or TMWA Engineer.

TMWA will make every effort to shut down required mains to facilitate the necessary ties. However, it will be the contractor's responsibility to test these mains prior to removing sections or taking apart existing mains. Under no circumstances will existing mains be disconnected until the Inspector is satisfied that the main is completely shut down.

9.11 VENTING

The contractor will install corporation stops or air relief valves on the water main at locations directed by the Inspector for the purpose of venting the main during pressurization.

9.12 PRESSURIZATION, TESTING AND PLACING INTO SERVICE

The contractor may be required to pressure test portions of a line as it is installed before the entire line is completed. In this way any errors of workmanship will be found immediately and can be corrected at minimum expense.

All parts of the pipeline must be backfilled and braced sufficiently to prevent movement under pressure.

Since the purpose of testing is to test all parts of a pipeline, thrust blocks at fittings are also subjected to the test pressure. Therefore, all thrust blocks forming part of the finished line should be permanent and constructed to withstand test pressure and temporary bracing must not be resorted to.

Do not test against freshly poured concrete thrust blocks - allow enough time for concrete to set before subjecting them to test pressure. Allow a minimum of 24 hours for concrete to set.

The open end of a line can be sealed temporarily with a mechanical line cap (blind end coupling). Line caps are available in all sizes and can be used repeatedly merely by assembling on the last installed pipe length. Line caps are provided with an outlet to serve as an air relief vent or for filling the line as may be required. Contractor will furnish line caps.

The last full length laid should be firmly braced to prevent kicking out under pressure. All exposed pipe must be backfilled, to hold it securely in line.

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The line can be filled from any available potable water source. The line should be filled slowly. The water can be introduced from lines in service directly through valved connections, by temporary connections to hydrants, from taps made in the new line, or at the connection in the line cap. All such connections, however, should be made at the lowest point in the line.

When permanent air relief valves are not located at high spots, air should be vented manually, but slowly, from all high spots in the pipeline before making either pressure strength or leakage tests.

If the line is filled from a test end located at a high point, an additional outlet should be made there so as to relieve air at that point.

The purpose of a pressure strength test is to make certain that the line will stand normal working pressure plus reasonable excesses that may occur. A test pressure of 150 psi is generally sufficient. However, in some cases, higher test pressures may be used at the low end of a new system to achieve the minimum required test pressure of 125 psi at the highest point of the new system. In these cases, the test pressure at the low end shall never exceed 185 psi.

The purpose of leakage tests is to verify the water-tightness of the section of pipeline under test and includes its joints and all fittings. All leaks shall be repaired at the time they are found.

All testing shall be done under the direct supervision of a TMWA Inspector on the job.

All test apparatus shall be furnished by the contractor at his own expense.

Typically, the hydrostatic test is performed simultaneously with the chlorine retention period. Flushing and disposal of the heavily chlorinated water is the responsibility of the Contractor and shall be performed in accordance with the most current version of ANSI/AWWA Standard C651, Disinfecting Water Mains.

Prior to a main being placed into service after initial construction the water main shall be disinfected in accordance with the most current version of AWWA C651, Disinfecting Water Mains. The disposal of any spent chlorine solutions must be coordinated with the Division of Environmental Protection, Bureau of Water Pollution Control. Before a main can be placed into service it must pass Total Coliform analysis, have a system chlorine residual and a turbidity of less than 1 NTU.

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9.13 CROSSING, THROUGH UNDERMINING, EXISTING TRANSITE AND SMALL DIAMETER CAST IRON WATER PIPE

Whenever any asbestos cement (transite) water pipe, or four (4) inch and six (6) inch cast iron water pipe, is crossed through undermining by another utility such as phone, cable TV, electric, storm drain, or sanitary sewer and the trench width is greater than three (3) feet the contractor will notify TMWA’s Inspector. In most cases, the crossing through undermining of six (6) and eight (8) transite, or four (4) inch and six (6) inch cast iron will require a section of pipe to be replaced. In some cases, the crossing through undermining of ten (10) inch diameter and larger transite pipe may require a section of pipe to be replaced. This decision regarding pipe replacement will be made on a case by case basis at the discretion of TMWA's Engineer or Inspector.

If it has been determined that a section of pipe must be replaced, TMWA personnel will determine which valves to close to isolate the section of pipeline, the effect of the outage, and when the work is to be completed. The transition from transite to ductile iron shall be assembled with dresser couplings in accordance with TMWA Standard detail 10L-8.

TMWA will provide an Inspector and a crew to aid in the customer notification, shutdown, water main disinfection, and flushing. The contractor will cover all other associated costs such as labor, pipe, coupling construction equipment, backfill, and street restoration. The actual main replacement will be performed by the on-site applicant’s contractor. If the undermining is a result of work performed by a contractor that is not approved to perform water pipeline construction then TMWA's crew will execute the work and bill the contractor accordingly.

If it is determined that a section of pipe will not need to be replaced, specific backfill requirements set forth in Section 5, Trench Bedding, Backfill & Excavation shall be followed. Contractor shall taper the trench near water main.

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