

## Water Specifications Section 300

### 310 Design Criteria for Water Distribution

#### 311 General Information

These design criteria are minimum requirements to be used in the design of water distribution systems within the jurisdiction of the City of Burnet. The jurisdiction of the City of Burnet is defined as the area bound by the ETJ of the City of Burnet. In all cases, the Texas Commission on Environment Quality's Design Criteria for water distributions systems shall be enforced as the minimum design criteria for use in the City of Burnet. Fire flows shall meet the required flows and corresponding residual pressures as specified by the local governing Fire Code. The following design criteria will be supplemented by the TCEQ design criteria.

##### 311.01 General Design Criteria

- A.  $C = 120$  (Hazen-Williams Friction Coefficient)
- B. Average day demand, single family residence, = 200 gal/capita/day
- C. Peak day demand = 500 gal/capita/day
- D. Peak hour demand = 750 gal/capita/day

##### 311.02 Peak Hour Demand

- A. Maximum velocity in distribution system = 5 fps
- B. Minimum pressure at any point of entire network must be not less than 35 psi.

##### 311.03 Emergency Demand (Fire Flow)

- A. Maximum velocity in distribution system = 10 fps
- B. Fire flow - Residential
  - 1 & 2 family dwellings where distance between homes is more than 31 feet apart = 750gpm
  - where distance between homes is 11-30 feet = 1000 gpm
  - where distance between homes is 10 or less feet = 1500 gpm

Fire flow – Commercial/Industrial  
Principal Mercantile and industrial areas = 3000gpm  
Light mercantile = 1500 gpm  
Minimum industrial = 1,000 gpm

- C. Minimum residual pressure during fire flow shall not be less than 20 psi for both Residential and Commercial/Industrial.

#### 312 Design Criteria - Mains

312.01 Size: Size of mains shall conform to the Burnet Water Master Plan. Minimum size of mains shall be 8". Mains size shall be larger than 8" if the flow needed for fire protection, peak hour demand or high-density land usage exceeds the capacity of the minimum main size.

312.02 Layout: Water distributions system layout should be designed with consideration for general system gridding, future transmission mains, and other developments nearby. All lines over 300 feet in length shall be looped, non-looped mains must be approved by the City Engineer. In the case of a non-looped main, a 2" blowoff valve or fire hydrant shall be placed at the end of main. Water mains that cross rivers and creeks shall either be affixed to the underside of a bridge as approved by the City Engineer or in most cases be buried and shall always use River & Creek Crossing Pipe per Item 370 Standard Product List or as approved by the City Engineer.

312.03 Cover: Water mains shall have 36" of cover minimum and 60" cover maximum between the top of the pipe and the finished grade.

312.04 Location: Water mains should be located where maintenance can be accomplished with the least interference with traffic, structures, and other utilities and for residential streets is generally located as shown in the details at the end of this section. The minimum easement width for water lines that are not in the Right of Way is twenty feet (20'). The separation between water and wastewater mains shall comply with the following TCEQ requirements.

Where the nine-foot separation distance cannot be achieved, the following criteria shall apply:

(A) New Waterline Installation - Parallel Lines

1. Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater line/force main and the licensed professional engineer is able to determine that the existing line is not leaking, the new potable waterline shall be located at least two feet above the existing line, measured vertically, and at least four feet away, measured horizontally, from the existing line. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater line and if disturbed it must be replaced.
2. Where a new potable waterline parallels an existing pressure rated wastewater line and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater line shall be replaced with a 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater line.
3. Where a new potable waterline parallels a new wastewater line/force main, the wastewater line shall be constructed of 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater line, measured vertically, and at least four feet away, measured horizontally, from the wastewater line.

(B) New Waterline Installation – Crossing Lines

1. Where a new potable waterline crosses an existing, non-pressure rated wastewater line, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater line. The potable waterline shall be at least two feet above the wastewater line. Whenever possible, the crossing shall be centered between the joints of the wastewater line. If the existing wastewater line is disturbed or shows signs of leaking, it shall be replaced for at least nine feet in both directions with 150 psi pressure rated pipe.

2. Where a new potable waterline crosses an existing, pressure rated wastewater line, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater line. The potable waterline shall be at least six inches above the wastewater line. Whenever possible, the crossing shall be centered between the joints of the wastewater line. If the existing wastewater line shows signs of leaking, it shall be replaced for at least nine feet in both directions with 150 psi pressure rated pipe.
3. Where a new potable waterline crosses a new, non-pressure rated wastewater line and the standard pipe segment length of the wastewater line is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater line. The potable waterline shall be at least two feet above the wastewater line. Whenever possible, the crossing shall be centered between the joints of the wastewater line. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at five percent deflection. The wastewater line shall be embedded in cement stabilized sand for the total length of one pipe segment plus 12 inches beyond the joint on each end.
4. Where a new potable waterline crosses a new, non-pressure rated wastewater line and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform with one of the following options:
  - a. Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater line shall be located below the waterline.
  - b. All sections of wastewater line within nine feet horizontally of the waterline shall be encased in an 18 foot or longer section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at five percent deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater line. The space around the carrier pipe shall be supported at 5 foot or less intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with water tight non-shrink cement grout or a manufactured water tight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.
  - c. When a new waterline crosses under a wastewater line, the waterline will be encased as described for wastewater lines in paragraph (b) above or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the water line and the wastewater line shall be provided. Both

the waterline and wastewater line must pass a pressure and leakage test as specified in AWWA C600 standards.

5. Where a new potable waterline crosses a new, pressure rated wastewater line, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater line. The potable waterline shall be at least six inches above the wastewater line. Whenever possible, the crossing should be centered between the joints of the wastewater line. The wastewater pipe shall have a minimum pressure rating of 150 psi. The wastewater line shall be embedded in cement stabilized sand for the total length of one pipe segment plus 12 inches beyond the joint on each end.
6. Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the sewer pipe. The use of brown coloring in cement stabilized sand for wastewater line bedding is recommended for the identification of wastewater force mains during future construction.

(C) **Waterline and Manhole Separation:** The separation distance from a potable waterline to a manhole shall be a minimum of nine feet. Where the nine foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five feet intervals with spacers or be filled to the spring line with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured seal.

(D) **Location of Fire Hydrants:** Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer line regardless of construction. See Section 312.09 for specific fire hydrant spacing and locations.

312.05 **Pipe:** Main piping materials shall be C-900 SDR-14 or upon approval C-900 SDR-18. Ductile Iron shall be used on all Fire hydrant services.

312.06 **Backflow Prevention Devices:** No water connection from any public drinking water supply system shall be made to any establishment where an actual or potential contamination or system hazard exists without an air gap separation between the drinking water supply and the source of potential contamination. The containment air gap is sometimes impractical and, instead, reliance must be placed on individual "internal" air gaps or mechanical backflow prevention devices. Under these conditions, additional protection shall be required at the meter in the form of a backflow prevention device (in accordance with AWWA Standards C510 and C511, and AWWA Manual M14) on those establishments handling substances deleterious or hazardous to the public health. The water purveyor need not require backflow protection at the water service entrance if an adequate cross-connection control program is in effect that includes an annual inspection and testing by a certified backflow prevention device tester. It will be the responsibility of the water purveyor to ensure that these requirements are met.

Overhead bulk water dispensing stations must be provided with an air gap between the filling outlet hose and the receiving tank to protect against back siphonage and cross-contamination.

312.07 Valves: Shall be properly spaced so that no more than one residential block or 30 customers will be without water during main repairs. For lines smaller than 10", typical spacing should be one block in high-density areas and two blocks in residential areas. All large mains, 10" and greater, should be valved off from smaller diameter mains. There will be a 3-valve system located at all fire hydrants (one at the lead and one on each side of the main where the lead is connected). There shall be 3 valves located at each tee in the main (one for each direction of the tee) and there shall be 4 valves located at each cross in the main (one for each direction of the cross). The location of all valves will be indicated by current survey data when the as-builts are submitted.

312.08 Air Release Valves: Automatic air/vacuum release valves will be placed at all high points.

312.09 Fire Hydrants: Shall be installed at the intersection of two streets and between intersections where necessary; at distances not in excess of 300 feet between hydrants in commercial districts and 500 feet in residential areas and 1000 feet for offsite extensions where there are currently no businesses or residences. Fire hydrants shall not be installed at the end of cul-de-sacs, but rather at the beginning of the curvature of the cul-de-sac. Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer line, cleanout, or manhole regardless of construction. All pipe must be acceptable without penalty to the Texas Fire Insurance Commission for use in water works supply and distribution.

### 313 Design Criteria - Services

313.01 Location: Water services shall be placed at the lot corner as shown in the details at the end of this section. The Engineer shall ensure that the electric, gas, telephone and cable TV are located on the opposite lot corner from the water service.

313.02 Service Piping: Size should be one inch (1") Type K Copper for all services serving single and two inch (2") Type K Copper with sweated or compression fittings (i.e. bending a 2" Copper pipe shall not be allowed) with two-one inch services to serve two residential lots, or as approved by the City Engineer. Commercial lots shall be sized according to the land use requirements. All new residential lots with a potable water meter and an irrigation meter shall be served by a single two inch (2") tap with two-one inch services. The irrigation meter shall have backflow prevention. In cases where irrigation meters are not proposed, but the City Engineer anticipates that irrigation meters will be installed at a later date, the minimum size of the service will be increased to two inches (2").

313.03 Cover: Water Services shall have 30" of cover between the top of the service and the flowline of the street curb and gutter.

313.04 Meters: All apartment buildings, manufactured home rental communities, condominiums, and other multiple use facilities (e.g. shopping centers, office complexes, etc.), must be plumbed in such a manner as to allow for sub-metering of the individual dwelling or rental units and individual water meters must be installed. Water meters must be from Section 370 Standard Product List.

### 314 Construction Plans

314.01 General: Construction plans shall include the following:

- A. Plan and profile of the proposed main.
- B. Location and stationing on all water services

- C. Location and stationing on all fire hydrants
- D. Location and stationing of all blowoff, air release, and gate valves.
- E. Standard Details
- F. Horizontal scale that allows plans to be legible (or as directed by the City Engineer).
- G. Sequence of construction (for water line and for all other construction in conformance with Section 101).

**320 Materials For Construction**

**321 General**

The Contractor shall furnish and install all pipe, miscellaneous pipe-fittings, valves, valve boxes, and testing in strict accordance with these specifications. All service fittings shall be suitable for use at hydrostatic working pressures up to 175 psi minimum. Testing of new water distribution system shall comply with Section 800 of the Standard Specifications.

**322 Materials**

All water mains shall have **metallic location tape** placed in the last 2 feet of fill of the trench (i.e. 2 feet deep from the final grade). See the details at the end of this section for more information.

**322.01 Polyvinyl Chloride Water Pipe:**

- A. General: All polyvinyl chloride (PVC) water pipe shall be of the rigid type and must bear the National Sanitation Foundation seal of approval for potable water pipe. Pipe shall be C-900 and pressure rated at SDR-14 (200 psi), except in certain areas SDR-18 (150 psi) shall be acceptable with approval from the City Engineer.  
  
Pipe shall have push-on, rubber gasket joints of the bell and spigot type with thickened integral bells with rubber gasket joints. Each joint of pipe shall consist of single continuous extrusion; bells or other components attached by solvent welding are not acceptable. The wall thickness of each pipe bell and joint coupling must be greater than the standard pipe barrel thickness. Clearance must be provided in every gasket joint for both lateral pipe deflection and for linear expansion and contraction.
- B. Applicable Specifications: Except as modified or supplemented herein, PVC pipe shall meet the following standards:
  - 1. AWWA C-900, SDR 18 or SDR 14 for PVC Pressure Pipe, 6, 8 and 12 inch nominal sizes, having Cast Iron Pipe size outside diameters.
  - 2. Fittings used with PVC Pressure pipe shall be AWWA C-110 or AWWA C-111 mechanical joint and restraint devices (i.e. Mega Lugs).
  - 3. All pipe must be approved by Underwriter's Laboratories for use in buried water supply and fire protection systems.
- C. Material Requirements: All pipe and fittings shall be made from clean, virgin, NSF approved, Class 12454B PVC. Clean reworked materials generated from the manufacturer's own production may be used within the current limits of the referenced AWWA C-900.

- D. Marking: Permanent marking on each joint of pipe shall include the following at intervals of not more than 5 feet:
1. Nominal pipe size and OD base (e.g., 4 CIPS).
  2. Type of plastic material (e.g., PVC 12454B).
  3. Standard Dimension Ratio and the pressure rating in psi for water at 73 °F (e.g., SDR 18, 150 psi).
  4. AWWA designation with which the pipe complies (e.g., AWWA C-900).
  5. Manufacturer's name or code and the National Sanitation Foundation (NSF) mark.

322.02 Ductile Iron Pipe:

- A. Fire line leads and fire hydrant leads shall be ductile iron. Domestic water services shall not be supplied from fire service leads, unless the domestic and fire connections are on separately valved branches with an approved backflow prevention device in the fire service branch. All fire mains shall be constructed of ductile iron pipe Pressure Class 350 for pipe 12-inch size and smaller.
- B. Iron pipe shall be ductile iron pipe meeting all requirements of standards as follows:
- C. For push-on and mechanical joint pipe: AWWA C-151
- D. For flanged pipe: AWWA C-115. Barrels shall have a nominal thickness required by Table 1 of AWWA C-115. Flanges shall be ductile iron (gray iron is not acceptable); they shall be as shown in ANSI/AWWA C115/A21.15 and shall conform to dimensions shown in Table 2 and Figure 1 of AWWA C115. These flanges are the same in all respects as flanges shown in ANSI/AWWA C110/A21.10 for fittings and are standard for all flanges used with pipe, valve, and equipment units in the City of Burnet water distribution systems. Flanges shall be fabricated and attached to the pipe barrels by U.S. fabricators using flanges and pipe barrels of U.S. manufacture. If fabrication is to be by other than the pipe barrel manufacturer, a complete product submittal and approval by the Engineering Department will be required. Additionally, such fabricator shall furnish certification that each fabricated joint has been satisfactorily tested hydrostatically at a minimum pressure of 300 psi.
- E. Linings and Coating: Interior surfaces of all iron water pipe shall be cement-mortar lined and seal coated as required by AWWA C104. Interior surfaces of all iron wastewater and force main fittings shall be coated with a non-corrosive lining material acceptable to the City of Burnet. Pipe exteriors shall be coated as required by the applicable pipe specification. The type and brand of interior lining shall be clearly marked on the outside of the pipe and fittings. Except as authorized by the Engineer, only one type and brand of pipe lining shall be used on a given project.

Except as described above for flanged pipe and where not otherwise indicated, ductile iron pipe shall be minimum Class 250 as defined by ANSI/AWWA C150/A21.50-current; all ductile iron pipe and flanges shall meet the following minimum physical requirements:

Grade 60-42-10:

Minimum tensile strength: 60,000 psi.

Minimum yield strength: 42,000 psi.

Minimum elongation: 10 percent.

The flanges for AWWA C115 pipe may be also be made from:

Grade 70-50-05:

Minimum tensile strength: 70,000 psi.

Minimum yield strength: 50,000 psi.

Minimum elongation: 5 percent.

- F. Ductile Iron Fittings: Fittings shall be flanged or mechanical joint and shall meet all requirements of standards as follows:
1. All mechanical joints shall be fitted with mechanical joint restraint devices (i.e. Mega-Lugs).
  2. Sizes 4 inch through 24 inch: AWWA C-110 or AWWA C-153
  3. Sizes larger than 24 inch: AWWA C-110.
  4. Interior surfaces of all iron water pipe fittings shall be lined with cement- mortar and seal coated as required by AWWA C104. Interior surfaces of all iron wastewater and force main fittings shall be coated with a non-corrosive lining material acceptable to the City of Burnet. Gaskets for mechanical joints shall conform to ANSI/AWWA A21.11/C-111. Tee-head bolts, nuts and washers for mechanical joints shall be high strength, low alloy, corrosion resistant steel stock equal to "COR-TEN A" having UNC Class 2 rolled threads or alloyed ductile iron conforming to ASTM A 536; either shall be fabricated in accordance with ANSI/AWWA A21.11/C-111.
  5. Hex head bolts and nuts shall satisfy the chemical and mechanical requirements of ASTM A449 SAE Grade 5 cadmium plated, and shall be fabricated in accordance with ASTM B 18.2 with UNC Class 2 rolled threads.
  6. All threaded fasteners shall be marked with a readily visible symbol cast, forged or stamped on each nut and bolt, which will identify the fastener material and grade. The producer and the supplier shall provide adequate literature to facilitate such identification; painted markings are not acceptable.
- G. Polyethylene Film Wrap: All iron pipe, fittings and accessories shall be wrapped with standard 8 mil (minimum) low density polyethylene film or 4-mil (minimum) cross laminated high-density polyethylene conforming to AWWA C-105, with all edges overlapped and taped securely with duct tape to provide a continuous wrap to prevent contact between the piping and the surrounding backfill. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective wrap before backfilling.
- H. Markings: Each pipe joint and fitting shall be marked as required by the applicable AWWA specification. This includes in all cases: Manufacturer's identification, Country where cast, year of casting, and "DUCTILE" or "DI".



322.03 Water Valves:

- A. Description: This item shall govern the valves furnished and installed as indicated on the Drawings. Gate valves shall be either Mueller or Clow, resilient seat type, 300 psi test pressure, 200 psi working pressure, mechanical joint, with inside stem meeting AWWA C-509 specifications.

Valves shall be wrapped with 8-mil polyethylene film with all edges and laps securely taped to provide a continuous wrap.

- B. Materials: The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation in the Work is of the kind and quality that satisfies the specified functions and quality.
- C. Samples, Inspection and Testing Requirements: All tests and inspections called for by the applicable standards shall be performed by the manufacturer. Upon request, results of these tests shall be made available to the purchaser.
- D. Other Requirements: Each submittal shall be accompanied by:
1. Complete data covering:
    - a. the operator, including type and size, model number, etc.,
    - b. the manufacturer's name and address of his nearest service facility,
    - c. the number of turns to fully open or close the valve.
  2. Detailed instructions for calibrating the limit stops for open and closed positions, and
  3. Any other information that may be necessary to operate and maintain the operator.
  4. Complete dimensional data and installation instructions for the valve assembly as it is to be installed, including the operator.
  5. Complete replacement parts lists and drawings, identifying every part for both the valve and operator.

322.04 Other Valves:

- A. Iron-Body Gate Valves: Unless otherwise indicated, Iron Body Gate Valves, 2" to 24", including Tapping Valves, shall conform to AWWA C509, "Resilient Seated Gate Valves for Water and Sewerage Systems".

Iron Body Gate Valves larger than 24", including Tapping Valves, shall be double disc, parallel seat valves meeting the requirements of AWWA C500.

All Gate Valves larger than 12" shall be equipped with a 2" bypass that is built into the housing of the main valve (the bypass valve shall have a valve box that extends to the surface in the same manner as the main valve box).

1. Stem Seals: All valves shall have approved O-ring type stem seals. At least two O-rings shall be in contact with the valve stem where it penetrates the valve body.
2. Operation: All valves shall have non-rising stems with a 2" square operating nut in the distribution system, or with a spoke type hand-wheel at pump stations when approved by the Engineer, turning clockwise to close.
3. Valve Ends: Valve ends flanged or mechanical joint, as indicated or approved.

Tapping valves shall have inlet flanges conforming to MSS SP-60, with bolt holes drilled per ANSI B16.1 Class 125. Seat rings and body casting shall be over-sized as required to accommodate full size cutters; the outlet end shall be constructed and drilled to allow the drilling machine adapter to be attached directly to the valve.

4. Gear Case: All geared valves shall have enclosed gear cases of the extended type, attached to the valve bonnet in a manner that makes it possible to replace the stem seal without disassembly and without disturbing the gears, bearing or gear lubricant. Gear cases shall be designed and fabricated with an opening to atmosphere so that water leakage past the stem seal does not enter the gear case.
- B. Butterfly Valves: Unless otherwise indicated, all valves shall conform to the current "AWWA" Standard C-504, "Rubber-Seated Butterfly Valves", Class 150B, except as modified or supplemented herein.

1. Functional Requirements

- a. Valves shall be the short body design and shall have flanged connections on both ends unless otherwise called for.
- b. Valves shall be of such design that the valve discs will not vibrate or flutter when operated in a throttled position. Valve discs shall be secured to the shafts by means of keys or pins so arranged that the valve discs can be readily removed without damage thereto. All keys and pins used in securing valve discs to shafts shall be stainless steel or monel. Valve discs shall be stainless steel or ductile iron, ASTM A 536, Grade 65-45-12 (448-310-12); seating edge shall be stainless steel or other corrosion resistant material.
- c. Valve shafts shall be constructed of wrought stainless steel or monel. The ends of the shaft shall be permanently marked to indicate the position of the disc on the shaft.
- d. All buried valves shall have approved manufacturer's O-ring type. There shall be at least two O-rings in contact with the valve shaft where it penetrates the valve body.
- e. Rubber seats located on the valve disc shall be mechanically secured with stainless steel retainer rings and fasteners.
- f. Unless otherwise indicated, valves shall be provided with manual operators with vertical stems and 2 inches square operating nut turning clockwise to close and equipped with a valve disc position indicator. All keys or pins shall be stainless steel or monel. Buried valves shall

have the valve stems extended or adjusted to locate the top of the operating nut no more than 24 inches below finish grade.

## 2. Performance Requirements

- a. Unless otherwise indicated, valve operators shall be sized to seat, unseat, open and close the valve with 150 psi shutoff pressure differential across the disk and allow a flow velocity of 16 feet per second past the disc in either direction.
- b. Ball valves shall be brass, bronze, stainless steel as indicated on the Drawings or Details or as approved by the Engineer.

322.05 Air-Vacuum Release Valves: Valves shall be combination air-release, air-vacuum units having small and large orifice units contained and operating within a single body or assembled unit.

The small orifice system shall automatically release small volumes of air while the pipe is operating under normal conditions. The large air-vacuum orifice system shall automatically exhaust large volumes of air while the pipe is being filled and shall permit immediate re-entry of air while being drained.

Valves shall be rated for at least 150 psi service pressure.

### Material Requirements:

Valve exterior bodies and covers shall be cast iron.

Internal bushings, hinge pins, float guide and retaining screws, pins, etc., shall be stainless steel or bronze.

Orifice seats shall be Buna-N rubber.

Floats shall be stainless steel, rated at 1000 psi.

Unless otherwise indicated, these valves shall be as included in the Standard Products List.

322.06 Valve Boxes: All valves shall be equipped with adjustable valve boxes or vaults (where applicable). All valve boxes (whether in pavement or not) shall have a two foot by two foot (2' x 2') square of concrete six inches (6") thick placed around the valve box at grade. Where the valve is in pavement it shall be rotated so that the sides of the square are at a 45° angle with the curb as shown in the details at the end of this section.

322.07 Fire Hydrants: All fire hydrants shall be Mueller Super Centurion or Clow Medallion, three way hydrants and shall be installed with a six inch stub out line with a six inch valve. All valves for fire hydrant leads shall be located at the main by an anchor tee. All fire hydrants shall incorporate a 3-valve system (one at the lead and one on either side of the main at the lead). All fire hydrants shall have a four foot by four foot slab of six inch thick reinforced (wire mesh) concrete (4'x4'x6") placed just below the bury line (approximately 6 inches below the break-away nuts) to force the fire hydrant to "break-away" properly when struck by a vehicle (see details at the end of this section).

### A. Applicable Specifications:

1. AWWA C-502 current: "AWWA Standard for Dry-Barrel Fire Hydrants".

2. NFPA 1963: "National (American) Standard Fire Hose Coupling Screw Thread" and City of Burnet 5 ¼ inch (133 mm) Fire Hose Connection Standard (Available upon request from Standards Committee Secretary at 322-2806).
3. ANSI A-21.11 current: "American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings".

B. Functional Requirements:

1. Design Working Pressure shall be 250 psi and a test pressure of 400 psi.
  2. Inlet shall be side connection hub end for mechanical joint (ANSI A-21.11-current). Shoe shall be rigidly designed to prevent breakage.
  3. Lower Barrel shall be rigid to assure above ground break at traffic feature. Bury length of hydrant shall be three (3) feet minimum, five (5) feet maximum. Flange type connections between hydrant shoe, barrel sections and bonnet shall have minimum of 6 corrosion resistant bolts.
  4. Hydrant Main Valve shall be 5 1/4 inch I.D. Valve stem design shall meet requirements of AWWA C502, with Operating Nut turning clockwise to close. Operating Nut shall be pentagonal, 1 1/2 inch point to flat at base, and 1 7/16 inches at top and 1 inch minimum height. Seat ring shall be bronze (bronze to bronze threading), and shall be removable with light weight stem wrench. Valve mechanisms shall be flushed with each operation of valve; there shall be a minimum of two (2) drain ports.
  5. Traffic Feature shall have replaceable break-away ferrous metal stem-coupling held to stem by readily removable type 302 or 304 stainless steel fastenings. Break-away flange or frangible lugs shall be designed to assure above-ground break. Break-away or frangible bolts will not be acceptable.
  6. Outlet Nozzles shall be located approximately 18 inches above ground. Each hydrant shall have two (2) 2 1/2 inch nozzles 180 degrees apart with National (American) Standard Fire Hose Coupling Screw Thread NFPA 1963 and one (1) 5 ¼ inch pumper nozzle. Nozzles shall be threaded or cam-locked, O-ring sealed, and shall have type 302 or 304 stainless steel locking devices. Nozzle caps and cap gaskets shall be furnished on the hydrant. The cap nut shall have the same configuration as the operating nut.
  7. Hydrants shall be Dry-Top Construction, factory lubricated oil or grease with the lubricant plug readily accessible. The system shall be described for City approval.
  8. Hydrant shall have double O-ring seals in a bronze stem sheath housing to assure separation of lubricant from water and shall have a weather cap or seal, or both, as approved by the Owner, to provide complete weather protection.
- C. Material Requirements: All below ground bolts shall be corrosion resistant. The hydrant valve shall be Neoprene, 90 durometer minimum. The seat ring, drain ring, operating nut and nozzles shall be bronze, AWWA C-502 current, containing not over 16 percent zinc. Break-away stem coupling shall be of ferrous material; its retaining pins, bolts, nuts, etc. of type 302 or 304 stainless steel.

Coatings shall be durable and applied to clean surfaces. The coating shall be applied according to coating manufacturer's specifications. Other exposed ferrous metal shall

receive asphalt-based varnish, or approved equal, applied according to the coating manufacturer's specifications.

**322.08 Copper Tubing:** All copper service tubing shall be annealed seamless Type K water tube meeting ASTM B88 and rated at 150 psi working pressure. The tubing shall be homogenous throughout and free from cracks, holes, crimping, foreign inclusions or other defects. It shall be uniform in density and other physical properties.

Nominal Tube Size, inches	Outside Diameter, inches		Wall Thickness, inches	
	Average	Tolerance	Average	Tolerance
1	1.125	± 0.0035	0.065	± 0.0045
2	2.125	± 0.005	0.083	± 0.007

**322.09 Water Service Connection Fittings:**

- A. Brass Goods: All brass valves, couplings, bends, connections, nipples and miscellaneous brass pipe fittings and accessories used in meter connections, service lines, air release piping assemblies, and wherever needed in the water distribution system, shall conform to the City of Burnet Standards and AWWA C-800, except as herein modified or supplemented.

Unless otherwise noted, the goods described herein shall be fabricated of standard Red Brass (Waterworks Brass) meeting ASTM B62 or B584, alloy 83600, consisting of 85 percent copper and 5 percent each of tin, lead and zinc.

Exposed threads shall be covered with plastic caps or sheeting to protect the threads.

Brass goods of each type and class shall be compatible with other fittings in common usage for similar purposes. Where not otherwise indicated, all such materials shall meet the following requirements:

For 3/4" and 1" sizes only, corporation valve inlet threads, and the internal threads of saddles shall be the AWWA CC taper thread conforming to AWWA C800. External threads of corporation valve inlet must be compatible with internal threads of the service saddle.

For 2" and larger services, inlet threads of corporation valves shall be AWWA (IP) thread (male); outlets of service saddles shall be tapped with AWWA IP thread (female); the service shall be equipped with a gate valve at the main. Two inch (2") Type K Copper shall be installed with sweated or compression fittings (i.e. bending the pipe shall not be allowed).

Connections of all new tubing, and of tubing repairs wherever possible, shall be by compression connections for 3/4" to 2" copper. Connections shall be designed to provide a seal and to retain the tubing, without slippage, at a working water pressure of 100 psig minimum.

Brass pipe shall conform to the weights and dimensions for Extra Strong pipe given in Table A.2 of AWWA C800.

**B. Valve / Water Meter Boxes:**

1. Each valve box installed shall be of cast iron material and designated with H20 load capacity or greater and be of the extension type. This requirement does apply to valves placed outside of the traffic area.
  2. Residential Water Meter Boxes can be cast iron or plastic with a cast iron lid. Residential Valve Boxes can be plastic or cast iron.
  3. Commercial Water Meter Boxes shall be cast iron or steel and approved for the application.
- C. Tapping sleeves shall be of all stainless steel construction, with a full wrap around gasket. It shall have a pressure test port mounted on the side of the stem with NPT threads and a stainless steel plug.
- D. All services shall be connected to the main with a saddle (i.e. direct taps are not permitted).

**323 Acceptance Testing**

323.01 Flushing and Testing of Water Mains: Flushing and Disinfection of mains shall comply with AWWA C651. Testing shall comply with Section 800 of the City of Burnet Technical Construction Standards and Specifications.

**324 Construction Methods**

324.01 Installation: Installation shall comply with Section 600 of the City of Burnet Technical Construction Standards and Specifications.

**370 Standard Products List**

<sup>371</sup>  
~~370.01~~ Piping

DUCTILE IRON PIPE MANUFACTURER	TYPE	SIZES
U.S. PIPE TYLER PIPE GRIFFIN PIPE AMERICAN DUCTILE IRON PIPE McWANE	SLIP JOINT, M.J., & FLANGED	3" AND UP
<b>RIVER CROSSING &amp; CREEK CROSSING</b>		
U.S. PIPE - ONLY	USIFLEX	4" AND UP

<b>P.V.C. C-900 DR-14, DR18, DR25 MANUFACTURER</b>	<b>TYPE</b>	<b>SIZES</b>
J-M PIPE CERTAINTED NORTH AMERICAN PIPE CAN-TEX	SLIP	4" AND UP

372  
370.02 Valves

<b>MUELLER VALVES</b>		
<b>PRODUCT</b>	<b>PARTS NUMBER</b>	<b>SIZES</b>
GATE VALVE M.J. TO M.J. RESILIENT WEDGE	A-2360-20 A-2361-20	2" THRU 12", 14", 18", 20", 24" 16"
GATE VALVE FLANGE TO FLANGE RESILIENT WEDGE	A-2361-16 A-2360-6	16" 2" THRU 12", 14", 18", 20", 24"
GATE VALVE FLANGE TO M.J. RESILIENT WEDGE	A-2360-16 A-2361-16	4" THRU 24" (NOT 16") 16"
GATE VALVE I.P.T. RESILIENT WEDGE	A-2360-8	2"
GATE VALVE TAPPING RESILIENT WEDGE FLANGE TO M.J.	A-2360-16 A-2361-16	4" THRU 24" (NOT 16") 16"

<b>CLOW VALVES</b>		
<b>PRODUCT</b>	<b>PARTS NUMBER</b>	<b>SIZES</b>
GATE VALVE M.J. TO M.J. RESILIENT WEDGE	F-6100	2" - 24" (EXCEPT 2 1/2")
GATE VALVE FLANGE TO FLANGE RESILIENT WEDGE	F-6102	2" - 24"
GATE VALVE FLANGE TO M.J. RESILIENT WEDGE	F-6106	3" - 24"
GATE VALVE TAPPING RESILIENT WEDGE FLANGE TO M.J.	F-6114	4' - 24"

GATE VALVE I.P.T.  
RESILIENT WEDGE

F-6103

2"

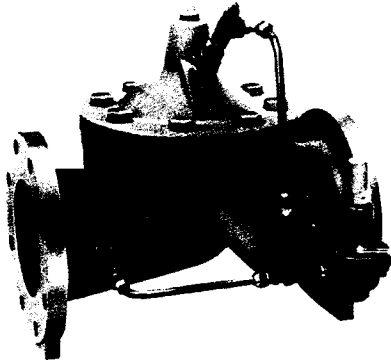




MODEL **90-01**  
**690-01**

2" - 24"

## Pressure Reducing Valve



- Sensitive and Accurate Pressure Control
- Easy Adjustment and Maintenance
- Tamper Resistant
- Optional Check Feature
- Fully Supported Frictionless Diaphragm

The Cla-Val Model 90-01/690-01 Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet pressure. This valve is an accurate, pilot-operated regulator capable of holding downstream pressure to a pre-determined limit. When downstream pressure exceeds the pressure setting of the control pilot, the main valve and pilot valve close drip tight.

If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted in the main valve cover chamber closing the valve to prevent return flow.

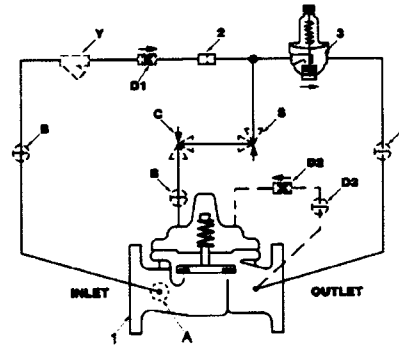
### Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58 Restriction Fitting
3	CRD Pressure Reducing Control

### Optional Features

Item	Description
A	X48A Flow Clean Strainer
B	CK2 Cock (Isolation Valve)
C	CV Flow Control (Closing)*
D	Check Valves with Cock
H	Solenoid Drain To Atmosphere
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

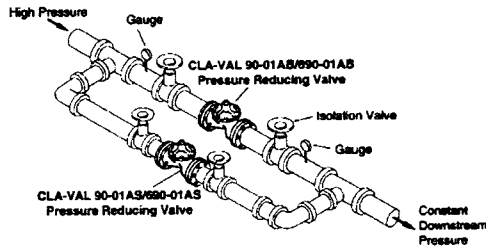
\*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.



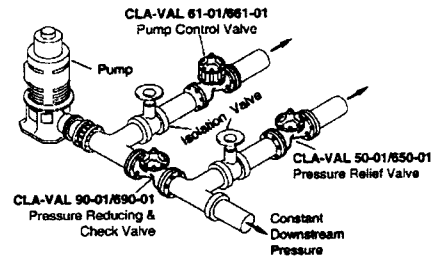
The "D" feature on a vertically installed 6" and larger valve must be horizontally oriented.

### Typical Applications

Typical pressure reducing valve station using Model 90-01AB/690-01AB and Model 90-01AS/690-01AS in parallel to handle wide range of flow rates. Larger Model 90-01AB/690-01AB valve takes care of peak loads and smaller Model 90-01AS/690-01AS handles low flows.



The 90-01D/690-01D Combination Pressure Reducing and Check Valve is installed downstream of a pump where a constant system pressure is required. The check feature is to prevent reverse flow through the pump and to hold system pressure when the pump is off.



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**370.03 Air Release Valves**

MANUFACTURER	PARTS NUMBER-SERIES	SIZES
APCO	140 SERIES	1/2" THRU 3"
APCO	140-C SERIES	4" & UP

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**370.04 Back-Flow Prevention**

MANUFACTURER	R.P.Z. SERIES	SIZES
WILKINS	975XLSE	3/4" THRU 2"
AMES	4000SS	4" THRU 10"
MANUFACTURER	SWING CHECK SERIES	SIZES
MUELLER	A-2606-01	4" THRU 16"

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**370.05 Fire Hydrants**

PRODUCT	PARTS NUMBER	SIZES
MUELLER SUPER CENTURION 250	A-423	6"
CLOW MEDALLION	F-2545	6"

376

**370.06 Boxes**

VALVE BOX MANUFACTURER	SERIES	
TYLER/UNION	6850	ADJUSTABLE
EAST JORDON IRON WORKS	# 4905	ADJUSTABLE
EAST JORDAN IRON WORKS	#3126000	ADJUSTABLE
1" W/S METER BOX MANUFACTURER	SERIES	
EAST JORDON IRON WORKS	# 15 - # 32515000	PLASTIC BOTTOM-C.I. TOP

MANUFACTURER	SERIES	SIZE
	2" METERS	2' X 3' X 1.5' METAL BOX
	#305-01- FOR \ METERS 4" & 6"	3' X 5' X 3" CONCRETE VAULT H-20 TRAFFIC FRAME, COVER
CAPITAL PRECAST	METERS 4" AND 6"	SAME AS ABOVE

## 370.07 Meters

MANUFACTURER	SERIES	SIZE
SENSUS	SRH COUMPOUND SCREEN # SM-951-R1	2" THRU 6"
SENSUS	TURBO-DRS	2" thru 8"
	W-100 DRS	2"
	W-1000 DRS	4"
	W-2000 DRS	6"
	W-3500 DRS	8"

## 370.08 Miscellaneous

MUELLER PRODUCTS		
PRODUCT	PARTS NUMBER	SIZES
<i>SERVICE FITTINGS</i>		
CORPORATIONS	B-25008	1" & 2"
ANGLE CURB STOP	B-24258	1"
STRAIGHT CUT OFF	B-24350	1"
UNION	H-15403	1" & 2"
M.I.P.	H-15428	1" & 2"
F.I.P.	H-15451	1" & 2"
FLARE TO COMP.	H-15071	1"
METER SWIVEL	H-10890	1"
METER BUSHING	H-10889	1" X 3/4"
METER BUSHNG	H-10888	3/4" X 5/8"
BRASS PLUG	H-10033	1" & 2"
90 DEGREE BEND	H-15209	1" & 2"
CORPORATIONS	B-2996	2" P.V.C. SERVICES
Y-BRANCH	H-15343	2" X 1"

**OTHER PRODUCTS**

<b>PRODUCT</b>	<b>PARTS NUMBER</b>	<b>SIZES</b>
<b><i>TAPPING SLEEVES</i></b>		
SMITH-BLAIR	662 & 663 SERIES	ALL
MUELLER	304L SERIES	ALL
<b><i>TAPPING SADDLES</i></b>		
SMITH-BLAIR	313 SERIES	ALL
<b><i>RESTRAINTS -GLANDS</i></b>		
MEGA LUGS-EBAA	1100 & 2000 SERIES	ALL
UNIFLANGES	1400 & 1500 SERIES	ALL
<b><i>FULL CIRCLE CLAMPS</i></b>		
SMITH-BLAIR	226 OR- 227	ALL
<b><i>BOLTED COUPLINGS</i></b>		
SMITH-BLAIR	441, 442, & 461 SERIES	ALL
POWER SEAL	3506 SERIES	ALL
<b><i>M.J FITTINGS</i></b>		
TYLER/UNION	M.J. CLASS 350	OR EQUAL -ALL

