Section 02521

# GATE VALVES

## PART 1 GENERAL

### 1.01 SUMMARY

This Section includes the furnishing and installation of gate valves for isolation and dead-end service as shown on Plans and as specified herein.

### 1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

1. Payment for gate valves is on a unit price basis. Unit price includes cost of required box for gate valves.

2. Payment for 2-inch blow-off valve with box is on a unit price basis for each installation.

3. Refer to Section 01270 – "Measurement and Payment" for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

### 1.03 REFERENCES

This specification references the following publications in their current editions. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

A. ASTM A307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength

B. ASTM B62: Standard Specification for Composition Bronze or Ounce Metal Castings

C. ASTM B763/B763M: Standard Specification for Copper Alloy Sand Castings for Valve Applications

D. ASTM D429: Standard Test Methods for Rubber Property - Adhesion to Rigid Substrates

E. AWWA C500: Standard for Metal-Seated Gate Valves for Water Supply Service

F. AWWA C509: Standard for Resilient-Seated Gate Valves for Water Supply Service

G. AWWA C515: Standard for Reduced Wall, Resilient- Seated Gate Valves for Water Supply Service

H. AWWA C550: Standard for Protective Interior Coatings for Valves and Hydrants

I. NSF/ANSI 61: Standards for Drinking Water Systems Components

1.04 SUBMITTALS

A. Conform to requirements of Section 01330 – “Submittal Procedures.”

B. Submit manufacturer's product data for proposed valves for approval.

C. Shop drawings, including construction features, assembly drawings, weight information, and materials of construction for valves 3 inches and larger and for valves with electric motor or gear operators.

D. Certification that each valve has been hydrostatically tested at 200 percent of rated working pressure.

E. Provide detailed drawings of gearing mechanism for 20-inch and larger gate valves.

F. Operation and Maintenance Data in accordance with Section 01782 – "Operation and Maintenance Data"

1.05 RELATED REQUIREMENTS

A. Section 01270 – “Measurement and Payment”

B. Section 01330 – “Submittal Procedures”

C. Section 01782 – “Operations and Maintenance Data”

D. Section 02085 – “Valve Boxes, Meter Boxes, and Meter Vaults”

E. Section 02317 – “Excavation and Backfill for Utilities”

F. Section 02514 – “Disinfection of Water Lines”

G. Section 02515 – “Hydrostatic Testing of Pipelines”

H. Section 09902 – “Painting and Protective Coating”

I. Other related Work as called for on Plans or specified elsewhere in this or other Specification Sections.

1.06 QUALITY ASSURANCE

A. Submit manufacturer's affidavit that gate valves are manufactured in the United States and conform to stated requirements of AWWA C500, AWWA C509, AWWA C515, and this Section, and that they have been satisfactorily tested in the United States in accordance with AWWA C500, AWWA C509, and AWWA C515.

B. All valves to have make, size, working pressure, and the letters “AWWA” cast into the valve bodies.

1.07 SYSTEM DESCRIPTION (NOT USED)

1.08 DELIVERY, STORAGE AND HANDLING

A. All valves to be drained and closed prior to shipment

B. Package valves to prevent damage in handling or transit. Store valves in a protective environment from the elements until installed into the Work.

C. Ship with flange protectors

1.09 – 1.13 NOT USED

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

A. American Flow Control, Mueller

B. American Darling

C. U.S. Pipe and Foundry Company

D. Clow

E. Or Approved Equal

2.02 MATERIALS

A. Gate Valves 1½ Inches in Diameter and Smaller:

125 psig; bronze; Rising-Stem (RS); single-wedge; disc type; screwed ends.

B. Gate Valves 2 Inches in Diameter:

Iron body, double disc, Non-Rising Stem (NRS), 150-pound test, 2-inch square nut operating clockwise to open.

C. Gate Valves 3 Inches to 12 Inches in Diameter:

Provide non-directional, standard-wall resilient seated (AWWA C509), parallel seat double disc (AWWA C500), or reduced-wall resilient seated gate valves (AWWA C515), 200 psig working pressure rating, bronze mounting, push-on bell ends with rubber joint rings, NRS and nut-operated for exposed valves unless otherwise shown or specified, NRS only for buried valves. Comply with following requirements unless otherwise specified in Plans:

1. Design:

   Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless-steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.

2. Body:

   Cast or ductile iron, flange bonnet and stuffing box together with ASTM A307 Grade B bolts. Manufacturer's initials, pressure rating, and year manufactured shall be cast in body.

3. Bronze:

   Valve components in waterway to contain not more than 15 percent zinc and not more than 2 percent aluminum.

4. Stems:

   ASTM B763/B763M bronze, alloy number UNS C99500 minimum yield strength of 40,000 psi; minimum elongation in 2-inches of 12 percent, Non-Rising.

5. O-rings:

   For AWWA C500, Section 4.2.4.8, for AWWA C509, Section 4.2.3.7 and for AWWA C515, Section 4.2.4.9.

6. Stem Seals:

   Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar for operating torque.

7. Stem Nut: Independent or integrally cast of ASTM B62 bronze

8. Resilient Wedge:

   Molded, synthetic rubber, vulcanized and bonded to cast or ductile iron wedge or attached with 304 stainless steel screws tested to meet or exceed ASTM D429 Method B; seat against epoxy-coated surface in valve body.

9. Bolts:

   AWWA C500 Section 4.4.2, AWWA C509 Section 4.4.4 or AWWA C515 Section 4.4.4; stainless steel for below ground; cadmium plated, or zinc coated for above ground.

D. Gate Valves 14 inch and larger in Diameter: Provide AWWA C500; parallel seat double disc gate valves or push-on bell ends with rubber rings and NRS nut-operated unless otherwise specified. Provide approved double disc valves with 150 psig working pressure rating. Comply with following requirements unless otherwise specified on Plans:

1. Body:

   Cast iron or ductile iron; flange together bonnet and stuffing box with ASTM A307 Grade B bolts. Cast following into valve body manufacturer's initials, pressure rating, and year manufactured. When horizontally mounted, equip valves greater in diameter than 12 inches with rollers, tracks, and scrapers.

2. O-rings: For AWWA C500, Section 4.2.4.8.

3. Stems:

   ASTM B763/B763M bronze, alloy number UNS C99500 minimum yield strength of 40,000 psi; minimum elongation in 2-inches of 12 percent, Non-Rising.

4. Stem Nut:

   Machined from ASTM B62 bronze rod with integral forged thrust collar machined to size; Non-Rising.

5. Stem Seals:

   Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar for operating torque.

6. Bolts:

   AWWA C500 Section 4.4.2; stainless steel for below ground; cadmium plated, or zinc coated for above ground.

7. Discs:

   Cast iron with bronze disc rings securely peened into machined dovetailed grooves.

8. Wedging Device:

Solid bronze or cast-iron, bronze-mounted wedges. Thin plates or shapes integrally cast into cast-iron surfaces are acceptable. Other moving surfaces integral to wedging action shall be bronze monel or nickel alloy-to-iron.

9. Bronze Mounting:

   Built as integral unit mounted over, or supported on, cast-iron base and of sufficient dimensions to be structurally sound and adequate for imposed forces.

10. Gear Cases:

    Cast iron; furnished on 18-inch and larger valves and of extended type with steel side plates, lubricated, gear case enclosed with oil seal or O-rings at shaft openings.

11. Stuffing Boxes:

    Located on top of bonnet and outside gear case

E. Gate Valves: Provide AWWA C515; reduced-wall, resilient seated gate valves with 250 psig pressure rating, NRS. Furnish with spur or bevel gearing.

1. For horizontally mounted gate valves, provide bevel operation gear mounted vertically for above ground operation.

2. Use valve body, bonnet, wedge, and operator nut constructed of ductile iron. Fully encapsulate exterior of ductile iron wedge with rubber.

3. Ensure wedge is symmetrical and seals equally well with flow in either direction.

4. Provide ductile iron operator nut with four flats at stem connection to apply even input torque to the stem.

5. Bolts:

   AWWA C515, Section 4.4.4, Stainless Steel for below ground; cadmium plated or zinc coated for above ground.

6. Provide high strength bronze stem and nut.

7. O-rings:

   AWWA C515, Section 4.2.4.9 pressure O-rings as gaskets.

8. Provide stem sealed by three O-rings. Top two O-rings are to be replaceable with valve fully open at full rated working pressure.

9. Provide thrust washers to the thrust collar for easy valve operation.

F. Coatings for Gate Valves 2 Inches and Larger:

AWWA C550 non-toxic, imparts no taste to water, functions as physical, chemical, and electrical barrier between base metal and surroundings, minimum 8-mil-thick, fusion-bonded epoxy. Prior to assembly of valve, apply protective coating to interior and exterior surfaces of body.

1. Resiliently Seated Gate Valve:

Internal and external surfaces to have a fusion bonded epoxy coating system suitable (NSF/ANSI 61 Listed) for use with potable water.

2. Double-Disc and Solid Wedge Gate Valves:

Valve bodies to be factory coated inside and out with an epoxy coating system to provide corrosion resistance for intended service. Interior coatings in contact with potable water shall meet NSF/ANSI 61 standards. For buried service provide shop applied exterior coating suitable for direct burial.

3. All coatings in contact with potable water must be NSF/ANSI 61 Listed.

G. Gate Valves Extension Stem:

When shown on Plans, provide Non-Rising, extension stem having coupling sufficient to attach securely to operating nut of valve. Upper end of extension stem shall terminate in square wrench nut no deeper than 4 feet from finished grade or as shown on Plans. Support extension stem with an arm attached to wall of manhole or structure that loosely holds extension stem and allows rotation in the axial direction only.

H. Gate Valves in Factory Mutual (Fire Service) Type Meter Installations:

Conform to provisions of this specification; outside screw and yoke valves; carry label of Underwriters' Laboratories, Inc.; flanged, Class 125; clockwise to close.

I. Gate Valves for Tapping Steel Pipe:

Provide AWWA C515 resilient wedge gate valve or AWWA C500 rotating disc gate valves. Mount gate valve in the horizontal position. Furnish with bevel gearing and valve stem extension with operation supports.

J. Provide flanged joints when valve is connected to steel or PCCP.

K. Operators

1. Outside Stem and Yoke (OS&Y) to have handwheels

2. NRS valves to have wrench nuts for buried service, handwheels for aboveground service

3. Bevel or spur gears to be steel with bronze pinion shaft and bronze bearings

4. Enclosed gear cases required for all geared valves

5. Buried valves to have greased packed gear case enclosing gears and stuffing box

6. Geared valves to have opening to atmosphere between packing and gear box

L. Valve Boxes:

Provide Standard Type “A” valve boxes conforming to requirements of Section 02085 – "Valve Boxes, Meter Boxes, and Meter Vaults."

M. Provide fusion-bonded epoxy coating on all interior and exterior surfaces of valves. Epoxy shall be applied in accordance with AWWA C550 and be NSF61 Certified.

N. Gate valve shall accept a full size tapping cutter

PART 3 EXECUTION

3.01 – 3.02 NOT USED

3.03 ERECTION/INSTALLATION APPLICATION AND/OR CONSTRUCTION

A. Earthwork:

For buried valves, conform to applicable provisions of Section 02317 – “Excavation and Backfilling for Utilities.”

B. Operation:

Do not use valves for throttling without prior approval of manufacturer.

C. If type of valve is not indicated on Plans, use gate valves as line valves for sizes 20-inches and smaller. When type of valve is indicated, no substitute is allowed

D. Setting Buried Valves and Valve Boxes

1. Direct bury valves and those in subsurface vaults open clockwise; aboveground valves open counterclockwise.

2. Remove foreign matter from within valves prior to installation. Inspect valves in open and closed positions to verify that parts are in satisfactory working condition.

3. Prior to hydrostatic testing of water line and valve:

   a. Test valve by opening and closing valve a minimum of two times to verify valve seats properly.

   b. Remove foreign matter from within valves.

4. Install valves in accordance with manufacturer's recommendations. Install valves and valve boxes where shown on Plans. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of 4 feet, or to undisturbed trench face when less than 4 feet. Install valves completely closed when placed in water line.

5. For pipe section of each riser, use only 6-inch, ductile iron Class 51, or DR18 PVC pipe cut to proper length. Riser must be installed to allow complete access for operation of valve. Assemble and brace box in vertical position as indicated on Plans.

E. Painting of Valves

Paint valves in vaults, stations, and above ground with approved paint per Section 09902 – "Painting and Protective Coating"

3.04 – 3.07 NOT USED

3.08 DEMONSTRATION / TESTING AND INSPECTION

A. Disinfection and Testing

1. In the presence of the Project Manager, perform disinfection of valves and appurtenances as required by Section 02514 – "Disinfection of Water Lines" and test as required by Section 02515 – "Hydrostatic Testing of Pipelines."

2. Operate each valve through at least one complete cycle.

3. After installation, inspect each valve for adequate tightness. No leakage allowed.

4. Valves shall be factory hydrostatically tested by the manufacturer per AWWA C500, AWWA C509, and AWWA C515. Field testing shall be according to Specification Section 02515 – "Hydrostatic Testing of Pipelines." Valves shall not be subjected to a test pressure greater than twice rated working pressure. If test pressures are greater than the rated working pressure of the valve, then possible additional allowable leakage rates greater than AWWA Standards must be taken into account.

5. Repair or replace valves which exceed leakage rate.

3.09 – 3.10 NOT USED

END OF SECTION