



August 14, 2023

Candy Thompson, PE  
Drinking Water State Revolving Fund Engineering Manager  
Water Quality Division  
Oklahoma Department of Environmental Quality  
PO Box 707 (707 N. Robinson)  
Oklahoma City, OK 73101

Subject: AIS Availability Waiver Application for Backflow Preventors, 1-2.5" Stainless Steel Pipe, 2.5" and smaller stainless-steel fittings.  
City of Oklahoma City, Oklahoma City Water Utilities Trust, PWSID No. 1020902  
Hefner Water Treatment Plant Ozone System Expansion / Upgrades  
DWSRF Project No. P-040-1020902-09, P-040-1020902-10

Dear Ms. Thompson:

The purpose of this application is to obtain an AIS availability waiver for the specified Backflow Preventors, Stainless Steel (SS) Pipe, 2.5" and smaller stainless-steel fittings for the above reference project. These materials will be critical to provide the necessary improvements to the Ozone System.

Exhibits A, B, and C attached to this letter provide justification that the contractor has provided due diligence search for AIS compliant materials for these systems. As a result, we are requesting a waiver from the AIS requirements for these items. **This project is critical to maintaining the integrity of the water supply to Oklahoma City's system and an expedited review is requested.** Loss of the Ozone system would severely compromise the ability of the City to meet the ODEQ requirements for disinfection and disinfection by-products control.

The following information follows the Information Checklist for Waiver Requests form:

General:

1. Description: 4" backflow preventor, 1" to 2.5" stainless steel pipe, 2.5" and smaller stainless-steel fittings (including expansion bushings).
2. Scheduled Quantity/Item Type/Unit of Measure:

Backflow Preventors:

Description	Unit of Measure	Quantity
4" Backflow Preventor	Each	1

SS Piping:

Description	Unit of Measure	Quantity
1" SCH40S 316L SSTL PIPE PE	Linear Feet	40
1-1/2" SCH40S 304L SSTL PIPE PE	Linear Feet	20
2" SCH40S 304L SSTL PIPE PE	Linear Feet	140
1-1/2" SCH40S 304L SSTL PIPE PE	Linear Feet	140
1" SCH40S 304L SSTL PIPE PE	Linear Feet	40
1" SCH40S 304L SSTL PIPE PE	Linear Feet	60
1/2" SCH40S 304L SSTL PIPE PE	Linear Feet	50
1/2" SCH40S 304L SSTL PIPE PE	Linear Feet	20
1" 316 SSTL PROCESS TUBING	Linear Feet	40
1-1/2" 316 SSTL PROCESS TUBING	Linear Feet	20
1" SCH40S 316L SSTL PIPE PE	Linear Feet	20
1" SCH40S 316L SSTL PIPE PE	Linear Feet	20
1" SCH40S 316L SSTL PIPE PE	Linear Feet	20
1" SCH40S 316L SSTL PIPE PE	Linear Feet	60
1" SCH40S 316L SSTL PIPE PE	Linear Feet	60
1" SCH40S 316L SSTL PIPE PE	Linear Feet	60
1" SCH40S 316L SSTL PIPE PE	Linear Feet	60
4" SCH40S 316L SSTL PIPE PE	Linear Feet	260

SS Pipe Fittings:

Description	Unit of Measure	Quantity
1-1/2" 316 SSTL 150# WELDED UNION	Each	4
1" 316 SSTL 150# WELDED UNION	Each	4
1" 316 SSTL 150# WELDED UNION	Each	1
2" 316 SSTL 150# WELDED UNION	Each	6
1-1/2" 316 SSTL 150# WELDED UNION	Each	8
1" 316 SSTL 150# WELDED UNION	Each	4
2" 316 SSTL 150# WELDED UNION	Each	12
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED UNION	Each	3
1" 316 SSTL 150# WELDED FLANGE	Each	2
1-1/2" 304 SSTL 150# WELDED UNION	Each	2

1-1/2" 304 SSTL 150# WELDED UNION	Each	2
1" 304 SSTL 150# WELDED UNION	Each	2
2" 304 SSTL 150# WELDED UNION	Each	1
1-1/2" 304 SSTL 150# WELDED 90 ELL	Each	1
1-1/2" 304 SSTL 150# WELDED COUPLING	Each	1
1-1/2" 304 SSTL 150# WELDED TEE	Each	1
1-1/2" X 3/4" 304 SSTL 150# WELDED BUSH	Each	2
2" 304 SSTL 150# WELDED 90 ELL	Each	3
2" 304 SSTL 150# WELDED 45 ELL	Each	2
2" 304 SSTL 150# WELDED COUPLING	Each	6
2" 304 SSTL 150# WELDED TEE	Each	5
3" X 2" 304 SSTL 150# WELDED BUSH	Each	1
1-1/2" 304 SSTL 150# WELDED 90 ELL	Each	15
1-1/2" 304 SSTL 150# WELDED COUPLING	Each	6
1-1/2" 304 SSTL 150# WELDED UNION	Each	6
1-1/2" 304 SSTL 150# WELDED TEE	Each	2
1-1/2" 304 SSTL 150# WELDED SQ PLUG	Each	4
3" X 1-1/2" 304 SSTL 150# WELDED BUSH	Each	8
1" 304 SSTL 150# WELDED 90 ELL	Each	5
1" 304 SSTL 150# WELDED 90 ELL	Each	10
1" 304 SSTL 150# WELDED 45 ELL	Each	4
1" 304 SSTL 150# WELDED UNION	Each	4
1" 304 SSTL 150# WELDED TEE	Each	1
2" X 1" 304 SSTL 150# WELDED BUSH	Each	1
2" X 1" 304 SSTL 150# WELDED BUSH	Each	4
1/2" 304 SSTL 150# WELDED 90 ELL	Each	6
1/2" 304 SSTL 150# WELDED 90 ELL	Each	4
1/2" 304 SSTL 150# WELDED UNION	Each	2
1/2" 304 SSTL 150# WELDED UNION	Each	2
1" X 1/2" 304 SSTL 150# WELDED BUSH	Each	1
2" X 1/2" 304 SSTL 150# WELDED BUSH	Each	1
1" 316 SSTL UNIONS	Each	4
1" 316 SSTL MALE CONNECTORS	Each	4
1" 316 SSTL 90 ELBOWS	Each	8
1-1/2" 316 SSTL UNIONS	Each	2
1-1/2" 316 SSTL MALE CONNECTORS	Each	8
1-1/2" 316 SSTL 90 ELBOWS	Each	2
1" 316 SSTL 150# WELDED 90 ELL	Each	4

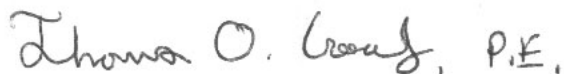
1" 316 SSTL 150# WELDED UNION	Each	2
1" 316 SSTL 150# WELDED FLANGE	Each	1
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED UNION	Each	2
1" 316 SSTL 150# WELDED FLANGE	Each	1
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED UNION	Each	2
1" 316 SSTL 150# WELDED TEE	Each	2
1" 316 SSTL 150# WELDED FLANGE	Each	1
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED COUPLING	Each	1
1" 316 SSTL 150# WELDED UNION	Each	2
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED COUPLING	Each	1
1" 316 SSTL 150# WELDED UNION	Each	2
1" 316 SSTL 150# WELDED 90 ELL	Each	4
1" 316 SSTL 150# WELDED COUPLING	Each	1
1" 316 SSTL 150# WELDED UNION	Each	2

3. [REDACTED]:
  - a. [REDACTED].
  
4. Location of Construction Projects:
  - a. Project located at the Hefner Water Treatment Plant  
 3827 W Hefner Rd., Oklahoma City, Oklahoma 73120
  
5. Name and Address of Proposed Supplier
  - a. [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]
  
6. Supporting documentation including that the contractor made a reasonable survey of the market, such as description of the process for identifying suppliers and a list of contacted suppliers.
  - a. Crossland Heavy Contractors has contacted [REDACTED] the main suppliers in the area and determined that AIS compliant backflow preventors are not available.

- b. Crossland Heavy Contractors has contacted [REDACTED] and determined that AIS compliant SS piping is not available.
7. Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials.
  - a. See attached Exhibit A1 & A2.
8. Contractor and/or supplier to provide a statement confirming the non-availability of the domestic construction material which is being sought.
  - a. See attached Exhibit B1, B2, B3, B4, B5.
9. Has the State received other waiver requests from the materials described in the request for comparable projects?
  - a. The EPA has approved several projects in the United States with comparable projects including waivers for usage of backflow preventors. following projects. Please see attached Exhibits C & D.
    - i. Tualatin Valley Water District, Hillsboro, Oregon, WIFIA – Willamette Water Supply System.
    - ii. New River Valley Regional Water Authority, Virginia, DWSRF – 2020 Waterworks Improvement Phase II.
  - b. The EPA has approved several projects in the United States with comparable projects including waivers for usage of SS pipes and fittings. following projects. Please see attached Exhibits E & F.
    - i. San Mateo, California, CWSRF - San Mateo Wastewater Treatment Upgrade and Expansion.
    - ii. Nampa, Idaho, CWSRF – Nampa Wastewater Treatment Plan Recycled Water Upgrades.
10. Project Schedule:
  - a. The affected project has a contract price of \$44,432,000.00 and is scheduled to be completed by January 28, 2026. Time is of the essence on the procurement of the pipe, fittings, and backflow preventor as it involves work in areas that are on the critical path to meet the scheduled completion date.

Should you have any questions regarding these documents or should you require additional information, please contact our consultant Tom Crowley, PE, Carollo Engineers at (816) 326-6714 or [tcrowley@carollo.com](mailto:tcrowley@carollo.com).

Sincerely,  
CAROLLO ENGINEERS, INC.



Thomas O. Crowley, PE

cc: Will Huggins, PE, City of Oklahoma City

Candy Thompson  
Oklahoma Department of Environmental Quality  
August 14, 2023  
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Andrew Mishler, PE, City of Oklahoma City  
Dan Ethington, PE, Carollo Engineers, Inc.  
Kevin Rood, PE, Carollo Engineers, Inc.

This waiver request was submitted to the EPA by the state of Oklahoma and applies only to the project in the subject line. All supporting correspondence and/or documentation from contractors, suppliers or manufacturers included as a part of this waiver request was done so by the recipient to provide an appropriate level of detail and context for the submission. There may be documents with project diagrams, schedules, and supplier correspondence in formats that do not meet the Federal accessibility requirements for publication on the Agency's website. Hence, these exhibits have been omitted from this waiver publication. They are available upon request by emailing [DWSRFWaiver@epa.gov](mailto:DWSRFWaiver@epa.gov).

## SECTION 15286

### STAINLESS STEEL PIPE AND TUBING

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. Section includes: Stainless steel piping and tubing for the following services:
1. Potable Water (PW): Above Grade.
  2. Gaseous Nitrogen (GAN).
  3. Gaseous Oxygen (GOX).
  4. Ozone Off Gas (OOG).
  5. Ozone Gas (OG).
  6. Sample (SA).
  7. Utility Water (UW) Above Grade.

##### 1.02 REFERENCES

- A. City of Oklahoma City "Standard Specifications for the Construction of Public Improvements."
1. Latest version as adopted by the Oklahoma City Water Utilities Trust. The "Standard Specifications" are available for review or purchase in the Office of the City Clerk of the City of Oklahoma City or on the City website ([www.okc.gov](http://www.okc.gov)).
  2. In the event of a conflict between the Contract Documents and the City of Oklahoma City "Standard Specifications," the provisions of these Contract Documents shall apply.
- B. City of Oklahoma City SCADA Standards - Latest Version.
- C. American Society of Mechanical Engineers (ASME):
1. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.
  2. B16.11 - Forged Fittings, Socket-Welded and Threaded.
  3. B31.3 - Process Piping.
  4. B36.19 - Stainless Steel Pipe.
- D. ASTM International (ASTM):
1. A182 - Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
  2. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
  3. A194 - Standard Specification for Carbon and Alloy Steel Nuts and Bolts for High Pressure or High Temperature Service, or Both.
  4. A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  5. A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

6. A276 - Standard Specification for Stainless Steel Bars and Shapes.
  7. A312 - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
  8. A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
  9. A403 - Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.
  10. A774 - Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Services at Low and Moderate Temperatures.
  11. A778 - Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
  12. A790 - Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe.
  13. A928 - Standard Specification for Ferritic/Austenitic (Duplex) Stainless Steel Pipe Electric Fusion Welded with Addition of Filler Metal.
  14. A967 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- E. Compressed Gas Association (CGA):
1. G-4.1 - Cleaning Equipment for Oxygen Service.
- F. NSF International (NSF):
1. Standard 61 - Drinking Water System Components - Health Effects.

### 1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15052 - Common Work Results for General Piping.
- C. Shop drawings:
1. Detailed layout drawings:
    - a. Dimensions and alignment of pipes.
    - b. Location of valves, fittings, and appurtenances.
    - c. Location of field joints.
    - d. Location of pipe hangars and supports.
    - e. Connections to equipment and structures.
    - f. Location and details of shop welds.
  2. Thickness and dimensions of fittings and gaskets.
  3. Photographs, drawings, and descriptions of pipe, fittings, welding procedures, and pickling and passivating procedures.
  4. Material specifications for pipe, gaskets, fittings, and couplings.
  5. Data on joint types and components used in the system including, flanged joints, grooved joint couplings and screwed joints.
- D. Cleaning procedures used for liquid oxygen and ozone piping systems in accordance with CGA Standard G-4.1.



## PART 2 PRODUCTS

### 2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Add joints and flexible couplings in a manner that achieves intent of maximizing size of individual piping sections.
- B. Shop fabrication: Fabricate piping sections in the shop and pickle and passivate at point of manufacture.
- C. Field assembly:
  - 1. Field welding is prohibited.

### 2.02 STAINLESS STEEL PIPE

- A. General:
  - 1. Pipe sizes specified in the Specifications and indicated on the Drawings are nominal.
- B. Wall thickness:
  - 1. Piping 3 inches in nominal diameter and greater:
    - a. For general service applications with pressures less than 250 pounds per square inch gauge, pipe diameter 24-inches or less, minimum wall thickness corresponding to Schedule 10S.
    - b. For pressures exceeding 250 pounds per square gauge, minimum wall thickness corresponding to Schedule 40S.
  - 2. Piping less than 3 inches in nominal diameter:
    - a. Piping with threaded or grooved joints:
      - 1) Minimum wall thickness corresponding to Schedule 40S.
  - 3. Piping with threaded or grooved joints:
    - a. For general service applications with pressures less than 250 pounds per square inch gauge, minimum wall thickness corresponding to Schedule 40S.
    - b. For pressures exceeding 250 pounds per square inch gauge, minimum wall thickness corresponding to Schedule 80S.
- C. Piping material and manufacturing:
  - 1. Comply with the requirements outlined in the following table:

Service	Stainless Steel Grade	Pipe Manufacturing Process
For low chloride water service with chloride concentrates below 200 parts per million and/or free chlorine less than 2 parts per million at ambient temperatures.		
Piping 3 inches in nominal diameter and larger	Type 304L stainless steel in accordance with ASTM A240	In accordance with ASTM A778
Piping less than 3 inches in nominal diameter	Type 304L stainless steel in accordance with ASTM A240	In accordance with ASTM A312
Digester Gas, Oxygen and Ozone Service, Membrane and Reverse Osmosis Filtration Systems with chloride concentrations less than 1,000 parts per million and/or free chlorine less than 4 parts per million at ambient temperatures.		
Piping 3 inches in nominal diameter and larger		Type 316L in accordance with ASTM A778

Service	Stainless Steel Grade	Pipe Manufacturing Process
	Type 316L or LDX 2101 stainless steel in accordance with ASTM A240	Type LDX 2101 in accordance with ASTM A790
Piping less than 3 inches in nominal diameter	Type 316L or LDX 2101 stainless steel in accordance with ASTM A240	Type 316L in accordance with ASTM A312
		Type LDX 2101 in accordance with ASTM A790

2. Chemical analysis certificates.
- D. Fittings for piping 3 inches in nominal diameter and greater:
1. Material: In accordance with ASTM A240 stainless steel, grade to match the pipe.
  2. Manufacturing standard: In accordance with ASTM A774.
  3. Wall thickness of fitting: In accordance with ASME B36.19 for the schedule of pipe specified.
  4. End configuration: As needed to comply with specified type of joint.
  5. Dimensional standards:
    - a. Fittings with weld ends: In accordance with ASME B16.11.
    - b. Fittings with flanged ends: In accordance with ASME B16.5, Class 150.
- E. Fittings for piping less than 3 inches in diameter:
1. Material: In accordance with ASTM A240 stainless steel, grade to match the pipe.
  2. Manufacturing standard: In accordance with ASTM A403, Class WP.
  3. Wall thickness and dimensions of fitting: In accordance with ASME B16.11 and as required for the schedule of pipe specified.
  4. End configuration: As needed to comply with specified type of joint.
  5. Forgings in accordance with ASTM A182, or barstock in accordance with ASTM A276. Match forging or barstock material to the piping materials.
- F. Piping joints:
1. Joint types, piping greater than 2 inches in diameter, general:
    - a. Where type of joint is specifically indicated on the Drawings or specified, design and shop-fabricate piping sections utilizing type of joint illustrated or scheduled.
    - b. Joints at valves and pipe appurtenances:
      - 1) Provide flanged valves and flanged pipe appurtenances in stainless steel piping systems with flanged ends.
      - 2) Design and fabricate piping sections to make connections with flanged valves and pipe appurtenances using flanged coupling adapters or flanged joints.
        - a) Flexible couplings and flanged coupling adapters: Provide stainless steel construction with materials matching the piping system, and conforming to requirements as specified in Section 15121 - Pipe Couplings and External Joint Restraints.
    - c. Joints in digester gas, ozone and oxygen piping systems, membrane and reverse osmosis filtration systems:
      - 1) Aboveground piping: Welded, flanged, or grooved.

- 2) Underwater piping: Welded or flanged.
- 3) Buried piping: Welded or mechanically restrained.
2. Joints in piping 2 inches in diameter and smaller: Flanged, grooved, or screwed with Teflon™ tape thread lubricant, as scheduled.
3. Welded joints:
  - a. Pipe 12 inches and larger in diameter: Automatically weld joints using gas tungsten-arc procedures.
  - b. Piping 4 inches through 12 inches in diameter: Double butt welded joints.
  - c. Piping less than 4 inches in diameter: Single butt-welded joints.
  - d. Mark each weld with a symbol that identifies the welder.
4. Flanged joints: Conforming to the requirements in accordance with ASME B16.5, Class 150.
5. Flanges for Schedule 40S and Schedule 80S pipe:
  - a. Provide forged stainless steel (type matching piping system) welding neck flanges or slip-on flanges in accordance with ASME B16.5 Class 150.
  - b. Material: In accordance with ASTM A182.
6. Grooved joints:
  - a. Pressure less than 500 pounds per square inch:
    - 1) Cut grooves from Schedule 40 or higher.
  - b. Heavier schedule pipe sections used for cut groove ends:
    - 1) Tapered inside diameter to transition from the inside diameter of the lighter schedule pipe.
  - c. Butt welds connecting pipes of different schedules that leave an abrupt change in inside diameter are not allowed.
  - d. Couplings:
    - 1) Rigid type, cast from ductile iron, [REDACTED]. High performance coating as specified in Section 09960 - High-Performance Coatings.

G. Gaskets:

1. Ozone and oxygen service: TFE sheet.
2. Aeration air service: As specified in Section 15052 - Common Work Results for General Piping.
3. All other service applications: EPDM, nitrile, or other materials compatible with the process fluid.
  - a. Drinking water applications: NSF Standard 61 compliant materials only.

H. Bolts for flanges:


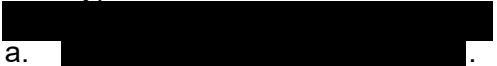
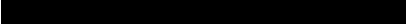
1. Bolts and nuts: Type 316 stainless steel in accordance with ASTM A193 heavy hex head.
  - a. Bolt length such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut.
  - b. Nuts: In accordance with ASTM A194 heavy hex pattern.

I. Fabrication of pipe sections:

1. Welding: Weld in accordance with ASME B31.3.
2. Weld seams:
  - a. Full penetration welds, free of oxidation, crevices, pits and cracks, and without undercuts.
  - b. Provide weld crowns of 1/16 inch with tolerance of plus 1/16 inch and minus 1/32 inch.

- c. Where internal weld seams are not accessible, use gas tungsten-arc procedures with internal gas purge.
  - d. Where internal weld seams are accessible, weld seams inside and outside using manual shielded metal-arc procedures.
- J. Cleaning (pickling) and passivation:
- 1. Following shop fabrication of pipe sections, straight spools, fittings, and other piping components, clean (pickle) and passivate fabricated pieces.
  - 2. Clean (pickle) and passivate in accordance with ASTM A380 or A967.
    - a. If degreasing is required before cleaning to remove scale or iron oxide, cleaning (pickling) treatments with citric acid are permissible.
      - 1) However, these treatments must be followed by inorganic cleaners such as nitric acid/hydrofluoric acid.
    - b. Passivation treatments with citric acid are not allowed.
  - 3. Finish requirements: Remove free iron, heat tint oxides, weld scale, and other impurities, and obtain a passive finished surface.
- K. Cleaning pipe for ozone and liquid oxygen service:
- 1. Following shop fabrication of piping sections, descale, clean and seal piping section in accordance with CGA Standard G-4.1.

## 2.03 STAINLESS STEEL TUBING

- A. Stainless steel tubing:
- 1. Seamless tubing made of Type 316L stainless steel and in accordance with ASTM A269, wall thickness not less than 0.035 inch.
- B. Fittings: Swage ferrule design:
- 1. Components made of:
    - a. Type 316 stainless steel.
  - 2. Double acting ferrule design, providing both a primary seal and a secondary bearing force.
  - 3. Flare type fittings are not acceptable.
  - 4. 
- C. Tubing may be bent instead of fittings. Tubing must be bent utilizing equipment provided by the manufacturer.
- D. Valves for use with stainless steel tubing:
- 1. Ball type valves with swage ends to match tubing diameter.
  - 2. Constructed from:
    - a. Type 316 stainless steel with TFE seats.
  - 3. 
    - a. .

## **2.04 SOURCE QUALITY CONTROL**

- A. Visually inspect pipe for welding defects such as crevices, pits, cracks, protrusions, and oxidation deposits.
- B. Provide written certification that the pipe as supplied are in accordance with ASTM A778. Supplemental testing is not required.
- C. Provide written certification that the fittings as supplied are in accordance with ASTM A774.
  - 1. Supplementary testing is not required.
- D. Thoroughly clean any equipment before use in cleaning or fabrication of stainless steel.
- E. Storage: Segregate location of stainless steel piping from fabrication of any other piping materials.
- F. Shipment to site:
  - 1. Protect all flanges and pipe ends by encapsulating in dense foam.
  - 2. Securely strap all elements to pallets with nylon straps. Use of metallic straps is prohibited.
  - 3. Cap ends of tube, piping, pipe spools, fittings, and valves with non-metallic plugs.
  - 4. Load pallets so no tube, piping, pipe spools, fittings, or valves bear the weight of pallets above.
  - 5. Notify Engineer when deliveries arrive so Engineer may inspect the shipping conditions.
  - 6. Engineer may reject material due to improper shipping methods or damage during shipment.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install piping in such a manner as not to impart strain to connected equipment.
- B. Slope horizontal lines so that they can be drained completely.
- C. Provide valve drains at low points in piping systems.
- D. Install eccentric reducers where necessary to facilitate draining of piping system.
- E. Provide access for inspection and flushing of piping systems to remove sediment, deposits, and debris.

### **3.02 FIELD ASSEMBLY OF SHOP-FABRICATED PIPING SECTIONS**

- A. Join shop-fabricated piping sections together using backing flanges, flexible couplings, flanged coupling adapters, grooved couplings, or flanges.

### 3.03 FIELD QUALITY CONTROL

- A. Test piping to pressure and by method as specified in Section 15052 - Common Work Results for General Piping.
  - 1. If pressure testing is accomplished with water:
    - a. Use only potable quality water.
    - b. Piping: Thoroughly drained and dried or place immediately into service.
- B. Visually inspect pipe for welding defects such as crevices, pits, cracks, protrusions, and oxidation deposits.
- C. Welds in liquid oxygen and ozone service piping: Examined and inspected in accordance with ASME B31.3.

### 3.04 PROTECTION

- A. Preserve appearance and finish of stainless steel piping by providing suitable protection during handling and installation and until final acceptance of the Work.
  - 1. Use handling methods and equipment to prevent damage to the coating, include the use of wide canvas slings and wide padded skids.
  - 2. Do not use bare cables, chains, hooks, metal bars, or narrow skids.
  - 3. Store stainless steel piping and fittings away from any other piping or metals. Storage in contact with ground or outside without protection from bad weather is prohibited.
  - 4. Protect stainless steel piping and fittings from carbon steel projections (when grinding carbon steel assemblies in proximity) and carbon steel contamination (do not contact stainless steel with carbon steel wire brush or other carbon steel tool).

END OF SECTION

**SECTION 15117**  
**SPECIALTY VALVES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Flow control valves.
  2. Backflow preventers.
  3. Float Valves.
  4. Solenoid valves.
  5. Plastic body diaphragm valves.
  6. Stainless Steel diaphragm valves (ozone service).
  7. Corporation stops.
  8. Curb stops.
  9. Cocks.
- B. As specified in Section 15110 - Common Work Results for Valves.

**1.02 REFERENCES**

- A. City of Oklahoma City "Standard Specifications for the Construction of Public Improvements."
1. Latest version as adopted by the Oklahoma City Water Utilities Trust. The "Standard Specifications" are available for review or purchase in the Office of the City Clerk of the City of Oklahoma City or on the City website ([www.okc.gov](http://www.okc.gov)).
  2. In the event of a conflict between the Contract Documents and the City of Oklahoma City "Standard Specifications," the provisions of these Contract Documents shall apply.
- B. City of Oklahoma City SCADA Standards - Latest Version.
- C. American Society of Civil Engineers (ASCE):
1. 25 - Earthquake-Actuated Automatic Gas Shutoff Devices.
- D. American Society of Mechanical Engineers (ASME):
1. B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.
- E. American Water Works Association (AWWA):
1. C511 - Standard for Reduced Pressure-Principle Backflow-Prevention Assembly.
  2. C800 - Underground Service Line Valves & Fittings (Also Included: Collected Standards For Service Line Materials).
- F. ASTM International (ASTM):
1. A48 - Standard Specification for Gray Iron Castings.
  2. A126 - Standard Specification for Gray Iron Casting for Valves, Flanges, and Pipe Fittings.

- b. Valve shall have solenoid shut off feature energize to open, energize to close.
  - c. Valve shall modulate to maintain desired flow through remote mounted orifice plate.
    - 1) Flow rate shall be adjustable.
  - d. Rated for 125 pounds per square inch gauge.
  - e. Pilot line: Equipped with a strainer and with isolation valves to facilitate pilot system maintenance without removing valve from service.
  - f. Solenoid valve electrical characteristics as indicated on the Drawings.
  - g. End connections:
    - 1) 3 inch and smaller: Screwed.
    - 2) 4 inch and larger: 150 pound rated flanges in accordance with ASME B16.42.
3. Materials:
- a. Body and cover: Cast Iron ASTM A48 or Ductile Iron ASTM A536.
  - b. Valve trim: Series Type 303 stainless steel.
  - c. Stem: Series Type 303 stainless steel.
  - d. Pilot control and trim: Series Type 303 stainless steel.
  - e. Diaphragm: EDPM.
  - f. Orifice: Series Type 303 stainless steel.
- B. Flow control valve schedule: As indicated on Drawings.

### 2.03 BACKFLOW PREVENTERS

- A. [REDACTED]:
- 1. [REDACTED] 1/2-inch through 2-inch.  
[REDACTED] for sizes 2 1/2 inch, 3 inch, 8 inch, and 10 inch.  
[REDACTED] for sizes 4 inch and 6 inch.
  - 2. [REDACTED].
- B. Design: Reduced pressure chamber type in accordance with AWWA C511.
- C. Include shutoff valves at each end of backflow preventer with properly located test cocks.
- D. Shutoff valves:
- 1. Backflow preventers 2-inch and smaller: Provide with full-port, quarter turn, resilient seated ball valves.
  - 2. Backflow preventers larger than 2-inch: Provide with resilient seated, outside stem and yoke gate valves.

### 2.04 [REDACTED]

- [REDACTED]
- B. Float valves: Pilot controlled, diaphragm, or piston actuated from hydraulic pressure of liquid flowing through valve.