

[REDACTED]

November 13, 2023

Mr. James Baltzer
NC Department of Environmental Quality
Division of Water Infrastructure
512 North Salisbury Street
Raleigh, NC 27604

Re: Johnston County 210 Wastewater Treatment Facility for Contract 1 and 2
Project No. CS370560-18 Clean Water State Revolving Fund (CWSRF)
Submit to cwsrfwaiver@epa.gov

Subject: Project Waiver for American Iron and Steel Requirements
for 1/4" – 2" Small Diameter Stainless Steel Fittings, Small-Bore Class 150#

Dear Mr. Baltzer,

[REDACTED] and Johnston County Public Utilities are requesting an AIS waiver for small diameter stainless steel fittings, Small-Bore Class 150#. If this request is in order, please forward it to EPA for consideration and approval.

The mechanical component for the fittings associated with the Work for hose bibbs, flushing connections, instruments, and other components located around the wastewater and biosolids buildings and structures located at the 210 WWTF.

Contractors have contacted their suppliers who in turn contacted several manufacturers about whether they are able to furnish AIS mechanical component small diameter stainless steel fittings. Suppliers and manufacturers contacted by [REDACTED] [REDACTED] have indicated that there is no domestic source for small diameter SST fittings, Small-Bore Class 150# in 1/4" to 2" sizes. Refer to *Attachment 1* for correspondence from suppliers.

[REDACTED] (Contract 1) contacted the following Suppliers:

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
- | [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
- | [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED] (Contract 2) contacted the following Suppliers:

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] has checked EPA's AIS Waiver site and found recent projects that have received a project waiver for small diameter stainless steel fittings, Small-Bore Class 150#.

The following supporting documentation is included for review and is presented in the order listed.

General

1. Description of the foreign and domestic construction materials
2. Unit of Measure
3. Time of delivery or availability
4. Location of the construction project
5. Location of BFPAs on project site
6. Project Schedules
7. Justification for the use of foreign construction materials
8. Similar Approved Waiver Requests:
9. Summary

Cost Waiver Request, we are not submitting a waiver based on cost.

Please let me know if additional information is needed to submit this request.

Thank you for your consideration in this matter.

Sincerely,

[REDACTED]
[REDACTED]
[REDACTED]

Enclosure (Cost Estimate Spreadsheet)

cc: Chandra C. Farmer, PE, Johnston County
Kim Rineer, PE, Johnston County

[REDACTED]
[REDACTED]

[REDACTED]



1. Description of the foreign and domestic construction materials

Foreign Construction Materials: Small-Bore Class 150#, small diameter stainless steel pipe fittings in the sizes 1/4” through 2”

Domestic Construction Materials: These materials and mechanical stainless steel components are *not* manufactured domestically for small diameter stainless steel pipe fittings, Small-Bore Class 150#.

The project waiver is for all 1/4” through 2” materials and mechanical stainless steel fittings listed in Part 2 below which are part of the project work currently in construction and for future change work. Additionally, the stainless steel fittings cannot be a sole source from a specific manufacturer due to North Carolina state bidding requirements.

2. Unit of Measure, Quantity, Estimated Cost

- a. See attached/enclosed spreadsheet

3. Time of delivery or availability

- Fitting Delivery Time = 4-6 weeks

4. Location of BFPAs on project site

- Refer to *Attachment 3* for drawings with BFPA’s shown for location on site.

5. Project Schedules for JCPU 210 WWTF SRF CS370560-18

- a. JCPU 210 Wastewater Treatment Facility (WWTF) – Contract 1
NTP – 01-03-2022
Substantial Completion – 05-06-2024
Final Completion – 07-05-2024
- b. JCPU 210 WWTF Biosolids Dewatering and Solids Handling Improvements – Contract 2
NTP – 03-01-2022
Substantial Completion – 06-20-2024
Final Completion – 08-19-2024

6. Location of the construction project

- 210 WWTF project sites which are located adjacent to the Johnston County Landfill
680 County Home Road, Smithfield, NC 27577

7. Justification for the use of foreign construction materials

Small-Bore Class 150# stainless steel fittings in the sizes required for the project specific areas (*reference Attachment 3*) as they are not manufactured (melted) and available from US Suppliers / Manufactures.

[REDACTED]

8. Similar Approved Waiver Requests:

The EPA's AIS website (<https://www.epa.gov/cwsrf/staterevolving-fund-american-iron-and-steel-ais-requirement>) indicates that AIS waiver requests have been granted for stainless steel fittings of various sizes that are substantially the same as this request.

These waivers were for projects in:

- City of San Diego, CA (August 31, 2023)
- Nelson County Service Authority, Nelson County VA (August 31, 2023)
- KS Northwest Wichita Water Treatment Facility, City of Wichita, Wichita, KS (June 28, 2023)

9. Summary

Based on the information discussed herein, [REDACTED] is requesting that small diameter stainless steel fittings as specified and proposed be allowed for this project. Suppliers would be:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Or equal

Please let [REDACTED] know of any questions or comments after reviewing this request.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Contract	Pay Item #	Location/Description			Quantity	Unit	Ext. Total	Install Date
		PRESSURE GAUGES (RAS PS) 316L SST						
1	13.23		1/2"	THRD NIPPLE x 4" LONG	6			not installed
1	13.23		1/2"	THRD NIPPLE x 2" LONG	6			not installed
1	13.23		1/2"	THRD 90° ELBOW	3			not installed
1	13.23		1/2"	THRD COUPLING	3			not installed
1	13.23		1/2"	THRD BALL VALVE	6			not installed
		BNR HOSE BIBBS (RCW) 316L STAINLESS STEEL						
1	9.21		3/4"	SST THRD NIPPLE x 16" LONG	8			not installed
1	9.21		3/4"	SST THRD NIPPLE x 2" LONG	8			not installed
1	9.21		3/4"	SST THRD 90° ELBOW	8			not installed
1	9.21		3/4"	QUARTER TURN HOSE BIBB WITH 3/4" STANDARD HOSE THREAD	8			not installed
1	9.21		3/4"	HOSE VACUUM BREAKER CONNECTION	8			not installed
		PW/RCW PAD MANUAL AIR RELEASE 304 STAINLESS STEEL						
1	4.43/4.46		1"	SST THRD NIPPLE x 8" LONG	4			not installed
1	4.43/4.46		1"	SST THRD NIPPLE x 4" LONG	2			not installed
1	4.43/4.46		1"	SST THRD 90° ELBOW	4			not installed
1	4.43/4.46		1"	THRD BALL VALVE	2			not installed
		CHEM STORAGE AND FEED HOSE BIBBS (RCW) 316L STAINLESS STEEL						
1								not installed
1								not installed
1								not installed
1								not installed
		BNR Air Flow Meter (Venturi Meters)						
1	9.22		1/4" x 3"	Nipple	6			not installed
1	9.22		1/2" x 1/4"	Reducer	6			not installed
1	9.22		1/2"	Close Nipple	6			not installed
		BNR & Clarifier Isolation Ring Material (Detail I40-0801)						
1	9.20/12.17/12.67		1/2"	THRD 90 Elbow (for pressure gauges)	8			not installed
1	9.20/12.17/12.67		1/2"	Cross (for pressure gauges)	4			not installed
						Total		

SECTION 40 05 24.13
STEEL PIPE FOR LOW PRESSURE PROCESS AIR SERVICE

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. This specification shall apply to steel and stainless steel pipe for low pressure air service (less than 25 psig).
- B. The AWWA Specifications referenced in this section are supplemented as follows:
 - 1. An affidavit of compliance is required from the pipe manufacturer.
 - 2. The steel manufacturer's certification that the material meets the ASTM Specification will be accepted in lieu of tests on specimens taken from the fabricated pipe.
 - 3. The fabricator may purchase steel plates on the chemical basis only and shall furnish to the Owner certified test reports.
- C. All parts of the materials furnished shall be amply designed, manufactured, and constructed for the maximum stresses occurring during fabrication, erection and operation. All materials shall be new and both workmanship and materials shall be of the very best quality, shall be entirely suitable for the service to which they will be subjected, and shall conform to all applicable sections of these Specifications. Manufacturer's designs shall accommodate all of the requirements of these Specifications.
- D. The Contractor shall be responsible for the structural design of the steel and stainless steel pipe, fittings, and couplings. The Contractor shall submit certification that the steel and stainless-steel pipe, fittings, and couplings have been designed to resist all loads implied and reasonably anticipated.
- E. Reference Section 40 05 00 – Basic Mechanical Requirements.

PART 2 – PRODUCTS

2.01 CARBON STEEL PIPE AND FITTINGS

- A. Steel pipe and fittings for process aeration and other low pressure air service (less than 25 psig) shall conform to AWWA C200. Steel pipe shall meet or exceed the manufacturer and material requirements of ASTM A53, Grade B or ASTM A139, Grade B.

- B. Steel pipe shall be fabricated by either the spiral weld or single longitudinal seam method and shall be rated for at least 25 psig and 300 degrees Fahrenheit (°F) with a minimum yield strength of 35,000 psi. Design stress in the pipe wall at the design pressure shall not exceed 50 percent of the minimum yield strength of the steel.
- C. Steel pipe shall be manufactured to the following nominal pipe sizes and minimum wall thicknesses:

Nominal Pipe Size (inches)	Minimum Sheet or Plate Thickness (inches)
6 or less	0.125
8 to 14	0.134
16	0.134
18	0.187
20 to 24	0.250
30	0.250
36	0.250
42	0.250
48 to 54	0.250
60 to 66	0.312
72 to 84	0.375
90	0.375

- D. Fittings shall be fabricated from the pipe specified and shall conform to AWWA C208, Table 1 (Figure 1). Fittings provided for the purpose of transition to other types of piping shall be in accordance with the applicable portions of AWWA C207 and AWWA C208, unless otherwise shown on the Drawings.
- E. Flanges shall be AWWA C207, standard hub type, slip-on welding flanges, Class B, unless otherwise required for connection to equipment.
- F. Bolts for flanged joints shall be of the size and length called for and in accordance with the "American Standard" and comply with the requirements of the ANSI/AWWA Standards. Bolts shall be a minimum ASTM A307, Grade B, hot-dip galvanized, carbon steel in accordance with ANSI A21.10 (AWWA C110). Bolts shall have hexagonal heads and nuts; no washers shall be used.

- G. Gaskets for flanged joints shall be Viton or silicone material, "Ring-Gasket" type, 1/8-inch minimum thickness, and suitable for 300 degrees Fahrenheit continuous service at 25 psig. Segmented gaskets will not be acceptable.
- H. Welded field connections shall be of the single "V" butt or bell and spigot joint type in accordance with AWWA C206. Welded connections shall not be permitted where such connections would interfere with the removal of valves or equipment or create sections of pipe too large for removal from structures. All field welds shall be inspected when field welding is permitted. Refer to Article 3.01 herein.
- I. The piping layout shown on the Drawings is based upon typical fittings available in steel piping for process air. In some instances, flange joints shown may not be required for steel pipe. Welded joints may be substituted for flange joints subject to approval by the Engineer. Welded joints will not be acceptable where such joints would interfere with the removal of valves or equipment or create sections of piping too large for removal from structures as determined by the Engineer.
- J. Harnessed flexible couplings may also be used in lieu of flanges at locations approved by the Engineer. Lugs shall be welded to the pipe in accordance with the requirements of AWWA Manual M11 for Steel pipe where required for harnessing of flexible couplings.
- K. Painting for steel pipe and fittings shall be as specified below.
 - 1. Inspection of surface preparation and application of paint shall be in accordance with Section 09 90 00 – Painting.
 - 2. Shop painting and field touch-ups shall be electrically inspected by the use of a holiday detector in accordance with AWWA C209 and Section 09 90 00 – Painting.
 - 3. The interior of all steel pipe for process air service shall receive 3 mils (dry) of inorganic zinc primer rated for 300°F continuous service and shall be [REDACTED] as manufactured by [REDACTED] or equal. After the lining has cured, it shall be thoroughly washed with high pressure water to remove all detachable particles.
 - 4. Exterior Painting for Exposed Steel Pipe (Indoor and Outdoor)
 - a. Except for areas of pipe to be welded, the exterior of exposed steel pipe shall receive a prime coat of 5 to 10 mils (dry) of inorganic zinc primer rated for 300°F continuous service and shall be Carbozinc 11 as manufactured by [REDACTED] or equal.
 - b. Areas of pipe to be welded shall receive 1 mil (dry) of weldable primer as manufactured by [REDACTED], or equal. After welding and pressure and leakage testing are completed, welded joints shall be thoroughly cleaned of all foreign matter and any scale or rust and primed as specified above.

- c. Over the prime coat shall be a finish coat of 3 to 5 mils (dry) of a high heat polymer coating and shall be Thermaline 4000 as manufactured by [REDACTED] or equal.

2.02 EXTERIOR PAINTING AND TAPE WRAP FOR BURIED STEEL AND STAINLESS STEEL PIPE

- A. Except for areas of pipe to be welded, the exterior of buried steel and stainless steel pipe shall receive a prime coat of 6 to 10 mils (dry) of an epoxy-phenolic or epoxy-amine primer service rated for -50°F to 300°F continuous service and shall be [REDACTED] as manufactured by [REDACTED] as manufactured by [REDACTED] as manufactured by [REDACTED] or equal. The primer product used shall be compatible with the exterior tape system manufacturer recommendations.
- B. Areas of pipe to be welded shall receive 1 mil (dry) of weldable primer as manufactured by [REDACTED], or equal. After welding and pressure and leakage testing are completed, welded joints shall be thoroughly cleaned of all foreign matter and any scale or rust and primed as specified above.
- C. The exterior of buried steel and stainless steel pipe shall receive, over the prime coat, a multi-layered, cold-applied tape wrap system which shall be shop applied with a minimum total coating thickness of 80 mils. The cold applied type wrap shall operate satisfactorily at a temperature of 300°F.
- D. The wrap shall be applied in accordance with manufacturer's recommendations and as specified herein. All fittings shall be wrapped in accordance with manufacturer's recommendations. Successive layers shall be applied such that windings are staggered and overlay the midpoints of previous tape widths. Prime coat and wrap shall be applied to each joint as specified for the pipe for continuous coating and wrapping of all buried steel piping. Polyethylene backed coatings shall be protected from sunlight at all times. The tape wrap system shall be the [REDACTED] Coating System as manufactured by the [REDACTED], or equal.

2.03 STAINLESS STEEL PIPE AND FITTINGS

- A. Stainless steel pipe for process aeration and other low pressure air service for nominal pipe sizes ranging from three (3) inches to sixty (60) inches shall be manufactured from 304L stainless steel annealed and pickled sheets and plates per ASTM A240.
- B. Stainless steel pipe shall be fabricated in accordance with ASTM A778 and shall be rated for at least 25 psig and 300 degrees Fahrenheit (°F). Only seamless or one (1) longitudinal seam shall be permitted unless otherwise required for fabrication of large diameter pipe in accordance with ASTM A774. Only stainless steel pipe shall be provided; tubing shall not be allowed. Stainless steel pipe shall be as manufactured by [REDACTED] approved equal.

- C. Stainless steel pipe shall be manufactured to the nominal pipe sizes as listed in ANSI B36.19, Table 2, and shall have the following minimum wall thicknesses:

Nominal Pipe Size (inches)	Schedule/Gauge/Plate
4 and less	Schedule 5S (0.083-inch)
5 to 8	Schedule 5S (0.109-inch)
10 to 12	12 gauge (0.109-inch)
14 to 18	11 gauge (0.125-inch)
20	10 gauge (0.140-inch)
24 to 36	0.187-inch
42 to 48	0.250-inch
54 to 60	0.312-inch

- D. Fittings shall be fabricated from the pipe specified and shall conform to ASTM A774, unless otherwise shown on the Drawings or required for proper installation.

- E. Flanges where shown on the Drawings shall be a lap joint flange assembly consisting of a 304L stainless steel slip-on rolled angle ring with a 304L stainless steel drilled backup flange conforming to ASTM A240, and shall conform dimensionally to ANSI B16.1, Class 125. The leg of the angle ring shall not interfere with the flange bolt holes. Alternately, slip-on plate flanges conforming to ANSI B16.1, Class 125 are acceptable at specific locations as approved by the Engineer. The plate flange shall be continuously welded to the pipe. The backup flanges and plate flanges shall be supplied with the following nominal thicknesses:

Nominal Pipe Size (inches)	Flange Thickness (inches)
2-1/2 to 3	1/2
4	9/16
6 to 10	5/8
12 to 16	3/4
18 to 20	7/8
24 to 30	1
36	1-1/8
42	1-1/4

Nominal Pipe Size (inches)	Flange Thickness (inches)
48	1-3/8
54	1-3/8
60	1-1/2

- F. Bolts for flanged joints shall be of the size and length called for and in accordance with the "American Standard" and comply with the requirements of the ANSI/AWWA Standards. Bolts shall be per ANSI B18.2, stainless steel, type and grade to prevent galling. Bolts shall have hexagonal heads and nuts; no washers shall be used. Bolts used at all transitions to material other than stainless steel shall be furnished with dielectric insulation material service rated for 300 degrees Fahrenheit continuous service at 25 psig.
- G. Gaskets for flanged joints shall be ██████ or silicone material, "Ring-Gasket" type, 1/8-inch minimum thickness, and suitable for 300 degrees Fahrenheit continuous service at 25 psig. Dielectric gaskets shall be used at all transitions to material other than stainless steel. Segmented gaskets will not be acceptable.
- H. Joints in piping 3 inches in diameter or larger shall be butt welded or flanged, unless otherwise shown on the Drawings. Joints in piping less than 3 inches in diameter shall be threaded, unless otherwise shown on the Drawings.
- I. Welding practices for joints shall conform to those specified for the manufacture of the pipe and fittings in ASTM A774 and A778, and the specifications contained herein. All welds shall be free from burrs, snags, or rough projections.
- J. Welding shall be performed by AWS-certified welders in conformance with standard procedures. Piping with wall thickness up to 11 gauge (0.125-inch) shall be welded with the TIG (GTAW) process. Heavier walls shall be properly beveled and have a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW), MIG (GMAW), or Metallic Arc (SMAW) process. Filler wire of ELC grades only shall be added to all welds to provide a cross section at the weld equal to or greater than the parent metal. Weld deposit shall be greater than the parent metal. Weld deposit shall be smooth and evenly distributed and have a crown of no more than 1/16 inch on the I.D. and 3/32 inch on the O.D. of the piping or fittings. Concavity, undercut, cracks, or crevices shall not be allowed. Butt-welds shall have full penetration to the interior surface, and inert gas shielding shall be provided to the interior and exterior of the joint. Excessive weld deposits, slag, spatter, and projections shall be removed by grinding. Angle face rings shall be continuously welded on both sides to the pipe or fitting. Welds on gasket surfaces shall be ground smooth.
- K. All fittings shall be welded with 304L filler metal. All elbows through 24-inch size shall be long radius, die-formed, and shall be automatically butt welded in accordance with ASTM A774 of the same material and thickness as the pipe using gas tungsten-arc

procedures with inert gas backing. Tees, crosses, true wyes, and laterals shall be shop-fabricated. All short radius, special radius, and reducing elbows and long radius elbows greater than 24-inch shall be mitered construction with at least (5) miter sections for 90-degree bends, (3) mitered sections for 45-degree and 60-degree bends, and (2) mitered sections for 30-degree and smaller bends. All reducers shall be straight tapered, cone-type. Longitudinal welds on all fittings, except elbows, shall be accomplished by the same procedures as listed for pipe. Weld seams shall have full penetration and be free of oxidation, crevices, pits, cracks, and protrusions. Fitting dimensions shall be in accordance with ANSI B16.9 and shall be terminated and dimensioned as indicated on the Drawings.

- L. Pipe spools shall be manually welded with 304L filler metal using gas tungsten-arc procedures with internal gas purge where internal weld seams are not accessible. Where they are accessible, seams shall be welded both inside and outside using manual shielded metal-arc procedures. Weld seams shall have full penetration and shall be free of oxidation, crevices, pits, cracks, and protrusions.
- M. All pipe, fittings, and spools shall be completely pickled and passivated by immersion in a nitric-hydrofluoric bath at the proper temperature and length of time to insure removal of all free iron, weld scale, and other impurities and to ensure the establishment of a passive surface. A clean water rinse shall follow the acid pickle.
- N. The inspection of all welds shall be required. This shall be a visual inspection for crevices, pits, cracks, protrusions, and oxidation deposits. Presence of any of these items found in the weld seams shall be considered as grounds for rejection of the joint.
- O. All fabricated piping shall have openings plugged and flanges secured for storage and/or transport after fabrication. All fabricated piping shall be piece marked with identifying numbers or codes which correspond to the Contractor's layout and installation drawings. The marks shall be located on the spools at opposite ends and 180 degrees apart.
- P. The piping supplier during manufacturing, fabrication, and handling stages and the Contractor during handling and installation stages shall use extreme care to avoid the contact of any ferrous materials with the stainless steel piping. Only manufacturer recommended saws, drills, files, wire brushes, etc. shall be used for stainless steel piping. Pipe storage and fabrication racks shall be non-ferrous or stainless steel or rubber-lined. Nylon slings or straps shall be used for handling stainless steel piping. Contact with ferrous items may cause rusting of iron particles embedded in the piping walls. After installation, the Contractor shall wash and rinse all foreign matter from the piping surface. If rusting of embedded iron occurs, the Contractor shall pickle the affected surface with [REDACTED] or equal, scrub with stainless steel brushes, and rinse clean.
- Q. Buried process air pipe shall be tape wrapped in accordance with Section 2.02.

2.04 PROCESS AIR PIPE SUPPORT AND EXPANSION/CONTRACTION SYSTEM

- A. The process air pipe support and expansion/contraction system shall include fixed supports, sliding supports, and expansion joints. Expansion joints shall be either a split sleeve expansion coupling or a metal bellows expansion joint as indicated on the Drawings. A metal bellows expansion joint shall be provided for all expansion joints, unless otherwise indicated on the Drawings.
- B. The air pipe support and expansion/contraction system shall consist of expansion joints at the locations shown on the Drawings, with one fixed support between each pair of expansion joints. Fixed support details shall be as shown on the Drawings. Additional air pipe supports shall be sliding supports as shown on the Drawings and according to the support spacing requirements indicated and/or scheduled on the Drawings. Sliding and fixed support details shall be as shown on the Drawings.
- C. Expansion couplings shall be bolted split-sleeve [REDACTED] as manufactured by [REDACTED], or equal. Couplings shall be installed where shown on the Drawings and as specified in the following table, in accordance with the manufacturer’s recommendations for the specific application. Expansion couplings shall be provided at each insert flow tube. Initial gap width (space between plain ends of joining pipes) shall be set based on recommendations from the manufacturer. The body “type” shall be as required to meet the working pressure indicated.

Nominal Pipe Size (inch)	Coupling	Width “W” (inch)	Longitudinal Movement (C/E) (inch)
3 to 4	Type 1 Style 231 S	5.25	0.75
6	Type 1 Style 231 S	8	1.25
8 to 14	Type 1 Style 231 S	10	1.50
16 to 24	Type 1 Style 231 S	14.38	2.00
30 to 48	Type 2 Style 231 S	14.38	2.00
Greater than 48	Type 2 Style 231 S	16.38	3.00

- 1. Couplings shall be suitable for a pressure of 25 psig and a temperature of 300 degrees Fahrenheit, at minimum. The design “delta” or change in temperature shall be a minimum of 250 degrees Fahrenheit.
- 2. Couplings shall be bolted, split-sleeve type and shall consist of four components: one-piece housing, gasket assembly, bolts and nuts, and end rings as required for pipe restraint. Gasket material shall be Viton or silicone.
- 3. Couplings shall be manufactured from Type 316L stainless steel using 316 stainless steel bolts and nuts with a minimum tensile strength of 85,000 psi. End

rings shall be Type 316L stainless steel. End rings shall be shop-welded to one end of one pipe installed in the coupling.

4. Couplings shall be provided and installed as specified and shown on the Drawings.
 5. The gap, "G", between ends of pipe shall be initially set and installed based on width of required clear space and the ambient temperature at the time of installation in conformance with requirements provided by manufacturer accounting for the required design movement allowance as specified for contraction and expansion of pipe.
- D. All other air pipe expansion joints and/or where indicated on the Drawings shall be stainless steel bellows type expansion joints by [REDACTED], or equivalent coupling by [REDACTED] as specified and indicated on the Drawings. Laying lengths of expansion joints vary according to manufacturer. Lengths of expansion joints shown on the Drawings are approximate. Contractor shall provide dimensioned layout drawings for air piping based on the expansion joints ultimately furnished.
1. Expansion joints shall be metal bellows type with fixed flanged end preparations with a stainless steel internal flow liner. The joints shall provide for a minimum of 2 inches of axial movement in either direction for air pipe sizes 4 to 6 inches in diameter and a minimum of 3.5 inches of axial movement in either direction for all pipe sizes 8 inches and larger. Joints shall provide for a minimum lateral movement of 1/2 inch for all sizes. Number of convolutions shall be determined by the manufacturer based on movement requirements specified and a cycle life of 2,000 or more. The flanges shall meet the same thickness and class requirements as required for the joining stainless steel pipe.
 2. Joints shall be suitable for a pressure of 25 psig and a temperature of 300 degrees Fahrenheit, at a minimum. The design "delta" or change in temperature shall be a minimum of 250 degrees Fahrenheit.
 3. Joint and flanges shall be manufactured from Type 316L stainless steel using Type 316 stainless steel bolts and nuts with a minimum tensile strength of 85,000 psi. Coupling shall have an air service liner welded on the upstream side of the bellows.
 4. The length of bellows, number of convolutions, and spacing between flanges shall be designed and installed accounting for the ambient temperature at the time of installation, which shall accommodate the full range of expansion and contraction movements as specified.
 5. Required "cycle life" shall be a minimum of 2,000 based on "Expansion Joint Manufacturers Association" (EJMA) criteria, 10th Edition or later.

6. Metal bellows expansion joints shall be restrained using limit rods bolted between flange tabs. All material shall be Type 316L stainless steel. The limit rods and connecting tabs, including flanges, shall be designed by the manufacturer for the maximum loading condition.
7. Joints required for buried pipe shall be installed within a handhole or manhole as indicated on the Drawings. No backfill of any nature or material shall be placed against, under or over the joint.

PART 3 – EXECUTION

3.01 FIELD WELDING OF STEEL AND STAINLESS STEEL PIPING AND FITTINGS

- A. Contractor shall minimize the amount of field welding of steel and stainless steel piping required. Locations for pipe field welding will be evaluated and allowed on a case-by-case basis upon written approval of the Engineer. All field welding of steel and stainless steel pipe is subject to the following requirements:
 1. Welding shall be performed by AWS-certified welders in conformance with AWS 1.6. Submit welder's certification for approval prior to performing any field welding.
 2. Piping with wall thickness up to 11 gauge (0.125-inch) shall be welded with the TIG (GTAW) process. Heavier walls shall be properly beveled and have a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW) or MIG (GMAW) process. Filler wire of ELC grades only shall be added to all welds to provide a cross-section at the weld equal to or greater than the parent metal. Weld deposit shall be greater than the parent metal. Weld deposit shall be smooth and evenly distributed and have a crown of no more than 1/16 inch on the I.D. and 3/32 inch on the O.D. of the piping or fittings. Concavity, undercut, cracks, or crevices shall not be allowed. Butt-welds shall have full penetration to the interior surface. Excessive weld deposits, slag, spatter, and projections shall be removed by grinding.
 3. Jigs shall be utilized to align adjacent sections of piping.
- B. Post-Weld Treatment:
 1. All field welds shall be wire brushed utilizing steel or stainless steel wire brushes to remove slag and spatter. Stainless steel brushes shall be used on stainless steel pipe.
 2. The weld and the heat affected area shall be pickled with a brush-on pickling gel in accordance with ASTM A380 to remove all weld residue, oxide, and heat stain from the field weld and affected areas.

3. Pickling of stainless steel pipe shall be done in accordance with pickling paste manufacturer's directions, and areas being pickled shall be protected from direct sunlight. After pickling period is complete, neutralize pickling gel in accordance with directions and rinse area clean.

- C. Where field welding of steel (carbon or stainless) piping is approved by the Engineer, all field welds shall be visually inspected and either ultrasonic or radiographically tested by an approved quality assurance testing firm in accordance with AWS D1.1, AISC Design Guide 21 Welded Connections, Section 9.0, and other applicable referenced sections of AWS and AISC. The Contractor is responsible for all costs associated with testing and shall be responsible for contracting with an approved testing firm. The Contractor shall submit a proposed testing firm and personnel for approval in addition to his proposed plan to visually inspect and test all field welds of steel pipe prior to field welding of steel pipe.

3.02 FLUSHING AND TESTING

- A. Flushing and testing of all installed low pressure air piping shall be performed as specified in Section 40 05 00 – Basic Mechanical Requirements. The field testing procedure for process air piping shall use air pressure only.

END OF SECTION

SECTION 40 05 24.43
STEEL PIPE FOR MISCELLANEOUS SERVICE

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. This specification shall apply to steel pipe only for applications as detailed in Part 2.
- B. The AWWA Specifications referenced in this section are supplemented as follows:
 - 1. An affidavit of compliance is required from the pipe manufacturer.
 - 2. The steel manufacturer's certification that the material meets the ASTM Specification will be accepted in lieu of tests on specimens taken from the fabricated pipe.
 - 3. The fabricator may purchase steel plates on the chemical basis only and shall furnish to the Owner certified test reports.
- C. All parts of the materials furnished shall be amply designed, manufactured, and constructed for the maximum stresses occurring during fabrication, erection and operation. All materials shall be new and both workmanship and materials shall be of the very best quality, shall be entirely suitable for the service to which they will be subjected, and shall conform to all applicable sections of these Specifications. Manufacturer's designs shall accommodate all of the requirements of these Specifications.
- D. The Contractor shall be responsible for the structural design of the steel and stainless steel pipe, fittings, and couplings. The Contractor shall submit certification that the steel and stainless steel pipe, fittings, and couplings have been designed to resist all loads implied and reasonably anticipated.
- E. Reference Section 40 05 00 – Basic Mechanical Requirements.

PART 2 – PRODUCTS

2.01 STEEL PIPE AND FITTINGS FOR NATURAL GAS, PROPANE GAS AND COMPRESSED SERVICE AIR

- A. Steel pipe and fittings for natural gas, propane gas and compressed service air shall conform to ASTM A120, black, seamless, Schedule 40 or 80 as indicated in the Interior Piping System Schedule. Unless otherwise shown or required, all pipe and fittings shall be threaded. Fittings shall conform to ANSI B16.3, 300 pound class and shall be of the black malleable iron screw type. All threaded joints shall conform to ANSI B2.1 with tapered threads at 3/4 inches per foot. Joints shall be made tight with an oil and graphite

paste or Teflon thread tape applied to the male threads only. All pipe 1-1/2-inches and smaller shall be reamed to remove scale and dirt.

2.02 STEEL PIPE AND FITTINGS FOR CHLORINE LIQUID AND GAS

- A. Steel pipe and fittings for chlorine liquid and gas shall be Schedule 80 seamless carbon steel pipe and shall conform to the requirements of ASTM A106, Grade B with threaded joints and forged carbon steel fittings rated at 2,000 lbs. cold water pressure. Fittings shall conform to the requirements of ASTM A694. Joints shall be made up with litharge and glycerin prepared immediately before use.

2.03 STEEL PIPE AND FITTINGS FOR CAUSTIC SOLUTION

- A. Steel pipe for caustic solution shall conform to the requirements of ASTM A120, Black, welded or seamless, Schedule 40. Joints for pipe shall be butt welded or flanged. Threaded joints shall not be allowed. All connection to existing piping valves, accessories, etc. shall be flanged with Teflon gaskets. All pipe shall be reamed and flushed after welding to remove scale and dirt. Unions shall be provided at all valves and accessories at least every 50 feet in the piping system.

2.04 CORRUGATED METAL PIPE (CMP)

- A. Corrugated Metal Pipe (CMP) and fittings shall be of the sizes shown or specified and shall conform to every aspect of AASHTO M-36, latest revision.
- B. Corrugated metal pipe shall be fabricated from galvanized steel sheets. Corrugation profile shall be 2-2/3-inch crest to crest and 1/2-inch crest to valley, and sheet thickness shall be 16 gage/.064-inch minimum.
- C. Pipe sections shall be helically corrugated with each pipe end rerolled to obtain no less than two (2) annular corrugations.
- D. Bands for connecting pipe shall be fabricated from galvanized steel. Bands shall be flat with a continuous corrugation on each end to index the second pipe corrugation. Bands shall be 16 gage/.064-inch thick minimum, 10-1/2-inches wide minimum, and shall be drawn together by no less than two (2) 1/2-inch diameter galvanized steel bolts with nuts.
- E. All CMP utilized for permanent installation shall have gasketed joints.

2.05 MISCELLANEOUS STEEL PIPE AND FITTINGS

- A. Other steel pipe and fittings not specified elsewhere shall conform to ASTM A120, black or galvanized, as directed by the Engineer, seamless, Schedule 40 or 80 as indicated in the appropriate Piping System Schedule in Section 40 06 20 – Process Pipe, Valve, and Gate Schedules or as indicated on the Drawings.

- B. Unless otherwise shown or required, all piping and fitting shall be threaded. Fittings shall conform to ANSI B16.3, 300 pound class and shall be of the black malleable iron screw type. All threaded joints shall be made tight with an oil and graphite paste or Teflon thread tape applied to the male threads only. All pipe 1-1/2 inches and smaller shall be reamed to removed scale and dirt. Pipe to be galvanized shall have a deep galvanized coating applied in full accordance with ASTM A123.

PART 3 – EXECUTION

3.01 FIELD WELDING OF STEEL AND STAINLESS STEEL PIPING AND FITTINGS

- A. Contractor shall minimize the amount of field welding of steel and stainless steel piping required. Locations for pipe field welding will be evaluated and allowed on a case-by-case basis upon written approval of the Engineer. All field welding of steel and stainless steel pipe is subject to the following requirements:
 - 1. Welding shall be performed by AWS-certified welders in conformance with AWS 1.6. Submit welder's certification for approval prior to performing any field welding.
 - 2. Piping with wall thickness up to 11 gauge (0.125-inch) shall be welded with the TIG (GTAW) process. Heavier walls shall be properly beveled and have a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW) or MIG (GMAW) process. Filler wire of ELC grades only shall be added to all welds to provide a cross-section at the weld equal to or greater than the parent metal. Weld deposit shall be greater than the parent metal. Weld deposit shall be smooth and evenly distributed and have a crown of no more than 1/16 inch on the I.D. and 3/32 inch on the O.D. of the piping or fittings. Concavity, undercut, cracks, or crevices shall not be allowed. Butt-welds shall have full penetration to the interior surface. Excessive weld deposits, slag, spatter, and projections shall be removed by grinding.
 - 3. Jigs shall be utilized to align adjacent sections of piping.
- B. Post-Weld Treatment
 - 1. All field welds shall be wire brushed utilizing steel or stainless steel wire brushes to remove slag and spatter. Stainless steel brushes shall be used on stainless steel pipe.
 - 2. The weld and the heat affected area shall be pickled with a brush-on pickling gel in accordance with ASTM A380 to remove all weld residue, oxide, and heat stain from the field weld and affected areas.
 - 3. Pickling of stainless steel pipe shall be done in accordance with pickling paste manufacturer's directions, and areas being pickled shall be protected from direct

sunlight. After pickling period is complete, neutralize pickling gel in accordance with directions and rinse area clean.

- C. Where field welding of steel (carbon or stainless) piping is approved by the Engineer, all field welds shall be visually inspected and tested by an approved quality assurance testing firm in accordance with AWS D1.1, AISC Design Guide 21 Welded Connections, Section 9.0 and other applicable referenced sections of AWS and AISC. The Contractor shall be responsible for contracting with an approved testing firm. Nondestructive testing methods shall be used unless otherwise approved by the Engineer. The Contractor shall submit a proposed testing firm and personnel for approval in addition to his proposed plan to visually inspect and test all field welds of steel pipe prior to field welding of steel pipe.

3.02 FLUSHING AND TESTING

- A. Flushing and testing of all installed low pressure air piping shall be performed as specified in Section 40 05 00 – Basic Mechanical Requirements. The field testing procedure for process air piping shall use air pressure only.

END OF SECTION