

COUNTY OF SUFFOLK



STEVEN BELLONE
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF PUBLIC WORKS

DARNELL TYSON, P.E.
CHIEF DEPUTY COMMISSIONER

GILBERT ANDERSON, P.E.
COMMISSIONER

ERIC M. HOFMEISTER
DEPUTY COMMISSIONER

June 26, 2018

Timothy P. Burns, P.E.
Director, Division of Engineering & Program Management
NYS Environmental Facilities Corporation
625 Broadway
Albany, NY 12205

Subject: CP-8108 Suffolk County Sewer District #3 – Bergen Point WWTP - Outfall Replacement
– AIS Waiver Request for Duplex Stainless-Steel Pipe

Dear Mr. Burns:

The contractor, OHL/Posillico/SELI Overseas JV (JV), for the above referenced project is requesting a waiver for piping to be supplied in accordance with Specification Section 15219 – Fabricated Duplex Stainless Steel Pipe and Fittings. As per Section 4 AIS Requirements Subpart D. of the NYS Revolving Fund Program Requirements Bid Packet for Construction Contracts for Contractors, an AIS Waiver may be issued when “Iron and Steel Products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality.”

The EPA Guidelines Memorandum: Implementation of the American Iron & Steel provisions of P.L. 113-76, dated 03/20/2014 page 6, para 16: defines what “Produced in the United States means” as follows: “All manufacturing processes, including processes such as melting, refining, forming, rolling, drawing, finishing, fabricating & coating.”

The JV has provided documentation, attached as Exhibit 1, that they cannot obtain the following for the Super Duplex 2507 pipe, fittings and flanges:

- One Hundred percent of the 2507 Super Duplex piping and fittings
- One Hundred percent of the 2507 Super Duplex flange products

Production of the Super Duplex 2507 pipe, fittings and flanges will be as follows:

- The 2507 materials in question will be melted, refined, and rolled into flat plate of the required thickness & widths at steel mills in western Europe.
- The 2507 finished flat plates will be shipped to specialty manufacturers in the USA and rolled & welded into pipe and cut & machined into pipe and flanges of various diameters & thicknesses as required for the project.

SUFFOLK COUNTY IS AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

- The finished pipe & flanges will be shipped to Douglas Bros. in Portland, ME USA for final cutting, fitting welding & cleaning to produce finished flanged pipe spools for installation in Bergen Point, West Babylon, NY.

This piping material was specified for the project for the following reasons:

- The existing Prestressed Concrete Cylinder Pipe (PCCP) is failing due to wire breaks and PCCP would not be considered as a replacement pipe due to its failure.
- The piping is being installed on the shores of Great South Bay in Long Island, designated by New York State as part of the South Shore Estuary Reserve. The groundwater in this area is brackish and the areas of pipe installation can flood with bay water. The pipe material is required to have a life expectancy of 100 years and meet the pressure requirements of the outfall operation including surge pressures in excess of 125 PSI. Neither Ductile Iron, Steel, fiberglass or HDPE pipe could meet these conditions. Therefore, the Super Duplex and Duplex pipe was specified.
- The Super Duplex and Duplex pipe provides a high integrity piping material that is corrosion resistant to brackish and salt water and will meet the life expectancy the Suffolk County Department of Public Works required for the project.

The procurement of the material and manufacturer of the pipe can take up to 34 weeks as stated in the backup included in Exhibit 1. If the AIS waiver was approved today, the pipe would be available for installation in late February of 2019. As the installation of this pipe is on the critical path of this project and must be installed in March of 2019, the project schedule is in jeopardy of being missed without this AIS waiver request.

As this project is critical to the protection of the Great South Bay from a failure of the existing outfall pipe and to maintain the schedule as stated above, we respectfully request that a decision be made regarding the waiver request be made by July 15, 2018 to allow the Contractor to maintain the project schedule. The pipe supplier, Douglas Brothers, A Division of Robert Mitchell Co. Inc. cannot move forward with obtaining the material to produce the 2507 pipe, fittings and flanges until the Waiver request is approved. A copy of the Specification is included as Exhibit 2.

Please feel free to contact Janice McGovern (631 852-4188) of the Suffolk County Department of Public Works or myself at your convenience.

Sincerely,



Janice McGovern, P.E.
Principal Civil Engineer
Suffolk County Dept. of Public Works

cc: SCDPW – John Donovan, Chief Engineer - SCDPW
CDM Smith – K. Kelly, M Taylor, J Stypulkowski, B Nylic
JV – Christopher Mauro

EXHIBIT 1 – AIS BACKUP INFORMATION

Douglas

Brothers Div.

ROBERT MITCHELL CO., INC.

423 RIVERSIDE INDUSTRIAL PARKWAY, PORTLAND, MAINE 04103

TELEPHONE (207) 797 - 6771

FAX (207) 797 - 8385

June 26, 2018

**SCOPE OF WORK PROPOSAL No. 2571-Rev.2
FOR SUPPLY ONLY OF
SHOP PRE-FABRICATED
SUPER DUPLEX SS PIPE SPOOLS**

To: OHL POSILLICO SELI

Attn: Christopher Mauro

**BID: Bergen Point WWTP
Outfall Replacement CP-8108
Suffolk County, Babylon, NY**

Bid date/time: 7-26-2017

Section: 15219

Addendum: 10 (see Clarification #1)

This revised Proposal No. 2571 is issued to incorporate our original proposal of July 27, 2017 with the additional terms determined necessary for acceptance of Purchase Order No. 1000-013 dated 03/13/2018 from the Joint Venture of OHL POSILLICO SELI; hereafter referred to as the contractor. We require written acceptance of this revised proposal and all terms incorporated herein, or as subsequently revised and accepted in writing by both parties.

PRICING

Item No. 1: One lot of shop fabricated Super Duplex SS piping spools for the above project.

Total Lump Sum Price* \$ _____ CPT Jobsite (excludes taxes)

*Pricing provided by Douglas Brothers is strictly limited to this scope of work proposal and is subject to the attached Terms and Conditions of Quotation and Attachment No. 1; except as noted or supplemented herein or by written supplement.

SPECIAL CONDITIONS

Due to the ongoing instability in the pricing of stainless steel materials, this proposal is a current value quotation only based on material costs and raw material surcharges as of June 2018. We cannot predict and include any cost escalation that may occur prior to contract award and order placement; therefore this pricing is not to be considered firm for the duration of this project. Also, availability of material will be discussed at time of order placement. We urge bidding contractors to add their own escalation factors to this quotation. Our pricing will be reviewed at time of order acceptance, taking into account this project's requirements, our stocks, current market conditions, future escalation potential, and your delivery schedule. This condition overrules any general condition herein indicating firm pricing.

Note: Bidding contractors should be aware of the long lead availability on the super duplex materials (up to 24 weeks from our vendors) and our 8 to 10 week fabrication cycle to complete any delivery. We will require advanced authorization to procure materials and agreement to pay us for such received and stored materials.

SPECIAL NOTICE - AIS WAIVER REQUIRED

Not all material proposed herein is available in conformance with the project's EPA funded American Iron and Steel (AIS) requirements for U.S. domestically produced steel products specifically:

1. 100% 2507 Super Duplex piping products (all foreign melt & manufacture). Approximate value XXXX USD.
2. 100% 2507 Super Duplex flange products (all foreign melt & manufacture). Approximate value XXXX USD.

SCOPE OF SUPPLY

Item No. 1. One lot of shop fabricated stainless steel piping spools. Refer to submittal drawing 18E0003, sheets 1 through 4

Christopher Mauro

From: bdix@felkerbrothers.com
Sent: Friday, July 21, 2017 11:48 AM
To: MKlemme@felkerbrothers.com
Subject: #6919 West Babylon, NY - Bergen Outfall Project

Ladies and Gentlemen,

We will be providing a bid price for the pre-fabricated stainless steel piping systems for the Bergen Point WWTP Outfall Tunnel Replacement project that currently bids next week. As you are all well aware of, this project involves the American Iron & Steel (AIS) Act which requires all stainless steel materials to have been melted and manufactured in the United States only.

Unfortunately after weeks of sourcing the materials necessary for the project, we were unable to locate a domestic supplier of the plate required to manufacture the 2205 / 2507 Super Duplex AWWA C228 plate flanges. The flanges will be domestically manufactured in the United States but because of the Super Duplex and plate thickness requirements, melting of the raw plate materials will take place in Sweden and the United Kingdom. All other materials required for the project will conform to the domestic requirements of the AIS Act.

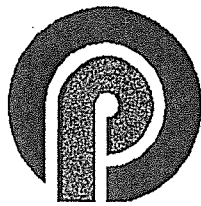
Felker Brothers would be happy to help provide any letters / documentation required to submit a formal waiver request to the EPA for the AWWA C228 flange materials.

Thank you for giving us a chance to partner with you on this project and we wish you the best of luck with your bid,

Brandon Dix
Fabrication Sales Strategist / Estimating Dept. Supervisor

Mobile: (715) 897-4198
Direct: (715) 486-2150
<http://www.felkerbrothers.com>





**MID
AMERICA**
Pipe Fabricating & Supply, LLC

Phone (620) 827-6121
Fax (620) 827-6601
2674 NW Hwy 102 Scammon, KS 66773

Project: Bergen Point WWTP Outfall - NY
Bid date: 07/26/2017 @ 11:00am ET

Adder for any additional "flange sets" beyond what we show (no nut, bolt & gasket sets)
60" set = Duplex \$xxxxx Super Duplex \$xxxxx
72" set = Duplex \$xxxx Super Duplex \$xxxxx

The plate for the pipe fabrication and the flanges will be imported. Pipe, fittings and flanges will be manufactured in the US. Surcharges for this special material are impossible to predict. The pricing will be updated monthly until a purchase order is received unless the buyer makes other arrangements to pre-purchase the raw material. As soon as we are allowed to place an order for material the price will be locked in regardless of when it arrives. Currently the raw material is 6 mos out.

NOTES:

- 1.e At the time of this quote we have received "10" addendum. Please inform us if more have been issued so that we may comply with them.e
- 2.e We do not provide nor are we responsible for any field technicians.e
3. No union label required or provided for this project.e
- 4.e Unless accepted by Buyer within 15 days of bid date, this offer is subject to revision e and/or confirmation by Seller.e
- 5.e Any pipe between two fixed points must have 2 points of movement. This can be accomplished by a combination of flex couplings, buttstraps, bells or loose flanges.e If there are not at least 2 points of movement, 2 flanges will be shipped loose for field welding for each instance.e
- 6.e All piping and welds shall be cleaned per the specification at our facility. We will take every precaution to protect the pipe for the journey to the jobsite. However, e additional cleaning may be needed after arrival to the jobsite. Final inspection and any subsequent cleaning required by the engineer will be the responsibility of the contractor.e

Our preliminary design based on the 150psi test pressure shown on the drawings requires that the 60" & 42" piping inside the pump station will be 1/2" wall. The 72" pipe at the tees and wyes will be 3/4" wall. All other pipe will be 3/8" wall.

Please Note: The flanges specified as "SB" are rated for 86psi with a max test pressure of 107psi. So unless the engineer has information beyond what is currently published for these flanges, it will not handle the 150psi test requirement.

Jacob Armonas

From: David Cox <midamericapipe@att.net>
Sent: Monday, February 12, 2018 11:37 AM
To: Jacob Armonas
Subject: RE: Bergen Point Outfall - Duplex SS Pipe

Jacob,

Please see response below:

David Cox



Mid America Pipe

www.midamericapipe.com

(417) 438-4019 direct

(417) 883-5150 fax

From: Jacob Armonas [mailto:jarmonas@posillicoinc.com]
Sent: Monday, February 12, 2018 10:05 AM
To: midamericapipe@att.net
Cc: Christopher Mauro
Subject: Bergen Point Outfall - Duplex SS Pipe

David,

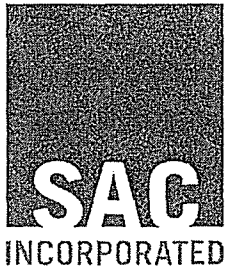
After reviewing your proposal, we have a few questions that need clarification.

1. You noted that some of your material does not meet the AIS requirement. Can you provide a formal response showing this is not possible or confirm your material will meet the AIS requirements per section 4 attached? **This particular material is simply not available domestically. It will most likely come from an Asian source such as Japan.**
2. Your price does not include a UA label on the pipe. This project is pro union and there will be an issue without it. Can you provide a response to this or confirm you will provide the label? **We are not a union shop and cannot provide a label. We could however provide material for a union shop. We could manufacture the pipe and ship the fittings & flanges loose for welding in the union shop. We could also tack weld the fittings or the flanges to our pipe for final welding by a union shop if that is an acceptable alternative.**
3. Can you acknowledge you received and reviewed all 10 addendums. **Yes we received and reviewed all of the addenda.**

I apologize for the redundancy in the questions but this project is significant for the New York/Long Island area. It will be under the magnifying glass by many local and federal agencies.

Feel free to reach out to me if you have any questions.

Thanks,



Bergen Point SW Outfall Fabricated Duplex Pipe & Pipe Support System

Base Bid Description

The following scope is for SAC to provide all necessary SST Pipe, Pipe Support Systems, and Piping Components as outlined below, and as indicated in SAC's Bergen Point Duplex Redlines Rev.1 and Bergen Point Pipe Support Redlines Rev.1. The layout of the Pipe System, as well as final design of the Pipe Support System are to be designed and engineered by a Professional Engineer Licensed in the State of Florida.

Fabricated Duplex Piping – Per Specification 15219

NOTE: Not all 2507 or 2205 Duplex pipe, fittings, and flanges are compliant to the requirements of AIS due to the availability. Most raw plate product is sourced out of western Europe and is manufactured in the United States.

Submittals

- 1) Final Layout and Fabrication Drawings of SAC Provided Duplex Piping
 - a. Drawings to include dimension and location of Valves & Inline Devices not provided by SAC.
- 2) All necessary mill test reports to verify compliance to project specifications
- 3) Welding Procedure Specifications (WPS) for each proposed shop welding procedure or process
- 4) Procedure Qualification Record (PQR)

Material Delivery

- 1) All Piping for Buried Service is to be 2507 Super Duplex, ASTM A790 or A928, Schedule 3/8" Wall
- 2) All Piping for Interior Service is to be 2205 Duplex, ASTM A790 or A928, Schedule 3/8" Wall
- 3) All Fittings are to be "As Welded," ASTM A815 HT-0, Material and Schedule to match Pipe Exposure
- 4) Flanges are to be AWWA C228, Class SB, Material to match Pipe Exposure
- 5) Flanges are to be provided at all Equipment, Valves, Inline Devices, and as needed for installation of buried piping.
- 6) Quantities of Flanges for Field Fit-Up are as follows:

72" –	42" –	24" –
60" –	30" –	
- 7) BNG Sets are to be provided for all SAC Provided piping. Material is to match Pipe Exposure. Flange Bolt Torque Requirements shall be reviewed and stamped by a Professional Engineer.
- 8) Insulating Kits are to be provided at all dissimilar material connections.
- 9) All Pipe & Fittings are to be provided Hot Rolled Annealed & Pickled with a No.1 Finish
- 10) All Weld Zones are to be Cleaned, Pickled, & Passivated after Fabrication Per SAC Standard, adhering to the requirements of ASTM A380 & A967
- 11) Shipping requirements are per project specifications & shall include.
 - a. Internal Spider Bracing at each end of the pipe and at 10ft centers for shipping of pipe 42" and larger.



SAC EAST
135 Talcott Road
Williston, VT 05495

SAC FABRICATION
3150 West Houn Dr (8600 S)
West Jordan, UT 84088

SAC WEST
4210 Riverwalk Pkwy, Ste 350
Riverside, CA 92505

Christopher Mauro

From: Jameson Job <jameson@sacincorporated.com>
Sent: Friday, August 11, 2017 3:27 PM
To: Christopher Mauro
Cc: Anthony Weber
Subject: RE: Bergen Outfall Project
Attachments: Bergen Point SW Outfall Quote (7-26-17) (rev. 2).pdf

Chris,

Good Afternoon and Congrats on the Bergen Point Outfall Project.

I wanted to follow up with the email which you had sent Anthony. I have attached our original scope here for review. There are links embedded in the first paragraph of the scope which will take you to our project redlines. For this project we provided a Price for the Duplex Piping (including all necessary flange hardware, gaskets, isolation kits, etc), as well as the pipe supports (including those necessary in the shafts). Additionally, we had provided a package price which you will see on there for doing both scopes of work.

As for your two questions:

- 1) Not all 2507 or 2205 Duplex pipe, fittings, and flanges are compliant to the requirements of AIS due to the availability. Most raw plate (particularly for the 2507) product is sourced out of western Europe and pipe is manufactured in the United States.
- 2) We did not provide compliance with union labor at bid time, but do have a partner that I could have take a look. This was bid as or own non-union labor out of Salt Lake City, UT.

We also believe we have an alternative to utilizing flanges for the installation of all the buried duplex piping. This will both reduce the material cost of the duplex piping as well as the labor associated with install. I would love to the opportunity to discuss this further in person.

In the meantime, please let us know if you should have any questions or comments on what we have provided.

We hope to the opportunity to work with you here and I am happy to meet at your convenience when the time is right.

Best Regards,

Jameson

EXHIBIT 2 – SPECIFICATION SECTION 15219

SECTION 15219

FABRICATED DUPLEX STAINLESS STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to furnish, install and test fabricated duplex stainless steel process pipe and fittings, 2-inch to 96-inch nominal diameter for piping systems shown on the Drawings and specified herein.
- B. The Contractor is advised to read the detailed fabrication and installation requirements included in PART 3 of this Section. These requirements shall be strictly enforced by the Engineer during execution of the work.
- C. The work includes, but is not necessarily limited to:
 - 1. Furnishing and installing interior, stainless steel pipe, fittings and specials with screwed, butt welded, or flanged and plain ends.
 - 2. Furnishing and installing exterior, below grade, stainless steel pipe, fittings and specials with screwed, butt welded, or flanged and plain ends.
 - 3. Furnishing stainless steel pipe sleeves and stainless steel pipe wall castings for interior and exterior wall and foundation wall penetrations.

1.02 RELATED WORK

- A. Submittals are included in Section 01300.
- B. Testing is included in Section 01410.
- C. Delivery, Storage and Handling is included in Section 01600.
- D. Concrete Work is included in Division 3.
- E. Field Painting is included in Section 09902.
- F. Valves and Appurtenances are included in Section 15100.
- G. Piping Specialties are included in Section 15120.
- H. Pipe Hangers and Supports are Included in Section 15140.

1.03 SUBMITTALS

- A. All submittals, including cut-sheets, drawings and operation and maintenance data, shall have text written in English, and all numerical data shall be in the foot-pound-second system of units. Submittals shall include a description identifying the contents of each submittal and the contents

of other submittals so as to provide the Engineer with a general overview of the scope of each submittal associated with this Section.

- B. Submit, in accordance with Section 01300, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site. Shop drawing and construction submittal data for piping under this Section shall include all data and information required for the complete piping system shown on the Drawings. All dimensions shall be based on the actual equipment to be furnished.
1. Joint cross section detail drawings for each joint type used on this project.
 2. Catalog cut sheets for pipe and fittings furnished, showing a table of dimension for each nominal pipe diameter.
 3. Welding submittals, including a description of each welding process used by the pipe mill and fabrication shop. Welding submittals shall include the following in accordance with the ASME BPVC, Section IX:
 - a. Welding Procedure Specifications (WPS) for each proposed field and shop welding procedure or process
 - b. Procedure Qualification Record (PQR)
 - c. Welders' and welding operators' certification records for each WPS
 - d. Weld inspection reports
 4. A summary of material specifications for products furnished under this Section.
 5. Procedure documentation for Manufacturers standard mill-applied surface treatments, including chemical cleaning, mechanical polishing, electro-polishing, and passivation as specified herein.
 6. Spool drawings for special fabrications used in multiple locations.
 7. Isometric sub-assembly drawings (iso-drawings) showing dimensioning of straight tube sections, laying length of branch fittings, locations and details of joints, instrumentation taps, and other piping appurtenances.
 8. Flange gasket data including technical data sheets.
 9. Flange bolting calculations including design tension and target torque values; bolting patterns and procedures; and bolting equipment and calibration data. Calculations shall be stamped by a professional engineer in the state of manufacture.
 10. Insulated Joint Inspection Reports: Provide all data and combine all testing results into a separate report. Report shall be signed and certified by the contractor stating that the requirements in this specification have been met.
 11. Prior to shipping submit certified test reports and affidavits verifying the pipe for this Contract was manufactured and tested in accordance with the standards specified herein.

- C. In general, corrections or comments or lack thereof, made relative to submittals during review shall not relieve the Contractor from compliance with the requirements of the contract documents. The Contractor is responsible for the final dimensions and layout conforming with the existing conditions by field verification; selecting fabrication processes and techniques of construction; coordinating the work of all trades, and performing the work in a safe and satisfactory manner.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01600 for general requirements.
- B. Care shall be taken in loading, transporting and unloading to prevent injury to the mill applied surface treatments on the wall surface inside and outside the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, and pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior and interior surface treatments. Bare chains, cables, hooks, metal bars or other equipment likely to cause damage to the pipe or coating shall not be used. All pipe handling and hauling equipment shall meet the approval of the Engineer before use.
- C. Materials, if stored, shall be kept safe from damage. The interior of all piping, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
- D. Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Stacking shall conform to manufacturer's recommendations.
- E. Field cutting of the pipe segments prior to removing them from the stock pile shall not be allowed.
- F. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe by the Contractor, at the Contractor's own expense. All pipe and fittings shall be thoroughly cleaned (see para. 3.05) before installation and shall be kept clean until they are put into service.
- G. To maintain circular shape and prevent distortion, each length of pipe larger than 42 inches shall be braced with an approved type of internal spider (stull) at each end of the pipe during shipping, handling and installation. In addition to the stulls at the ends of the pipe sections, the pipe shall be stulled at a maximum of 10 ft on center, or as additionally required to maintain roundness of plus/minus 1 percent during shipping and handling. The stull material shall be a minimum grade 304 stainless steel. If stulls are attached by welding, welds shall be ground flush and Penetration Tested.

1.05 REFERENCE STANDARDS

- A. ASTM International
 - 1. A 182/A 182M – Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
 - 2. A 240/A 240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

3. A 380 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
 4. A 480/A 480M – Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
 5. A 790/A 790M – Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
 6. A 815/A 815M – Standard Specification for Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings
 7. A 928/A 928M – Standard Specification for Ferritic/Austenitic (Duplex) Stainless Steel Pipe Electric Fusion Welded with Addition of Filler Metal
 8. A 960/A 960M – Standard Specification for Common Requirements for Wrought Steel Piping Fittings
 9. A 999/A 999M – Standard Specification for General Requirements for Alloy and Stainless Steel Pipe
 10. E 94 – Standard Guide for Radiographic Examination
 11. E 1032 – Standard Test Method for Radiographic Examination of Weldments
- B. American Water Works Association (AWWA)
1. C220 – Stainless-Steel Pipe, ½ in. (13 mm) and Larger
- C. NACE International
1. SP0286 – Electrical Isolation of Cathodically Protected Pipelines

PART 2 PRODUCTS

2.01 STAINLESS STEEL ALLOYS FOR PIPE, FITTINGS AND FLANGES

- A. Pipe and fittings specified herein shall be furnished in the alloy groups listed below. In general, the intended uses for these alloys are as follows (P-Numbers for base metal classification in the ASME BPVC Section IX are included in parenthesis):
1. For interior installations as listed in the pipe Schedule, 2205 – Duplex (austenitic/ferritic) stainless steel (ASME P-10H) pipe and fittings.
 - a. Pipe per ASTM A 790, UNS S32205 or ASTM A 928, UNS S32205.
 - b. Fittings and flanges per ASTM A 815 HT-0, UNS S32205 meeting AWWA C228 Class SB (Class 125 Drilling).
 2. For buried installations as listed on the pipe schedule, 2507 – Super Duplex (austenitic/ferritic) stainless steel (ASME P-10H) pipe and fittings.
 - a. Pipe per ASTM A 790, UNS S32750 or ASTM A 928, UNS S32750.

- b. Fittings and flanges per ASTM A 815 HT-0, UNS S32750 meeting AWWA C228 Class SB (Class 125 Drilling).

2.02 SURFACE TREATMENTS FOR STAINLESS STEEL PIPE AND FITTINGS

- A. Stainless steel pipe specified below shall receive mill-applied surface treatments at the rolling and pipe mills prior to delivery to the site. The mill finish, cleaning and descaling requirements shall be as defined below in order from roughest (worse) to finest (better).
 - 1. No. 2D – This surface treatment process creates a smooth finish (63 μ inches Ra or better) by cold-rolling, annealing, and skin passivating the pipe and fittings after fabrication. Pipe and fittings shall be immersed in a 125°F bath of 10% nitric acid and 3% hydrofluoric acid solution for a minimum of 15 minutes. This process shall be followed by a neutralizing rinse to passivate the surface. Equivalent processes proposed for pipe, tube, and fittings furnished under this specification shall be submitted for approval of the Engineer.
 - 2. No. 2B – This process creates a smoother finish than a No. 2D finish (20 μ inches Ra or better) by adding a light, cold-rolled pass between polished rolls at the end of the cold-rolling process, heat treating, pickling, and skin passivating. Pickling shall be by immersion in a 125°F bath of 10% nitric acid and 3% hydrofluoric acid solution for a minimum of 15 minutes. Occasional grinding marks appearing on the surface of this finish shall be acceptable. This process shall be followed by a neutralizing rinse for passivation of the surface. Equivalent processes proposed for materials furnished under this finish specification shall be submitted for approval of the Engineer.
 - 3. No. 2BA – This surface treatment process creates a smooth, bright, and reflective finish (20 to 40 μ inches Ra) by bright annealing in a furnace under vacuum (<10-1 Torr partial pressure of water), or a nitrogen, argon or dry-hydrogen atmosphere creating a near oxygen free condition, followed by cold rolling between polished rollers.
- B. All stainless steel plate and coil stock used in the manufacture of pipe shall have a minimum No. 2D finish, as defined above, when delivered to the mill prior to forming, welding, and receiving additional surface treatments for the final surface finishes specified below.

2.03 LARGE DIAMETER FABRICATED STAINLESS STEEL PIPE (30 INCHES AND LARGER)

- A. As-welded, fabricated, duplex stainless steel pipe shall be installed as indicated on the pipe schedule and as shown on the Drawings. Pipe dimensions and tolerances shall be in accordance with ASTM A999. All pipe segments shall be hydrostatically tested, after fabrication, to the test pressure shown on the Drawings.
- B. Pipe shall be fabricated from plate stock of the following alloys in accordance with the designated ASTM standard:
 - 1. ASTM A 928 Class 2 HT-0, UNS S32205 or UNS S32750 ferritic/austenitic stainless steel. Pipe shall have a minimum wall thickness of 3/8 inch and have a No. 2D surface finish or better.

2.04 FABRICATED FITTINGS FOR LARGE DIAMETER STAINLESS STEEL PIPE

- A. Large diameter fabricated fittings, 30-inch diameter and larger, for fabricated duplex stainless steel pipe shall be designed and manufactured in accordance with ASTM A 960.
- B. Fittings shall be manufactured from the following alloys in accordance with the designated ASTM standard:
 - 1. ASTM A 815 HT-0, UNS S32205 or UNS S32750 ferritic/austenitic stainless steel. Fittings shall have a minimum wall thickness of 3/8 inch and have a No. 2D surface finish or better.

2.05 WELDING MATERIALS

- A. Welding materials shall be in accordance with ASME Code, Section VIII, Division 1 and Section IX, and the applicable welding procedure specification.
- B. Weld filler metals shall meet the following requirements:
 - 1. For UNS S32205 to UNS S32205 construction:
 - a. Coated electrodes per AWS A5.4/ASME SFA 5.4 as E2209.
 - b. Bare wire per AWS A5.9/ASME SFA 5.9 as ER2209.
 - c. Flux cored wire: AWS 5.22 as E2209 T1-1, E2209 T1-4.
 - 2. For UNS S32750 to UNS S32750 or UNS S32205 to UNS S32750 construction:
 - a. Coated electrodes per AWS A5.4/ASME SFA 5.4 as E2594.
 - b. Bare wire per AWS A5.9/ASME SFA 5.9 as ER2594.
 - c. Flux cored wire: AWS 5.22 as E2594 T1-1/-4.
 - 3. Alternative filler metals shall be approved by Engineer.

2.06 STAINLESS STEEL FLANGE BOLTS, STUD-BOLTS, AND NUTS

- A. All flange bolts length shall be selected by the Contractor such that three full threads, as a minimum, protrude from the hex nut and washer after assembly. Flange bolts for dielectric insulating flange kits shall be fully-threaded along their length. The Contractor is cautioned that flange bolts having smooth shank segments along their length will not fit in Mylar sleeves or molded sleeve-washers.
- B. Flange bolts shall have ASME B1.1, coarse threads, Class 2A fit, and be manufactured of Grade 2205 duplex stainless steel. Bolts for direct-buried assemblies shall be 2507 super duplex stainless steel. Bolts shall conform to ASME B18.2.1.
- C. Flange nuts shall have ASME B1.1, coarse threads, Class 2A fit, and be manufactured of Grade 2205 duplex stainless steel, having square or hex heavy dimensions in accordance with ASME B18.2.2. Nuts for direct-buried assemblies shall be 2507 super duplex stainless steel.

2.07 ANTI-SEIZE BOLTING LUBRICANTS

- A. Flange bolts shall be installed using a nickel anti-seize lubricant capable of achieving the required bolt torque and sealing stress, and permitting future disassembly with minimal manual input.

- B. Excess anti-seize compound shall be removed by degreasing solvent prior to finish painting the piping.
- C. Anti-seize compound shall be:
 - 1. Never-Seez Pure Nickel Special Lubricant manufactured by Bostik, Wauwatosa, Wisconsin.
 - 2. Loctite Heavy Duty Anti-Seize Lubricant Manufactured by Henkel Technologies, Rocky Hill, Connecticut.
 - 3. Chesterton 772 Premium Nickel Anti-Seize Compound manufactured by Chesterton Technical Products, Stoneham, Massachusetts.
- D. Flange bolts shall be adequately degreased of all corrosion inhibiting slush oil and excess anti-seize lubricant prior to field application of prime and finish coatings.

2.08 STAINLESS STEEL BOLTED SLEEVE COUPLINGS

- A. Bolted sleeve couplings for pipe shall be installed where shown on the Drawings, and at locations where a disassembly gap is necessary to complete a piping assembly. Bolted sleeve couplings are not restrained and require tie-rod and lug type restraints as specified below where necessary.
- B. Sleeve couplings shall be constructed in accordance with AWWA C111, and have middle and end-rings fabricated of ASTM A240, UNS S32205 duplex stainless steel or equivalent. The coupling shall have track-head bolts and hex heavy nuts constructed of Grade 2205 duplex stainless steel.
- C. The sleeve coupling gasket shall be constructed of Fluoroelastomer (FKM, Viton®).
- D. Bolted sleeve couplings for stainless steel pipe shall be:
 - 1. Style 38, in 2205 duplex stainless steel manufactured by Dresser Industries, Bradford, Pennsylvania.
 - 2. Or equal.

2.09 INSULATING FLANGES

- A. For purposes of this specification, the terms "Pipe Flange Insulating Kit", "Insulated Flange", "Insulated Joint", and "Dielectric Flange" are used synonymously.
- B. Pipe flange insulating kit materials shall be designated by the manufacturer as suitable for service at the operating temperatures and pressures specified on the Plans.
- C. Pre-assembled isolating flange kit shall be designated by the manufacturer as suitable for service at the operating temperatures and pressures specified on the Plans.
- D. Flange insulating kits shall consist of a one piece, full-face, insulating gasket, an insulating sleeve for each bolt, insulating washers, and steel washers. For nominal pipe diameters up to and including 36-inches, provide one insulating washer and one steel washer on each side of the flange for each flange bolt. For nominal pipe diameters greater than 36-inches, the insulating

washers shall be installed sandwiched between a pair of matching steel washers on each side of the flange for each flange bolt.

- E. Insulating Gasket: Insulating gasket retainers shall be full face, Type E, NEMA G-10 glass reinforced epoxy retainers with an ethylene propylene diene Monomer (EPDM) rubber rectangular cross section O-ring seal. Minimum total gasket thickness shall not be less than 1/8 inch. The gasket shall have the same outside diameter as the pipe flange. For steel and stainless steel pipe, the gasket's inside diameter shall be equal to the inside diameter of the pipe's steel cylinder. At valve-to-pipe connections where the inside diameters are not equal, the gasket's inside diameter shall be equal to the smaller of the two inside diameters. Dielectric strength shall be not less than 550-volts per mil, and compressive strength shall be not less than 50,000-psi. The manufacturer's name and date of manufacture shall be marked on both sides of the gasket with minimum two-inch tall block letters using a durable marking ink or paint. The gasket shall be installed within 6 months of its date of manufacture. Do not store insulated flange gaskets at jobsites under direct sunlight or at temperatures exceeding 110 degrees Fahrenheit.
- F. Insulating Sleeves: Provide full-length, one-piece, NEMA G-10 glass reinforced epoxy insulating flange bolt sleeves. Dielectric strength shall be not less than 400-volts per mil. The length of the insulating sleeves shall provide an air gap between the end of the insulating sleeve and inside surface of the stud bolt nut with a tolerance of 1/32 inch minimum and 1/8 inch maximum. Insulating sleeve length must be adjusted for the actual thickness of the duplex stainless steel washers and insulating washer thickness.
- G. Insulating Washers: Insulating washers shall be NEMA G-10 glass reinforced epoxy with a minimum thickness of 1/8 inch. Dielectric strength shall not be less than 550-volts per mil, and compressive strength shall not be less than 50,000 psi. The insulating washer's inside diameter shall be sized to fit over the insulating sleeve's outside diameter.
- H. Duplex Stainless Steel Washers: Provide 2205 duplex stainless steel washers for insulated flanges greater than 36 inches in nominal diameter. Double duplex stainless steel washers (4 washers per flange bolt) are required for insulated flanges greater than 36 inches in nominal diameter. The inside and outside diameter of the duplex stainless steel washers shall match those of the insulating washers. The duplex stainless steel washers must be able to freely rotate around the insulating sleeve. Attention must be paid to the fit between the duplex stainless steel washers and the insulating sleeve in order to avoid the washers twisting and cracking the sleeves when the flange bolts are torqued.
- I. Provide four extra insulating sleeves and eight extra insulating washers for each insulating flange upon successful inspection of the insulating flange by the Engineer.

PART 3 EXECUTION

3.01 QUALITY CONTROL AND QUALITY ASSURANCE

- A. Quality control (QC) and quality assurance (QA) for the design, fabrication, and installation of the pipes specified herein shall be the responsibility of the Manufacturer and Contractor, including all QC and QA procedures used in the shop and field required to comply with this Section. The Owner and/or Engineer may choose to verify QC or QA with an independent testing firm, herein referred to as QA verification. All QA verification inspections, examination, and testing will be completed after QC and QA procedures have been performed by the Manufacturer or Contractor. The Contractor shall notify the Owner and Engineer 3 weeks prior to testing. Tests of all pipes, fittings and appurtenances shall be conducted on consecutive days

so that all testing may be completed during a single trip. In the event that equipment furnished as part of this Section is provided in multiple deliveries to facilitate the construction schedule, QA verification inspections may be completed on the equipment provided in each delivery. The Owner shall retain the services of an industry specialist and the Engineer to perform all QA verification inspections. The Contractor shall allow unhindered access to the Engineer, inspection staff, and the Owner's personnel, including access for progress photographs and video documentation of the work.

- B. If work is rejected after QA verification inspection, examination, or testing additional QA verification inspections and examinations performed on corrected work shall be paid for by the Contractor. For QA verification inspections, the Contractor shall provide reimbursement for airfare (direct flights where available), hotel, taxi, and the current GSA per diem rate for the location of inspection within the GSA region for three persons. Flights over 4 hours shall be business class or better. In addition, reimbursement for subsequent QA verification inspections shall include all repeat testing and/or inspection related costs, including costs associated with use of the independent inspection laboratory staff; laboratory analysis; and review and analysis of independent lab testing or inspection results performed by the Engineer, Owner, or Owner's representative.
- C. All equipment shall be designed, fabricated, and installed in accordance with the requirements of this Section.
- D. All equipment furnished under this Section shall be new and unused products of manufacturers having a successful record of manufacturing and servicing the pipe and systems specified herein for a minimum of 10 years.
- E. The Contractor shall submit to the Engineer, four copies of all certified mill test reports for chemical analysis and mechanical properties including tensile, impact, and bend test results for all materials used in the construction of all system component parts. The mill test reports shall identify the components for which the material will be used and information necessary to verify compliance with this Section.
- F. If there are difficulties in fabrication, installation or performance of the piping products furnished under this Section due to the manufacturer's fabrication or Contractor's installation, additional service to correct the deficiencies shall be provided at no change in Contract Price or Contract Time to correct the problems. The resulting work shall meet the acceptance testing requirements specified below.
- G. Inspection by the Owner's representative or failure to inspect shall not relieve the Contractor of responsibility to provide materials and perform the work in accordance with the Contract Documents.
- H. The Owner and Engineer reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.

3.02 PIPE AND FITTING INSTALLATION – GENERAL REQUIREMENTS

- A. Pipe and fittings shall be installed true to alignment and rigidly supported. Anchorage shall be provided where required. The deflection at pipe joints shall not exceed that recommended by the pipe, tube and fitting manufacturer. All pipe and appurtenances connected to equipment shall be supported to prevent any strain on the connecting equipment nozzles and flanges.

- B. The contractor shall be responsible for the quality of joint preparation and finished welds installed under this Section. Under no circumstances shall permanent backer-rings or other consumable inserts be used for field or shop welding of stainless steel pipe. Non-consumable refractory inserts shall be allowed with the Engineer's approval. Submit all proposed refractory inserts with welding submittals specified above for Engineer's approval.
- C. Full penetration butt-welded field joints shall be made using line-up clamps. Alternative methods to line-up clamps proposed by the Contractor shall be submitted with welding submittals specified above for Engineer's approval.
- D. Straight spools and fittings for 3/8-inch or greater thickness wall pipe shall be connected using butt joints (see para. 3.04.E) or Van Stone face-rings and flanges as shown on the Drawings and specified above.
- E. Rust spots on new stainless steel pipe and fittings are nearly always due to surface contamination of free iron, and shall not be allowed. If free iron is not removed deep corrosion pits can result, especially in an aqueous process environment (water or wastewater). Pipe, tube and fittings shall be inspected by the Engineer and Contractor upon delivery, and stored in a location that will prevent entry of contaminants prior to installation. The Contractor shall be responsible for protection of all pipe, tube, fittings and valves, and adhere to the following mandatory requirements, and others specified in the paragraphs below:
 - 1. All stainless steel materials shall be protected from contact with carbon steel including but not limited to hoisting and rigging equipment, steel tables, storage racks and hand tools.
 - 2. Pipe shall not be bundled using ferrous metal banding at the mill or distributor's facility.
 - 3. Contact and wear surfaces of tools used for carbon steel fabrication shall not be used for fabrication of stainless steel pipe and fittings. These include abrasive grinding and cutting wheels, wheel cutters and rollers, threading taps and dies, tube bending equipment and all other bearing edge tools.
 - 4. All manual or powered wire brushes used for surface repair and joint preparation shall be manufactured from stainless steel as specified below. No brushes with carbon steel wire shall be used for fabrication of stainless steel.
 - 5. All on-site carbon steel pipe and structural steel cutting and blasting operations must be shielded to protect stored and installed stainless steel pipe, tube and fittings.
 - 6. All exterior surface scratches; surface contamination by ferrous metal grinding kerf; contamination by paint markers and crayons etc. during storage shall be removed prior to fabrication.
- F. Interior and exterior surfaces of pipe and fittings may be examined by the engineer for free iron contamination by the ferroxyl test. All contaminated surfaces shall be cleaned in the field by pickling using a lean spray-applied pickling cleaner suitable for large surfaces system. Pickling shall be followed with passivation of the entire treated surface by a neutralizing rinse. The spray-applied pickling solution shall be:
 - 1. Avesta Classic Cleaner 401®, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.

2. Antox® 75E Pickling Cleaner, manufactured by Chemetall US, New Providence, New Jersey.
 3. Kytex® Brightener 123, manufactured/distributed by Harvard Chemical Research, Atlanta, Georgia.
- G. Field cutting of stainless steel pipe shall be by mechanical wheel cutter or abrasive saw, leaving a smooth cut at right angles to the axis of the pipe. Abrasive cutting wheels to be used for stainless steel pipe and tube shall be new and designed to prevent iron, sulfur or chlorine contamination to the surface under preparation or repair, and the surfaces of adjacent piping. Pipe and tube shall be deburred as part of preparation for all joint configurations. Abrasive cutting wheels acceptable for use on stainless steel pipe and tube shall be:
1. Charger® cutting wheels manufactured by Norton/Saint-Gobain Abrasives, Worcester, Massachusetts.
 2. Saitech Z-Tech® cutting wheels manufactured by United Abrasives/SAIT, Windham, Connecticut.
 3. Specialist® cutting wheels manufactured by Flexovite, Angola, New York.
- H. Field grinding of stainless steel pipe and tube, including root pass weld grinding; pipe beveling prior to welding; and repair of surface finishes on the exterior of the pipe after installation shall use new grinding wheels. The primary method of pipe beveling in the field shall be by field machining equipment, so use of grinding shall be by request from the Contractor and approval of the Engineer. Pipe beveling by grinding shall be demonstrated by the Contractor by preparing three sample specimens for inspection by the Engineer. Grinding wheels shall be designed to prevent iron, sulfur or chlorine contamination to the surface under repair or the surfaces of adjacent piping. Abrasive grinding wheels acceptable for use on stainless steel pipe and tube shall be:
1. Norzon Plus® grinding wheels manufactured by Norton/Saint-Gobain Abrasives, Worcester, Massachusetts.
 2. Saitech Pipeline® grinding wheels manufactured by United Abrasives/SAIT, Windham, Connecticut.
 3. Flexon® ZA24S grinding wheels manufactured by Flexovite, Angola, New York.
- I. Wire wheels used to remove defects on the pipe surface after installation shall be constructed of the same material as the pipe wall or Type 316 SS. The surface finish on the pipe shall be equivalent to the specified mill-applied surface finish or better.
- J. Buried pipes shall be installed on a bedding of sand.

3.03 WELDING PROCEDURE QUALIFICATION – SUPPLEMENTARY REQUIREMENTS

- A. Welding Procedure Specifications (WPS) developed for each base metal alloy specified above shall be qualified in accordance with ASME B31.3, ASME BPVC Section IX, and the supplementary requirements specified in the paragraphs below.
- B. The impact test temperature shall be -40 degrees F. A set of three specimens shall have been tested for both the weld metal and the heat affected zone. The lateral expansion and impact

energy shall not have been less than 0.015-in and 40 ft-lbs, respectively, for each specimen. The procedures shall have been qualified using coupons of equal or greater thickness than the maximum thickness of the pipe to be used.

- C. Separate procedure qualifications are required for weld repairs.
- D. All welders shall have been qualified to each weld procedure they are expected to use during fabrication and erection. Also, the Fabricator/Installer shall submit welding procedures previously qualified for the following different base metal combinations involved in this project:
 - I. P10H to P10H Duplex stainless steel to duplex stainless steel
- E. Preheating shall be limited to that required to warm the steel above 50°F and to remove all moisture.
- F. Interpass temperatures shall not exceed 300°F for welds involving 2205 duplex stainless steel or 210°F for welds involving 2507 super duplex stainless steel. The more restrictive (lower) temperature requirement rules for 2205-to-2507 welds. The fabricator shall state the method for monitoring interpass temperatures.
- G. Autogenous welds are not permitted.
- H. GTAW wash passes, used for localized smoothing are prohibited. Repair welds performed using the GTAW method require a separate weld procedure.
- I. Each welding gas for GMAW shall be qualified separately. GMAW gases with more than 1% O₂, or more than 3% CO₂ are not permitted. For GTAW and GMAW with ER2209, gas shall contain 2-3% N₂. For FCAW, refer to the manufacturer's recommendations.
- J. GTAW root welds shall have inert gas shielding on the back side.
- K. Copies of Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR), including the qualification of special tests shall be submitted to the Engineer for approval prior to start of fabrication. Welder and welding operator qualifications shall be available at the job site for review.

3.04 WELDING

- A. All welding shall be in accordance with the requirements of ASME B31.3.
- B. All welded joints shall be sealed watertight with continuous welds.
- C. Assemble and weld pipe and fittings following erection methods that result in a minimum of distortion from weld shrinkage. Surfaces to be welded shall be free from oil, grease, paint and other foreign material.
- D. Welding shall not be performed during rain, snow, excessive wind, low temperature or other adverse conditions unless a weather screen is erected to protect the welding area and the welder. If conditions necessitate the removal of the weather screen before the weld has cooled, a temporary covering shall be placed around the welded joint.

- E. Pipe and fitting butt welds, unless particularly specified otherwise, shall be full-penetration double welded, butt joints with back gouging. Single-V groove or single-bevel groove welds with backing are permitted only as approved by the Engineer.
- F. Brackets shall be attached with continuous fillet welds.
- G. Toughness of welds and heat affected zone shall match the requirements for the base metal.
- H. Do not use exothermic welding (CAD welding) for attachments, grounding, or any other item.
- I. Acceptable welding processes include: GTAW, GMAW, SMAW, FCAW and SAW.
- J. Electrodes for SMAW shall be stored and conditioned before use in the same manner as low-hydrogen electrodes.
- K. Welding heat input shall be limited to avoid producing intermetallic compounds that decrease the material toughness. Weld weaving shall be limited to 0.25-inch width and minimum arc travel speed shall be as specified in the WPS to control heat input.
- L. Lifting attachments and temporary alignment and fit-up attachments for stainless steel shall be from stainless steel of adequate strength. Lugs, guides and other temporary attachments for weld fit-up shall be completely removed, leaving a smooth stainless steel surface free of contamination.
- M. Arc strikes shall be removed by grinding to produce a smooth surface free of cracks and contamination.
- N. No more than two repair welds are permitted at a given location, without prior approval of the Engineer.

3.05 CLEANING, DESCALING, AND PASSIVATION OF STAINLESS STEEL WELDS

- A. Stainless steel sheet, plate and pipe are normally cleaned by the producer using acid pickling solutions or mechanical methods. Additional contamination of the metal is expected during the process of welding, fabrication and installation of the equipment. This section addresses the requirements for post-fabrication cleaning of duplex stainless steel. It is intended for this procedure to be used by stainless steel fabricators, not intended to be used by primary producers of stainless steel mill products.
- B. All finished welds and heat-affected zones (as well as the base metal) shall be free from heat tint, discoloration, or any other surface contamination that can affect the corrosion resistance.
- C. Cleaning and removal of heat tint shall be in accordance with ASTM A 380. Abrasive grinding and blasting shall be allowed for descaling slag from welded joints. However, abrasive grinding and blasting shall not be a substitute for cleaning and passivation. All joints descaled by abrasive grinding and/or blasting shall be chemically cleansed and passivated as specified herein.
- D. Cleaning operations often present hazards to both personnel and facilities. Manufacturers' Material Safety Data Sheets (MSDS) shall be consulted to determine the hazard of handling specific chemicals. Follow manufacturers' instructions for safe handling and storage of acid cleaning materials and pickling products. Dispose of spent materials according to local

regulations. Disposal of acid pickling and any other residual or wastes shall meet all environmental regulations. The cost of collecting, managing, and disposal of any cleaning wastewaters shall be included in the scope. Coordinate the work with on-site safety and environmental compliance staff.

- E. When acid pickling is performed, care shall be taken to protect any carbon steel elements and concrete from contact with the pickling product. If carbon steel elements come into contact with the paste, they may be rejected and require replacement at the option of the Engineer, at no additional cost to the Owner.
- F. Heat tint on the welds and the HAZ on the pipe interior and exterior shall be cleaned and passivated after welding using a chemical cleaning system including a pre-cleaning solution, pickling paste, and neutralizing rinse. The cleaning system shall be applied in accordance with the manufacturer's instructions.
- G. The surface shall be pickled using a heavy duty stainless steel pickling paste. The paste shall be applied using an acid resistant brush. The metal temperature during acid cleaning or pickling shall be at least 50°F, but not above 105°F. Do not pickle in direct sunlight. The cleaning solution shall be:
 - 1. BlueOne® Pickling Paste 130, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
 - 2. Antox® 71E Plus Pickling Paste, manufactured by Chemetall US, New Providence, New Jersey.
 - 3. Kytex® Pickling Paste 316, manufactured by Harvard Chemical Research, Atlanta, Georgia.
- H. Passivation shall be accomplished using a neutralizing rinse to remove the pickling paste. The residuals shall be removed by a water rinse. The neutralizing rinse shall be:
 - 1. Neutralizing Agent 502®, manufactured by Avesta Finishing Chemicals, Orchard Park, New York.
 - 2. Antox® NP, manufactured by Chemetall US, New Providence, New Jersey.
 - 3. Kytex® Neutralizer 408, manufactured by Harvard Chemical Research, Atlanta, Georgia.
- I. The cleaned surfaces shall be visually inspected under adequate lighting. Surfaces shall be free of oil, grease, flux, welding slag, dirt, metal chips, gross contamination, weld heat tint, etc., as is appropriate for the practice used.
 - 1. As an option, the inspection may be performed following exposure of the surfaces to water hydrostatic testing or high humidity to observe for rust staining.
 - 2. Surface finishes in ground or sanded areas shall be representative of 80 grit or better finish.
 - 3. Surface finishes of blasted surfaces shall be representative of 100 grit or finer.
 - 4. Surfaces that do not meet inspection requirements shall be refinished and/ or cleaned to the original requirements.

3.06 CERTIFIED WELD INSPECTOR AND NON-DESTRUCTIVE EXAMINATION OF WELDS

- A. As part of the Special Inspections, the Contractor will retain the services of a certified weld inspector and non-destructive examination technician for the review of welding procedure specification, qualification and individual welder's certifications.
- B. Full-Penetration Butt Welds shall be inspected as follows:
 - 1. All root and final cover passes of all full-penetration butt-welds shall be 100% examined visually (VT) and 25% of each weld examined by radiography (RT). The root pass shall be ground prior to VT examination. Acceptance criteria shall be as specified in Table 341.3.2 in ASME B31.3 for the fluid service scheduled.
- C. Non-destructive radiographic examination shall be carried out in accordance with the following requirements:
 - 1. The radiographic inspection procedure and all radiographs be developed and interpreted by a qualified technician hired by the Contractor.
 - 2. All radiographs of welds shall be made in accordance with ASTM E94 and ASTM E1032, and approved based upon the criteria specified in ASME BPVC, Section V. At least one penetrometer shall be used with each radiographic negative. One set duplicate films shall be taken and submitted to the Engineer.
 - 3. Radiographic film shall be developed at the location where the radiography is performed. The Contractor shall view the radiographs and have them interpreted independently by a qualified NDE technician.
 - 4. Sharp protrusions made by film clips shall be removed. Penetrometers shall be selected and placed in accordance with ASTM E94. If the penetrometer cannot be placed on the source side, a technique shot shall be made in accordance with the procedures included in ASTM E94, to demonstrate the ability to produce an acceptable technique. The technique shot radiograph shall be submitted for approval.

3.07 BOLTING PROCEDURE FOR FLANGED JOINTS

- A. Flanged joints shall be assembled per the gasket manufacturer's instructions and as specified herein. Utilize calibrated bolting equipment capable of applying a measured torque to flange bolts during joining. Bolting patterns, procedures and bolting equipment data shall be submitted to the Engineer prior to flange fitting and bolting.
- B. The contractor shall retain the services of a bolting specialist for calculation of the necessary clamping tension and target installation torque for bolting operations on flanges with flat gaskets. Full face gaskets shall not be used. The contractor shall submit bolting calculations to the Engineer for inclusion in the project records.
- C. Flange bolts, nuts, and washers shall be visually inspected and cleaned prior to bolting. Lubricate bolts and nuts; if hardened washers are not used, lubricate the flange surface around the bolt holes. Hand-tighten all nuts and bolts then tighten them to 10 to 20% of the target torque. However, the initial torque shall not exceed 20% of the target torque. The bolts shall be tightened according to the pattern included in AWWA Manual M11, Figure 12-3.

- D. For flanges having 4 to 8 bolts there shall be three rounds of tightening, after hand tightening, to 30%, 60% and then 100% of the target torque. For flanges having 12 or more bolts there shall be four rounds of tightening, after hand tightening, to 20%, 40%, 80% and 100% of the target torque. At 100% of target torque the flange gap shall be measure at every other bolt to confirm uniformity. The bolts shall be re-tightened to the target torque 24-hours after completion of the initial bolting sequence.
- E. The Contractor shall be responsible for filling out the Flange Bolting Worksheet, located at the end of this Section, for all flanged joints on the project. The joints shall be identified in accordance with the designation included in the laying schedule. The form shall be submitted to the Engineer at the end of each workday, after the 24-hour re-tightening sequence, for filing in the project records.

3.08 INSTALLATION OF INSULATING FLANGE MATERIALS

- A. Provide a minimum of five days advance notice to the Engineer before assembling insulated pipe flanges to allow for coordination and observance.
- B. Install pipe flange insulating materials at the locations shown on the Plans. Install pipe flange insulating materials in accordance with the manufacturer's recommendations and NACE recommended practice SP0286, "Electrical Isolation of Cathodically Protected Pipelines." Particular attention shall be paid to properly aligning the flanges prior to inserting the insulating sleeves around flange bolts. Prevent moisture, soil, or other foreign matter from contacting any portion of the insulated flange prior to or during installation. If moisture, soil, or other foreign matter contacts any portion of the insulated flange, disassemble it, clean with a suitable solvent and dry prior to reassembling. Follow the manufacturer's recommendations regarding the torqueing pattern of the bolts and the amount of torque to be used when installing the flange insulating kit. Do not use conductive grease on the flange bolts or any other flange components.

Install pre-assembled pipe flange insulating materials at the locations shown on the Plans. Install pipe flange insulating materials in accordance with the manufacturer's recommendations and NACE recommended practice SP0286, "Electrical Isolation of Cathodically Protected Pipelines." Test pre-assembled pipe flange isolating kit prior to coating.

3.09 HYDROSTATIC TESTING REQUIREMENTS FOR STAINLESS STEEL PIPING SYSTEMS

- A. All piping shall be subject to acceptance tests. Provide all necessary utilities, labor, and equipment. All pipe and fittings shall be pressure tested using air to 100 psi over 30 minutes. Acceptance criteria shall be no leakage or loss of pressure during the test.
- B. All piping shall also be field hydrotested at 1.5 times the rated working pressure for 60 minutes.
- C. Correct any leakage and repair any damage to the pipe and pipe appurtenances or to any structures resulting from or caused by tests. All leaks shall be repaired and lines retested.