August 30, 2024

Mr. Andy Bruels
Division Director of Financial and Technical Services
South Dakota Department of Agriculture and Natural Resources
523 E Capitol Ave.
Pierre, SD 57501-3182

Dear Mr. Bruels,

The City of Mitchell, South Dakota is requesting a product-specific waiver pursuant to the "American Iron and Steel" requirements for the Mitchell Pump Station and Ground Storage Reservoir project.

The Mitchell Pump Station and Ground Storage Reservoir project will provide a 2.5 million gallon ground storage reservoir and corresponding pump station to service the City of Mitchell, SD. The project's main purpose is to increase the city's water storage, improve pressures in the distribution system, and provide improved water quality for the city.

The Mitchell Pump Station and Ground Storage Reservoir project began construction in November of 2022 and is scheduled to be concluded in November of 2024.

General

1. **Description of the foreign and domestic construction materials:**
    a. Small-Bore Stainless-Steel Fittings
        i. 2" Stainless Steel 150# Unions
        [redacted]
        [redacted]
        iv. 1/2" x1-1/2" Stainless Steel Schedule 40 Nipple
        [redacted]
        vi. 1/2" Stainless Steel150# Threaded Tee
        vii. 1/2" x 1/4" Stainless Steel 150# Hex Head Reducing Bushing

2. **Unit of measure:**
    a. Each

3. **Quantity and Price:**

Product	Quantity	Unit Cost	Total Cost
2" Stainless Steel 150# Unions	4	$88.36	$353.44
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
1/2" x1-1/2" Stainless Steel Schedule 40 Nipple	64	$1.19	$76.16
[redacted]	[redacted]	[redacted]	[redacted]
1/2" Stainless Steel150# Threaded Tee	32	$3.59	$114.88
1/2" x 1/4" Stainless Steel 150# Hex Head Reducing Bushing	16	$1.83	$29.28
		Total	**$1,652.84**

4. **Time of delivery or availability:**
   a. Domestic: Not available
   b. Non-AIS, Import: One (1) Week after approved shop drawings.
5. **Location of the construction project:**
   a. Mitchell Pump Station and Ground Storage Reservoir
   b. Mitchell, SD 57031
6. **Name and address of the proposed supplier:**
   a. [redacted]
   1001 E 14th Street
   Sioux Falls, SD 57104-5224
7. **Detailed Justification for the use of foreign construction materials:**
   a. Stainless steel pipe and corresponding fittings are specified for process water lines 2-inches or smaller. The stainless-steel pipe and fittings are specified to be Schedule 40, Type 304, rated for 300 psi. The 150# fittings above meet this specification. The project requires 2-inch stainless steel piping to bring process water from two (2) booster pumps to two (2) chemical ejection panels.

   The above fittings are unable to be domestically sourced and therefore unable to meet AIS requirements. Below is a listed of contacted suppliers and attached is a letter from one of these suppliers and a letter from the prime contractor stating the inability to source these fittings domestically. For this reason, an Availability Waiver is requested.

The assistance recipient is unaware of the State receiving other waiver requests for the materials described in this waiver request for comparable projects. However, a similar project-specific availability waiver for 150-pound small diameter stainless steel pipe and fittings was granted to the City of Graham, North Carolina on May 28, 2024.

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

SECTION 40 23 19
PROCESS PIPING AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes furnishing and installation of the following, as indicated, in accordance with the provision of the Contract Documents:
   1. Pipe, fittings, wall pipes, connections, and gauges associated with interior Work.

B. Related section include:
   1. Section 01 11 00 – Summary of Work.
   2. Section 01 33 00 – Submittal Procedures.
   3. Section 01 45 00 – Quality Control.
   4. Section 01 60 00 – Product Requirements.
   5. Section 09 96 10 – Protective Coating Systems.
   6. Section 40 27 87 – Process Pipe Supports, Anchors, and Sleeves.
   7. Section 40 27 89 – Process Pipe Specialties.
   8. Section 40 27 97 – Process Gauges.
   9. Section 40 27 98 – Process Pipe Identification.
   10. Section 40 71 00 – Flow Measurement.
   11. Section 43 05 10 – Disinfection of Water Systems

1.02 REFERENCES

A. Reference Standards include:
   1. American National Standards Institute (ANSI)
   2. American Society of Mechanical Engineers (ASME)
   3. American Society for Testing Materials (ASTM)
   4. American Water Works Association (AWWA)
   5. American Welding Society (AWS)
   6. National Sanitation Foundation (NSF)
   7. ANSI/AWWA C104/A21.4: Cement-Mortar Lining for Gray-Iron and Ductile-Iron Pipe and Fittings for water.
   8. ANSI/AWWA C105/A21.5: Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for water and other liquids.
   9. ANSI/AWWA C110/A21.10: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1,219 mm), for Water.
   10. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   11. ANSI/AWWA C115/A21.15: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
   12. ANSI/AWWA C150/A21.50: Thickness Design of Ductile-Iron Pipe.
   13. ANSI/AWWA C151/A21.51: Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand Lined Molds for water or other liquids.
   14. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
   15. ASME B16.22: Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
   16. ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tubes.
   17. ASTM B 88: Seamless Copper Water Tube.
   18. ASTM D-1784: Rigid Poly(Vinyl Chloride) Compounds and Chlorinated
   19. Poly(Vinyl Chloride) Compounds.
   20. ASTM D-1785: Poly(Vinyl Chloride) (PVC) Plastic Pipe, schedules 40, 80, 120.
   21. ASTM D-2464: Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
   22. ASTM D-2467: Socket Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
   23. ASTM D-2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

24. ASTM D-2855: Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
25. AWWA C600: Installation of Ductile-Iron Water Mains and Their Appurtenances.
26. AWWA C606: Grooved and shouldered type joints.
27. AWWA C651: Standard for Disinfecting Water Mains.
28. AWWA C653: Disinfection of Water Treatment Plants.
29. NSF Standards No. 60 and 61 – National Sanitation Foundation.

1.03 QUALITY ASSURANCE

A. Welding Materials and Procedures: Conform to ANSI/AWS D.1.1.

B. Employ certified welders.

C. Piping modifications subject to Engineer's review. No additional compensation allowed for modifications required to suit equipment furnished by Contractor.

1.04 SUBMITTALS

A. Submit Shop Drawings in accordance with Section 01 33 00 – Submittal Procedures for all pipe and fittings indicating: Name of Manufacturer, Materials, Standard Dimensions, References, and Joint Data.

B. Submit Affidavit of Compliance for ductile iron pipe and fittings.

C. Submit design calculations for structural design of pipe thickness where pipe class or thickness is not specifically called out.

D. Submit detailed piping layout drawings showing piping and connections to equipment and appurtenances.

E. Grooved/shouldered joint couplings and fittings shall be shown on drawings and product submittals, and shall be specifically identified with the applicable style or series designation.

F. Submit written certification from the grooved/shouldered component manufacture that all grooved/shouldered components (couplings, fittings, valves, gaskets, bolts and nuts) are of the same manufacture and grooving tools are of the same manufacturer as the grooved/shouldered components.

1.05 PAINTING AND IDENTIFICATION SYSTEMS

A. All material and equipment in this section shall be factory primed. Primer shall be compatible with finish coats of paint provided under Section 09 96 10 – Protective Coating Systems.

B. The Contractor shall refinish and restore to the original appearance all equipment that has sustained damage to the manufacturer's finish or prime coats of paint or enamel.

C. Finish painting of all materials and equipment in this Section shall be the responsibility of the Contractor, and shall be as described in Section 09 96 10 - Protective Coating Systems, unless otherwise specifically indicated.

D. Provide identification systems as identified under Section 40 27 98 - Process Pipe Identification.

1.06 REGULATORY REQUIREMENTS

A. All Products that may come into contact with water intended for use in a Public Water System shall meet ANSI/NSF International Standards 60 and 61, as appropriate. A Product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each Product.

PART 2 PRODUCTS

2.01 PIPE SCHEDULE

A. Process Piping:
   1. Ductile Iron.

B. Chemical Feed System Transfer and Feed Piping:
   1. Polyvinyl Chloride (PVC).

2. Chlorinated PVC (CPVC).
3. Polyethylene tubing.
4. As otherwise shown on Drawings or specified in other Sections.

C. Other Piping:
1. Stainless Steel.
2. Polyvinyl Chloride (PVC).
3. Chlorinated PVC (CPVC).
4. Copper.
5. As otherwise shown on Drawings or specified in other Sections.

2.02 DUCTILE IRON PIPE AND FITTINGS

A. General
1. Minimum Pressure Class (Pounds per Square Inch – PSI):
a. Interior and exterior, flanged:
1) 12-inch diameter and smaller: 350 PSI.
2) 14-inch diameter and larger: 250 PSI.
b. Interior and exterior, grooved and shouldered:
1) 12-inch diameter and smaller: 350 PSI
2) 14-inch through 18 inch diameter: 250 PSI
3) 20-inch through 36-inch diameter: 150 PSI
4) 42-inch diameter and larger: 175 PSI
c. Buried, mechanical, and push-on joints:
1) 12-inch diameter and smaller: 350 PSI.
2) 14-inch diameter and larger: 250 PSI.
2. On-site inspection of all materials by Contractor.
3. Pipe coating:
a. Buried and submerged: bituminous coating (asphalt coating).
b. Interior and exposed: prime coat.
4. Bolts and nuts:
a. Buried and submerged: stainless steel.
b. Interior and exposed: 304 Stainless Steel
5. Pipe lining:
a. All pipelines except air lines: cement-mortar.
b. Ductile iron pipe for air lines shall be unlined.
6. Submit design calculation for structural design of pipe thickness where pipe thickness or class is not specifically called out.
7. Mechanical joint glands: ductile iron retainer type.
8. Polyethylene encase (wrap) all buried pipe and fittings.
9. Pipe and fittings to match face and drill of valves.
10. All flanges shall be full-faced flanges.
11. All materials shall be new and unused.

B. Pipe: ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.

C. Flanged Pipe: ANSI/AWWA C115/A21.15.
1. Minimum Class: Class 53.

D. Grooved and Shouldered Pipe: ANSI/AWWA C606
1. Grooved Minimum Class: Class 53
2. Shouldered Minimum Class: Class 350.

E. Fittings:
1. Flanged, Grooved and Shouldered fittings:
a. Conform to ANSI/AWWA C110/A21.10.
b. Full face gaskets, bolts, and nuts: AWWA C110, Appendix A.
c. Grooved and Shouldered: Conform to ANSI/AWWA C606
d. Material: ductile iron.

2. Reducers: all reducers shall be concentric pattern unless noted otherwise on the Project Drawings.

F. Gaskets:
1. All gaskets shall be fully faced.
2. Gaskets used on air lines shall be EPDM material.
3. Provide American Toruseal gaskets at high service discharge piping to provide a minimum of 350 psig pressure rating.

G. Coatings and Linings:
1. For Interior Piping
   a. Exterior Coating: per Section 09 96 10 - Protective Coating Systems
   b. Cement lining: ANSI/AWWA C104/A21.4.
2. For Exterior Buried Piping
   a. Exterior Coating: Standard asphaltic coating meeting ANSI/AWWA C110/A21.10 and ANSI/AWWA C151/A21.51.
   b. Cement lining: ANSI/AWWA C104/A21.4.
   c. Polyethylene encasement: High Density Cross Laminated (HDCL) polyethylene conforming to ANSI/AWWA C105/A21.5.

H. Joints - Pipe and Fittings:
1. Push-on: ANSI/AWWA C111/A21.11.
2. Mechanical: ANSI/AWWA C111/A21.11.
3. Mechanical joints with tie rods:
   a. Tie rods: ASTM A307 Carbon Steel.
   b. Washers: ANSI B18.22.1, plain steel.
   c. Threaded connections
      1) ANSI/ASME B1.20.1, NPT
   d. See details on Project Drawings.
4. Flanged: ANSI/AWWA C110/A21.10 and ANSI/AWWA C115/A21.15.
5. Provide type of joint as indicated on Project Drawings.
6. Grooved and shouldered joints are acceptable only where approved by Engineer.
   a. Conform to AWWA C606.
   b. Couplings shall consist of two or more ductile iron housing segments conforming to ASTM A536, elastomer gasket, and zinc-electroplated steel or stainless steel bolts and nuts.
      1) Grooved coupling - Victaulic Style 31.
      2) Shouldered coupling - Victaulic Style 44.
      3) Grooved flange adapter - Victaulic Style 341.
      4) Transition to grooved end IPS to Ductile Iron pipe and fittings - Victaulic Style 307 couplings may be used on 3” thru 12” pipe.
      5) Groove coupling and groove flange adapter gaskets are to be rated by the coupling manufacture of an elastomer grade suitable for the intended service. Gaskets shall be molded and produced by the coupling manufacturer. Gasket are to be of elastomer material with properties as designated in ASTM D-2000 and design molded of synthetic rubber with a short center leg which shall bridge the pipe ends offering an initial seal on the leading edge of the pipe ends.
7. The Engineer will only accept Uni-Flanges or approved equivalent at locations that receive prior approval.

I. Wall sleeves: wall sleeve shall be provided where ductile iron pipe passes through concrete walls unless a wall pipe is used.

J. Approved Manufacturers:
1. American Ductile Iron Pipe
2. U.S. Pipe
3. Tyler Union
4. McWane Ductile

5. Prior Approved Equivalent.

2.03 STAINLESS STEEL PIPE

A. Threaded End Pipe (For process water line 2-inch and smaller)
   1. ASTM A312 stainless steel pipe, Schedule 40, Type 304 rated for 300psi minimum.
      a. On-site inspection by Contractor of all materials.
      b. Fittings shall be threaded, material to match pipe, and conforming to ANSI/ASME B16.3, Class 300.
      c. All materials to be new and unused.
   2. Contractor shall use the extra low carbon version of stainless steel if piping is identified as 304L, 316L, or in any form of this (i.e., 3xxL).

B. Shop Fabricated Component Passivation:
   1. Pickle and passivate pipe sections, straight spools, fittings, and other piping components following shop fabrication.
   2. Immerse fabricated pieces in sulfuric acid solution followed by immersion in a nitric-hydrofluoric bath and subsequent wash at the proper temperature and length of time.
   3. Finish Requirements: remove free iron, heat tint oxides, weld scale, and other impurities to obtain a passive finished surface.

C. Field Weld Passivation:
   1. All field welds shall be passivated using a compound containing nitric acid.
   2. Compounds containing providing passivation and cleaning of the welds are acceptable.
   3. Follow manufacturer's instructions for application and clean up of product.

2.04 PVC PIPE AND FITTINGS

A. General:
   1. Materials: ASTM D-1784, Type 1, Grade 1.
   2. Weight: Schedule 40 or Schedule 80 as indicated on Drawings.
   3. Pipe: ASTM D-1785.
   4. Fittings: ASTM D-2467, socket type or ASTM D-2464, flange type.
   5. Pipe coating:
      a. Buried and submerged: none.
      b. Exposed: painted.
   6. Solvent cement: ASTM D-2564, primer and PVC solvent cement.

B. Approved Manufacturers:
   1. Georg Fischer.
   2. Hayward.
   3. Asahi/America.
   4. IPEX.
   5. No other manufacturers will be acceptable.

2.05 CPVC PIPE AND FITTINGS

A. General:
   1. Materials: ASTM D-1784, Class 23447-B, Type 4, Grade 1.
   2. Weight: Schedule 40 or Schedule 80 as indicated on Drawings, conforming to ASTM F441.
   3. Pipe: ASTM F441.
   4. Fittings: ASTM F437 and F439, socket type or flange type
   5. Pipe Coatings:
      a. Buried and submerged: none
      b. Exposed: painted
   6. Solvent cement: ASTM F93-14, primer and PVC solvent cement.

B. Approved Manufacturers:
   1. Georg Fischer.
   2. Hayward.

3. Asahi/America.
4. IPEX.
5. No other manufacturers will be acceptable.

2.06 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B88, Types L and M, drawn temper, seamless copper tube.
   1. Solder filler material: 95-5 Tin-Antimony Solder having 0.10% lead content. (ASTM B32).
   2. Solder flux: ASTM B813, liquid or paste type.
   3. Brazing filler material: BCuP meeting ANSI/AWS A5.8.
   4. Braze flux: ANSI/AWS A5.31, Type FB3-A or FB3-C.
      a. Use of brazing flux is not necessary if the components being joined are wrought copper tube, wrough copper fittings and the filler metal being used is of the BCuP series.

B. Copper Fittings
   1. Threaded joint fittings: threads conform to ASTM B1.20.1
   2. Soldered joint fittings: Meet ASME B16.22
   3. Push connect (Push-fit) joint fittings: Meet ANSI 1061
   4. Flanged fittings: Meets ASME 16.24, Class 150, with solder joint ends
   5. Copper Unions: MSS SP-123, cast-copper alloy, hexagonal stock body, with ball and socket, metal to metal seating surfaces and solder joint or threaded ends.

2.07 FLANGE INSULATING GASKET KITS

A. Approved Manufacturer:
   1. Advance Products Systems.
   2. Prior Approved Equivalent.

B. Size: per diameter of flange.

C. Pressure rating: meet minimum pressure rating of attached piping.

D. Provide to meet either full-faced or raised faced portion of flange.
   1. Full-Faced Gasket
      a. Type E gaskets.
      b. Precision cut bolt holes.
      c. Material: plain face or Neoprene face phenolic.
   2. Raised Face Portion
      a. Type F gaskets.
      b. Inside diameter of the bolt hole circle should be slightly smaller than the outside diameter of the gasket, assuring an exact, automatic positioning of the gasket.
      c. Material: plain face or Neoprene face phenolic.

E. Provide insulating sleeve and washer with the single insulation sets.
   1. Material: high density polyethylene (HDPE), phenolic, and Mylar.
   2. Provide with each set a 1/8” thick S.A.E. electro-plated steel washer.

PART 3 EXECUTION

3.01 PREPARATION

A. Make necessary field measurements to determine pipe laying lengths; fabricate pipe; deliver pipe to site; store pipe with ends capped to prevent contamination and damage to interior; prepare pipe for installation; work pipe into place without forcing or springing.

B. Do not store or ship small diameter pipe inside larger diameter pipe.

C. Ream pipe and tube ends. Remove burrs. Repair lining at pipe cuts.

D. Remove scale and dirt, inside and outside, before assembly.

E. Remove all cuttings, filings, and other debris from inside of pipe.

F. Remove welding slag or foreign material from pipe and fitting materials.

G. Remove temporary preservative coatings from valves, fittings, and appurtenances prior to installation.

H. Clean, repair, or replace equipment malfunctioning due to presence of foreign material left in piping during installation or entering piping after installation due to Contractor's work at no cost to Owner.

3.02 DUCTILE IRON PIPE AND FITTINGS

A. Joints:
   1. Buried: push-on or mechanical.
   2. Interior submerged: flanged or grooved and shouldered.
   3. Interior exposed: flanged or grooved and shouldered, except where indicated otherwise on the Project Drawings.

B. Mechanical Joints:
   1. Carefully assemble in accordance with the manufacturer’s recommendation.
   2. Bolts shall be uniformly tightened to the torque values listed in Appendix A of ANSI/AWWA C111/A21.11. Over tightening of bolts to compensate for poor installation practice will not be permitted.
   3. The holes in mechanical joints with tie rods shall be carefully aligned to permit installation of the tie rods.

C. Flanged Joints:
   1. Pipe shall extend completely through screwed-on flanges. The pipe end and flange face shall be finish machined in a single operation. Flange faces shall be flat and perpendicular to the pipe centerline.
   2. Care shall be taken to avoid restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress in the flanges when bolting flanged joints.
   3. One flange shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be gradually tightened and at a uniform rate, to ensure uniform compression of the gasket.
   4. Special care shall be taken when connecting piping to pumping equipment to ensure that piping stresses are not transmitted to the pump flanges. All connecting piping shall be permanently supported so that accurate matching of bolt holes and uniform contact over the entire surface of the flanges is obtained before any bolts are installed in the flanges.

D. Grooved Joints:
   1. Grooved joints shall be installed in accordance with the manufacturer’s latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer.
   2. The grooved coupling manufacturer’s factory trained representative shall provide on-site training for contractor’s field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation.
   3. A distributor’s representative is not considered qualified to conduct the training or jobsite visit(s).

E. Penetrations:
   1. Install pipe straight through concrete walls or floors.
   2. Provide wall sleeves where ductile iron pipe passes through concrete walls and floors, unless specified otherwise on Project Drawings.
   3. Extend pipe such that the end extends 4" beyond the face of the wall unless specified otherwise on Project Drawings.
   4. Install embedded wall flange in center of wall or floor and grout in place when embedded wall pipe flange shown on Project Drawings.
   5. Fabricate wall pipes to dimensions required.

F. Support pipe at fittings with rods; anchor and support in accordance with Section 40 27 87 - Process Pipe Supports, Anchors and Sleeves.

G. Pipe and fittings to match face and drill of valves and appurtenances.

3.03 STAINLESS STEEL PIPE

A. Welding

1. Filler material for welding stainless steel and allows shall be Type 308L filler for Type 304L material and Type 316L filler for Type 316L material.
2. Heat input control for welding shall be specified in the applicable WPS and shall not exceed 55,000 joules per inch.
3. Complete penetration pressure retaining welds shall be made using the Gas Tungsten Arc Welding (GTAW) process for the root and second layer as a minimum.
4. Socket welds or butt welds in all stainless steel instrument tubing lines shall require an inert gas purge using argon during welding to avoid oxidation.
5. The application of heat to correct weld distortion and dimensional deviation without prior written approval from the Engineer is prohibited.
6. Unless otherwise approved in writing, the GTAW process shall require the addition of filler metal.
7. The maximum preheat and interpass temperature for austenitic stainless steel shall be 350° F (176° C). The minimum preheat temperature shall be 50° F (10° C).
8. Complete joint penetration welds welded from one side without backing, weld repairs welded from one side without backing, or weld repairs in which the base metal remaining after excavation is less than 0.1875 inch (5 mm) from being through wall, shall have the root side of the weld purged with an argon purge gas prior to welding. Purge gas shall only be argon. The argon purge gas shall be classified as welding grade argon or shall meet Specification SFA-5.32, AWS Classification SG-A. The purge gas shall be maintained until a minimum of two layers of weld metal have been deposited.

B. Cleaning and Pickling

1. All stainless steel piping shall be thoroughly cleaned and pickled at the mill in accordance with ASTM A380.
2. Pickling shall produce a modest etch and shall remove all embedded iron and heat tint. After fabrication, pickled surfaces shall be subjected to a 24 hour water test or a ferroxyl test to detect the presence of residual embedded iron. All pickled surfaces damaged during fabrication including welded areas shall either be mechanically cleaned or repickled or passivated in accordance with ASTM A380. Materials that have been contaminated with steel alloys or free iron shall not be used until all contamination is removed. When cleaning to remove steel or iron contamination is required, it shall be performed in accordance with ASTM A380, Code D requirements. All stainless steel surfaces shall be adequately protected during fabrication, shipping, handling, and installation to prevent contamination from iron or carbon steel objects or surfaces. Particulate matter shall be removed from piping and welds. Labels shall be affixed to the piping sections to indicate shop cleaning has been performed. Welds shall be either mechanically cleaned or pickled or passivated on the exterior of the pipe.
3. For small diameter piping, a solution shall be circulated. For piping large enough to enter, a passivation gel may be used on the interior of the pipe.

3.04 THREADED OINTS

A. Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be fully and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed after threading and before assembly to remove all burrs.

B. Threaded joints in plastic piping shall be made with Teflon thread tape applied to all male threads. At the option of the Contractor, threaded joints in other piping may be made up with Teflon thread tape, thread sealer, or a suitable joint compound. Thread tape and joint compound or sealers shall not be used in threaded joints that are to be seal welded.

3.05 COMPRESSION OINTS

A. Ends of tubing shall be cut square and all burrs shall be removed. The tubing end shall be fully inserted into the compression fitting and the nut shall be tightened not less than 1-1/4 turns and not more than 1-1/2 turns past fingertight, or as recommended by the fitting manufacturer, to produce a leaktight, torque-free connection.

3.06 SOLVENT WELDED OINTS

A. All joint preparation, cutting, and jointing procedures shall comply with the pipe manufacturer's recommendations and ASTM D2855. Pipe ends shall be beveled or chambered to the dimensions recommended by the manufacturer. Newly assembled joints shall be suitably blocked or restrained to prevent movement during the setting time recommended by the manufacturer. Pressure testing of solvent welded piping systems shall not be performed until the applicable curing time, as set forth in Table X2.1 of ASTM D2855, has elapsed. Solvent welding shall be performed by bonding operators who have met the requirements of ASME B31.3 and A328.

B. Flanges or unions shall be provided where needed to facilitate disassembly of equipment or valves. Flanges or unions shall be joined to the pipe by a solvent weld. When acceptable to Engineer, threaded joints may be used instead of solvent welded joints in exposed interior locations for the purpose of facilitating assembly. The use of threaded joints shall be held to a minimum.

3.07 PVC CPVC PIPE

A. Form solvent joints in PVC pipe and fittings to ANSI/ASTM D2855. Form solvent joints in CPVC pipe and fittings to ANSI/ASTM F493. Solvent joints are to be used only where threaded or flanged connections are inappropriate.

B. 2-inch and larger: make connections to equipment and supply lines with flanges, unless otherwise specified.

C. Under 2-inches: make connections to equipment and supply lines with solvent joints, unless otherwise specified.

D. All PVC pipe shall be installed by a master plumber or under the supervision of a master plumber.

3.08 COPPER PIPE

A. Install fittings for changes in direction and branch connections in hard drawn copper tube. Where approved changes in direction may also be made by bending of Types K and L tube. Type M tube shall not be bent

B. Ream ends of pipe and tube and remove burrs to restore full inside diameter and remove burr from outer diameter. Remove slag, scale, dirt and debris from inside and outside of pipe, tube and fittings before assembly.

C. Construct soldered joints to ASTM B828.

D. Construct brazed joints to ANSI/AWS C3.4.

E. Install press-connect and push-connect fittings in accordance with manufacturer's instruction.

F. Install solder-joint to male-thread adapters, or solder-joint to male-thread unions meeting the requirements of ASME B16.18 or ASME B16.22, adjacent to each threaded valve and threaded equipment connection in a copper tube system.

G. Install ASME B16.24 cast copper alloy pipe flanges adjacent to each flanged valve and flanged equipment connection in a copper tube system.

3.09 DISSIMILAR PIPE CONNECTIONS

A. Provide non-conducting connections or flange insulating gasket kits wherever jointing dissimilar metals in open systems.

3.10 TESTING

A. Hydrostatically test each entire line in accordance with AWWA C600-99.

B. All joints shall be watertight and free from leaks. All leaks shall be repaired by and at the expense of the Contractor.

C. Refer to the Piping Schedule for the minimum test pressure requirements. If not noted within Piping Schedule, the minimum test pressure shall conform to the pressure identified in AWWA C600.

3.11 DISINFECTION

A. Disinfect process and miscellaneous water piping in accordance with Section 43 05 10 – Disinfection of Water Systems.

END OF SECTION 40 23 19