REGIONALSAN
Sacramento Regional County Sanitation District

Contract Documents for the Construction of

Sacramento Regional Wastewater Treatment Plant

BIOGAS FACILITY VALVE REPLACEMENT PROJECT RFB 8194

VOLUME 1 OF 2

PART A - SPECIFICATIONS

00820 - SAFETY
01140 - COORDINATION WITH OPERATIONS
15061 - STEEL PIPE
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JULY 2015

SECTION 00820

SAFETY

1.01 GENERAL

A. All operations shall conform to applicable occupational safety and health standards, rules, regulations and orders which include, but are not limited to: Title 29 of the Code of Federal Regulations and the Electrical, Construction, Tunnel and General Industry Safety Orders issued by the Division of Industrial Safety (Cal/OSHA) of the State of California. In the event of a conflict between the requirements in the referenced standards, the most stringent standard shall prevail.

B. The Contractor shall submit their IIPP for review.

C. All contractors, vendors and visitors will wear hardhats and safety vests at all times while in construction areas. In addition, if necessary, appropriate foot, eye and ear protection shall be worn.

D. Contractor shall have a Site Specific Safety Plan that has been specifically prepared for the contemplated work. Site Specific Safety Plan shall comply with section 3203 of Cal/OSHA and shall be applicable to all individuals engaged in the Work, including the Contractor's subcontractors, suppliers and others.

E. An Emergency Action Plan and a Fire Prevention Plan in accordance with sections 3220 and 3221 respectively of Cal/OSHA shall be included in Site Specific Safety Plan.

F. The responsibility for safety rests with the Contractor who must provide a safe work site for workers and other individuals entering the area.

G. District reserves the right to stop any work activity that creates a serious safety violation as defined by Cal/OSHA, and Contractor does not take immediate corrective actions.

H. In accordance with OSHA's National Emphasis Program (NEP), any contractor or subcontractor working on or adjacent to chlorine, sulfur dioxide, and/or digester gas systems during a Process Safety Management (PSM) inspection will also be inspected by OSHA per CPL 02-09-06.

1.02 PROJECT SPECIFIC SAFETY PROGRAM

A. Project Specific Safety Program shall include:

1. Designation of Safety Manager. A resume shall be provided.

2. Detailed description of Site Specific Safety Plan.

3. Policies and procedures to ensure compliance with regulations.

4. Staffing plan and organization chart for implementation of the safety program.

5. Training program including new employee orientation.

6. List of equipment, supplies and personal protective devices that will be available and utilized.

7. Description of accountability for foreman and supervisors.

8. Site Specific Emergency Response Plan for accidents and injuries.

9. Description of accident investigation and reporting procedures.

10. Description and frequency of tailgate and regular safety meetings.

11. Participation of subcontractors, suppliers and others in Project Safety Program.

12. Method of identifying, correcting, or remedying situations that are unsafe or not in compliance with Project Safety Program.

13. Plans and procedures for confined space entries.

14. Provisions for excavation safety.

15. Procedure for preparation of Work Permits.

16. Method to remedy nonconforming situations.

B. The Project Specific Safety Program shall be submitted to District, for Review, prior to commencement of work and shall remain in effect until the Work has been completed. Site Specific Safety Plan shall be reviewed, updated, and changes submitted as they occur.

1.03 SAFETY MANAGER

A. A Safety Manager shall be designated who has responsibility for safety of the Work and who has the duty to implement and secure compliance with the Site Specific Safety Plan. Safety Manager shall have the authority to remedy or correct any unsafe or noncompliance situations or problems.

B. Safety Manager or designated alternate individual shall be on site when Work is being pursued. Contractor will be permitted to designate an alternate individual to act on behalf of Safety Manager when Safety Manager is absent from the work site.

C. Safety Manager shall prepare Work Permits for each confined space entry and shall organize and observe each entry.

1.04 PROTECTION OF WORKERS

A. SRWTP receives sewage and industrial wastes. There is a possibility that solvents, fuels and hazardous material may be in the wastewater. The wastewater and the associated facilities should be considered contaminated. Individuals who contact wastewater, debris or existing facilities should take appropriate safety and health precautions such as personal protective equipment and inoculations for disease.

B. Safety equipment and precautions shall be utilized to protect workers and District personnel during the work.

1.05 WORK PERMITS

A. There are areas and operations at the SRCSD which are potentially hazardous or dangerous if the appropriate precautions are not taken. The Work Permit process is utilized to review proposed work activities and to ensure good work practices and appropriate safety measures are followed. Contractor is required to prepare Work Permits and comply with the stipulated conditions. A Work Permit shall provide a detailed description of the proposed activities and sequencing.

B. The Work Permit procedure is described in Section 01140. Examples of activities which require a Work Permit are:

1. Operations that have open flames, the potential for sparks or activities that may result in high temperatures. Examples include welding, cutting, grinding and electrical work.

2. The use of tools or electrical equipment in classified areas.

3. Work on equipment or piping which contains, or has contained, a flammable or hazardous material, chemical or gas. Work on or in proximity to chemical or gas storage facilities.

4. The use of hazardous materials.

5. Activities which involve electricity at greater than 500 volts.

6. Activities that involve pressures greater than 150 psi.

7. Activities that involve work in a confined space including the opening of vaults and manholes.

8. Activities that involve special precautions required by Cal/OSHA.

1.06 DOUBLE ISOLATION

A. Double isolation shall be provided as specified in Section 01140.

1.07 REPORTING

A. All incidents that are reportable on OSHA Form 200 or that result in property damage in excess of $1,000 shall be promptly reported to District. A detailed description of the incident including names and statements of witnesses shall be provided within 5 days of the occurrence.

B. Contractor shall inform the District within 5 days of any claims, suits, or citations of violations that may arise from an incident or injury.

1.08 NON COMPLIANCE

A. When a serious hazard is identified, the Contractor will receive a verbal notification of the problem and a request to rectify the situation. If the situation is not corrected in the allotted time or reoccurs, a written notification will be issued to the Contractor that will clearly describe the condition, date Contractor initially was notified, the recommended action and the expected date of compliance. If the situation is not corrected, the Contractor's worker's compensation insurance carrier will be notified.

****END OF SECTION****

SECTION 01140

COORDINATION WITH EXISTING OPERATIONS

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

A. Contractor work activities that impact existing District operations, property or facilities (such as Interceptor pipelines, manholes, treatment processes, environmental resources, and access roads to District facilities) require an approved, signed Access Request (AR) prior to commencement of work. Interruption of flow or connection to an existing system or interceptor requires a Shutdown Plan and Location Map to be included with the Access Request. In addition to the Shutdown Plan, any activity that requires special safety precautions to be taken will require a Safety Work Plan to be included with the Access Request.

B. The Access Request

1. Allows District Operations time to review the proposed work and to schedule and coordinate necessary process or equipment shutdowns,

2. Allows District Safety office review of proposed work and contractors' safe work practices related to the specific work to be performed,

3. Informs the contractor of any special hazards or exposures related to the specific work.

C. The District maintains permits to collect, treat and discharge wastewater. These permits establish discharge limits for wastewater, storm water, and air emissions and establish spill reporting requirements and fines. Violation of District permits shall not result from the Contractor's work. Any unauthorized discharge or spill shall immediately be reported to the District's Plant Control Center (916-875-9400). District will require Contractor to stop or restrict any activity that has or could result in an unauthorized discharge or permit violation. District will prevent or remedy the situation by the most expeditious means. Contractor will be responsible for all costs incurred including fines.

1.02 REQUIREMENTS

A. COORDINATION AND ACCESS

Activities that affect the operation of existing District equipment, including SRWTP processes, Interceptor pipelines or facilities, or access to District property will require coordination between District and Contractor.

1. Access Requests are generally required based on impending work activities discussed at weekly construction coordination meetings, and approval is issued jointly by the District O&M Support office and District Safety Office.

2. Unrestricted access for District personnel and equipment shall be provided at all times to existing facilities, unless a reduced level of access is explicitly allowed in the approved Access Request.

1.03 ACCESS REQUESTS

A. An Access Request provides notification of a Work Item or other activity proposed by the Contractor. An Access Request describes the contemplated work including when, where and how it will be accomplished. An Access Request shall be submitted by a qualified representative of the Contractor who is familiar with all aspects of the work and pertinent safety requirements. An Access Request may be required whenever any of the following conditions are contained in or will be affected by Contractor's work:

1. General Project mobilization or District property access,

2. Work in, connection to, or removal of any pipeline, manhole, pump station, asset or wastewater process or equipment.

3. Any work that may impact environmental resources on District property,

4. Any work that may impact or disrupt other activities on District property such as leased agricultural operations, scientific studies, or concurrent construction projects,

5. Excavation on District property, dewatering of any excavation, structure, tank, vessel, or piping system

6. Installation or removal of bulkheads, cofferdams and isolation devices

B. A fully completed Access Request form shall be submitted at least 14 calendar days prior to the date proposed for commencement of work. An Access Request meeting may be required prior to the approval of the work or upon the District's request.

C. Contractors are required to describe the proposed work activity, indicate the property, system or equipment that will be affected, list the labor and equipment to be utilized, indicate the date, time and duration of the work, describe measures that will be implemented to reduce impacts to District property and facilities, and describe safety precautions to be observed. Drawing and section numbers shall be indicated where appropriate. A Shutdown plan shall be included with the Access Request when the work affects an existing system or process.

D. The Contractor shall plan and schedule Access Requests as early as possible. An Access Request will be reviewed and returned within 14 calendar days after submission of all necessary information. Sufficient information and detail shall be included with an Access Request to permit District to evaluate the proposed operation and the associated risks. Insufficient information on an Access Request may delay approval within 14 calendar days.

E. Contractor shall not be allowed to proceed with any work, or any portion of the work, described in an Access Request without complying with all the conditions, in their entirety, of the Access Request approval. All conditions of approval, including additional safety precautions added by District Safety Office, shall be complied with and effectively communicated to Contractor's personnel and subcontractors. If the Contractor does not agree with the additional safety requirements, work shall not start until resolution is attained. Changes in the proposed activities or field conditions of an Access Request, or delay of the work, will require the submission of a new or revised Access Request.

1.04 SHUTDOWN PLAN

A. A Shutdown Plan shall be included with an Access Request whenever an existing operating system or facility such as a pipeline, basin, tank, channel, power supply, control circuit, instrumentation, equipment, pump, meter, or structure is affected.

Shutdowns shall be planned and coordinated to minimize the number and duration of activities that affect existing operations.

B. District will limit the duration of shutdowns for critical systems. Stated durations are the total time period between when the system is made available to Contractor and when it is ready for return to service. If Contractor cannot complete the work within the allowed time, Contractor shall immediately request an extension from District. If District does not approve the requested extension, Contractor shall complete the work or return the system to operable condition. District will complete the work if Contractor does not return the system to operable condition as directed. Contractor is responsible for extra costs or damages incurred by Contractor or District to meet these requirements.

C. Requirements:

1. Designate the equipment or system that will be affected or removed from service. Describe the work to be undertaken. Identify the portion of the system that will be isolated, dewatered, decommissioned, de-energized, depressurized, or drained.

2. List the labor, equipment, materials, tools, utilities and incidental items to be used.

3. Indicate measures to prevent discharge of wastewater, stormwater pollution, odor or disruption of treatment processes.

4. Indicate dewatering method and means for disposal of leakage water.

5. Provide details for bulkheads, cofferdams and isolation devices.

6. Describe safety precautions and equipment.

7. Describe recovery plan if the shutdown cannot be completed as planned.

8. List activities to be done by District.

9. Indicate the time estimated to complete the shutdown.

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

ACCESS REQUEST

Prime Contractor	Contract #	Date
Sub-Contractor	AR #	Revision
Contact for Contractor	Work Item #	CPM Activity #
Phone	□ Work Plan Attached	□ Drawing Attached

PART 1 – CONTRACTOR WORK PERMIT

Start Date/Time	Completion Date/Time
Reference Contract Drawings/Specifications	
Equipment or System to be Worked On	
Location of Work	
Provide MOC ref. no. for work affecting the SRWTP Gas Mgmt. or Chemical Handling Areas:	

Type of Work (check all that apply)	□ Civil	□ Mechanical	□ Electrical	□ Instrumentation
	□ Process	□ Coating	□ Hotwork	□ Other (specify)
	□ Mobilization	□ Traffic/Ped. Access	□ Shutdown	

Description of Work (Ref. process system/piping system)

_____

_____

Anticipated Hazards

_____

_____

Tools/Equipment to be Used	□ Cutting/Welding Torches	□ Arc Welders	□ Jack Hammers
	□ Power Saws	□ Grinders	□ Pneumatic Tools
	□ Backhoe	□ Crane	□ Radioactive Test Device

Access Request Instructions

- Contractor fills out AR with sufficient information to define the work and anticipated safety hazards. Contractor signs AR at bottom of page 2.
- R.E. reviews AR and signs on page 3 prior to delivering AR to O&M Support and Safety Office staff.
- O&M Support and Safety Office review and approve the AR with conditions, restrictions, or additional Safety items (all additional safety items on page 2 will be initialed)
- RE gives approved AR back to contractor prior to contractor performing the work.
- Contractor reviews AR conditions and Safety page prior to beginning work.

PART 2 – CONTRACTOR SAFETY PRECAUTIONS

All items checked will be complied with/used in accordance with applicable safety standards (CalOSHA, UFC, etc.) and the requesting contractor's safety program.

HOT WORK PLAN
- □ Isolate Combustibles
- □ Fire Extinguishers
- □ Fire watch
- □ Flash Protection
- □ Not Applicable

VENTILATION
- □ Natural only
- □ Auxiliary, continuous
- □ Not Applicable

AIR MONITORING
- □ Periodic
- □ Continuous
- □ Frequency _____
- □ Not Applicable

HOUSEKEEPING
- □ Debris Removal
- □ Dust Control
- □ Maintain access to/through worksite
- □ Not Applicable

POTENTIAL ATMOSPHERIC HAZARDS TO BE MONITORED
- □ Oxygen Deficiency
- □ Combustible Gases
- □ Oxygen Enrichment
- □ Toxic Gases
- □ Other _____
- □ Not Applicable

EXCAVATION/TRENCHES
- □ Shoring
- □ Benching
- □ Sloping
- □ Barricades
- □ Excavation Plan Submittal Number _____
- □ Not Applicable

HAZARDOUS MATERIALS TRAINING
- □ Substance(s) _____
- □ Not Applicable

ELEVATED AREAS
- □ Fall Protection
- □ Guardrails
- □ Not Applicable

ENERGY CONTROL PROCEDURES
- □ Lockout
- □ Blockout
- □ Tagout
- □ Not Applicable

PIPING/EQUIPMENT OPENING AND/OR ENTRY(ensure prior to opening)
- □ Effectively Isolated
- □ Depressurized
- □ Drained
- □ Purged/Flushed of Hazardous Substance(s)
- □ Not Applicable

REVIEW EMERGENCY PROCEDURES/ALARMS
- □ Chlorine/Sulfur Dioxide Areas
- □ Oxygen Handling Areas
- □ Gas Management Areas
- □ Other _____
- □ Not Applicable

ABATEMENT ACTIVITIES (Title 8, Construction Safety Orders)
- □ Asbestos (Article 4 § 1529)
- □ Lead (Article 4 § 1532.1)
- □ Not Applicable

CONFINED SPACE PROCEDURES
- □ Permit Required
- □ Personnel Retrieval System
- □ Non-permit
- □ Communication w/ Entrant
- □ C-5
- □ Rescue Personnel @ site
- □ Entry Permit @ site
- □ Supplied Air
- □ Not Applicable

OTHER SAFETY PRECAUTIONS
- □ _____
- □ _____
- □ _____
- □ _____

SIGNATURE BLOCK

Contractor signs below after page 1 and 2 are filled out with sufficient detail to allow AR to be reviewed. Contractor identifies all anticipated safety items prior to signing below. Safety Office staff will initial next to any additional safety items that have been checked off during the AR review process.

_____ Contractor Representative	_____ Date
_____ Reviewed by Resident Engineer	_____ Date

Access Request – Page 2 of 3

PART 3 – APPROVERS' REMARKS

Safety Office Comments □ See Attachment

_____

_____

_____

_____

_____

_____

_____

_____	_____
Approved By: SRWTP Safety Office	Date

District O&M Support Comments □ See Attachment

_____

_____

_____

_____

_____

_____

_____

_____	_____
Approved By: District O&M Support	Date

Distribution:

□ Operation Support	□ O&M Manager 1 (2)	□ Electrical Supervisor
□ Safety Officer	□ Process Team Leader	□ Facility Maintenance
□ Resident Engineer	□ Ops Support Supervisor	□ Project Engineer
□ Contractor (supplied by RE)	□ Other _____	

**** END OF SECTION ****

SECTION 15061

STEEL PIPE

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

A. SCOPE:

1. This section specifies steel pipe, fittings, flanges, connections, linings, and coatings.

B. RELATED WORK:

1. The following specification sections are referenced herein:

Section	Title

1.02 REFERENCES

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed references, the requirements of this section shall prevail.

Reference	Title
ANSI B1.1	Unified Inch Screw Threads
ANSI B1.20.1	Pipe Threads, General Purpose
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B16.3	Malleable Iron Threaded Fittings
ANSI B16.4	Gray Iron Threaded Fittings
ANSI B16.9	Factory-Made Wrought Steel Buttwelding Fittings
ANSI B16.11	Forged Fittings, Socket-Welding and Threaded
ANSI B16.12	Cast Iron Threaded Drainage Fittings
ANSI B16.14	Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads
ANSI B16.28	Wrought Steel Buttwelding Short Radius Elbows and Returns
ANSI B16.39	Malleable Iron Threaded Pipe Unions Classes 150, 250 and 300
ASME Section IX	Certification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators

Reference	Title
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A106	Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A126	Gray Iron Castings for Valves, Fittings, and Pipe Fittings
ASTM A193	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A197	Cupola Malleable Iron
ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
ASTM A536	Ductile Iron Castings
ASTM F593	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
AWWA C200	Steel Water Pipe--6 Inches (150 mm) and Larger
AWWA C207	Steel Pipe Flanges for Waterworks Services-- Sizes 4 In. Through 144 In.
AWWA C208	Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C213	Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
NSF 61	National Sanitation Foundation, Drinking Water System Components – Health Effects
SAE J429	Mechanical and Material Requirements for Externally Threaded Fasteners, Standard
SSPC-SP 10	Near-White Blast Cleaning

1.03 SUBMITTALS

A. The following information shall be submitted for review:

1. Manufacturer's information and catalog data showing compliance with this specification and a full description of the item.

2. A copy of the ASME Certification of Welders and current work history.

3. Contractor's shop drawings, layout drawings, and anchorage details.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS (DELETED)

PART 2 -- PRODUCTS

2.01 PIPE

A. ASTM A53:

1. Size range: 1/8 to 26 inches. Yield strength ≥ 35,000 psi. Tensile strength ≥ 60,000 psi. Grade B, schedule 40.

2.02 FITTINGS

A. ASTM A126:

1. Class 125 cast iron fittings shall conform to ASTM A126 Class B; and ANSI B16.1, ANSI B16.4, ANSI B16.12, or ANSI B16.14. Tensile strength ≥ 31,000 psi. Fittings shall be threaded or flanged as indicated.

B. ASTM A197:

1. Class 150 malleable iron fittings shall conform to ASTM A197; and ANSI B16.3 or B16.39. Yield strength ≥ 30,000 psi. Tensile strength 40,000 ≥ psi. Fittings shall be threaded as indicated.

C. ASTM A536:

1. Ductile iron fittings shall conform to ASTM A536. Fittings shall be threaded, grooved, or flanged as indicated.

D. ASME B16.9:

1. Butt-welding steel fittings in accordance with ASME B16.9. Same class or thickness as the pipe to which it connects.

E. ASME B16.3

1. Threaded malleable iron fittings, Class 150 or Class 300 in accordance with ASME B16.3.

2. Galvanized per ASTM A 153 where used with galvanized pipe.

F. Grooved Joint Fittings:

1. Per Paragraph 2.04 D.

2.03 FLANGES

A. ASTM A126:

1. Class 125 cast iron flanges shall conform to ASTM A126 class B and ANSI B16.1. Tensile strength ≥ 31,000 psi. Flanges shall be threaded with flat face.

B. ASTM A234:

1. Class 150 forged steel flanges shall conform to ASTM A235; and ANSI B16.5 or B16.28. Flanges shall be threaded, weld neck, slip-on, or socket weld. Flanges shall be raised face with continuous spiral groove.

    a. Flanges shall be flat face when connecting to other flat face flanges.

2. Class 300 forged steel flanges shall conform to ASTM A235; and ANSI B16.5 or B16.28. Flanges shall be threaded, weld neck, slip-on, or socket weld. Flanges shall be raised face with continuous spiral groove.

C. ASTM A395:

1. Class 150 ductile iron flanges shall conform to ASTM A395 and ANSI B16.5. Flanges shall be threaded with flat face.

D. AWWA C207:

1. Class B (86 psi); Class D (150 psi); and Class E (275 psi) steel flanges shall conform to AWWA C207. Classes D and E shall match ANSI B16.1 Class 125 drilling and diameter. Flanges shall be slip-on with flat face.

E. Flange Gaskets:

1. PTFE envelope gaskets with concentric, convex moulded rings bonded to an EPDM core.

2. EPDM:

    a. Durometer Shore A hardness: 65.

    b. Temperature range: -4 to 210 degrees F.

    c. Manufacturer:

        1) Garlock style stress saver.

        2) ASAHI/America style AV.

        3) Or equal.

2.04 CONNECTIONS

A. THREADED CONNECTIONS:

1. Pipe thread dimensions and size limits shall conform to ANSI B1.20.1.

B. SLEEVE-TYPE COUPLINGS:

1. Sleeve-type couplings shall be constructed of steel per Section 15050.

C. PLAIN END COUPLINGS:

1. Plain end couplings shall be ASTM A536 Grade 65-45-12 ductile iron. Size range: 1½ to 14". Gruvlok 7005, Victaulic Style 99, or equal.

2. Bolts, washers and nuts for buried, submerged, and gas exposures shall be Type 316 stainless steel regardless of any other protective coatings.

3. Gaskets shall be fluoroelastomer.

4. Use only on ductile iron pipe and with written approval of Engineer.

D. GROOVED END COUPLINGS:

1. Flexible-type couplings shall be ASTM A536 Grade 65-45-12 ductile iron. Size range: ¾ to 24". Gruvlok 7001, Victaulic Style 77, or equal.

2. Rigid-type couplings shall be ASTM A536 Grade 65-45-12 ductile iron. Size range: ¾ to 24". Gruvlok 7004HPR, Victaulic Style HP-70, or equal.

3. Flanged coupling adapters shall be ASTM A536 Grade 65-45-12 ductile iron. Size range: 2 to 24". Gruvlok 7012, Victaulic Style 741, or equal.

4. Grooved steel to grooved ductile iron pipe transition couplings shall be ASTM A536 Grade 65-45-12 ductile iron. Size range: 3 to 12". Victaulic Style 307, or equal.

5. Bolts, washers and nuts for buried, submerged, and gas exposures shall be Type 316 stainless steel regardless of any other protective coatings.

6. Gaskets shall be fluoroelastomer.

E. RESTRAINT DEVICES:

1. Restraint devices shall be welded steel harness assemblies designed per AWWA Manual M-11.

2.05 SPOOL COATING

1. Pipe spools and fittings shall be painted using a prime coat and two coat finishes as follows:

   a. Apply 5-7 mil DFT prime coat, Carboline: Carboguard 890 VOC or equal.

b. Apply two 2-3 mil DFT finish coats to obtain a total system of 9 – 13 mils DFT, Carboline: Carbothane 134MC Polyurethane or equal.

c. Color shall be C705 light Gray.

2.06 LINING

A. Glass Lining

1. Pipe and fittings shall be glass lined with a vitreous material to a minimum thickness of 10 mils. Thickness to be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type film thickness gage such as Mikrotest Model FM, Elcometer Model III/IEZ, or equal. Glass lining shall provide continuous coverage as tested by a Tinker and Rasor Model M1 nondestructive type holiday detector, K-D Bird Dog, or equal low voltage holiday detector. The unit shall operate at less than 75 volts. Volts shall be cause for rejection. Glass-lined pipe shall be prefabricated. Field cut pieces will only be allowed if no damage occurs to the glass lining. Ends shall be rounded and coated.

2. Pipe shall be bored, machined, or grit blasted to remove any voids, protrusions or surface irregularities to obtain a smooth continuous surface for glass lining. Fittings shall be ground or grit blasted to remove any voids, protrusions, or surface irregularities.

3. Glass lining shall be Ferrock MEH-32, Vitco SG-14, or equal.

2.07 FACTORY TESTING (DELETED)

PART 3 -- EXECUTION

3.01 PIPE INSTALLATION

A. Install pipe in accordance with the drawings and the manufacturer's instructions and recommendations.

3.02 FITTING INSTALLATION

A. Install fittings in accordance with the manufacturer's instructions and recommendations.

3.03 CONNECTION INSTALLATION

A. THREADED CONNECTIONS:

1. Cut, thread, and join in accordance with the fitting manufacturer's instructions and recommendations, and ANSI B31.1.

B. FLANGED CONNECTIONS:

1. Cut, thread and join in accordance with the fitting manufacturer's instructions and recommendations, and ANSI B31.1.

C. TAKEDOWN COUPLINGS:

1. Install screwed unions, flanged or grooved end mechanical coupling type joints where indicated on the drawings. Use flanged or grooved end joints on pipelines 2-1/2 inches in diameter and larger.

D. RESTRAINT DEVICES:

1. Install in accordance with the manufacturer's instructions and recommendations to prevent joint separation.

E. DIELECTRIC CONNECTIONS:

1. Provide dielectric connections for dissimilar metal pipe connections.

3.04 COATING INSTALLATION

A. Coatings shall be applied and patched in accordance with the manufacturer's instructions and recommendations.

3.05 LINING INSTALLATION

A. Linings shall be installed and patched in accordance with the manufacturer's instructions and recommendations.

1. Do not install lining until all welding, tapping, and other fabrication is complete.

2. Grind internal welds smooth before applying lining.

B. Verify that interior surfaces of glass lined pipe and fittings have continuous coverage:

1. Verify with low voltage wet sponge holiday detector in accordance with NACE SP0188.

2. Discard glass lined steel piping and fittings with voids or casting anomalies that exceed the maximum non-visible pinholes allowances below:

	Maximum Pinholes	
Diameter	**Fittings**	**Pipe (per 20-foot length of pipe)**
4- to 8-inch	3-5	10-12

3. Discard lined piping and fittings found to have pinholes, crazing, or fish scales which expose the metal substrate.

3.06 CLEANING, DISINFECTION AND TESTING (DELETED)

****END OF SECTION****

SECTION 15250

INSULATION FOR EXPOSED PIPING AND EQUIPMENT

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

A. SCOPE:

1. This section specifies insulation for exposed piping, equipment, and appurtenances.

B. RELATED WORK:

1. The following specification sections are referenced herein:

Section	Title

1.02 REFERENCES

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

Reference	Title
ASTM B209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C533	Calcium Silicate Block and Pipe Thermal Insulation
ASTM C534	Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C547	Mineral Fiber Pipe Insulation
ASTM C552	Cellular Glass Thermal Insulation
ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E96	Water Vapor Transmission of Materials

1.03 SUBMITTALS

A. The following information shall be submitted for review:

1. Manufacturer's information and catalog data showing compliance with this specification and a full description of the product.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Piping insulation shall be tubular type. Insulation for valves, expansion joints, and flanges shall be the reusable fitting blanket type.

2.02 PIPING INSULATION

A. ELASTOMERIC TYPE:

1. EPDM elastomeric closed-cell foam insulation shall conform to the requirements of ASTM C534, Type I. Foams that are no based on EPDM are not acceptable. Temperature range: -40°F to +220°F.

2. Properties:

a. Thermal conductivity: 0.245 or less BTU-inch/hour-ft^2 degrees F.

b. Water vapor transmission: Less than 0.03 perms.

c. Vapor barrier flame spread: 25 or less.

3. Refer to Table A for Insulation Schedule.

4. Acceptable products: Aeroflex series Aerocel; or equal.

2.03 EQUIPMENT INSULATION (DELETED)

2.04 INSULATION JACKETS (DELETED)

2.05 INSULATION FITTING COVERS (DELETED)

2.06 REUSABLE FITTING BLANKETS

A. Reusable fitting blankets shall be designed for access to valves, flanges, etc. The reusable blanket shall be custom sewn, with TFE-coated fiberglass cloth jacket and liner, fiberglass insulation and stainless steel lacing anchors.

2.07 SHIELDS

A. Thermal pipe hanger shields shall be provided at pipe supports. It shall be asbestos-free, hydrous silicate insert, treated for water resistance and encased in a 360 deg. galvanized steel jacket. Provide stainless steel band clamps to prevent slippage between pipe wall and thermal shield. Temperature range 20 – 500 deg. F. B-line series B338 or equal.

2.08 ANTI-CONDENSATION COATING (DELETED)

PART 3 -- EXECUTION

3.01 INSTALLATION

A. PIPING:

1. Install insulation in accordance with the drawings and the manufacturer's recommendations. Seal off ends of fiberglass insulation with vapor barrier coating.

2. Install jacketing and fitting covers in accordance with the drawings and the manufacturer's recommendations. Locate seams on underside of piping. Form aluminum caps to fit over the adjacent jacketing and to completely cover coated insulation ends. Secure caps in place with a jacket strap.

B. PUMPS:

1. Do not insulate pumps.

C. MECHANICAL EQUIPMENT:

1. Install insulation in accordance with the drawings and the manufacturer's recommendations.

2. Install jacketing and fitting covers in accordance with the drawings and the manufacturer's recommendations. Locate seams on underside of piping. Form aluminum caps to fit over the adjacent jacketing and to completely cover coated insulation ends. Secure caps in place with a jacket strap.

3.02 PIPING INSULATION SCHEDULE

A. See Table A.

Table A – Piping Insulation Schedule

PIPING SERVICE	LOCATION	INSULATION TYPE	INSULATION THICKNESS FOR PIPE SIZES IN INCHES					JACKET	COVER
			1 inch and less	1.25 to 2 inches	2.50 to 4 inches	5 to 6 inches	8 inches and larger		
FOG	Outdoor	Elastomeric	N/A	N/A	2	2	N/A	none	none

****END OF SECTION****