

Procurement Specification for Fabrication of a Double Containment Piping System for Tank Farm Upgrades/Waste Feed Delivery

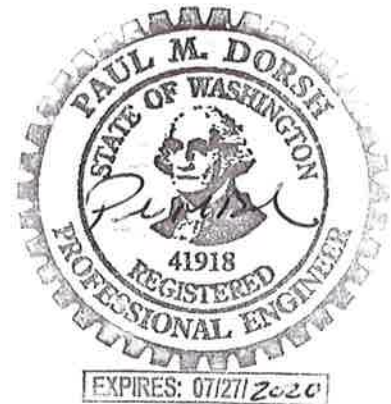
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**PROCUREMENT SPECIFICATION FOR FABRICATION OF A DOUBLE
CONTAINMENT PIPING SYSTEM FOR TANK FARM
UPGRADES/WASTE FEED DELIVERY**

June 2019

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Abbreviations, Initialisms, and Acronyms

CMTR	Certified Material Test Reports
CAWI	Certified Associate Welding Inspector
CWI	Certified Welding Inspector
DCPS	Double Containment Piping System
DFLAW	Direct Feed Low Activity Waste
EMF	Effluent Management Facility
FRP	Fiberglass Reinforced Polyester
GS	General-Service
HDPE	High Density Polyethylene
MT	Magnetic Particle Examination
NDE	Non Destructive Examination
NPS	Nominal Pipe Size
PMI	Positive Material Identification
PSSH	Packaging, Storage, Shipping and Load Handling
PT	Liquid Penetrant Examination
QAP	Quality Assurance Plan
RT	Radiographic Examination
SDS	Safety Data Sheets
SS	Safety-Significant
SSPC	Society for Protective Coatings
UT	Ultrasonic Examination
VT	Visual Examination
WPQR	Welding Procedure Qualification Records

Units

In.	inch
lb/ft ³	Pound per cubic foot
lb/in ²	Pound per square inch
mil	One thousandth of an inch
°F	Degree Fahrenheit
Btu-in/h-ft ² -°F	Thermal conductivity value, “k-value”
ppm	Parts per million
Rad	Unit of absorbed radiation dose

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1.0 SCOPE

1.1 SPECIFICATION

This Specification provides minimum requirements for a double-containment piping system (DCPS) to be used for underground transfer of waste solutions. The primary (inner/carrier) pipe is classified as Safety-Significant (SS). The encasement (outer) piping is classified as General-Service (GS).

1.2 WORK INCLUDED

The work within the scope of this Specification includes procurement, preparation of installation and fabrication (spool) drawings, fabrication, examination, testing, documentation, packaging, and shipping of the piping subassemblies.

1.3 WORK NOT INCLUDED

The work not in the scope of the Specification includes unloading, site handling and storage, installation, and final inspections and testing.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of the basis of design to the extent specified in the applicable sections of this Specification. In the event of a conflict between the documents referenced herein and the requirements of this Specification, the requirements of this Specification shall take precedence.

2.1 GOVERNMENT DOCUMENTS

The government documents listed in Table 2-1 constitute a part of this Specification to the extent specified herein. The most current version of the documents shall be used unless otherwise specified.

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Table 2-1. Government Documents.

Document Number	Title
DOE G 414.1-3	Suspect/Counterfeit Items Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance
DOE RL-92-36	Hanford Site Hoisting and Rigging Manual
RPP-8360	Lifting Attachment and Lifted Item Evaluation for Hoisting, Rigging, Transport and Load Handling
TFC-ENG-STD-06	Design Loads for Tank Farm Facilities
TFC-ENG-STD-22	Piping, Jumpers, and Valves
24590-WTP-ICD-MG-01-030	ICD 30 – Interface Control Document for Direct LAW Feed
24590-WTP-ICD-MG-01-031	ICD 31 – Interface Control Document for DFLAW Effluent Returns to Double-Shell Tanks
Drawings	
Document Number	Title
H-14-111301, Sheet 1	AP Farm Waste Transfer, Waste Feed Layout General Arrangement
H-14-111321, Sheet 1	LAW Feed Upgrades Civil Plan and Profile
H-14-111322, Sheet 1	Piping Waste Feed Line Mod Pipe Support Key Plan
H-14-111322, Sheet 2	Piping Waste Feed Line Mod Pipe Support Plan
H-14-111322, Sheet 3	Piping Waste Feed Line Mod Pipe Support Plan
H-14-111322, Sheet 4	Piping Waste Feed Line Mod Pipe Support Plan
H-14-111371, Sheet 1	LAW Interface Piping Civil Plan and Profile
H-14-111371, Sheet 2	LAW Interface Piping Civil Plan and Profile
H-14-111372, Sheet 1	Piping LAW Interface Piping Pipe Support Key Plan
H-14-111372, Sheet 2	Piping LAW Interface Piping Pipe Support Plan
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H-14-111372, Sheet 6	Piping LAW Interface Piping Pipe Support Plan
H-14-111373, Sheet 1	Piping Details AP Farm Yard Piping
H-14-111373, Sheet 2	Piping Details AP Farm Yard Piping
H-14-111373, Sheet 3	Piping Details AP Farm Yard Piping
H-14-111373, Sheet 4	Piping Details AP Farm Yard Piping
H-14-111375, Sheet 1	Piping - AP Farm Waste Feed Hydraulic Diagram
H-14-111375, Sheet 2	Piping - AP Farm Waste Feed Hydraulic Diagram

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2.2 NON-GOVERNMENT DOCUMENTS

National codes and standards listed in Table 2-2 constitute a part of this Specification to the extent specified herein and on Drawings (Table 2-1). The most current edition (with addenda) as of the date of issuance of this specification shall be used unless otherwise specified.

Table 2-2. Non-Government Documents. (2 Sheets)

Document Number	Title
ASME B&PVC, 2017 Section V	<i>Boiler and Pressure Vessel Code – Nondestructive Examination</i> , American Society of Mechanical Engineers (ASME), New York, New York.
ASME B16.9	<i>Factory Made Wrought Butt Welding Fittings</i> , ASME, New York, New York.
ASME B16.11	<i>Forged Fittings, Socket-Welding and Threaded</i> , ASME, New York, New York.
ASME B31.3, 2016	<i>Process Piping</i> , ASME, New York, New York.
ASME NQA-1, 2008/2009A	<i>Quality Assurance Requirements for Nuclear Facility Applications</i> , ASME, New York, New York.
ASNT SNT-TC-1A	<i>Standard Topical Outlines for Qualification of Nondestructive Testing Personnel</i>
ASTM A105	<i>Standard Specification for Carbon Steel Forgings for Piping Applications</i> ASTM International, West Conshohocken, Pennsylvania.
ASTM A106	<i>Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM A234	<i>Standard Specification for Piping Fittings of Wrought Carbon Steel and Allow Steel for Moderate and High Temperature Service</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM A312	<i>Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM A380	<i>Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM A403	<i>Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM C177	<i>Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM C518	<i>Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM D1621	<i>Standard Test Method for Compressive Properties of Rigid Cellular Plastics</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM D1622	<i>Standard Test Method for Apparent Density of Rigid Cellular Plastics</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM D5162	<i>Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM D6226	<i>Standard Test Method for Open Cell Content of Rigid Cellular Plastics</i> , ASTM International, West Conshohocken, Pennsylvania.
ASTM D7091	<i>Standard Practice for Nondestructive Measurements of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals</i> , ASTM International, West Conshohocken, and Pennsylvania.

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Table 2-2. Non-Government Documents. (2 Sheets)

Document Number	Title
AWS A5.01, 2013	<i>Welding Consumables, Procurement of Filler Metals and Fluxes</i> , American Welding Society, Miami, Florida.
AWS D1.1, 2015	<i>Structural Welding Code – Steel</i> , American Welding Society, Miami, Florida.
AWS D1.3, 2008	<i>Structural Welding Code – Sheet Steel</i> , American Welding Society, Miami, Florida.
AWS D1.6, 2017	<i>Structural Welding Code, Stainless Steel</i> , American Welding Society, Miami, Florida.
AWS QC1	<i>Standard for AWS Certification of Welding Inspectors</i>
SSPC-SP3	<i>Power Tool Cleaning</i> , The Society for Protective Coatings (SSPC), Pittsburgh, Pennsylvania

3.0 REQUIRMENTS

The DCPS will be direct buried waste transfer lines connecting to an interface location (as shown on drawings) connecting the Direct Feed Low Activity Waste (DFLAW) facility and the Effluent Management Facility (EMF) to Tank Farms.

3.1 SYETEM DESCRIPTION

The DCPS is assembled from double-walled pipe consisting of a 3-in. NPS (nominal pipe size) stainless steel primary pipe (SS) located concentrically inside of a 6-in. NPS encasement carbon steel pipe (GS) with appurtenances as shown on the Drawings (Table 2-1). Epoxy coating and rigid foam insulation shall be applied to the exterior encasement piping with final insulation jacket.

The DCPS shall be factory or shop-fabricated as complete as practicable and supplied as pipe spools to minimize field work. Pipe spool size shall be suitable for transport by truck. Prepare dimensioned pipe spool drawings that will be used for fabrication showing fittings, support details, support, and anchor locations. Include fabrication details including piece mark numbers, weld details, nondestructive examinations requirement, cleaning, and testing applicable only to the subject pipe spool.

The Fabricator shall provide installation drawings based on the pipe routings defined in Buyer-provided Drawings (Table 2-1). The installation drawings shall show the location and orientation of each pipe spool. Pipe spools shown on the installation drawings shall be traceable to the individual pipe spool drawings. Installation drawings will be used by the Buyer to install the pipe spool.

3.2 MATERIAL

Piping, Piping Components, Pipe Supports, Pipe Guides, and Pipe Anchors: See the Pipe Data (Appendix A) and Drawings (Table 2-1).

Certified Material Test Reports (CMTR) shall be submitted to the BUYER for all pressure boundary and structural materials, (these items are Safety Significant). All non-Safety Significant materials used in construction shall be provided with a Certificate of Conformance,

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accordance with the Quality Assurance Plan (QAP). Certificates of Conformance shall be traceable to the material used in the fabrication and conform to the requirements in the QAP. Material CMTR's are also acceptable, and if supplied, shall contain the test results from all testing specified by the referenced material code or standard, be traceable to the material used in the fabrication, and shall also conform to the requirements in the QAP.

When the material is subdivided, SELLER shall transfer the heat number to the part and remnants using a certified low corrosion marker meeting the following requirements:

- less than 200 ppm total halogens (free and chemically combined)
- less than 300 ppm aggregate of iron, copper, lead, zinc, mercury, and sulfur

SELLER shall provide traceability of the certified marker to the BUYER. This will ensure that all parts of the original stock piece are traceable.

Small parts, such as couplings, flanges, etc., may be kept in boxes that are labeled with heat numbers.

The SELLER shall submit to the BUYER, for review, all high-strength materials to be incorporated and applicable heat treatments.

Materials shall be free from any defects or imperfections that may affect performance as verified through qualification and production inspection tests.

3.2.1 Pipe

Provide materials as shown on the Drawings and the Pipe Data in Appendix A.

Prior to fabrication, all piping for the DCPS shall be examined to verify product marking and dimensions. Perform visual inspection to verify that the product marking is as described in the applicable ASTM Standards. PMI may be used to verify material chemistry of piping components. Perform a check of pipe outside diameter and wall thickness to ensure permissible variations in dimensions are in accordance with the applicable ASTM Standards.

3.2.2 Plate

Prior to fabrication, all plate and shapes to be used in fabricating the DCPS shall be examined to verify product marking and dimensions. Perform visual inspection of plate identification to verify that the product marking is as described in the applicable ASTM Standards.

3.2.3 Coating for Encasement Exterior

Prepare pipe surface per manufacturer's specifications. For factory coated pipe apply Scotchkote Fusion-Bonded Epoxy Coating 6233 per manufacturer's specifications. Coating shall be held back 2 to 3 in. from the field weld bevel. The hold-back area and bevel shall be coated with a weldable primer such as 3M Part Number 05917. Weld bevel requirements are found in Section 3.3 of this specification.

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Field applied pipe coating shall be Scotchkote Liquid Epoxy Coating 323. This coating should be applied in accordance with the coating manufacturer's instructions to a minimum dry film thickness of 30 mils. The dry film thickness must be measured using a suitable non-destructive magnetic gauge to verify the minimum applied thickness after the coating has cured to a Shore D hardness of 75-80 in accordance with ASTM D7091.

The coating shall be 100% inspected for holidays, pinholes, and discontinuities (such as runs, drips, and inclusions) with a holiday detector in accordance with ASTM D5162. All deficiencies and defects shall be corrected in accordance with the coating manufacturer's instructions. Any repaired areas shall be retested and allowed to cure before applying the insulation. Submit coating technical data sheets and Safety Data Sheets (SDS). Submit coating and inspection procedures along with personnel qualifications.

3.2.4 Rigid-Polyurethane Foam Insulation for Piping

Rigid Polyurethane Foam Insulation for Straight Piping and Bends: Use foam in-place 2-component system or spray-on with minimum apparent overall density of 2.1 lb/ft³ at 74°F in accordance with ASTM D1622; 85%-95% closed cells at 74°F in accordance with ASTM D6226. The "k" factor of 0.13 – 0.18 BTU in/h ft² °F at 75°F in accordance with ASTM C177 or C518; and minimum compressive strength of 25 lb/in² parallel to rise and 17 lb/in² perpendicular to rise at 74°F when tested in accordance with ASTM D1621. These properties shall be verified and documented by test before fabrication and test data submitted. Pre-molded rigid-polyurethane insulation sections are not permitted. Insulation shall be 1 3/4-in. thick minimum, (2 1/4" nominal) with the overall spool diameter as specified in Section 3.2.5. Insulation on the encasement shall be held back 5 in. from the field weld bevel.

If the insulation is cast with the "foam-in-place" method the installed insulation shall be tested for voids. Either nondestructive, destructive, or a combination of the two testing methods shall be used. Destructive method shall consist of pre-production testing. The pre-production testing samples shall represent actual production runs of pipe spools and should be performed prior to the start of a shift's production run. The sample's insulation shall be sectioned by providing a cross-sectional view of the insulation showing through thickness from pipe wall to insulation jacket. Voids 1/2-in. and deeper shall be repaired.

Procedures for application of insulation, testing for voids, and repair of voids shall be submitted to the Buyer for approval prior to fabrication. Testing procedure shall be developed based on documented mock-up testing that is capable of detecting voids 1/2-in. deep or deeper. Submit foam technical data sheets and SDSs. Preferred insulation installer is Thermacor Process, L.P.

3.2.5 Insulation Jacket

The overall diameter of the piping with insulation and jacket cannot exceed 12.5 in.

The insulation jacket shall be fabricated from a waterproof nonmetallic material. The insulation jacket, in combination with the foam insulation, shall be structurally adequate in both hoop and axial directions for resistance to piping stresses from loads in tension, compression, and torsion; and flexure from handling, shipping, site storage, field installation, and thermal expansion and contraction. The piping spools will be stored at the Hanford Site outdoors (air temperature ranges from -25 through 115°F) in direct sunlight prior to installation. The insulation jacket

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material shall retain its functional capability when exposed to a total accumulated lifetime dose of 1.0×10^8 rad.

The preferred jacket is HDPE completely covering the foam-in-place insulation as provided by Thermacor Process, L.P. A mastic covering similar to Canusa^{TM1} K-60 may be used on the ends of the spool insulation to keep the insulation clean and dry.

Provide technical data sheets and SDSs for the HDPE jacket, HDPE fitting covers, spiders for centering jackets, HDPE jacket for field closures, mastic covering (if used) and installation procedures. Insulation jacket shall have no de-lamination or gaps that expose the insulation.

Fiberglass-reinforced polyester (FRP) casing for foam in-place insulation shall not be used.

3.2.6 Field Joint Kits

Field kits shall be provided for the installation of coating, insulation, and jacketing over all field welds similar to "Typical Insulation Field Joint" detail on Drawing H-14-111373, sheet 2. Provide waterproof shrink sleeve for field joints, such as Covalence WPCT, (formerly Raychem) or Canusa^{TM1} K-60. Submit instructions for installation of pipe coating, insulation, and jacket over field joints and repairs.

3.2.7 Weld Filler Metal

Submit legible CMTRs, with results of chemical analysis and physical tests required for Schedule I level of testing in accordance with AWS A5.01. When filler metal is procured from a non-audited supplier, independent chemical and physical tests must be performed for each heat of material and test results submitted prior to fabrication to verify conformance to AWS specification, Schedule I level of testing. The independent test for chemical properties of stainless steel weld filler metal may be done by PMI.

3.3 FABRICATION AND ASSEMBLY

Primary pipe and encasement piping subassemblies shall be fabricated and assembled in accordance with ASME B31.3 and approved drawings. Hold back for the encasement pipe coating is found in Section 3.2.3. Hold back for the insulation on the encasement pipe is found in Section 3.2.4. The spools shall be marked for identification and orientation to facilitate proper location and orientation in the field. Identification shall include the line number.

Keep piping system clean and dry. When fabrication has started, plug or cap ends of piping to the extent practical during fabrication.

3.3.1 Pipe Supports and Anchors

Fabricate pipe supports and anchors in accordance with Seller's approved drawings and this Specification.

Cut pipe using methods that result in clean, straight cuts. Ream pipe to nominal inside diameter after cutting.

¹ Canusa is a registered trademark of or licensed to ShawCor Ltd, Toronto, Ontario, Canada.

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3.3.2 Welding

All weld joints and seams along the pressure boundaries shall be 100 percent continuously welded. Weld joints and seams shall be wire brushed or buffed after final Nondestructive Examination (NDE) and inspections as required to remove heat discoloration, oxidation, all burrs, and sharp edges.

Stainless steel material shall be cleaned/prepared according to Section 3.4 of this specification.

3.3.3 Welding Procedures and Qualifications

Personnel and procedures for welding pressure-retaining components along with attachments thereto, shall have been qualified in accordance with the applicable fabrication code prior to the start of welding.

Personnel and procedures for welding structural components shall have been qualified in accordance with the applicable AWS welding standard (i.e., AWS D1.1 for steel, AWS D1.6 for stainless steel, and AWS D1.3 for sheet steel) prior to the start of welding (welding qualifications and procedures per ASME B&PVC, Section IX are acceptable).

SELLER shall submit copies of all Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records (WPQRs) for all welders to be employed in the performance of this Specification (including tacking). All weld records shall be maintained by the SELLER for BUYER review at any time. SELLER shall provide records to indicate that welder/operator is qualified. A copy of welder performance qualification test results and renewal of qualification documentation shall be maintained at the jobsite for the Buyer's evaluation, if desired. A copy of the Weld Procedure Specifications (WPSs), Procedure Qualification Records (PQRs), and Supporting Demonstration Records, as applicable, shall be maintained at the jobsite for the Buyer's evaluation, if desired.

The SELLER's quality control procedures shall include the requirement that no welders shall have in their possession more than one type of filler metal at any one time, an exception is that welders may have both bare wire and covered electrodes that deposit weld metal of the same A-number class. SELLER's filler metal control procedure shall be submitted and approved.

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3.3.4 Weld Inspection Requirements

Personnel performing visual weld inspections shall be a Certified Welding Inspector (CWI) (Minimum Level II) in accordance with the requirements specified in ASME B&PV Code, Section IX, and AWS QC1, "Standard for AWS Certification of Welding Inspectors." Documentation shall be submitted prior to the start of fabrication.

NDE processes required within this specification shall require review and approval of SELLER:

1. Personnel certification procedure,
2. The NDE operational procedures, and
3. Personnel certifications including current and valid visual acuity examination (< 1 year old). The examination must be performed annually.

Personnel certification procedure and certification package for NDE personnel shall accurately reflect the requirements embodied in the applicable issue of ASNT SNT-TC-1A, "Standard Topical Outlines for Qualification of Nondestructive Testing Personnel," plus any other requirements of the SELLER.

Personnel performing NDE required by Table 3-1 shall be qualified/certified to ASNT SNT-TC-1A (Level II or III), current edition unless otherwise specified.

3.3.5 Weld Identification

Prepare weld identification drawings (weld maps), isometric or spool that shows relative positions of pressure-containing welds and attachment welds to pressure-retaining components.

Assign weld numbers to each pressure-containing weld and each attachment weld to pressure-retaining components. Record weld numbers and the welder ID on weld identification drawings or process traveler as welds are made.

Place the welder identification symbol and weld number adjacent to welds upon completion. Place the identification symbol approximately every 3 feet on long seams or large welds. Marking pens used on stainless steel shall be free of chlorides.

Do not reuse weld numbers. If a weld is completely replaced, assign a new number.

Maintain material traceability by showing heat/lot numbers on weld identification drawings for materials requiring Certified Material Test Reports (CMTR).

Tools marked for stainless steel shall be used on stainless steel only. Tools previously used on carbon steel shall not be used on stainless steel. Areas on the stainless steel pipe that show signs of coming in contact with carbon steel (rust marks or streaks) shall be cleaned of the free iron. Control fluoride/chloride contamination of stainless steel piping by using materials approved for stainless steel use.

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3.3.6 Pipe Bends

Bend pipe in accordance with Buyer approved procedure meeting ASME B31.3 requirements including tolerances given in ASME B31.3, Section 332.2. Flattening of a bend shall not exceed 8% of nominal outside diameter. Use methods and equipment that produce bends free of wrinkles, bulges, or kinks. The bend flatness shall be within ± 1 degrees. If hot bending stainless steel pipe, the procedure shall either prevent the resultant oxide film or remove the oxide film by cleaning in accordance with ASTM A380 for both the interior and exterior surfaces.

The minimum required thickness of the pipe bends, after bending, was determined in accordance with Section 304.2.1, *Pipe Bends*, of ASME B31.3. A corrosion allowance determined per TFC-ENG-STD-22 was then added to the ASME value. The resulting values are very small and are bounded by the “Mechanical Strength” requirement of ASME B31.3 Section 302.5.

Per ASME B31.3 – 302.5: “Designs shall be checked for adequacy of mechanical strength under applicable loadings. When necessary, the wall thickness shall be increased to prevent overstress, damage, collapse, or buckling due to superimposed loads from supports, ice formation, backfill, transportation, handling, or other loads enumerated in paragraph 301.” These loads occur during installation and operation and will never be known in full detail. Design consideration is given to these loads by requiring that the final wall thickness after bending shall be no less than 7/8 of the original wall thickness.

Note: The 7/8 value is based on a mill tolerance where the minimum wall thickness shall not be more than 12.5% under the nominal wall thickness specified.

The minimum required wall thickness values after bending are:

Primary/Carrier	$7/8 \times 0.216$	= 0.189 in.
Encasement/Secondary	$7/8 \times 0.280$	= 0.245 in.

Document the wall thickness measurements after pipe bending. Ensure wall thickness measurements are traceable to fabricator spool drawings.

3.3.7 Alignment

Distortion of piping to bring it into alignment for joint assembly shall be minimized (see ASME B31.3 Sections 328.4 and 335).

3.3.8 Insulation

Surfaces to receive insulation shall be free of moisture, oil, dirt, and other foreign material. Documentation for surface inspection cleanliness shall be prepared prior to application of insulation. Insulation and jacketing shall be applied to all buried portions of the encasement piping. The insulation and jacketing shall terminate on the risers above grade. Submit inspection documentation for information/record.

Factory/shop shall apply insulation to the maximum extent practicable in accordance with manufacturer's instructions.

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Repair insulation, as required, in accordance with manufacturer's instructions.

Factory/shop shall apply the insulation jacketing to the maximum extent practicable.

Apply insulation after weld examination, satisfactory leak testing and holiday testing of epoxy coating.

3.3.9 Tools

Tools marked for stainless steel shall be used on stainless steel only. Tools previously used on carbon steel shall not be used on stainless steel except for tooling used to make pipe bends. Tooling used for stainless steel pipe bending shall be thoroughly cleaned prior to contact with stainless steel pipe. After bending, stainless steel pipe shall be tested for free-iron in accordance with ASTM A380 using the tests for free-iron, the water-wetting and drying test (use distilled or deionized water). Examine and clean stainless steel bends as required in accordance with ASTM A380. After cleaning, re-examine and clean as required. Contact of the stainless steel primary pipe outside surface with the carbon steel encasement pipe shall be prevented. Areas on the stainless steel pipe that show signs of coming in contact with carbon steel (rust marks or streaks) shall be cleaned of the free iron.

3.4 CLEANING

The primary pipe exterior surface shall be cleaned in accordance with ASTM-A380-2017, *Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems*. Inspection shall be according to ASTM A380, Paragraph 7.2. The primary pipe shall also be cleaned in accordance with ASTM A380 prior to installation into the secondary encasement pipe. The completed pipe-in-pipe subassembly shall be protected to prevent contamination of the primary pipe during shipping and storage.

Tools marked for stainless steel shall be used on stainless steel only. Tools previously used on carbon steel shall not be used on stainless steel. Areas on the stainless steel pipe that show signs of coming in contact with carbon steel (rust marks or streaks) shall be cleaned of the free iron.

Keep piping system clean. Control fluoride/chloride contamination of stainless steel piping by using materials with less than 200 ppm Halogens that are approved for stainless steel use. Once fabrication has started, plug or cap ends of piping when installation is not in progress. Cap or plug openings in fabricated pipe spool assemblies until installation in piping system.

Clean supports and anchors in accordance with SSPC-SP3, removing weld splatter and other adhering materials.

The encasement pipe shall be inspected and cleaned to remove any loose impediments and obstructions prior to inserting the primary pipe.

Confirm piping cleanliness is maintained after assembly of primary pipe into encasement pipe using a borescope. Provide documented evidence that cleaning has been accomplished as specified in this Section.

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3.5 EXAMINATION

Perform examinations for each pipe spool as listed in the schedule in Table 3-1 of this document, in accordance with ASME B31.3 for “Normal Fluid Service”. See Section 4.2 of this document for qualifications requirements.

In cases where volumetric examination is not possible (e.g., orientation of the weld), the subject welds shall have a documented in-process examination in accordance with ASME B31.3, paragraph 344.7 with liquid penetrant or magnetic particle examination specified for the root pass [see paragraph 344.7.1(e)] and will be identified as such on the fabrication drawings.

Note: A request for the use of an “in-process” examination as described above must be submitted and approved prior to use on a weld by weld basis.

Individual items described in paragraph 344.7.1 shall be documented (e.g., checklist format) for each in-process examination. The in-process examinations shall not be used to meet the required representation of the welder’s or the welding operator’s work unless necessary to meet the required representation of work.

3.5.1 Visual Examination (VT)

Perform 100% visual examination of final weld joints in accordance with ASME B31.3, paragraph 344.2. Acceptance criteria shall be in accordance with Table 341.3.2, “Normal Fluid Service Criteria.”

3.5.2 Liquid Penetrant Examination (PT)

Perform in accordance with ASME B31.3, paragraph 344.4. Acceptance criteria in accordance with paragraph 344.4.2.

3.5.3 Magnetic Particle Examination (MT)

Perform in accordance with ASME B31.3, paragraph 344.3. Acceptance criteria in accordance with ASME B31.3, paragraph 344.3.2.

3.5.4 Radiographic Examination (RT)

Perform in accordance with ASME B31.3, Paragraph 344.5. Acceptance criteria for welds shall be in accordance with ASME B31.3, Table 341.3.2.

Identify radiographic film with weld identification number, weld spool identification and project or work order number assigned to work covered by this Specification.

Prepare radiographic examination reports as follows:

- a. List each radiographic exposure location (0-1, 1-2...) individually on radiographic examination report.
- b. Indicate location acceptance or rejection and note discontinuities whether rejected or not.

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- c. When report includes radiographs of welds that have been repaired, indicate which welds are repair welds and how many times each weld has been repaired.

Radiographic examination results shall be independently reviewed by a qualified examiner. Differences must be resolved prior to submittal of final report.

Additional welding performed on a weld in an area that has already been examined by radiography is a repair. Identify subsequent radiographs by "R-1, R-2," etc. Designate cutouts used for repair as "C-1," "C-2," etc.

3.5.5 Ultrasonic Examination (UT)

Perform in accordance with ASME B31.3, paragraph 344.6. Acceptance criteria are described in paragraph 344.6.2 of ASME B31.3.

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3.5.6 Pipe Examinations/Testing (VT, PT, MT, RT, UT)**Table 3-1. Schedule of Pipe Examinations/Testing**

NDE/NDT Examination Methods	Pipe Examination Requirements	
	Primary	Secondary Encasement
Visual (VT)	H	H
Fit up		
Root pass		
Cover pass	100% (A, F, H)	100% (A, B, H, I)
Liquid Penetrant (PT)		
Root pass		
Cover pass		
Magnetic Particle (MT)		
Root pass		
Cover pass		
Radiographic (RT)		
Completed weld	100% (A) Note 1	20% (A, G, I) Note 1
Ultrasonic (UT)		
Completed weld	100% (A) Note 1	20% (A,I) Note 1
Leak/Pressure		
Completed weld	C or D	C or D
Note: 1. UT may be used in lieu of RT as approved by customer.		
Legend: A. Circumferential butt welds. B. Full penetration welds on branch connections. C. Pneumatic test. D. Hydrostatic test. E. Not used. F. Structural attachment welds to the pressure boundary for guides, supports, and anchors. G. In-Process examination may be substituted for all or part of the radiographic examination on a weld-for-weld basis upon Buyer approval of written request that provides the rationale (prior to welding). If in-process examination is used, the root pass shall be examined by the liquid penetrant or magnetic particle method and shall be documented in accordance with ASME B31.3 paragraph 344.7. H. Extent of visual examination shall be in accordance with ASME B31.3, Paragraph 341.4.1a. Each weld shall be represented in fulfilling the minimum requirements of ASME B31.3, Paragraph 341.4.1a. I. Longitudinal butt welds.		

3.5.7 Coating Examination

The coating shall be 100% inspected for holidays, pinholes, and discontinuities (such as runs, drips, and inclusions) with a holiday detector in accordance with ASTM D5162. All deficiencies and defects shall be corrected in accordance with the coating manufacturer's instructions. Any repaired areas shall be retested and allowed to cure before packaging and shipping.

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3.5.8 Examination Documentation

Visual examination shall be performed and appropriate documentation prepared by a Certified Welding Inspector (CWI). A Certified Associate Welding Inspector (CAWI) may perform examination when under immediate direction of a CWI. Fabrication and welding-related examination documentation shall be signed or stamped by individuals performing examinations. Where a CAWI performs examinations, documentation shall be signed or stamped by both the CAWI and the CWI under whose direction examinations were performed. Required examinations and independent reviews shall be completed and documented before starting leak testing.

Documentation of coating inspections must be traceable to individual spools. Locations of areas requiring repairs and retesting must be documented.

3.6 TESTING**3.6.1 Leak Testing**

Perform leak/pressure testing of pipe in accordance with ASME B31.3 Section 345 and this Specification for piping weld joints that will not be exposed during field erection using Buyer-approved test procedures. Submit Test Plan/Plans for all testing described by this specification. Use calibrated gages with ranges 1-1/2 to 4 times the test pressure.

Design pressure for Primary piping is 620 psi and 50 psi for Encasement piping. Design temperature for Primary piping is 200°F and 150° for Encasement piping. Design pressure and temperature are found in Appendix A.

Pipe joints being tested shall be visible and accessible during tests.

Note: Pipe joints that have been tested earlier, either at the vendor's facility or at the fabricator's shop, are not required to be visible. The pipe joints that have been tested earlier shall have all documentation required in Section 3.6.1 of this specification.

Install necessary restraining devices, before applying test pressure, to prevent distortion or displacement of piping.

Continuously maintain test pressure for at least 10 minutes. Visually examine piping joints, fittings, and other potential leak sources. Piping subassembly shall show no visual evidence of weeping or leaking.

Complete testing of secondary encasement piping before application of protective coating.

Document testing of each piping subassembly. Use separate forms to describe and record each piping subassembly. Describe piping subassembly for correlation to weld identification drawings, shop fabrication drawings, or Contract Drawings.

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3.6.1.1. Hydrostatic Pressure Testing

Perform in accordance with ASME B31.3, Paragraph 345.4, to the test pressures identified for the Pipe Data (Appendix A). Purge air from piping systems during filling and before applying pressure.

Remove water and dry piping to extent practical after testing.

3.6.1.2. Pneumatic Pressure Testing

Perform in accordance with ASME B31.3, Paragraph 345.5, to the testing pressures identified for the Pipe Data (Appendix A).

Perform testing with dry, oil-free air or with nitrogen.

4.0 QUALITY ASSURANCE

4.1 QUALITY ASSURANCE PROGRAM

The Seller shall comply with the quality assurance requirements stated in the Procurement Documents.

4.2 QUALIFICATIONS

Personnel and procedures for welding shall be qualified in accordance with ASME B31.3, Paragraph 328.2 prior to performing welding activities. Personnel performing examinations listed in 3.5 shall be qualified and certified in accordance with ASME B31.3, Paragraph 342. Qualification records of welding and examinations personnel shall be submitted.

4.3 VERIFICATION

The Buyer reserves the right to witness all tests and shall be given a minimum of five (5) working days written notice prior to each test date (not required for weld inspection and examination). Buyer representatives that may be present at the tests include but is not limited to Quality Assurance and Independent Qualified Registered Professional Engineer personnel. Inspections and tests are described in Section 3.0 of this Specification and are summarized in Table 4-1. For a full listing of all requirements refer to the individual sections listed in the table below.

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Table 4-1. Verification Methods and Responsibility.

Section	Requirements	Verification Method
3.2.1	Verify correct marking of each piping spool.	Visual
3.2.2	Verify correct marking of all plates and shapes.	Visual
3.2.3	Install epoxy coatings (both factory and field applied) to 30 mils dry film thickness.	Coating thickness gauge and Shore D durometer
3.2.3	No holidays, pinholes or discontinuities in epoxy coating.	Holiday tester (ASTM D5162)
3.2.4	Foam insulation shall be a minimum of 1 3/4-in. thick with no voids greater than 1/2 in.	Visual
3.2.5	Overall diameter of piping plus insulation and jacketing for straight sections of pipe must be less than or equal to 14 in.	Caliper
3.2.5	Insulation jacket has no delamination or gaps that expose the insulation	Visual
6.1	Blow debris from annular space between primary and encasement pipes	Visual
6.1	Clean inside of primary pipe with wadding/rags and isopropyl alcohol	Visual
6.4	Identification and marking of pipe spools; diameter of piping at bends	Visual; caliper

4.4 SUSPECT/COUNTERFEIT ITEMS

The Supplier shall ensure that no suspect or counterfeit parts or components are provided in conjunction with this procurement. Suspect counterfeit items are described in DOE G 414.1-3.

Seller shall warrant that “all items furnished under this purchase order are genuine (i.e., not counterfeit) and match the quality, test reports, markings and/or fitness for use required by the purchase order”.

5.0 SUBMITTALS**5.1 DOCUMENTS TO BE SUBMITTED**

The Seller shall submit the specified documents (as a minimum) to the Buyer at the address specified in procurement documentation. Each submittal should be marked with this Specification number, the item number, the purchase order number, and the Seller’s identification number. Electronic copies of each document shall be submitted, (other than RT film), along with a transmittal letter. All of this information shall become the property of the Buyer. See Table 5-1 for deliverable and schedule information and Section 5.3 for further explanation of each item in the table.

All data shall be sufficiently clear to allow legible copies to be made on standard reproduction equipment after microfilming.

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The table below is a summary of the required submittals, contract submittals are governed by the Master Submittal List in the contract documentation.

Table 5-1. Summary of Submittals

Item	Title	Purpose	When Required
1	Quality Assurance Program (4.1)	Covered By Atkins BMA	Not Required
2	Schedule	Pre-purchase Evaluation	With Bid
3	Shipping and Handling Procedure (3.2.1, 5.3, 6.1, 6.5) In-Process	Approval	Prior to Start of Work
4	Shipping and Handling Procedure (3.2.1, 5.3, 6.1, 6.5) Transport to Site.	Approval	Prior to Shipment
5	Fabrication Drawings (3.1)	Approval	Prior to Fabrication
6	Certified Material Test Reports (3.2)	Approval	Prior to Fabrication
7	Test Plan(s)	Approval	Prior to Testing
8	Test Results (3.6)	Information/Record	With Shipment
9	Insulation Test Results (3.2.4)	Information/Record	Prior to Fabrication
10	Weld Identification Drawings (3.3.5)	Information/Record	With Shipment
11	Cleaning Documentation (3.3.8, 3.4)	Information/Record	With Shipment
12	Examination Documentation (3.5.7)	Information/Record	With Shipment
13	Pipe Coating Technical Data Sheet and SDS (3.2.3)	Approval	Prior to Application of Coating
14	Pipe Coating Application and Inspection Procedure (3.2.3)	Approval	Prior to Application of Coating
15	Personnel Qualifications for Coating and Inspection (3.2.3)	Approval	Prior to Application of Coating
16	Insulation Installation Procedure (3.2.4)	Approval	Prior to Application of Insulation
17	Insulation Technical Data Sheet and SDS (3.2.4)	Approval	Prior to Application of Insulation
18	Jacket Technical Data Sheet (3.2.5)	Approval	Prior to Application of Jacket
19	Jacket Installation Procedure (3.2.5)	Approval	Prior to Application of Jacket
20	Field Joint Installation and Repair Procedure (3.2.6)	Approval	Prior to Shipment
21	Weld Filler Certified Test Reports (3.2.7)	Approval	Prior to Fabrication * Prior to Use
22	Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records (3.3.3)	Approval	Prior to Fabrication
23	Certified Welding Inspector Documentation (3.3.4)	Approval	Prior to Fabrication
24	Inspection and Test Report** (3.6.1)	Approval	Prior to Shipment

* When a supplemental procurement of weld filler is necessary it must receive approval prior to its use.

** Provide Inspection and Test Report for each spool that contains a summary of inspections and tests, identification of inspection and test personnel, material or process travelers, nondestructive examination records, identification of measuring and test equipment, borescope results, wall thickness measurements/sketches, cleanliness results, coating, insulation, and jacket inspection results, nonconformance's, and an overall assessment of adequacy.

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5.2 APPROVAL OF SUBMITTALS

Note: This information is for general information only, contract submittals are governed by the Master Submittal List in the contract documentation.

Submittals are divided into two types: 1) those requiring “approval” (e.g., approval data or pre-purchase evaluation data); and 2) those “not requiring approval” (e.g., vendor information data). Submittals “not requiring approval” will be reviewed to verify completeness and adequacy for their intended purposes. A submittal that is not approved, but requires approval, is identified as either:

- 1) “Not Approved Revise and Resubmit.” The submittal is considered technically deficient, or incomplete, and, therefore, unacceptable. Resubmittal is required; hence, the fabrication, procurement, or performance of procedures shall not proceed; or
- 2) “Approved with Comment.” Fabrication, procurement, and performance may proceed, and resubmittal is required to verify incorporation of the exception. Submittals “not requiring approval” that are determined to be incomplete or inadequate will be marked “Resubmit.” An explanation of the deficiencies will be included for corrective action by the Seller.

Approval by the Buyer does not relieve the Seller of responsibility for accuracy or adequacy of design under this Specification.

If any previously submitted items are revised, the Seller shall resubmit updated versions of said items for approval, in addition to the items listed above.

Certified data means that the design adequacy of a given item (document, drawing, calculation, etc.) must be verified by a qualified person other than the person who prepared the item. Each deliverable (drawing, calculation, etc.) shall have at least an originator or preparer signature and a checked-by or approved-by signature.

5.3 SUBMITTAL EXPLANATION

Brief explanations of each of the items in Table 5-1 are provided as follows:

(Item 1) Quality Assurance Program (see Section 4.1)

(Item 2) Schedule: Submit a schedule showing submittals and shipment dates of the equipment after receipt of the order.

(Item 3) Shipping and handling procedures (see Section 3.2.1, 5.3, 6.1, 6.5). The first Shipping and Handling procedure is an “In-Process” plan for handling between the fabricator and all subcontractors. The second Shipping and Handling procedure will cover the transport of the spools to the site.

(Item 4) Shipping and Handling Procedure for transport to site (see Section 3.2.1, 5.3, 6.1, 6.5), as described in Item 3 above.

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(Item 5) Fabrication Drawings: Installation drawings should show mating spools pieces, with reference dimensions, to centerline of primary pipe and fittings. Drawings need to be reproducible and in AutoCAD format for follow-on use of installing contractor to utilize as Non Destructive Examination (NDE) Weld Record drawings. Fabricator to scribe or otherwise mark top-of-pipe centerline alignment of each spool piece and identify mating spool piece to ensure proper orientation during field installation (see Section 3.1).

(Item 6) Certified Material Test Reports: Submit legible reports, certified by responsible manufacturer of materials used in fabrication of pipe, fitting, weld filler, and pipe support/anchor materials (see Section 3.2). Reports shall present result of chemical analysis and physical test specified in ASTM Codes and Standards Specifications for production lots and heats of materials. Note: Each “heat” for each material shall have independent chemical & physical testing by an NQA-1 qualified laboratory independent of the fabrication contractor. Each report shall identify the applicable spool number(s) or weld isometric drawings for correlation (see Section 3.2).

(Item 7) Submit Test Plans for testing described in Section 3.6. These shall be submitted prior to testing.

(Item 8) Test Results: Submit independent test results and Seller’s review for acceptability (see Section 3.6).

(Item 9) Insulation Test Results: Insulation properties shall be verified and documented by test before fabrication and test data submitted (see Section 3.2.4).

(Item 10) Weld Identification Drawings showing relative positions or pressure-containing welds (see Section 3.3.5).

(Item 11) Submit cleaning documentation (see Section 3.3.8 and 3.4).

(Item 12) Examination reports (see Section 3.5.7).

(Item 13) Epoxy coating product literature, Safety Data Sheets (SDS), inspection, and testing results (see Section 3.2.3).

(Item 14) Submit epoxy coating and inspection procedures (see Section 3.2.3).

(Item 15) Submit personnel qualifications for installation of epoxy coating (see Section 3.2.3).

(Item 16) Submit procedures for application of insulation, testing for voids, and repair of voids (see Section 3.2.4).

(Item 17) Submit insulation foam technical data sheets and SDS (see Section 3.2.4).

(Item 18) Submit technical data sheets and SDS for insulation jacket (see Section 3.2.5).

(Item 19) Submit installation procedures for installation of insulation jacket (see Section 3.2.5).

(Item 20) Submit instructions for installation of pipe coating, insulation, and jacket over field joints and repairs (see Section 3.2.6).

(Item 21) Submit independent chemical and physical tests of weld filler material (see Section 3.2.7).

(Item 22) Submit copies of all Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records (see Section 3.3.3).

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(Item 23) Submit documentation of Certified Welding Inspector (see Section 3.3.4)

(Item 24) Completed Leak Test Procedures/Reports with calibration documentation for test gauges (see Section 3.6.1).

6.0 PACKAGING, STORAGE, TRANSPORT AND LOAD HANDLING

6.1 GENERAL

All hoisting, rigging, transport and load handling activities shall comply with DOE-RL-92-36 “Hanford Site Hoisting and Rigging Manual”, RPP-8360 “Lifting Attachment and Lifted Item Evaluation for Hoisting, Rigging, Transport and Load Handling”, and TFC-ENG-STD-06 “Design Loads for Tank Farm Facilities.”

SELLER shall receive, clean, package, store, preserve, handle, and ship Structures, Systems and Components to protect against physical damage, or any effect that would affect quality or cause deterioration at all times while items are located on the SELLER’s premises. Any such activities associated with Quality Assurance (QA) items shall also meet the requirements of ASME NQA-1-2008/2009A, Quality Assurance Requirements for Nuclear Facility Applications, Part II, Subpart 2.2. Classification of items and packaging will follow the guidelines of ASME-NQA-1.

SELLER shall follow manufacturer’s recommendations for storage and handling of all purchased items.

SELLER shall submit a Packaging, Storage, Shipping, and Load Handling (PSSH) Plan. The PSSH plan shall include all plans, procedures, and drawings that address how items will be packaged, stored, shipped, and handled in accordance with the requirements described throughout this specification with the exception of topics covered by the Lift and Rigging Plan. Any requirements that are unable to be met shall be documented in the PSSH Plan with alternative methods clearly described. Upon approval of the PSSH these alternative methods will be acceptable for use.

Items subject to deleterious corrosion shall be protected in accordance with NQA-1 (e.g. using either contact-preservatives, inert gas blankets, or vapor-proof barriers with desiccants to absorb any moisture inside the container). The SELLER shall submit for BUYER approval a description of the preservation methodology specific to each package level type.

6.2 PRESERVATION AND PACKAGING

All equipment openings shall be capped, plugged or sealed to prevent entry of foreign material and humidity and protected against corrosion and physical damage.

Items shall be protected from dirt, soil, and moisture, and be suitable for unprotected storage outside for up to two years with no degradation to the piping spools. Outside environmental conditions include temperature range of -25°F to +115°F, solar radiation of 900 langleys, rainfall of up to 8 in. per year, and windborne (up to 80 miles per hour) fine particulates of predominantly silica compounds. Items shall be packaged in a manner to prevent damage or

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contamination during shipping, including shipment during the refurbishment process (such as to the insulation applicator).

6.3 PACKING

Exterior package type shall provide the level of protection required based on the storage and environmental limits. Containers, crates or skids may be used as the methodology for packaging.

6.4 IDENTIFICATION AND MARKING

Package marking shall follow the requirements of NQA-1 2008/2009A, Part II, Subpart 2.2 and at a minimum shall appear on two sides of a container, preferably on one side and one end. Package markings shall be applied with waterproof ink or paint in characters that are legible.

The fabricator installation drawings described in Section 3.1 shall show the location and orientation of each pipe spool. Pipe spools shown on the installation drawings shall be traceable to the individual pipe spool drawings.

When information relative to handling and special instructions is required, such information shall be preceded by the word CAUTION in letters that are at least 1/2 in. as permitted by package size. Alternatively if tags or labels are used, they shall be affixed to the container using a waterproof adhesive, tacks where practical, or a corrosion-resistant wire.

Clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.

Prior to shipment, all packages shall be clearly and suitably tagged to identify, at a minimum:

1. BUYER's name with destination address
2. SELLER's name with return address
3. Package numbers showing the Purchase Order Number followed by the package number and the total number of packages
4. Package contents description
5. Weight of package
6. Center of gravity
7. Parts list (for each package)
8. Handling instructions (e.g., Fragile, Center of Gravity, Keep Dry, This Side Up, Sling Here, Do Not Freeze) and stacking limitations, as appropriate
9. Special instructions (Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions, etc.) as appropriate.
10. Marking of items not within a container shall exhibit the above specified information in a location that is in plain unobstructed view. Marking may be applied directly to bare metal surfaces, provided it has been established that the marking material is not deleterious to the item.
11. If any hazardous chemicals are included with shipments, the transport vehicle shall display the relevant Department of Transportation labels/placards.

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6.5 SHIPPING AND HANDLING

The mode of transportation used shall be consistent with the protection of the item and with the packaging methods employed.

Every item shipped must arrive at the job site in the same condition it was in when it passed final quality control inspections and tests at the Seller's facility.

SELLER shall be responsible for all equipment damage which occurs as a result of improper transportation and storage.

The Seller shall deliver the piping spools to the Hanford Site location specified by the Buyer at the time of shipment and provide protection of the equipment during transit and storage.

Submit shipping and handling procedure to the Buyer that includes provisions for component preservation, packaging, shipping, storage, and unloading. Unloading will be done by the Buyer at the Hanford Site.

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Appendix A – Pipe Data

APPENDIX A

PIPE DATA

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Appendix A – Pipe Data

A1.0 PRIMARY PIPE DATA SHEET

Primary Pipe			
Line Number	Design Pressure lb/in² gage	Test Pressure lb/in² gage	Design Temperature °F²
AP06A-WT-WTL-SN-637	620	930 ¹	200°F
AP02D-WT-WTL-SN-700	620	930 ¹	200°F
Sizes	3 in.		
Pipe	ASTM A 312, Grade TP 316/316L, SMLS		
Wall Thickness	Schedule 40S		
Fittings	Stainless Steel, ASTM A403, Grade WP 316/316L SMLS, Butt-welding in accordance with ASME B16.9, Wall thickness to match pipe.		
Bends	Bends shall be performed per ASME B31.3-2016, Section 332.2. (See Section 3.3.6 for minimum wall thickness.)		
1. Testing will be performed hydrostatically (Section 3.6.1.1 & ASME B31.3 – 345.4)			
2. Refer to 24590-WTP-MG-01-030 for design temperature and pressure.			

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Appendix A – Pipe Data

A1.1 ENCASUREMENT DATA SHEET

Encasement Pipe			
Line Number	Design Pressure lb/in² gage	Test Pressure lb/in² gage	Design Temperature °F³
Encasement for:			
AP06A-WT-WTL-SN-637	50	55 ¹ -- 75 ²	150°F
AP02D-WT-WTL-SN-700	50	55 ¹ -- 75 ²	150°F
1. When testing is performed pneumatically.			
2. When testing is performed hydrostatically.			
3. Refer to 24590-WTP-MG-01-030 for design temperature and pressure.			

Encasement Pipe	
Transfer Piping	
Sizes	6 -in. , Schedule 40
Pipe	ASTM A106, Grade B, SMLS, with an external epoxy coating meeting the requirements of Section 3.2.3.
Wall Thickness	Standard Weight
Fittings	ASTM A234, Grade WPB, wrought steel, butt-welding in accordance with ASME B16.9. Wall thickness to match pipe.
Bends	Bends shall be performed per ASME B31.3-2016, Section 332.2. (See Section 3.3.6 for minimum wall thickness)

Encasement Pipe	
Test Risers	
Sizes	Less than 1 inch
Pipe	ASTM A106, Grade B, SMLS, with an external epoxy coating meeting the requirements of Section 3.2.3.
Wall Thickness	Schedule 80
Fittings	ASTM A 105, 3000 lb, ASME B16.11