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PROCUREMENT SPECIFICATION FOR FABRICATION OF DOUBLE CONTAINED PIPE FOR 241-AW AND 242-A EVAPORATOR

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMTR</td>
<td>Certified Material Test Report</td>
</tr>
<tr>
<td>CTR</td>
<td>Certified Test Report</td>
</tr>
<tr>
<td>CAWI</td>
<td>Certified Associate Welding Inspector</td>
</tr>
<tr>
<td>CWI</td>
<td>Certified Welding Inspector</td>
</tr>
<tr>
<td>GS</td>
<td>General Service</td>
</tr>
<tr>
<td>MT</td>
<td>Magnetic Particle Examination</td>
</tr>
<tr>
<td>NDE</td>
<td>Nondestructive Examination</td>
</tr>
<tr>
<td>NPS</td>
<td>Nominal Pipe Size</td>
</tr>
<tr>
<td>PMI</td>
<td>Positive Material Identification</td>
</tr>
<tr>
<td>PSSH</td>
<td>Packaging, Storage, Shipping, and Load Handling</td>
</tr>
<tr>
<td>PT</td>
<td>Liquid Penetrant Examination</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>QAP</td>
<td>Quality Assurance Plan</td>
</tr>
<tr>
<td>RT</td>
<td>Radiographic Examination</td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
</tr>
<tr>
<td>SS</td>
<td>Safety Significant</td>
</tr>
<tr>
<td>UT</td>
<td>Ultrasonic Examination</td>
</tr>
<tr>
<td>UV</td>
<td>Ultra Violet</td>
</tr>
<tr>
<td>VT</td>
<td>Visual Examination</td>
</tr>
<tr>
<td>WPQR</td>
<td>Welding Procedure Qualification Record</td>
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</table>

#### Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>Inch</td>
</tr>
<tr>
<td>lb/ft³</td>
<td>Pound per cubic foot</td>
</tr>
<tr>
<td>lb/in²</td>
<td>Pound per square inch</td>
</tr>
<tr>
<td>mil</td>
<td>One thousandth of an inch</td>
</tr>
<tr>
<td>°F</td>
<td>Degree Fahrenheit</td>
</tr>
<tr>
<td>ppm</td>
<td>Parts per million</td>
</tr>
</tbody>
</table>
1.0 SCOPE

1.1 SPECIFICATION OVERVIEW
This specification provides minimum requirements for fabricating new double-contained pipe between 241-AW Tank Farm and the 242-A Evaporator. Fabrication will include creating fabrication drawings, procuring materials, building piping spool pieces, finishing, coating and shipping. The new lines within the 241-AW Tank Farm, will travel to the AW-02A, AW-02E, and AW-B pit structures; lines outside of the 241-AW Tank Farm will travel from the fence line interface to the 242-A Evaporator. The double contained pipe consists of a primary (inner/carrier) pipe that is classified as Safety Significant (SS); and an encasement (outer) pipe that is classified General Service (GS). Drawings H-14-111860, H-14-111861 and H-14-111862 provide configurational requirements for fabrication.

1.2 WORK INCLUDED
The work within the scope of this Specification includes:
Preparation of fabrication and installation drawings, procurement of all materials, fabrication, examination, testing, documentation, packaging (includes dunnage), and shipping of the piping subassemblies. Fabrication boundaries are all items physically attached (welded) to the piping including caps and quality raw material specified within this specification.

1.3 WORK NOT INCLUDED
The work not in the scope of this Specification includes:
Material required to support installation (example: concrete footings, pipe clamps, shims, weld filler material for field use), wall nozzle assemblies, equipment boxes and covers, unloading, spreader beams, site handling and storage, installation, and all field 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 therein 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.
Table 2-1. Government Documents.

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOE G 414.1-3</td>
<td>Suspect/Counterfeit Items Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance</td>
</tr>
<tr>
<td>DOE/RL-92-36</td>
<td>Hanford Site Hoisting and Rigging Manual</td>
</tr>
<tr>
<td>WAC 173-303-640</td>
<td>Tank System</td>
</tr>
<tr>
<td>40 CFR 265.192</td>
<td>Design and Installation of New Tank Systems or Components</td>
</tr>
</tbody>
</table>

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. 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. (3 sheets)

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>ASME B16.9</td>
<td>Factory-Made Wrought Buttwelding Fittings</td>
</tr>
<tr>
<td>ASME B16.11</td>
<td>Forged Fittings, Socket-Welding and Threaded</td>
</tr>
<tr>
<td>ASME B31.3 (2016)</td>
<td>Process Piping</td>
</tr>
<tr>
<td>ASME NQA-1 (2008/2009 Addenda)</td>
<td>Quality Assurance Requirements for Nuclear Facility Applications</td>
</tr>
<tr>
<td>ASTM A53</td>
<td>Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless</td>
</tr>
<tr>
<td>ASTM A105</td>
<td>Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service</td>
</tr>
<tr>
<td>ASTM A106</td>
<td>Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems</td>
</tr>
<tr>
<td>ASTM D3418</td>
<td>Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry</td>
</tr>
<tr>
<td>ASTM D5162</td>
<td>Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates</td>
</tr>
</tbody>
</table>
### Table 2-2. Non-Government Documents. (3 sheets)

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td><strong>American Society for Nondestructive Testing</strong></td>
<td></td>
</tr>
<tr>
<td>ASNT-SNT-TC-1A</td>
<td>Personnel Qualification and Certification in Nondestructive Testing</td>
</tr>
<tr>
<td><strong>Society for Protective Coatings</strong></td>
<td></td>
</tr>
<tr>
<td>SSPC-PA2</td>
<td>Procedure for Determining Conformance to Dry Coating Thickness Requirements</td>
</tr>
<tr>
<td><strong>National Association of Corrosion Engineers</strong></td>
<td></td>
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<tr>
<td>SP0394</td>
<td>Standard Practice Application, Performance, and Quality Control of Plant-Applied Single-Layer Fusion-Bonded Epoxy External Pipe Coating</td>
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<tr>
<td>SP0490</td>
<td>Holiday Detection of Fusion-Bonded Epoxy External Pipeline Coating of 250 to 760 µm (10 to 30 mil)</td>
</tr>
<tr>
<td><strong>American Welding Society</strong></td>
<td></td>
</tr>
<tr>
<td>AWS A5.01M/A5.01 (2008)</td>
<td>Procurement Guidelines for Consumables — Welding and Allied Processes — Flux and Gas Shielded Electrical Welding Processes</td>
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<tr>
<td>AWS D1.6/D1.6M (2017)</td>
<td>Structural Welding Code - Stainless Steel</td>
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<tr>
<td>AWS QC1 (2016)</td>
<td>Standard for AWS Certification of Welding Inspectors</td>
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<tr>
<td><strong>Washington River Protection Solutions</strong></td>
<td></td>
</tr>
<tr>
<td>RPP-8360</td>
<td>Lifting Attachment and Lifted Item Evaluation for Hoisting, Rigging, Transport and Load Handling</td>
</tr>
<tr>
<td>TFC-ENG-STD-06 (Rev. D-1)</td>
<td>Design Loads for Tank Farm Facilities</td>
</tr>
<tr>
<td>TFC-ENG-STD-22 (Rev. G-2)</td>
<td>Piping Jumpers and Valves</td>
</tr>
<tr>
<td>TFC-ENG-STD-45 (Rev. B-2)</td>
<td>Installations for Potentially Flammable Atmospheres</td>
</tr>
<tr>
<td>TFC-ENG-STD-52 (Rev. A-1)</td>
<td>Subcontractor welding Standard</td>
</tr>
</tbody>
</table>

### 3.0 REQUIREMENTS

The waste transfer lines will be direct-buried between the 242-A Evaporator to the 241-AW Tank Farm.

### 3.1 SYSTEM DESCRIPTION

The double contained pipe consists of a primary (inner/carrier) pipe that is externally supported and concentrically located within a secondary encasement (outer) pipe. The primary pipe is classified as Safety Significant (SS); and an encasement pipe that is classified as General Service (GS). The piping is comprised of two primary and encasement pipe sizes. The waste feed line consists of a 3-in. nominal pipe size (NPS) stainless steel primary pipe and a 6-in. NPS encasement carbon steel pipe as shown on the drawings. The slurry lines consist of 2-in. NPS stainless steel primary pipe and a 4-in. NPS encasement carbon steel pipe. The exterior encasement piping is epoxy coated for corrosion protection followed by another abrasion resistant overcoat to protect the base epoxy layer.
The slurry and waste feed lines shall be factory or shop fabricated as complete as practicable and supplied as pipe spools to minimize fieldwork. The details of fabrication are found below.

3.2 GENERAL REQUIREMENTS

3.2.1 Fabrication Drawings

Fabrication/spool drawings shall be created based on the configurational requirements of drawings H-14-111860, H-14-111861 and H-14-111862. These drawings contain the following:

- H-14-111860 - details installation interfaces.
- H-14-111861 - details pipe lengths, required field weld locations and dimensional requirements.
- H-14-111862 – details pipe assemblies, components and parts.

The fabrication drawings based on the pipe routings defined in the above drawings shall be submitted and approved by the BUYER. The fabrication drawings shall account for the installation showing the location and orientation of each pipe spool in an installation overview. Pipe spools shown on the fabrication/installation drawing shall be traceable to the individual pipe spool drawings. The installation overview drawing will supplement the H-14 series drawings to install the pipe spool.

Fabrication details will include piece mark numbers, weld details, nondestructive examination (NDE) requirements, cleaning, and testing applicable only to the subject pipe spool.

3.2.2 Tooling and Marking

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.

Any marking/writing on stainless parts other than scribing shall be with a certified low-corrosion marker that has less than 200 ppm total halogens, less than 200 ppm sulfur, and less than 300 ppm total low melting metals. The SELLER shall provide traceability of the certified marker to the BUYER.

3.3 PIPING FABRICATION AND ASSEMBLY

Primary pipe and encasement piping subassemblies shall be fabricated and assembled in accordance with ASME B31.3, approved drawings, and the approved Fabrication, Inspection, Test (FIT) Plan(s). This section contains the requirements for all of the piping that includes the primary piping, encasement piping, bends, guides and supports. Activities include: cutting, welding, inspecting and cleaning.

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

Clean supports 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 visual inspection (borescope will be required for piping bends at a minimum). Provide documented evidence that cleaning has been accomplished as specified in this Section.

### 3.3.1 Material

Materials include piping, piping components, pipe supports, and pipe guides. See the Pipe Codes (Appendix A) and drawings for details on material specifics.

Prior to fabrication, all material for the double-contained slurry and waste feed lines shall be examined to verify product marking and dimensions. Visual inspection will be performed to verify that the product marking is as described in the applicable ASTM standards. A check of pipe outside diameter and wall thickness will be performed to ensure permissible variations in dimensions are in accordance with the applicable ASTM standards. Dimensions of primary pipe guide plates shall be verified prior to welding. Dimensions of primary pipe guide weldments shall be verified after welding but prior to installation into encasement piping.

Certified material test reports (CMTR) shall be submitted to the BUYER for all pressure boundary and structural materials. Positive material identification (PMI) or independent chemical testing shall be used to verify material chemistry of piping components. All other materials used in construction shall be provided with a Certificate of Conformance in 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 CMTRs 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 also conform to the requirements in the QAP.

The quality level of the material shall be as follows:

- Primary piping shall be QL-2 Safety Significant to include weld filler material that is used to weld to the primary piping.
- All other material shall be QL-3 General Service.

All Safety Significant material shall be procured from an evaluated QL-2 supplier or Commercial Grade Dedicated (CGD) to the requirements contained in the contract.

When the material is subdivided, the SELLER shall transfer the heat number to the part and remnants. Small parts (e.g., couplings, flanges) may be kept in boxes that are labeled with heat numbers. This will ensure that all parts of the original stock piece are traceable.

Materials shall be free from any defects or imperfections that may affect performance as verified through qualification and production inspection tests. Cut pipe using methods that result in clean, straight cuts. Ream pipe to nominal inside diameter after cutting.
To facilitate installation, the fabricator shall provide the following pedigreed raw material:
- Qty. 1 – 10’ stick of 2” stainless steel primary pipe, QL-2 (SS).
- Qty. 1 – 10’ stick of 3” stainless steel primary pipe, QL-2 (SS).
- Qty. 4 – 10’ sticks of 4” carbon steel encasement pipe, QL-3 (GS).
- Qty. 2 – 10’ sticks of 6” carbon steel encasement pipe, QL-3 (GS).

The carbon steel pipe does not require coating, the split pipe sections will be fabricated from these pipes during field installation.

3.3.2 Assemblies

The pipe spools shall be of suitable size for transport by truck and comply with pipe spool support drawing H-14-111861. Field weld locations are provided based on known underground obstructions allowing spools to be fitted. Each pipe spool that has a bend shall have a minimum of 3 contact points, 2 being pipe supports.

Encasement Inspection/Test Ports (Items 3 & 6 on H-14-111862) are required to be fabricated per the locations designated on H-14-111860. Table 3-1 provides the finished length of the weldment per location.

<table>
<thead>
<tr>
<th>Transfer Line</th>
<th>Riser</th>
<th>Length (Pipe C.L. to TOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL-170</td>
<td>Hydro Test</td>
<td>TBD in.</td>
</tr>
<tr>
<td></td>
<td>Test Port</td>
<td>TBD in.</td>
</tr>
<tr>
<td>SL-171</td>
<td>Hydro Test</td>
<td>TBD in.</td>
</tr>
<tr>
<td></td>
<td>Test Port</td>
<td>TBD in.</td>
</tr>
<tr>
<td>SL-172</td>
<td>Hydro Test</td>
<td>TBD in.</td>
</tr>
<tr>
<td></td>
<td>Test Port</td>
<td>TBD in.</td>
</tr>
<tr>
<td>SN-275</td>
<td>Hydro Test</td>
<td>TBD in.</td>
</tr>
<tr>
<td></td>
<td>Test Port</td>
<td>TBD in.</td>
</tr>
</tbody>
</table>

These assemblies shall be provided with the encasement pipe, 1” pipe, latrolet welded to the top of the encasement pipe and the cap (H-14-111862 Item 7). Prior to coating per Section 3.4.1, the encasement weldment shall be pressure tested per Section 3.5.1.2. The finished weldment is required to be epoxy coated per Section 3.4.1 with a 1” hold back from either side of the centerline where the split of the clamshell will be made in the field.

Each completed test riser assembly shall be packaged and labeled with the installation location.

3.3.3 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.
When bending primary piping, ensure at least one leg is capable of being fed through the encasement pipe of the same bend radius. Maximize individual pipe lengths where possible (i.e. minimize the number of welds).

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.

The minimum required wall thickness values are:

- Primary/Carrier 3” 0.076 in.
- Encasement/Secondary 6” 0.020 in.
- Primary/Carrier 2” 0.054 in.
- Encasement/Secondary 4” 0.017 in.
- Encasement/Test Riser 1” 0.012 in.

The wall thickness measurements will be documented after pipe bending. Identification will be provided between the spool drawings and the bend data. 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.

### 3.3.4 Alignment

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

### 3.3.5 Welding

All weld joints and seams along the pressure boundaries shall be 100% continuously welded. Weld joints and seams shall be wire brushed or buffed after final NDE and inspections as required to remove heat discoloration, oxidation, all burrs, and sharp edges. Welding shall comply with the requirements of TFC-ENG-STD-52, *Subcontractor Welding Standard*.

All primary piping welds shall be completed using 100% Gas Tungsten Arc Weld (GTAW). Welds made on to the outside of the primary piping shall also be GTAW. All encasement piping welds shall be GTAW for the root pass, first, and second passes at a minimum, other welding methods may be used for any weld after the second weld pass is completed.

### 3.3.5.1 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 piping components shall be qualified in accordance with ASME B31.3, Paragraph 328.2 prior to performing welding activities. Personnel performing examinations shall be qualified and certified in accordance with ASME B31.3, Paragraph 342. Qualification records of welding and examinations personnel shall be submitted.
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.

3.3.5.2 Weld Filler Material
Legible certified test reports (CTR) will be submitted, certified by the responsible manufacturer with results of chemical analysis and physical tests required for Schedule I level of testing in accordance with AWS A5.01. Independent chemical and physical tests will be performed for weld filler material to be used for primary pipe pressure boundary or attachment welds prior to fabrication to verify conformance to AWS specification and document results. The use of PMI for the independent chemical test of weld filler metal is not authorized.

3.3.5.3 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&PVC 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.

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.

3.3.5.4.Weld Identification

Prepare weld identification drawings (weld maps), isometric or spool drawings that shows the 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).

3.3.5.5.Weld 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 3.3.5.3 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.
When a circumferential weld with an intersecting longitudinal weld(s) is volumetrically examined, at least the adjacent 1-1/2” of each intersecting weld shall be examined.

### Table 3-2. Schedule of Pipe Examinations and Testing.

<table>
<thead>
<tr>
<th>NDE/NDT Examination Methods</th>
<th>Pipe Examination Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
</tr>
<tr>
<td>Visual (VT)</td>
<td>H</td>
</tr>
<tr>
<td>Fit up</td>
<td></td>
</tr>
<tr>
<td>Root pass</td>
<td></td>
</tr>
<tr>
<td>Cover pass</td>
<td>100% (A, F, H)</td>
</tr>
<tr>
<td>Liquid Penetrant (PT)</td>
<td></td>
</tr>
<tr>
<td>Root pass</td>
<td>100% (J)</td>
</tr>
<tr>
<td>Cover pass</td>
<td></td>
</tr>
<tr>
<td>Magnetic Particle (MT)</td>
<td></td>
</tr>
<tr>
<td>Root pass</td>
<td></td>
</tr>
<tr>
<td>Cover pass</td>
<td></td>
</tr>
<tr>
<td>Radiographic (RT)</td>
<td></td>
</tr>
<tr>
<td>Completed weld</td>
<td>100% (A) Note 1</td>
</tr>
<tr>
<td>Ultrasonic (UT)</td>
<td></td>
</tr>
<tr>
<td>Completed weld</td>
<td>100% (A) Note 1</td>
</tr>
<tr>
<td>Leak/Pressure</td>
<td></td>
</tr>
<tr>
<td>Completed weld</td>
<td>D</td>
</tr>
</tbody>
</table>

Note:
1. UT may be used in lieu of RT as approved by customer.

Legend:
A. Circumferential buttwelds.
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 buttwelds.
J. Applies to all welds configurations where a longitudinal weld intersects a circumferential weld.

3.3.5.5.1. 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.”
3.3.5.5.2. Liquid Penetrant Examination (PT)

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

3.3.5.5.3. 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.

3.3.5.5.4. 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.

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 made available for a qualified independent reviewer (Buyer QA and/or IQRPE). Differences must be resolved prior to submittal of final report. RT film shall be provided to the Buyer at completion of the fabrication.

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.

Encasement welds to be RT are to be selected by the BUYER.

Primary piping welds will be 100% RT due to inaccessibility and transport fluid type after installation. Encasement piping welds will be 20% RT due to inaccessibility after installation.

3.3.5.5.5. 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.
3.4 PIPE COATING

Complete pneumatic testing of secondary encasement piping before repairing factory applied protective coating where piping was cut and spliced over the primary piping.

3.4.1 Coating for Encasement Exterior

Scotchkote® Fusion-Bonded Epoxy Coating 6233P and an abrasion resistant overcoat Scotchkote 6352HF will be applied for factory-coated pipe per manufacturer’s specifications. The minimum dry film thickness of both products combined is to be 50 mils with a minimum dry film thickness of 16 mils for the 6233P and a minimum dry film thickness of and 34 mils for the 6352HF. Pipe surfaces will be cleaned, prepared, coating applied, and inspected/tested per SP0394 and manufacturer’s specifications. If manufacturer’s specifications and SP0394 conflict, the Seller shall conform to the manufacturer’s specifications. Coating shall be held back 4 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. Two coats of weldable primer shall be applied, not to exceed 1 mil dry film thickness per coat. Surface for application of weldable primer shall be cleaned and dried per manufacturer’s data sheet.

Encasement Inspection/Test Ports identified in Section 3.3.2 shall be coated with Scotchkote Liquid Epoxy Coating 323+. The 323+ coating shall be applied in accordance with the coating manufacturer’s instructions to a minimum dry film thickness of 30 mil.

Field applied pipe coatings to facilitate repairs prior to shipment to the Buyer shall be Scotchkote Liquid Epoxy Coating 323+ or Scotchkote 226P (for minor pinhole and abrasion areas only). The 323+ coating shall be applied in accordance with the coating manufacturer’s instructions to a minimum dry film thickness of 30 mil. The 226P coating shall be applied in accordance with the coating manufacturer’s instructions to a minimum of 20 mil in addition to the parent coating. Locations of areas requiring repairs, retesting, and results must be documented.

Coating technical data sheets and safety data sheets (SDS) will be submitted. Coating and inspection procedures will be submitted along with personnel qualifications.

3.4.2 Coating Examination

Inspections of Scotchkote products shall be performed by a qualified NACE CIP level 2 inspector at a minimum, under the supervision of a CIP level 3 inspector.

The dry film thickness must be measured in accordance with SSPC-PA2 using a suitable nondestructive magnetic gauge to verify the minimum applied thickness (50 mil) after the coating has cured.

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 for field applied pipe coating Scotchkote Liquid Epoxy Coating 323+ or Scotchkote 226P and SP0490 for Scotchkote Fusion-Bonded Epoxy Coating 6233P/6352HF. For thicknesses in excess of the 30

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mils called out by SP0490, voltage adjustments per SP0490 Equation 1 shall be made to support holiday testing. All deficiencies and defects shall be corrected in accordance with SP0394 or the coating manufacturer’s instructions. Any repaired areas shall be allowed to cure and retested. Locations of areas requiring repairs, retesting, and results must be documented. Coating and inspection procedures will be submitted along with personnel qualifications.

3.4.3 Coating Testing

Testing shall be performed per SP0394, Table 3 and Table 4. Test types A and B, as required per SP0394 Table 3, shall be performed. Flexibility testing is not required if field bending is not performed post-coating application.

3.5 ASSEMBLY TESTING

3.5.1 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 gauges where test pressures are within 25% and 75% of the overall range.

Design pressure for Primary piping is 620 psig and 60 psig for Encasement piping. Design temperature for Primary and Encasement piping is 200°F. Test 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.

3.5.1.1 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.
3.5.1.2. 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 conduct work and comply in accordance with a Quality Assurance Program (QAP) that meets the Quality Assurance (QA) criteria specified by the BUYER using form A-6006-661, “Quality Assurance Requirements.”

The BUYER reserves the right to verify the quality of work at the fabricator’s facilities including any sub-tier facilities. Access to sub-tier facilities shall be requested through the fabricator and verification may be performed jointly.

Quality assurance requirements have been interspersed through this Specification, where appropriate.

4.2 VERIFICATION

The BUYER reserves the right to witness all tests and shall be given a minimum of five (5) working days written (email acceptable) notice prior to each test date (not required for visual 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 summarized in Table 4-1. For a full listing of all requirements refer to the individual sections listed in the table below.
Table 4-1. Inspection Summary.

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<th>Section</th>
<th>Requirements</th>
<th>Verification Method</th>
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<td>Visual</td>
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<tr>
<td>3.3.1</td>
<td>Product Material Chemistry</td>
<td>PMI or Independent Testing</td>
</tr>
<tr>
<td>3.3.5.2</td>
<td>Conformance with AWS specification of weld filler metal by the responsible manufacturer</td>
<td>AWS A5.01</td>
</tr>
<tr>
<td>3.3.5.2</td>
<td>Independent chemical and physical verification of weld filler material for primary pipe pressure boundary or attachment welds to verify AWS conformance</td>
<td>AWS A5.01 Independent Testing</td>
</tr>
<tr>
<td>3.3</td>
<td>Free-iron examination of stainless steel pipes</td>
<td>ASTM A380</td>
</tr>
<tr>
<td>3.3.1</td>
<td>Post-cleaning surface inspection of steel for imperfections</td>
<td>Visual</td>
</tr>
<tr>
<td>3.4.2</td>
<td>Dry film thickness of epoxy coatings</td>
<td>Magnetic coating thickness gauge</td>
</tr>
<tr>
<td>3.4.3</td>
<td>Epoxy coating testing</td>
<td>SP0394 (Table 3 and 4)</td>
</tr>
<tr>
<td>3.4.2</td>
<td>No holidays, pinholes, or discontinuities</td>
<td>Holiday Detector (ASTM D5162)</td>
</tr>
<tr>
<td>3.3</td>
<td>Pipe Exterior Cleaning</td>
<td>ASTM A380</td>
</tr>
<tr>
<td>3.3.3</td>
<td>Pipe Interior Cleaning</td>
<td>Visual, Borescope</td>
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<tr>
<td>3.3.5.5</td>
<td>Weld examinations of each pipe spool per Table 3-1</td>
<td>CWI or CAWI</td>
</tr>
<tr>
<td>3.5.1</td>
<td>Leak/Pressure test of pipe spools</td>
<td>ASME B31.3</td>
</tr>
</tbody>
</table>

4.3 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”.

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5.0 PIPING IDENTIFICATION, STORAGE AND HANDLING

5.1 GENERAL

Piping spools and related equipment shall be clearly identifiable for receipt and use. All delivered items shall be packaged to allow for receipt and storage until use. Piping spools shall be packaged to be picked by crane and/or palletized to be handled by a fork lift.


The fabricator 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 fabricator’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.

5.1.1 Identification and Marking

Package marking a minimum shall appear on two (2) 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.

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 ½ in., as permitted by package size. Alternatively, if tags or labels are used, they shall be affixed to the container using 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, the following:

1. BUYER’s name with destination address.
2. SELLER’s name with return address.
3. Package numbers showing the purchase order/contract 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 (e.g., Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions), 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.

All pipe spools shall have the following clearly marked on the exterior of the epoxy surface prior to packaging with marking material that is not deleterious to the epoxy coating:

- Transfer line number (SL-171, etc.).
- Spool number that corresponds with the installation drawing and orientation if applicable.
- Center of gravity clearly marked to facilitate unloading and installation.
- Top dead center of the pipe assembly marking at each end to correspond the fabrication orientation to the field installed orientation.
- Coating dry film mil thickness along the top dead center of pipe at maximum spacing of ten feet along the pipe and at the mid-point of the pipe bends to support installation/surveying.

All pipe spool protective wrapping, as discussed in Section 5.1.2, shall have the following clearly marked on the exterior packaging surface:

- Transfer line number (SL-171, etc.).
- Spool number that corresponds with the installation drawing and orientation if applicable.
- Center of gravity clearly marked to facilitate unloading and installation.
- Approximate top dead center of pipe assembly at each end to support orientation.

5.1.2 Preservation and Packaging

The fabricator 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. 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 plan, these alternative methods will be acceptable for use.

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, ultra violet (UV), and moisture and be suitable for unprotected storage outside for up to one (1) year with no degradation to the piping spools and encasement test riser weldments. Outside environmental conditions will be determined by TFC-
ENG-STD-02. Items shall be packaged in a manner to prevent damage or contamination during shipping, including shipment during the refurbishment process.

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.

5.1.2.1. Packing

Exterior package type shall provide the level of protection required based on the storage and environmental limits. Protective wrap applied to exterior of pipe spools and encasement test riser weldments shall be a heat shrink polyolefin/polyethylene white wrap to meet UV protection requirements. Containers, crates, or skids may be used as the methodology for packaging.

5.1.2.2. Dunnage

Pipe spools shall be shipped with padded dunnage to adequately support the pipe sections during transportation and storage at the Buyer’s facility. The dunnage shall be configured to protect the coated surfaces and elevate the piping spool from the ground. It is preferable that the dunnage is banded (with padding) to the piping.

5.1.2.3. 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 fabricator’s facility.

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

SELLER shall be responsible for all necessary coating repair per SP0394 that occurs during handling, storage, or shipping while under the control of the SELLER.

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. The truck and driver will be required to stop at receiving 2355 Stevens in Richland WA and at the onsite receiving facility prior to arriving at the final unloading destination. Receiving and unloading may require significant processing time (hours).

Unloading will be done by the BUYER at the Hanford Site.
6.0 SUBMITTALS

6.1 DOCUMENTS TO BE SUBMITTED

Unless specified otherwise, the fabricator’s submittals shall be per the following subsections. All electronic submittals shall be in a suitable format per TFC-BSM-IRM DC-C-02, “Records Management,” and in compliance with TFC-BSM-IRM DC-C-07, “Vendor Processes.” 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 6-1 for deliverable and schedule information.

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

Table 6-1. Summary of Submittals.

<table>
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<tr>
<th>Item</th>
<th>Title</th>
<th>Purpose</th>
<th>Description</th>
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<td>Required for NQA-1</td>
<td>At time of award</td>
</tr>
<tr>
<td>2</td>
<td>Schedule</td>
<td>Pre-purchase Evaluation</td>
<td>With Bid</td>
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<tr>
<td>3</td>
<td>Fabrication/Spool Drawings (3.2.1)</td>
<td>Approval</td>
<td>Prior to Fabrication</td>
</tr>
<tr>
<td>4</td>
<td>Certified Material Test Reports (3.3.1)</td>
<td>Approval</td>
<td>Prior to Fabrication</td>
</tr>
<tr>
<td>5</td>
<td>Fabrication, Inspection, Test Plan(s) (3.3)</td>
<td>Approval</td>
<td>Prior to Fabrication</td>
</tr>
<tr>
<td>6</td>
<td>Weld Identification Drawings (3.3.5.4)</td>
<td>Information/Record</td>
<td>With Shipment</td>
</tr>
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<td>7</td>
<td>Cleaning Documentation (3.3)</td>
<td>Information/Record</td>
<td>With Shipment</td>
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<tr>
<td>8</td>
<td>Pipe Coating Technical Data Sheet and SDS (3.2.3)</td>
<td>Approval</td>
<td>Prior to Application of Coating</td>
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<tr>
<td>9</td>
<td>Pipe Coating Application and Inspection Procedure (3.4.1, 3.4.2)</td>
<td>Approval</td>
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<tr>
<td>10</td>
<td>Personnel Qualifications for Coating and Inspection (3.4.1, 3.4.2)</td>
<td>Approval</td>
<td>Prior to Application of Coating</td>
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<td>11</td>
<td>Weld Filler Certified Test Reports (3.3.5.2)</td>
<td>Approval</td>
<td>Prior to Fabrication</td>
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<td></td>
<td>* Prior to Use</td>
<td></td>
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<td>12</td>
<td>Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records (3.3.5.1)</td>
<td>Approval</td>
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<td>13</td>
<td>Certified Welding Inspector Documentation (3.3.5.3)</td>
<td>Approval</td>
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<tr>
<td>14</td>
<td>Inspection and Test Report** (3.6.1)</td>
<td>Approval</td>
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<tr>
<td>15</td>
<td>Radiography Film (3.3.5.5.4)</td>
<td>Information/Record</td>
<td>With Shipment</td>
</tr>
<tr>
<td>16</td>
<td>Shipping and Handling Procedure (5.1.2)</td>
<td>Approval</td>
<td>Prior to Shipment</td>
</tr>
</tbody>
</table>

* Prior to 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, visual and nondestructive examination records, identification of measuring and test equipment, borescope results, wall thickness measurements/sketches, cleanliness results, coating inspection results, nonconformance’s, and an overall assessment of adequacy.

Any changes shall be submitted per the RFI process requirements detailed in TFC-BSM-IRM DC-C-07, “Vendor Processes.”
6.2 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.

6.3 SUBMITTAL EXPLANATION

Brief explanations of each of the items in Table 5-1 follow:

1. **Quality Assurance Program.** See Section 4.1.

2. **Schedule.** Submit a schedule showing submittals and shipment dates of the equipment with bid.

3. **Fabrication/Spool 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 NDE weld record drawings. The fabricator is 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 3.2.1.

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4. **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. 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 and 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 3.3.1.

5. **Fabrication, Inspection, Test Plan(s).** Submit Fabrication, Inspection, and Test Plans for approval prior to fabricating.

6. **Weld Identification Drawings.** Drawings show relative positions or pressure-containing welds. See Section 3.3.5.4.

7. **Cleaning Documentation.** Submit cleaning documentation. See Section Section 3.3

8. **Pipe Coating Technical Data Sheet and SDS.** Epoxy coating product literature, SDS, inspection, and testing results. See Section 3.2.3.

9. **Pipe Coating Application and Inspection Procedure.** Submit epoxy coating and inspection procedures. See Section 3.4.1 and 3.4.2.

10. **Personnel Qualifications for Coating and Inspection.** Submit personnel qualifications for installation of epoxy coating. See Section 3.4.1 and 3.4.2.

11. **Weld Filler Certified Test Reports.** Submit independent chemical and physical tests of weld filler material. See Section 3.3.5.2.

12. **Welding Procedures, Procedure Qualification Records, and WPQRs.** Submit copies of all Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records. See Section 3.3.5.1.

13. **CWI Documentation.** Submit documentation of Certified Welding Inspector. See Section 3.3.5.3.

14. **Inspection and Test Report.** 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 inspection results, non-conformances, and an overall assessment of adequacy. See Section 3.6.1.

15. **Radiography Film.** Provide the weld examination radiography film for all final welds. See Section 3.3.5.5.4.

16. **Handling and Shipping Procedure.** 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. See Section 5.1.2.
APPENDIX A

PIPE CODE DATA
A1.0 PIPE CODE DATA

A1.1 PRIMARY PIPE DATA SHEET

Table A-1 lists the Pipe Code data for primary pipe.

Table A-1. Primary Pipe (M-9) Data.

<table>
<thead>
<tr>
<th>Line Number</th>
<th>Design Pressure (lb/in² gauge)</th>
<th>Test Pressure (lb/in² gauge)</th>
<th>Design Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AW02A-WT-WTL-SL-170</td>
<td>620</td>
<td>930* (+20/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AW02A-WT-WTL-SL-171</td>
<td>620</td>
<td>930* (+20/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AW02E-WT-WTL-SN-275</td>
<td>620</td>
<td>930* (+20/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AWVPB-WT-WTL-SL-172</td>
<td>620</td>
<td>930* (+20/-0)</td>
<td>200</td>
</tr>
</tbody>
</table>

Sizes 2 in., 3 in.
Pipe ASTM A 312, Grade TP 316L SMLS (per MT-50400)
Wall Thickness Schedule 40S (per MT-50400)
Fittings Stainless steel, ASTM A403, Grade WP 316L SMLS (per MT-50400)
Butt-welding in accordance with ASME B16.9
Bends Bends shall be performed per ASME B31.3-2016, Section 332.2 (see Section 3.3.6)

* Testing will be performed hydrostatically

A1.2 ENCASEMENT DATA SHEET

Table A-2 lists the Pipe Code data for encasement pipe.

Table A-2. Encasement Pipe (M-26a) Data.

<table>
<thead>
<tr>
<th>Line Number</th>
<th>Design Pressure (lb/in² gauge)</th>
<th>Test Pressure (lb/in² gauge)</th>
<th>Design Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AW02A-WT-WTL-SL-170</td>
<td>60</td>
<td>66* (+10/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AW02A-WT-WTL-SL-171</td>
<td>60</td>
<td>66* (+10/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AW02E-WT-WTL-SN-275</td>
<td>60</td>
<td>66* (+10/-0)</td>
<td>200</td>
</tr>
<tr>
<td>AWVPB-WT-WTL-SL-172</td>
<td>60</td>
<td>66* (+10/-0)</td>
<td>200</td>
</tr>
</tbody>
</table>

Sizes 4-in., 6-in.
Pipe ASTM A53 (MT-50400 allows ASTM A53 or A106), Grade B with an external epoxy coating meeting the requirements of Section 3.2.3.
Wall Thickness Schedule 40 (per MT-50400)
Fittings ASTM A234, Grade WPB, wrought steel, butt-welding in accordance with ASME B16.9. Wall thickness to match pipe.

* Testing will be performed pneumatically.