

Procurement Specification Cover Sheet

1. Title		
TECHNICAL SPECIFICATION FOR STRUCTURAL STAINLESS STEEL FOR MELTER ASSEMBLY SUPPORT FRAMES FOR THE		
DEFENSE WASTE PROCESSING FACILITY (U) - PROJECT #MLT4		
2. Specification No.	3. Revision	4. Page
S-501	2	1 of 9
5. Functional Classification	6. Requester Department	7. Requester Division
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ENGINEERING DOC. CONTROL - SRS



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1.0 PURPOSE

The purpose of this Specification is to define the requirements for fabricating Melter Vessel Support Frames for incorporation into the Melter Vessel Assembly.

2.0 SCOPE

2.1 Scope covered by the Specification

This Specification applies to the furnishing, detailing, fabrication, machining and milling of stainless steel Melter Vessel Support Frames as specified herein and as shown on the WSRC design drawings identified in Specification M-500, "Technical Specification for Melter Vessel Assembly for the Defense Waste Processing Facility." Information contained herein supplements Specification M-500. The work includes:

- Furnishing, detailing, fabrication, machining, installing and milling of stainless steel structural assemblies and weldments including stainless steel structural shapes, plates, bars, lifting lug pins, dowel pins, acme threaded studs and nuts, and structural fasteners.
- Sampling and testing of welds and materials, including documentation, as specified.

2.2 Scope not covered by this Specification

This Specification does not apply to the following items:

- Supply or fabrication of the Melter Vessel.
- Supply or assembly of Melter Vessel Assembly piping, conduit or other secondary components.

3.0 REFERENCED CODES AND STANDARDS

Unless otherwise specified herein or shown on the drawings, work under this Specification shall be performed in accordance with the Codes and Standards to the extent indicated by Specification M-500, "Technical Specifications for Melter Vessel Assembly for the Defense Waste Processing Facility" Section 3.0. The date of issue (or revision) indicated shall apply.

4.0 SUBMITTALS

4.1 Standard Forms

Prepare and submit engineering and quality verification document requirements in accordance with Attachments 8.1, "Engineering Document Requirements" and 8.2, "Quality Verification Document Requirements".

4.2 Engineering Documents

The following engineering documentation shall be submitted by the Supplier to WSRC for review and approval:

- 4.2.1 Detail shop drawings showing all member sizes and pieces, connections, welds and weld symbols, threaded fasteners, dowel pins, acme studs and all other miscellaneous stainless steel items. All materials shall be identified by piece mark number and ASTM material

designation number.

- 4.2.2 Shop erection diagrams showing the marking and position of each piece.
- 4.2.3 A written procedure on the cutting, forming and shaping of material in accordance with Section 6.1.1 of this specification.
- 4.2.4 A written procedure on Proof Load Test for "SC" items in accordance with Section 7.2 of this Specification.
- 4.2.5 Thread lubricant technical data in accordance with Section 6.1.7 of this specification.

4.3 Verification Documents

The following quality verification documentation shall be submitted by the Supplier to WSRC:

- 4.3.1 Nondestructive Examination and Verification Reports for all welds examined in accordance with Section 7.1.
- 4.3.2 Nondestructive Examination and Verification Reports for all "SC" welds reexamined and inspected after completion of the proof load test in accordance with Section 7.2 of this Specification.

4.4 Deviations

Requests to modify the requirements of this specification shall be submitted in accordance with Section 5.0 of M-SPC-S-00001, "Project Specification for Project Requirements for Purchase Orders for the Defense Waste Processing Facility".

5.0 MATERIALS

- 5.1 Stainless steel bars and miscellaneous shapes shall conform to ASTM A276, types 304 and 304L as specified on the WSRC design drawings. Stainless steel bars shall be furnished in Condition A; miscellaneous shapes shall be Class C in accordance with ASTM A484/A484M. Bars and shapes shall be hot-finished in accordance with ASTM A484/A484M. Grinding shall be finished using 120 grit minimum.
- 5.2 Stainless steel plates, sheets, and strips shall conform to ASTM A240/A240M, types 304 and 304L as specified on the design drawings. Tolerances of stainless steel plates, sheets, and strips shall conform to ASTM A480/A480M.
- 5.3 Welded stainless steel tubular members shall conform to ASTM A554, types 304 and 304L as specified on the design drawings. Outside dimension tolerances for stainless steel square and rectangular tubular members where the largest nominal outside dimension exceeds 8" shall be in accordance with Table 3 of ASTM A500. The tubular members shall be furnished in accordance with ASTM A554, Section 6 paragraph 6.1.2 welded, annealed and pickled; or paragraph 6.1.4 cold reduced, annealed and pickled. Finished tubular members shall be descaled. The inside weld bead need not be removed from the finished tubular member. A final cold working of tubular members in order to straighten members is allowed after final annealing, provided this operation minimizes reduction and stretching of the members. All proposed procedures for cutting, forming and shaping of materials shall be submitted by the Supplier in accordance with Section 4.2 of this Specification.
- 5.4 Stainless steel welding rods, bare electrodes and covered electrodes to be used in welding

stainless steel materials and the welding processes to be used shall be in accordance with Specification G-307A, "Technical Specification for Welding Requirements of Carbon Steel, Stainless Steel and Nickel Alloy Critical Fabricated Components".

- 5.5 Stainless steel structural bolts shall conform to ASTM A193/A193M, Grade B6 (AISI Type 410) or as specified on the design drawings. The maximum hardness shall be 28 HRC. Each lot or batch of bolts shall be tested for hardness in accordance with the following sampling plan.

Sampling Plan for Hardness Tests
 Acceptance Quotient Level (AQL) = 1.0%*
 (*AQL modified for small sample sizes)

Lot or Batch Size	Sample Size	No. of Samples Out of Spec.	
		Accept	Reject
1 to 20	ALL	0	1*
21 to 150	20	0	1
151 to 280	32	1	2
281 to 500	50	1	2

*Replace non-passing items only.

- 5.6 Stainless steel structural nuts shall conform to ASTM A194/A194M, Grade 6F (AISI Type 416). Each lot or batch of nuts shall be tested for hardness according to the sampling plan shown in Section 5.5.
- 5.7 Hardened stainless steel washers shall be manufactured in accordance with the dimensions given in Table 2 or 3 of ASTM F436. Stainless steel washer material shall be in accordance with ASTM A240/A240M, Type 410 and hardened to a value of 22 to 28 HRC or as shown on design drawings.
- 5.8 Master and slave dowel pins shall conform to ASTM A276, Type 316L. Conditioning, finish and heat-treatment shall be in accordance with the design drawings.
- 5.9 Acme threaded studs shall conform to ASTM A193/A193M, Grade B8R. Conditioning, finish and heat-treatment shall be in accordance with the design drawings.
- 5.10 Acme threaded nuts shall conform to ASTM A194/A194M, Grade 6F. Conditioning, finish and heat-treatment shall be in accordance with the design drawings, unless otherwise noted on design documents.
- 5.11 Lifting lug pins shall conform to ASTM A479/A479M, Type 410, condition 2 or as specified on the design drawings. The maximum hardness shall be 26 HRC.
- 5.12 The chemical requirement of all nonpermanent materials used in contact with stainless steel shall conform to M-SPC-S-00005, "Chemical Requirements for Materials Used in Contact with Austenitic Stainless Steel, Nickel and Nickel Alloys for the Defense Waste Processing Facility".

5.13 Supplementary Material Reports for SC-Items

- 5.13.1 For the items listed below which are identified as "SC" items on the WSRC design drawings, additional supplementary testing and reports shall be furnished by the Supplier.
- 5.13.2 High Strength Stainless Steel Bolting Material (paragraph 5.5) and Lifting Lug Pins (paragraph 5.11).
- 5.13.2.1 Supplier shall furnish WSRC with Manufacturer's Inspection Test Reports for all high strength stainless steel bolting materials and lifting lug pins in accordance with the applicable ASTM Standard. The final tempering temperature used and the results of hardness tests and nondestructive examination, if any, shall be shown on the test reports in addition to other required properties.
- 5.13.2.2 The Supplier shall perform 100 percent liquid-penetrant examination on lifting lug pins after completion of the proof load test specified in Section 7.2. Any transverse crack shall be cause for rejection. Any longitudinal discontinuity with a depth normal to the surface greater than 0.03 D (D = nominal pin diameter, inches) shall be cause for rejection. Liquid penetrant examination shall be in accordance with Specification G-307A.
- 5.14 Austenitic stainless steels in all product forms shall be solution annealed and descaled. The final surface finish shall be in the as-pickled finish unless otherwise specified. Blast cleaning is not allowed as a method of descaling or cleaning without WSRC concurrence.

6.0 FABRICATION AND ASSEMBLY

Fabrication and assembly shall be in accordance with WSRC accepted Supplier shop drawings (reference Sections 4.2.1 and 4.2.2).

6.1 General

- 6.1.1 Pieces shall be cut, formed, and shaped to sizes in accordance with the Supplier's written procedure specified in Section 4.2 and work points shown. Cut edges shall be machine cut, sheared or ground. Sharp or rough corners and edges shall be ground off, rounded, or chamfered smooth and shall be free of fins, tears, cracks, and other defects which would adversely affect the quality or strength of a weld or safety of individuals handling the material.
- 6.1.2 Details, fabrication, and bolted or welded connections shall be in accordance with the design drawings. Joints shall be fitted snug and flush.
- 6.1.3 All work points shown on the design drawings shall be adhered to in the shop detailing, fabrication and assembly.
- 6.1.4 Substitution of sections or modifications of design details when requested by the Supplier shall be made only after it has been accepted by WSRC.
- 6.1.5 The Supplier shall provide holes to suit future work and the work of others as indicated on the design drawings.
- 6.1.6 Bolted connections shall be the bearing type, with threads included in the shear planes, conforming to AISC Manual of Steel Construction, unless noted otherwise on the design drawings.
- 6.1.7 Bolts shall be installed using thread lubricant and the turn-of-nut method, unless noted

otherwise. In the turn-of-nut method, after bolts have been brought to the snug tight fit, permanent match marks shall be placed on the nut and protruding bolt point to enable inspector to verify the actual nut rotation. For ratios of gripped length to bolt outside diameter, L/D, up to 8 the turn fraction beyond snug tight shall be 1/2; for L/D ratios above 8 the turn fraction beyond snug tight shall be 2/3. High strength stainless steel bolts shall not be reused after having been once tightened to the full extent. The Supplier shall submit inspection records for installation of bolts.

6.2 Stainless Steel Frames and Assemblies

6.2.1 All stainless steel frames and assemblies shall be fabricated to the dimensions within the specified tolerances (flatness, parallelism, concentricity, perpendicularity etc.) as shown on the *design drawings*.

6.2.2 Welding of structural stainless steel for support frames shall be performed in accordance with Specification G-307A.

6.2.3 Stainless steel surfaces shall receive no paint other than piece marks, unless noted otherwise on design drawings.

7.0 EXAMINATION AND TESTING

7.1 Nondestructive examination (NDE)

The extent of examination shall be as specified below.

7.1.1 For welds identified on the WSRC design drawings, the extent of NDE shall be as follows:

- All fillet, flare bevel and partial penetration groove welds shall be examined over their entire length by the liquid penetrant examination method. Both the root pass and cover pass(es) shall be examined.

7.1.2 Additionally, for all welds identified and/or enclosed by "SC" boundaries on the WSRC design drawings, the extent of NDE shall be as follows:

- 100 percent of full penetration butt welds shall be liquid penetrant and radiographically examined. Both the root pass and cover pass(es) shall be liquid penetrant examined. Where it is physically impossible to perform radiographic examination, weld shall be examined by the ultrasonic method. The Supplier shall submit exceptions to the 100 percent radiographic examination requirement to WSRC for review and approval.

7.1.3 For all statically loaded welds that require visual or NDE, AWS D1.6 shall be used.

7.2 Testing Lifting Lugs - SC Items

The lifting lugs shall be load tested for a proof load of 125% of the weight of the totally assembled unit plus glass and water contents being applied to the lifting lugs. The proof load corresponding to the totally assembled weight plus glass and water contents shall be as specified on the WSRC design drawings. The assembly shall be lifted off the floor a minimum vertical dimension of six inches and held in this position for ten minutes. Inspections and NDE re-examination of all "SC" welds shall be performed to detect any permanent deformation and/or cracking after completion of the proof load test.

"SC" welds, except root passes, shall be liquid penetrant examined after completion of the proof load test in accordance with paragraph 7.1.2 of this specification.

The Supplier shall provide in accordance with Section 4.2, a written Proof Load Test procedure prior to performing the test.

The Supplier shall provide in accordance with Section 4.3, Nondestructive Examination and Verification Reports for all "SC" welds re-examined and inspected after completion of the proof load test.

8.0 ATTACHMENTS

8.1 Engineering Document Requirements

8.2 Quality Verification Document Requirements

Engineering Document Requirements Form Instructions

Purpose The Engineering Document Requirements (EDR) form is prepared by the originator, establishes a basis for actions required of a Supplier and provides the schedule for the submittal of engineering documents by the Supplier.

Legend

Entry No.	Information Required
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- | | |
|---|--|
| 1 | Document category number — see below. |
| 2 | Applicable specification number and appropriate paragraph. |
| 3 | Description corresponding to document category number. |
| 4 | Permission to proceed with fabrication or other specific processes is marked yes, if required. |
| 5 | List a milestone after award i.e., prior to fabrication, prior to test, prior to shipment, or with shipment that the listed document is to be submitted by Supplier. |
| 6 | Number of copies required for submittal. |
| 7 | Reproducible, Mylar, Vellum, etc |
| 8 | Enter remarks when appropriate. |

Document Category Number and Descriptions

- 1.0 Drawings
 - 1.1 Outline Dimensions, Services, Foundations and Mounting Details — Drawings providing external envelope, including lugs, centerline(s), location and size for electrical cable, conduit, fluid, and other service connections, isometrics and details related to foundations and mountings.
 - 1.2 Assembly Drawings — Detailed drawings indicating sufficient information to facilitate assembly of the component parts of an equipment item.
 - 1.3 Shop Detail Drawings — Drawings which provide sufficient detail to facilitate fabrication, manufacture, or installation. This includes pipe spool drawings, internal piping and wiring details, cross-section details and structural and architectural details.
 - 1.4 Wiring Diagrams — Drawings which show schematic diagram equipment, internal wiring diagrams, and interconnection wiring diagram for electrical items.
 - 1.5 Control Logic Diagrams — Drawings which show paths which input signals must follow to accomplish the required responses.
 - 1.6 Piping and Instrumentation Diagrams — Drawings which show piping system scheme and control elements.
- 2.0 Parts Lists and Costs — Sectional view with identified parts and recommended spare parts for one year's operation and specified with unit cost.
- 3.0 Complete WSRC Data Sheets — Information provided by Supplier on data sheets furnished by WSRC.
- 4.0 Instructions
 - 4.1 Erection/Installation — Detailed written procedures, instructions, and drawings required to erect or install material or equipment.
 - 4.2 Operations — Detailed written instructions describing how an item or system should be operated.
 - 4.3 Maintenance — Detailed written instructions required to disassemble, reassemble and maintain items or systems in an operating condition.
 - 4.4 Site Storage and Handling — Detailed written instructions, requirements and time period for lubrication, rotation, heating, lifting or other handling requirements to prevent damage or deterioration during storage and handling at jobsite. This includes shipping instruction for return.
- 5.0 Schedules: Engineering and Fabrication/Erection — Bar charts or critical path method diagram which detail the chronological sequence of activities, i.e., Engineering submittals, fabrication and shipment.
- 6.0 Quality Assurance Manual/Procedures — The document(s) which describe(s) the planned and systematic measures that are used to assure that structures, systems, and components will meet the requirements of the procurement documents.
- 7.0 Seismic Data Reports — The analytical or test report which provides information and demonstrates suitability of material, component or system in relation to the conditions imposed by the stated seismic criteria.
- 8.0 Analysis and Design Reports — The analytical data (stress, electrical loading, fluid dynamics, design verification reports, etc.) which demonstrate that an item satisfies specified requirements.
- 9.0 Acoustic Data Reports — The noise, sound and other acoustic vibration data required by the procurement documents.
- 10.0 Samples
 - 10.1 Typical Quality Verification Documents — A representative data package which will be submitted for the items furnished as required in the procurement documents.
 - 10.2 Typical Material Used — a representative example of the material to be used.
- 11.0 Material Descriptions — The technical data describing a material which a Supplier proposes to use. This usually applies to architectural items, e.g., metal siding, decking, doors, paints, coatings.
- 12.0 Welding Procedures and Qualifications — The welding procedure, specification and supporting qualification records required for welding, hard facing, overlaying, brazing and soldering.
- 13.0 Material Control Procedures — The procedures for controlling issuance, handling, storage and traceability of materials such as weld rod.
- 14.0 Repair Procedures — The procedures for controlling material removal and replacement by welding, brazing, etc., subsequent thermal treatments, and final acceptance inspection.
- 15.0 Cleaning and Coating Procedures — The procedures for removal of dirt, grease or other surface contamination, and preparation and application of protective coatings.
- 16.0 Heat Treatment Procedures — The procedures for controlling temperature and time at temperature as a function of thickness, furnace atmosphere, cooling rate and methods, etc.
- 19.0 UT — Ultrasonic Examination Procedures — Procedures for detecting discontinuities and inclusions in materials by the use of high frequency acoustic energy.
- 20.0 RT — Radiographic Examination Procedures — Procedures for detecting discontinuities and inclusions in materials by x-ray or gamma ray exposure of photographic film.
- 21.0 MT — Magnetic Particle Examination Procedures — Procedures for detecting surface or near surface discontinuities in magnetic materials by the distortion of an applied magnetic field.
- 22.0 PT — Liquid Penetrant Examination Procedures — Procedures for detecting discontinuities in materials by the application of a penetrating liquid in conjunction with suitable developing materials.
- 23.0 Eddy Current Examination Procedures — Procedures for detecting discontinuities in materials by distortion of an applied electromagnetic field.
- 24.0 Pressure Test — Hydro, Air, Leak, Bubble or Vacuum Test Procedures — Procedures for performing hydrostatic or pneumatic structural integrity and leakage tests.
- 25.0 Inspection Procedures — Organized process followed for the purpose of determining that specified requirements (dimensions, properties, performance results, etc.) are met.
- 26.0 Performance Test Procedures — Test performed to demonstrate that functional design and operational parameters are met.
 - 26.1 Mechanical Tests — e.g., pump performance, data, valve stroking, load, temperature rise, calibration, environmental, etc.
 - 26.2 Electrical Tests — e.g., impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.
- 27.0 Prototype Test Reports — Reports of a test which is performed on a standard or typical examination of equipment or item, and which is not required for each item produced in order to substantiate the acceptability of equal items. This may include tests which result in damage to the item(s) tested.
- 28.0 Personnel Qualification Procedures — Procedures for qualifying welders, inspectors and other special process personnel.
- 29.0 Supplier Shipping Preparation Procedures — Procedures used by a Supplier to prepare finished materials or equipment for shipment from its facility to the jobsite.

Quality Verification Document Requirements Form Instructions

Purpose The Quality Verification document Requirements (QVDR) is initiated by SRS and completed by the Supplier when providing quality verification documents. The QVDR is a multipurpose form to

Transmit quality verification documents from the Supplier,
Provide evidence of SSR release of documentation and/or work, and
Provide evidence of an SRS inspection check of documentation received at SRS.

WSRC Entries

Entry No.	Information Required
1	Enter Document Category Number — see below.
2	Enter Specification Number and Paragraph Reference.
3	Enter Description corresponding to the Document Category Number.
4	SSR to initial upon item release.
6	Enter "Remarks: as appropriate.
16	SSR and dates release.

Field Entries

Entry No.	Information Required
5	SRS inspector at the jobsite to complete check-in.
17	The SRS Inspector will review the quality verification documentation package. If found satisfactory, he signs and dates the check-in statement.

Supplier Entries

Entry No.	Information Required
7	Enter number of pages of quality verification document being submitted.
8	Enter information required.
9	Enter information required.
10	Enter information required.
11	Enter the quantity of units covered by the documents submitted. For each item on Entry No. 12 being released, provide a separate copy of this completed form and the supporting quality verification documents.
12	Enter information required.
13	Enter information required.
14	Enter information required.
15	Supplier — Signature of an employee authorized to sign such documents.

Document Category Numbers and Descriptions

- 12.0 Welding Verification Reports — Reports of welding performed to include weld identification, and certification that qualified welding procedures and welders were used.
- 13.0 Material Verification Reports — Reports relative to material which confirm, substantiate or assure that an activity or condition has been implemented in conformance with code and material specifications imposed by the procurement documents.
- 14.0 Major Repair Verification Reports — Reports may include weld repair locations (maps), material test reports for filler metal, pre- and post-weld heat treatment records, NDE records, etc. The resolution of whether a repair is major or not is an SRS responsibility.
- 15.0 Cleaning and Coating Verification Reports — Reports include a certification of visual examination for surface preparation, surface profile, materials, etc.; and also humidity data, temperature data and coating thickness data as required by the procurement documents.
- 16.0 Heat Treat Reports — Reports normally include furnace charts and similar records which identify and certify the item(s) treated, the procedure used, furnace atmosphere, time at temperature, cooling rate, etc.
- 17.0 Material Property Reports
 - 17.1 MTR (Material Test Reports) — These reports include all chemical, physical, mechanical, and electrical property test data required by the material specification and applicable codes. These are applicable to cement, concrete, metals, cable jacket materials, rebar, rebar splices, etc.
 - 17.2 Impact Test Data — Reports of Charpy or drop weight tests including specimen configuration, test temperature and fracture data.
 - 17.3 Ferrite Data — Reports of the ferrite percentage for stainless steel materials used, including castings and welding filler metals as deposited.
 - 17.4 Material Certificate of Conformance — Documents which certify conformance to the requirements of the applicable material specification.
 - 17.5 Electrical Property Reports — Reports of electrical characteristics, e.g., dielectric, impedance, resistance, flame tests, corona, etc.
- 18.0 Code Compliance — Verifying documents (such as data Forms U-1, M-2, State, etc.), which are prepared by the manufacturer or installer and certified by the Authorized Code Inspector.
- 19.0 UT — Ultrasonic Examination and Verification Reports — Examination results of certain characteristics of discontinuities and inclusions in material by the use of high frequency acoustic energy.
- 20.0 RT — Radiographic Examination and Verification Reports — Examination results of certain characteristics of discontinuities and inclusions in materials by x-ray or gamma-ray exposure of photographic film, including film itself.
- 21.0 MT — Magnetic Particle Examination and Verification Reports — Examination results of surface (or near surface) discontinuities in magnetic materials by distortion of an applied magnetic field.
- 22.0 PT — Liquid Penetrant Examination and Verification Reports — Examination results of surface discontinuities in materials by application of a penetrating liquid in conjunction with suitable developing techniques.
- 23.0 Eddy Current Examination and Verification Reports — Examination results of discontinuities in material by distortion of an applied electromagnetic field.
- 24.0 Pressure Test — Hydro, Air, Leak, Bubble or Vacuum Test and Verification Reports — Results of hydrostatic or pneumatic structural integrity and leakage tests.
- 25.0 Inspection and Verification Reports — Documented findings resulting from an inspection.
- 26.0 Performance Test and Verification Reports — Reports of Test Results
 - 26.1 Mechanical Test, e.g., pump, performance data, valve stroking, load, temperature rise, calibration, environment, etc.
 - 26.2 Electrical Tests, e.g., load, impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.
- 27.0 Prototype Test Report — Report of the test which is performed on a standard or typical example of equipment, material or item, and which is not required for each item produced in order to substantiate the acceptability of equal items. This normally includes tests which may, or could be expected to, result in damage to the item(s) tested.
- 28.0 Certificate of Conformance—A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements.