Procurement Specification Cover Sheet

1. Title

TECHNICAL SPECIFICATION FOR MELTER VESSEL FOR THE DEFENSE WASTE PROCESSING FACILITY (U)

PROJECT #MLT4

2. Specification No.	3. Revision	4. Page
M-501	5	1 of 10

5. Functional Classification	6. Requester Department	7. Requester Division
SC	DWPF Design Engr.	PD & CS

8. Cognizant Technical Function

Name	Date
Rick McBride / R. McBride RM 2/22/05	2-9-05

Title: Design Engineer

Department: PD & CS / Design Engineering

9. Additional Reviewer

Name	Date
Jerry Evatt / Jerry W. Evatt JE 2/23/05	2/9/05

Title: Design Engineer

Department: PD & CS / Design Engineering

10. Cognizant Quality Function

Name	Date
Bruce Dragon / FOR Bruce Dragon M. TAPANI MWT 2/24/05	2/10/05

Title: Quality Engineer

Department: Waste Solidification / Quality Engineering

11. Manager

Name	Date
Achyut Patel / A Patel	2/24/05

Title: DWPF Project Engineer

Department: DWPF Design Engineering

12. Other Approver

N/A

Name	Date
N/A	N/A

Title: N/A

Department: N/A

Standard Procurement Specification Revision History Sheet

1. Specification No. M-501			2. Revision No. 5	3. Page 2 of 10
4. Date	5. Revision No.	6. Paragraph No.	7. Description of Changes	
	5	2.2	Added "round bar".	
		5.2.2	Revised "A479" to "SA479".	
		5.2.3	Revised "A358" to "SA358"	
		5.3	Added Sections 5.3 through 5.3.4.	
		6.2	Revised to add weld reinforcement sizing requirements.	
		6.3	Revised to require stress relief operation prior to final machining.	
		6.5.1	Deleted "herein" and added "in Section 6.5.2".	
		7.3.2.2	Deleted "if any".	
		7.3.2.3.iv	Deleted "if any".	
		7.3.2.4	Added section on NDE of bus bars.	
		7.3.3	Added "in accordance with ASTM E499".	
		7.3.4.1	Added "/helium".	
		7.3.4.3	Added "(includes riser, riser end and all nozzle pad cavities)",	
			"/helium" and "or WSRC approved MSLT procedure".	
		7.3.4.4	Added "(includes nozzle N pad cavities)", "/helium" and "or WSRC	
			approved MSLT procedure".	
		7.3.4.5	Added "/helium" and "or WSRC approved MSLT procedure".	

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this Specification is to define the requirements for fabricating, testing and inspecting the Melter Vessel in accordance with the design drawings and other specifications referenced herein. Upon completion, the vessel will be installed into the Melter Vessel Support Frame which in turn will ultimately be installed into the Vitrification Building of the Defense Waste Processing Facility at the Savannah River Site.

2.0 SCOPE

2.1 Work Included Under This Specification

Provide all facilities, labor, materials, special tools, fixtures, accessories and equipment (except as otherwise noted herein) to fabricate, test and inspect the Melter Vessel in accordance with this Specification, Specification M-500 and the purchase documents.

Prepare and submit engineering and quality verification documents in accordance with Attachment 10.1, "Engineering Document Requirements" and 10.2, "Quality Verification Document Requirements".

2.2 Work Not Included Under this Specification

Supply and installation of the refractory lining in the vessel will be by others.

UNS N06690 material (plate, round bar and weld wire required for the fabrication of nozzles identified as "A" and "T" and for weld qualification samples) will be provided by WSRC. This material will require final machining by the Supplier.

Supply and fabrication of the two-piece machined support frame and all assembly work is covered by Specification S-501.

3.0 CODES AND STANDARDS

Items supplied shall conform to this Specification, other specifically referenced Project Specifications and to the applicable portions of referenced Codes and Standards. The relevant revisions of all referenced Codes and Standards are listed in Specification M-500, "Technical Specification for Melter Vessel for the Defense Waste Processing Facility."

4.0 DESIGN

4.1 The Melter vessel shall be designed in accordance with WSRC drawings identified in Specification M-500, Section 3.1. The vessel shall be fabricated, tested and inspected in accordance with ASME Section VIII, Division 1 Boiler & Pressure Vessel Code but will not be Code stamped.

4.2 The melter vessel, drawing PV813205, consists of a water jacketed shell and top head, with nozzles for supporting auxiliary equipment. Prior to its installation in the DWPF melt cell (operating area), the melter vessel is permanently assembled and piped up to a two-piece machined frame having provisions for remote handling and precise positioning in the melt cell. This assembly work is covered by Specification M-502.

4.3 A slurry of radioactive waste, glass frit and water is metered through two feed tubes to the glass pool inside the vessel. Energy to melt the glass is provided by passing electric current between immersed plate electrodes. Additional heat energy is furnished by eight resistance

heater elements above the glass pool. Molten glass is poured by means of differential pressure from the pour spout into stainless steel canisters.

4.4 Glass Containment

The conducting glass must not migrate through the refractory to the vessel wall as this would short out the electrode power supply. To prevent glass penetrations, insulation and refractory blocks must fit precisely with each other and with the vessel contours. This dictates that:

a. all internal surfaces of the vessel must be machined to close tolerances, and

b. vessel side wall and bottom nozzle tolerances must be held within close limits to ensure correct alignment with the predrilled refractory and close fitting internal components.

5.0 MATERIALS

5.1 General Requirements

5.1.1 Materials of construction for the Melter Vessel are as required on the Vessel Detail drawings, reference Specification M-500, Section 3.0 and Section 5.2 below. Material substitutions shall not be made without specific written acceptance by WSRC.

5.1.2 Contamination of stainless steel is not permitted. Requirements for contamination control are detailed in Specification M-500, Section 5.1.5.

5.2 Material Requirements

Unless otherwise noted on drawings, materials shall be as follows:

5.2.1 All stainless steel plate, sheet, and strip shall conform to ASME SA240 Type 304L. Material shall be supplied hot rolled, annealed, and pickled. Blasting as a method of descaling is not permitted.

5.2.2 All stainless steel bars and shapes shall conform to ASTM SA479/SA479M Type 304L.

5.2.3 All stainless steel pipe shall conform to ASME SA312/SA312M Type 304L and ASTM SA358/SA358M Type 304L. SA312 pipe shall be seamless hot finished, annealed, and pickled. SA358 pipe shall be Class 1 or 3 welded, annealed, radiographed and pickled.

5.2.4 All fittings shall conform to ASME SA403/SA403M Grade 304L. Fittings shall be Class WP-S or WP-WX.

5.2.5 Stainless steel structural bolts shall conform to ASME SA193/SA193M, Grade B8S.

5.2.6 Stainless steel structural nuts shall conform to ASME SA194/SA194M, Grade 8F, Nitronic 60 or WSRC approved equivalent.

5.3 Additional Requirements.

5.3.1 Process piping material shall be as specified by P-Code in Piping and Instrument Diagrams and detailed in Specification P-501, Attachment 9.3.

5.3.2 Electrical conduit containing instrumentation wiring (e.g. thermocouple wire) shall conform to the material requirements of P-Code P247, Specification P-501, Attachment 9.3.

5.3.3 Electrical conduit not containing instrumentation wiring shall conform to the material requirements of P-Code P70, Specification P-501, Attachment 9.3.

5.3.4 Pull boxes shall be 304L stainless steel.

6.0 FABRICATION

6.1 Shop detail and fabrication drawings shall be prepared based on WSRC supplied Vessel drawings (reference Specification M-500, Section 10.1). All melter vessel fabrication and assembly shall be in accordance with WSRC accepted shop detail and fabrication drawings.

6.2 All welding requirements shall conform to Specification M-500, Sections 5.3 and 5.4. Sizing of all Melter Vessel/Top Head nozzle opening reinforcement welds shall comply with ASME Section VIII, Division 1, Subsection UW-15 and UW-16, as applicable. Applied nozzle loads are negligible or have been accounted for in the design and additional reinforcements have been added where necessary.

6.3 As strict conformance to close toleranced dimensions is required, the Supplier shall use braces, forms or similar means to preserve the vessel/vessel heads shape during fabrication. To reduce residual stresses and improve dimensional stability, the Supplier shall perform a minimum of one (1) stress relief operation, at 1650° F. for one (1) hour, prior to final machining. All inaccessible cavities shall have an inert gas purge during stress relief operation. Additional stress relief operations are at Suppliers option. Surface finish requirements of Specification M-500, Section 5.2, shall apply after final stress relief. A stress relief procedure shall be submitted for review and acceptance in accordance with Specification M-500, Section 4.1.4.

6.4 Deleted.

6.5 Cleaning and Painting

6.5.1 Interior and exterior surfaces shall be thoroughly cleaned of all mill scale, cuttings, weld spatter, grease, oil and other foreign matter. Stainless steel equipment shall not be painted except as specifically noted in Section 6.5.2. A cleaning procedure shall be submitted for review and acceptance in accordance with Attachment 10.1.

6.5.2 After completion of vessel fabrication and dimensional inspection, the interior surface of the vessel shall be painted with the four-part epoxy coating system described in Attachment 10.3.

7.0 INSPECTION AND TESTING

7.1 The Supplier shall perform all necessary inspection and testing to ensure that the melter vessel meets all requirements of the Specifications, vessel drawings and other purchase order documents. This includes all dimensional inspections to confirm conformance to the vessel drawings, all in-process inspections required to verify quality and all pressure and leak testing required by Code and by this Specification.

7.2 Detailed inspection procedures shall be prepared to describe inspection equipment, methods and data to be recorded. Inspection procedure shall be submitted to WSRC for review and acceptance in accordance with Attachment 10.1. Inspection reports shall be submitted in accordance with Attachment 10.2.

7.3 Nondestructive Examination (NDE)

7.3.1 General Requirements

Nondestructive examination shall be performed as required by Specification M-500, Section 6.1.

7.3.2 NDE of the Vessel During Fabrication

7.3.2.1 All welds shall be subjected to liquid penetrant examination as follows:

i. Root pass and cover pass of fillet welds and full penetration welds deposited from one side only. In cases where thick joints are involved, the root liquid penetrant examination may be deferred until the second or third pass.

ii. Welds on the bottom ring forging and riser boss shall be checked by a progressive examination as follows.

First Side: 1/4T, 1/2T, 3/4T, cover pass
Second Side: Back gouge, 1/4T, 1/2T, 3/4T, cover pass

Where T is the distance from the root to the surface at any given location along the weld.

iii. Back chip and cover passes of all butt welds deposited from both sides, and other full penetration welds deposited from both sides.

iv. Areas where temporary attachments were welded to parent metal.

v. All machined welds after final machining. For these cases, the penetrant test after machining may take the place of the cover pass penetrant test.

7.3.2.2 Liquid penetrant examination of welds following stress relieving operations shall be as follows:

i. After the first stress relief, P.T. all welds which will not be machined.

ii. After each subsequent stress relief, P.T. only those welds a) which have been added after the previous stress relief, and b) which will not be machined.

7.3.2.3 Radiographic Examination

i. Radiographic examination shall be performed on all full penetration butt welds in accordance with UW-51, Section VIII, Division 1, ASME Code.

ii. Those welds in the bottom ring forging and riser boss, which cannot be checked reliably with radiographs, shall be examined with a progressive liquid penetrant test per Paragraph 7.3.2.1.ii.

iii. If the formed vessel heads are made from welded plates, all welds shall be 100% radiographed.

iv. Shell butt welds, as described in paragraph ii above, shall be 100% radiographed following the first stress relieving operation.

v. The Supplier shall maintain radiographic records including layout sketch (weld map) and reader sheets.

vi. Layout sketches (weld maps) shall be supplied to WSRC as required in accordance with Specification M-500, paragraph 5.3.1.

7.3.2.4 NDE of the electrode bus bars shall be in accordance with Specification M-502, Attachment 10.4.

7.3.3 Nozzle assemblies A and T (including manifolds) shall be halide leak tested at 15 psig in accordance with Attachment 10.4 prior to assembly to the top head. Both interior and exterior surfaces of the nozzle shall be checked. Supplier shall submit Nozzle A and T halide leak test reports in accordance with Attachment 10.2. Note: A Mass Spectrometer Leak Test (MSLT), in accordance with ASTM E499, using helium and the same leak rate may be used as an alternate for the halide leak test. Supplier shall submit a MSLT procedure, if preferred, to WSRC for review and acceptance. Alternate MSLT also applies to Section 7.3.4.

7.3.4 Water Jacket Testing

7.3.4.1 The vessel shell, bottom head and top head have two independent water passages each. These are identified as 'A' and 'B' on the vessel drawings. Each passage is fed by an independent manifold. This redundancy reduces the risk of loss of the vessel through coolant failure. To ensure the integrity of this dual path system, the 'A' and 'B' passages must be welded and tested in accordance with the sequence described below. The pressure tests shall be maintained for a sufficient time, not less than 10 minutes, to determine if there are any leaks. Supplier shall submit vessel shell, bottom head and top head halide/helium leak test and hydrostatic leak test reports in accordance with Attachment 10.2.

7.3.4.2 Hydrostatic test water shall be in accordance with Specification M-SPC-S-00005. After hydrostatic testing, shell, bottom head and top head water jacket passages shall be blown dry using clean, dried, filtered air. Dryness of air shall be measured using a Dew Point Analyzer. Water jacket passages shall be blown dry (starting with less than 10° F. air dew point) until there is less than 20° F. (differential) between the supply and return air dew points.

7.3.4.3 Shell Water Jacket Testing (includes riser, riser end and all nozzle pad cavities)

i. Weld the 'B' manifolds and flow channels only.

ii. Halide/helium leak test the 'B' passage per Attachment 10.4, or WSRC approved MSLT procedure, at 15 psig. Both the interior and exterior surfaces of the shell shall be checked.

iii. Perform a hydrostatic test of the 'B' passage at 90 psig.

iv. Dry the assembly with clean, dry, filtered air.

v. Complete fabrication and welding of the 'A' passage.

vi. Repeat steps i through iv for the 'A' passage.

7.3.4.4 Bottom Head Water Jacket Testing (includes Nozzle N pad cavities)

i. Weld 'A' and 'B' coils to the bottom head.

ii. Halide/helium leak test, in turn, the 'A' and 'B' passages per Attachment 10.4, or WSRC approved MSLT procedure, at 15 psig. Both interior and exterior surfaces of the head shall be checked.

iii. Subject both 'A' and 'B' coils to a 90 psig hydrostatic test.

iv. Dry the assembly with clean, dry, filtered air.

7.3.4.5 Top Head Water Jacket Testing

i. Weld the 'B' manifolds and flow channels only.

ii. Halide/helium leak test the 'B' passage per Attachment 10.4, or WSRC approved MSLT procedure, at 15 psig. Both interior and exterior surfaces of the head shall be checked.

iii. Perform a hydrostatic test of the 'B' passage at 90 psig.

iv. Dry the assembly with clean, dry, filtered air.

v. Complete fabrication and welding of the 'A' passage.

vi. Repeat steps i through iv for the 'A' passage.

After completion of each stage of testing, seal all relevant pipe openings as described in Specification M-SPC-S-00001.

7.3.5 Vessel Hydrostatic Testing

After all welding and final machining is completed, a hydrostatic test shall be performed as follows:

i. Assemble the head to the shell using a new stainless steel o-ring.

ii. Assemble blind flanges and o-rings on the A and T (as identified on design drawings) nozzles.

iii. Assemble blind flanges and rubber gaskets on all other nozzles.

iv. Perform vessel hydrostatic testing at 18 psig. Maintain pressure for a sufficient time, not less than 10 minutes, to determine if there are any leaks.

v. Remove the top head.

vi. Drain and dry the shell and head. Residual water shall be swabbed from both components.

vii. Supplier shall submit a vessel hydrostatic test procedure to WSRC for review and acceptance in accordance with Attachment 10.1 and a vessel hydrostatic test report in accordance with Attachment 10.2. Note: After removal of the top head, Supplier shall discard the stainless steel o-ring and vessel to top head bolts/nuts. Supplier shall furnish new o-ring and bolts/nuts to WSRC for final assembly.

7.4 Upon completion of fabrication of the vessel and prior to the application of the interior epoxy coating, dimensional inspections shall be performed in accordance with Specification M-500, Section 6.2.1. The measurements to be recorded are detailed in the Melter Vessel Dimensional Record Drawings attached to the purchase order.

8.0 DELETED

9.0 COMPLETION

9.1 After completion of all fabrication, inspection and testing, the vessel will be turned over for use under the scope of work described in Specification M-502.

9.2 Although no shipping preparations are required, the Supplier shall take all necessary steps to prevent any handling damage or ingress of contaminants to the vessel or its cooling passages. Reference Specification M-SPC-S-00001.

10.0 ATTACHMENTS

10.1 Engineering Document Requirements

10.2 Quality Verification Document Requirements

10.3 Four Part Epoxy Coating System

10.4 Halide Leak Test Procedure

OSR 45-6B# (Rev 8-27-91)

Engineering Document Requirements

Attachment No. 10.1
Revision No. 5
Spec/Req'n No. M-501

1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. Permission to Proceed Required		5. Submittal Schedule	6. Quantity Required		7. Kind of Copies	8. Remarks
			Yes	No		Init	Final		
15.0	6.5.1	Cleaning Procedure	X		90 Days A.R.O.	3		Print	A.R.O. = After Receipt of Order
25.0	7.2	Detailed Inspection Procedures	X		"	3		"	
24.0	7.3.5	Vessel Hydrostatic Test Procedure	X		"	3		"	
10.2	Att. 10.3 3.4.c	Abrasive Blasted SST Sample	X		As Req'd.	1		N/A	
15.0	Att. 10.3 2.1	Alternate Epoxy Coating Procedure	X		If Needed	3		Print	
24.0	7.3.3	Alternate MSLT Procedure(s)	X		If Needed	3		"	

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
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.

Attachment No. 10.2
Revision No. 5
Spec/Req'n No. M-501
Page 1 of 3

Quality Verification Document Requirements

1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. SSR Release	5. WSRC Receipt Inspection Check-In	6. Remarks	7. DOC Supplier Page Count
25.0	7.2	Detailed Inspection Reports				
24.0	7.3.3	Nozzle 'A' Halide/MSLT Test Report				
24.0	7.3.3	Nozzle 'T' Halide/MSLT Test Report				
24.0	7.3.4.1	Vessel Shell Path 'B' Halide/MSLT Test Report				
24.0	7.3.4.1	Vessel Shell Path 'B Hydrostatic Test Report				
24.0	7.3.4.1	Vessel Shell Path 'A' Halide/MSLT Test Report				
24.0	7.3.4.1	Vessel Shell Path 'A' Hydrostatic Test Report				
24.0	7.3.4.1	Bottom Head Coil 'A' Halide/MSLT Test Report				
24.0	7.3.4.1	Bottom Head Coil 'A' Hydrostatic Test Report				
24.0	7.3.4.1	Bottom head Coil 'B' Halide/MSLT Test Report				
24.0	7.3.4.1	Bottom Head Coil 'B' Hydrostatic Test Report				
24.0	7.3.4.1	Top Head Manifold 'B' Halide/MSLT Test Report				
24.0	7.3.4.1	Top Head Manifold 'B' Hydrostatic Report				
24.0	7.3.4.1	Top Head Manifold 'A' Halide/MSLT Test Report				

8. Supplier's Order No.	9. Supplier's Part	10. Supplier's Part Name	11. Quantity
12. PO No.	13. WSRC Line/Equip Tag or Code No.	14. WSRC Part Name	

15. Supplier's Conformance Statement

We certify that the work and required documents meet the requirements of the procuring documents.

Authorized Supplier Signature _____ Title _____ Date _____

16. Source Surveillance Representative at Suppliers Facility

Work was released based on satisfactory completion of quality surveillance and review of documentation.

☐ With Authorized Deviations Noted in Column 6
☐ No Deviations

Signature of SSR _____ Date _____

17. Receiving Inspection at SRS

This form and the quality verification documents referenced hereon have been received and their relationship to the hardware items verified.

Signature of WSRC Inspector _____ Date _____

Attachment No. 10.2
Revision No. 5
Spec/Req'n No. M-501
Page 2 of 3

Quality Verification Document Requirements

1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. SSR Release	5. WSRC Receipt Inspection Check-In	6. Remarks	7. DOC Supplier Page Count
24.0	7.3.4.1	Top Head Manifold 'A' Hydrostatic Test Report				
24.0	7.3.5	Vessel Hydrostatic Test Report				

8. Supplier's Order No.	9. Supplier's Part	10. Supplier's Part Name	11. Quantity
12. PO No.	13. WSRC Line/Equip Tag or Code No.	14. WSRC Part Name	

15. Supplier's Conformance Statement

We certify that the work and required documents meet the requirements of the procuring documents.

Authorized Supplier Signature _____ Title _____ Date _____

16. Source Surveillance Representative at Suppliers Facility

Work was released based on satisfactory completion of quality surveillance and review of documentation.

☐ With Authorized Deviations Noted in Column 6
☐ No Deviations

Signature of SSR _____ Date _____

17. Receiving Inspection at SRS

This form and the quality verification documents referenced hereon have been received and their relationship to the hardware items verified.

Signature of WSRC Inspector _____ Date _____

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.

Four Part Epoxy Coating System

1.0 SCOPE

1.1 This attachment covers surface preparation, epoxy coating and coating inspection procedures for the interior surfaces of melter vessel.

2.0 PURPOSE

2.1 The epoxy coating is designed to isolate the melter vessel wall from electric current in the glass melt pool. This provides a back-up to the primary refractory and ceramic fiber insulation layers. To satisfy stringent requirements for electrical isolation, the epoxy must meet the highest standards for adhesion, freedom from defects, and coating thickness. No deviation from the following procedure will be permitted without WSRC acceptance. If preferred, Supplier may submit an alternate epoxy coating procedure to WSRC for review and acceptance.

3.0 SURFACE PREPARATION

3.1 The surfaces to be coated include all internal surfaces of the shell, top and bottom heads, and all nozzles. Do not coat the nozzle flange faces or the bores of the "A" and "T" nozzles.

3.2 The WSRC SSR shall witness surface preparation per Sections 3.3 and 3.4.

3.3 Remove oil and grease by detergent steam cleaning. Flush surfaces with demineralized water (refer to Specification M-SPC-S-00005) to remove alkaline residue.

3.4 Abrasive blast all surfaces to be coated per the following:

a. Schedule abrasive blasting to occur on the same day the first coat is applied.

b. Abrasive blast, per SSPC SP 10/NACE No. 2, "Near White Blast Cleaning", all surfaces to be coated, with Du Pont Starblast® abrasive, or WSRC approved equal, using 90-100 psi air pressure.

c. *The Supplier shall submit a sample piece of abrasive blasted 304L stainless steel in* accordance with Attachment 10.1. This shall be used by the SSR to ensure a proper anchor pattern prior to applying the first coat.

d. Remove all dust and abrasive from the surfaces prior to coating in accordance with SSPC SP 10/NACE No. 2. Keep bare hands off the finished, cleaned surface.

e. After the surfaces have been blasted and cleaned, representative surface profile measurements shall be made by using Press-O-Film or equal. The surface profile shall be 1 mil minimum. The SSR shall witness this surface profile check.

4.0 EPOXY COATING – Two-Component Solvent-Based Materials:

4.1 The coating system is based on Keeler & Long, Inc., nuclear grade epoxy enamels and activators, and is defined in the table below. A total minimum dry film thickness of 16 mils is required. Supplier may substitute another coating system with WSRC written acceptance.

Four Part Epoxy Coating System

4.2 Table A

Coat No.	Lining System Numbers Epoxy Enamel	Color	Wet Film Thickness, min	Dry Film Thickness, min
1	Primer: KL65487107	White	9 mil	4 mil
2	Interm: KL65487107	White Tinted	9 mil	4 mil
3	Finish Coat: KLE20066	Medium Green	9 mil	4 mil
4	Topcoat: KLE27975	Dawn Gray	9 mil	4 mil

4.2.1 Mix four volumes of epoxy base and one volume of activator. Allow to stand two hours before spraying.

4.2.2 Recoating time is four hours minimum.

4.2.3 Parts must be at a minimum temperature of 60°F just before spraying.

4.2.4 Total dry film thickness shall be 16 mils minimum. Because the paint is applied to a nonmagnetic (stainless steel) surface, a measuring device using eddy currents is required.

4.2.5 Wet film thickness may be checked at the time of application with a wet film thickness gage to establish total dry film thickness to be obtained.

5.0 INSPECTION

5.1 The SSR shall witness and approve the blasted and cleaned surfaces per Sections 3.4.a and 3.4.d.

5.2 A check for discontinuities or pinholes in the coating shall be made using a Tinker and Rasor Holiday Detector, Model M-1 (67 Volts) or equal. A small amount of household detergent shall be added to the water for this test. This test shall be witnessed by the SSR.

5.3 Pinholes or discontinuities shall be repaired as follows. The SSR shall witness all repairs and the final check.

a. Determine whether pinholes are caused by defects in the metal substrate such as sharp corners, crevices, pits, or weld spatter. If so, remove defects.

b. Wipe abraded areas with clean solvent, Keeler & Long Thinner #KL4093 or equal, to remove any dust or foreign matter. Specification M-SPC-S-00005 applies.

c. Brush apply one coat to affected area, allow to dry tack free for a minimum of four hours and repeat this step until at least four coats have been applied.

d. Recheck for pinholes.

Halide Leak Test Procedure

1.0 SCOPE

1.1 This procedure is for the shop halogen detector probe (sniffer) test of the shell and top head "A" and "B" water jackets and their manifold assemblies and the two bottom head coils.

1.2 This testing shall be performed before the hydrostatic test of the "A" and "B" water jackets, manifolds and bottom head coils after they are installed respectively on the head and shell of the melter vessel.

2.0 PERSONNEL

2.1 Experienced personnel shall perform the testing outlined in this procedure.

3.0 APPARATUS

3.1 Four 1/4" ø or 3/8" ø valves.

3.2 One 2" ø or larger dial vacuum gauge graduated in psi or inches Hg.

3.3 Two 4-1/2 " ø or 6" ø dial pressure gauges with a range of no less than 1-1/2 times or more than 4 times the test pressure.

3.4 Halogen Leak Detector: General Electric Type H-25 or Infican Model HLD-2 or WSRC approved equal.

3.5 Halogen Leak Standard: General Electric Type LS-20 or WSRC approved equal.

3.6 Air ejector: Pomberthy Jet Pump GH 1/2 or WSRC approved equal.

3.7 Refrigerant - R12 or R44.

4.0 PROCEDURE

4.1 Before welding the coils, water jackets and manifolds to the vessel, remove any dirt, slag or moisture from the vessel outer weld surfaces.

4.2 After welding the coils, water jackets and manifolds to the vessel, remove dirt, mud, slag, moisture and debris from the water jacket and manifold welds to be examined.

4.3 Connect valves, gauges, ejector and refrigerant/air pressurizing connections to the water jacket/manifold. Seal all jacket openings. Close the valve to the pressure gauges and open the valve to the vacuum gauge. See Figure 1 on Page 3.

4.4 With the air ejector, evacuate the water jacket/manifold to 4.5 psi below atmosphere (10.2 psia). Close the valve to the ejector.

4.5 Backfill the water jacket/manifold with Freon 12 to atmosphere. This will immediately disperse the refrigerant throughout the test system. Close the valve to the vacuum gauge.

Halide Leak Test Procedure

4.6 Open the valve to the pressure gauges and pressurize the water jacket/manifold with air to 15 psig and hold for 30 minutes minimum before testing. The halogen mixture in the water jacket/manifold will be 15% by volume.

NOTE: The air line used for pressurizing must be free of standing water.

4.7 Before starting the test, allow the halogen leak detector to warm up for the time period recommended by the instrument manufacturer before calibrating. This time period will be longer the first time the instrument is used.

4.8 Before and after testing and every two hours during testing, calibrate the halogen leak detector by passing the probe tip or gun across the orifice of a halogen standard leak set at a leakage rage of 1.5×10^{-6} std. cc/sec. Keep the probe tip or gun within 1/8 inch of the orifice of the standard leak. The scanning rate shall not exceed that which can detect the leakage from the standard leak.

4.9 Scan with the halogen leak detector at the rate determined in Section 4.8 with the halide probe or gun held within 1/8" of the test surface. Test all pressurized head and shell vessel welds and "A" and "B" water jacket/manifold welds.

4.10 If leakage is detected, mark the area or areas of leakage.

4.11 Release the pressure in the water jacket/manifold to an area outside the test area to avoid background contamination.

4.12 Repair all detected leaks and retest per the appropriate steps of this procedure.

4.13 Purge the refrigerant from the system by repressurizing the water jacket/manifold with air to 15 psig and then venting. Repeat at least three times.

5.0 ACCEPTANCE CRITERIA

5.1 Any detectable leakage is unacceptable.

6.0 DOCUMENTATION

6.1 Prepare and submit a Halide leak test report in accordance with Attachment 10.2.

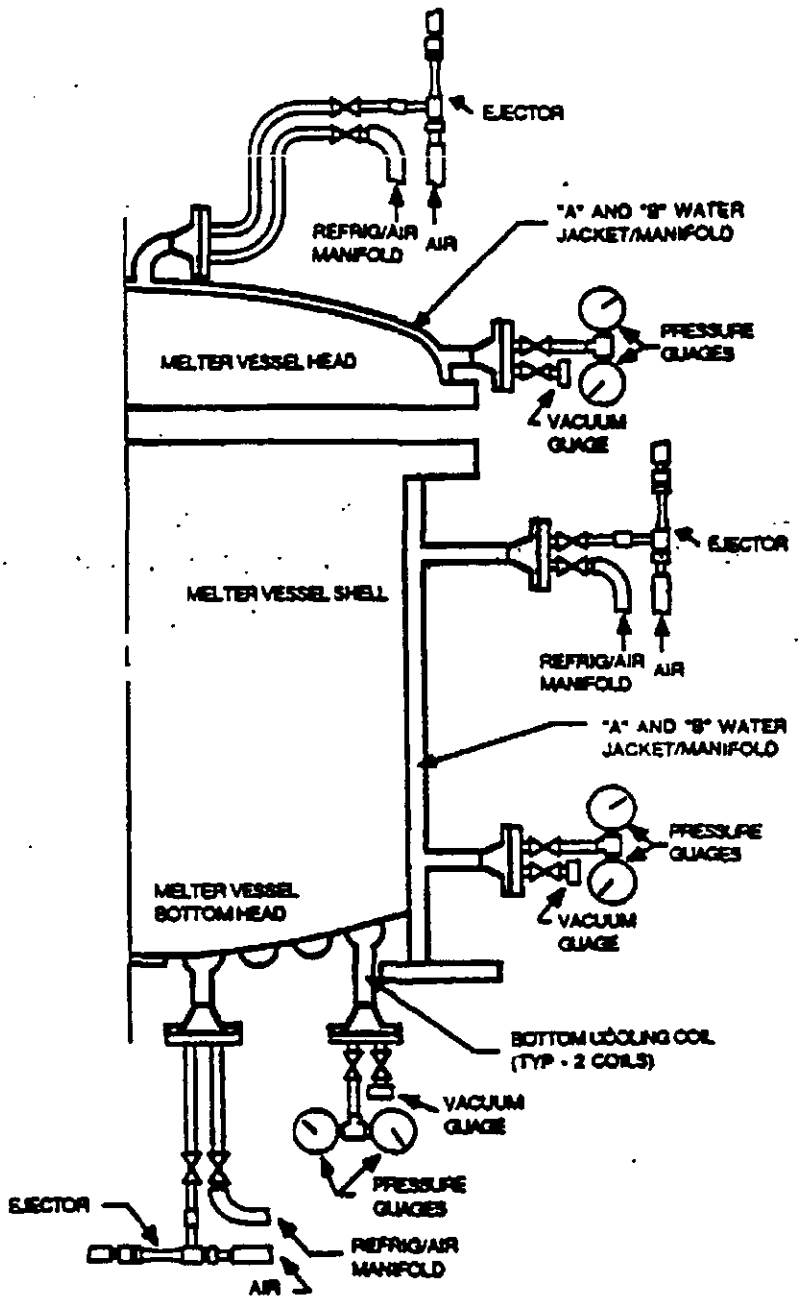

FIGURE 1 – TEST CONFIGURATION