



Specification E-I-343
Revision Number 9
Revision Date 11/23/04
ECO Number 11,165

SPECIFICATION
FOR FABRICATION OF THE
STANDARD WASTE BOX

Prepared by
Washington

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For

U. S. Department of Energy

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SPECIFICATION E-I-343 RECORD OF REVISION

| ECO/REV NUMBER DATE | PAGES/SECTIONS AFFECTED | REVISION DESCRIPTION |
|---------------------------|----------------------------|---|
| 3885/Rev. 0 11-8-89 | All | ECO 3885 created specification. |
| 7886/Rev. 0 10-12-95 | None | ECO 7886 change system from WH01 to PT00. |
| 9029/Rev. 1 5-27-98 | All | ECO 9029 revised paragraph 3.1.2 and updated format. |
| 9309/Rev. 2 02-10-99 | All | ECO 9309 revised the format and included user guidance. |
| 9434/Rev. 3 06-16-99 | All | ECO 9434 incorporated improved guidance for the user of the SWB. |
| 9946/Rev. 4 11-14-00 | All | ECO 9946 updated format |
| 10,276/Rev.5 12/12/01 | All | ECO 10,276 updated specification and modeled after the TDOP. User requirements moved to a stand-alone Handling and Operation Manual. |
| 10,326/Rev.6 12/18/01 | 2, 10 | Update to reflect Revision to drawing set and allow fastener material certification to be submitted prior to shipment. |
| 10,530/Rev. 7 09/24/02 | Sections 2, 3, and 5 | Update to specify that ASME Section V, Article 10 is to be followed for the leak test procedure development; clarify Level II qualification required for leak test personnel; Include inspection requirement for the lid, body, and assembly. |

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| ECO/REV NUMBER DATE | PAGES/SECTIONS AFFECTED | REVISION DESCRIPTION |
|---------------------------------|---|---|
| 10,503 Add 1/Rev. 7 09/24/02 | Section 5 | Change first paragraph of 5.1.4 to read as per the addendum. |
| 10,694/Rev. 8 04/16/03 | Sections 3.1.1 and 3.4.2 | Added purchasing documentation requirements section, revised the rivet installation requirements, and included measurements for installed rivets. |
| 11,165/Rev. 9 11/09/04 | Sections 2.4, 3.3.2, 3.3.4, 3.4, 3.4.1, 3.4.2, 5.1, and Attachment A | Added powder coating option and suspect/counterfeit items statement. |

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U. S. DEPARTMENT OF ENERGY
WASTE ISOLATION PILOT PLANT

SPECIFICATION E-I-343
Specification Fabrication of the
Standard Waste Box

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1.0 **SCOPE**

1.1 **Purpose**

The purpose of this specification is to convey fabrication instructions, testing and acceptance criteria for the Standard Waste Box (SWB), unless otherwise specified on the drawings or procurement documentation.

1.2 **Background**

The SWB was developed to package and transport contact-handled transuranic waste to the Waste Isolation Pilot Plant (WIPP) utilizing the TRUPACT-II or HalfPACT (Type B) transport packaging or can be used as a stand-alone DOT 7A, TYPE A packaging. The SWB was qualified by the U.S. Department of Energy (USDOE) in 1988 as meeting the U.S. Department of Transportation (USDOT) requirements for Specification 7A Type A packagings. Qualification has been documented in the USDOE, *DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging*, under Docket Number 89-07-7A and 98-45-7A.

1.3 **Definitions**

| | |
|----------------|---|
| AISI | American Iron and Steel Institute |
| ANSI | American National Standards Institute |
| ASME | American Society of Mechanical Engineers |
| ASNT | American Society for Nondestructive Testing |
| ASTM | American Society for Testing and Materials |
| AWS | American Welding Society |
| CMTR | Certified Material Test Report |
| SWB | Standard Waste Box |
| WTS | Washington TRU Solutions |
| WIPP | Waste Isolation Pilot Plant |
| Buyer | The SWB procuring organization |
| Seller | The SWB fabricating organization |
| User (Shipper) | The organization presenting the SWB for shipment. |

2.0 **APPLICABLE DOCUMENTS**

2.1 **USDOT 7A TYPE A Compliance Documents**

- A . Title 49 of the Code of Federal Regulations, Part 178, Section 178.350 (49 CFR 178.350), and Part 173, Section 173.474 (49 CFR 173.474)
- B . DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging

2.2 **WIPP Shipment Compliance Document**

- A . WP 08-PT.01, Standard Waste Box Handling and Operation Manual

2.3 Construction Drawings (Current Revision)

A . 165-F-001-W1 through – W4, Standard Waste Box Assembly

2.4 Codes, Specifications, and Standards

The current edition of codes, specifications, and standards at the time of fabrication shall be utilized.

The codes, specifications, and standards referred to by number or title in this specification or on the Contract Drawings shall form a part of this specification:

| | |
|----------------|---|
| ASME NQA-1 | QA Requirements for Nuclear Facilities |
| ASME Section V | Article 10, Leak Testing |
| ASNT | Recommended Practice No. SNT-TC-1A |
| ASTM A-36 | Standard Specification for Carbon Structural Steel |
| ASTM A108 | Standard Specification for Steel Bars, Carbon, Cold-Finish, Standard Quality |
| ASTM A-510 | Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel |
| ASTM A-513 | Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing |
| ASTM A-569 | Standard Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality |
| ASTM A-570 | Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality |
| ASTM A-576 | Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality |
| ASTM A-865 | Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated Welded or Seamless, for use in Steel Pipe Joints |
| ASTM B-633 | Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel |
| ASTM D-1056 | Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber |

| | |
|-------------|--|
| ASTM D-1186 | Standard Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base |
| ASTM D-3359 | Standard Test Methods for Measuring Adhesion by Tape Test |
| ASTM D-3451 | Standard Guide for Testing Coating Powders and Powder Coatings (as applicable) |
| ASTM F-835 | Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws |
| AWS D1.1 | Structural Welding Code – Steel |

3.0 DESIGN REQUIREMENTS AND PERFORMANCE CRITERIA

3.1 Description

The SWB is a box that consists of a bottom and a bolted lid closure. Both ends are convex. Two bumpers are welded to the curved ends of the box. The box has a flange and forty-two threaded rivet inserts. The lid has a flange welded around the perimeter. A ½-inch thick rubber gasket is used to seal the lid to the box.

The materials and processes utilized for the SWB are typical in the fabrication industry. The only exception is the use of a unique threaded rivet and the specialized tools required for installation. The Seller may produce the threaded rivets or procure them (Part Number S50-3069) and rivet installation tools from Bollhof Rivnut™, Inc., Kendallville, Indiana.

3.1.1 Purchasing Documentation Requirements

The following items are required to be called out in the purchasing documentation when ordering Standard Waste Boxes:

- A. Serial numbers to be stamped on the SWB per Section 3.3.3.
- B. Lid lift interface option to be used (1, 2, or both) as shown on the construction drawings in Section 2.3.
- C. Whether the optional bumper pads as shown on the construction drawings in Section 2.3 are to be incorporated or not.

3.2 Material Requirements

All materials of construction shall meet the requirements of this specification and those defined in 2.3 above.

Materials of construction (structural, weld wire, fasteners, etc.) shall be traceable by Heat or Lot number to a completed SWB. Certified Material Test Reports (CMTRs) shall be included in the Data Package.

All raw material receiving records, inspection record and/or traceable documentation shall be kept on file by the manufacturer, and shall be available to the Buyer upon request. All such documentation shall also be traceable to a finish unit serial number.

3.3 Fabrication Requirements

3.3.1 Assembly

Prior to assembly, all components shall be cleaned of cutting oils, marking dyes, weld flux, spatter, scale grime and all other foreign materials. Finished assembly and all interior areas shall be cleaned and visually inspected to verify that all surfaces are free of particles and liquids.

All components shall be assembled and tack-welded in place prior to final welding so that the unit dimensional and geometric properties can be checked and/or adjusted if required.

All components shall provide and/or accommodate a proper fit-up to facilitate proper weld joint integrity. Gaps at weld joints of more than 3/16 inch shall not be permitted, and the use of metal fillers to bridge weld joint gaps shall not be used.

Temporary bracing to hold dimensional and geometric characteristics during the final weld-off process may be used. All weld tacks shall be removed with the bracing.

Manufacturing processes shall be documented and controlled by instructions, procedures, checklists, travelers, or other appropriate means. Completed fabrication travelers shall be included in the data package.

Components shall be worked to allow for proper heat dissipation during the operation so that the material will not become brittle or deform due to overheating.

All sharp edges and corners shall be removed. The finished part dimensions and geometry shall comply with the applicable detail drawings.

3.3.2 Welding

All welds shall be made using a qualified procedure by qualified welding personnel in accordance with AWS D1.1 or ASME Section IX. Welder qualification records and weld procedures (including weld repair) shall be submitted to the Buyer in accordance with Attachment A.

All welding instructions such as weld placement, size, and configuration shall comply with applicable drawings.

All welds shall be visually inspected prior to painting/coating for acceptance in accordance with AWS D1.1. Visual weld inspectors shall

be qualified per AWS D1.1, Inspector Qualification. Welds failing the acceptance criteria shall be repaired in accordance with AWS D1.1.

During final welding, care should be exercised to ensure deformation or distortion of components or subassemblies are held to a minimum, but within drawing tolerances, by the use of proper welding techniques to adequately dissipate excessive heat. Such techniques shall consist of, but shall not be limited to, the use of welding fixtures, temporary bracing, skip welding, and cool down periods.

3.3.3 Serialization

All units shall be serialized by means of a unique 6-digit serial number, stamped in 2 locations per fabrication drawings. All data package records and supporting documentation shall reference each container by serial number.

3.3.4 Leak Testing

Before applying the paint/coating, each SWB lid and body assembly shall be examined by:

NOTE: Leak testing may be performed before or after welding lifts clips to assembly.

- A. Implementing a written leak test procedure in accordance with ASME Section V, Article 10. Personnel shall be qualified in accordance with ASNT Recommended Practice No. SNT-TC-1A. Leak test technicians shall be qualified SNT-TC-1A Level II minimum, instructed in the proper application of the test procedure, and shall be monitored by the quality assurance function.
- B. Establishing a ½- to-1 psig pneumatic pressure differential as measured with a calibrated pressure gauge graduated in not less than 1/10th pound increments.
- C. Utilizing an approved leak detection solution applied to all external containment welds.
- D. Repairing the weld if a leak is detected in accordance with AWS D1.1 and retested.

Caution: The pneumatic pressurization system shall be equipped with a pressure relief device that limits the pressure to a maximum of 3 psig.

Note: Welds attaching the lift clips to the SWB body are not subject to leak testing. However, should a lift clip weld be identified for repair, and the repair directly compromises a previously tested weld joint, then a leak test will be performed on the area of repair.

3.4 Painting/Coating Requirements

Note: All weld inspections and leak testing shall be completed prior to painting/coating.

All exterior and interior surfaces of the SWB shall be painted/coated (final coat white) as specified herein. The paint or coating systems, including primer and top coats, shall be applied in accordance with the manufacturer's recommendations. Systems utilized shall be approved by WTS Engineering and shall be in accordance with approved drawing requirements and procurement specifications.

3.4.1 Paint/Coating Prequalification and Inspection

A. Prequalification of Paint/Coating System

- (1) The paint/coating system shall be prequalified prior to use. The purpose of the qualification process is to demonstrate the adhesion characteristics of the paint/coating product when applied to a prepared steel substrate surface. The qualification process shall include:
 - (a) Cut 3 sample coupons ($\approx 1 \text{ ft}^2$) representative of the sheet material used in the construction of the SWB.
 - (b) Prepare the surface of the coupons using the surface preparation method proposed for SWB production. The method shall be documented and implemented in the production painting/coating process.
 - (c) Apply the proposed paint/coating system to obtain a minimum of 3 mil (dry film) thickness.
 - (d) After the paint/coating has dried in accordance with the manufacturer's instructions, the paint/coating shall be tested for adhesion performance.
 - (e) The paint/coating system shall obtain a 4B classification or better, when tested in accordance with Method B of ASTM D-3359.
- (2) The Buyer shall ensure the proposed paint/coating system is compatible with the contents to be shipped.
- (3) When requested by the Buyer, the Seller shall submit the sample coupons to the Buyer for approval.

B . Production Paint/Coating Inspection

- (1) Paint/coating thickness on each SWB shall be measured in the location identified in (2) below and shall meet a minimum dry film thickness of 3 mils exterior and 1.5 mils interior. The method of measurement shall be in accordance with ASTM D-1186, Method A or an approved equal.
- (2) Paint/coating adhesion shall be tested on the first production unit of every lot and on every 25th unit thereafter. The paint/coating adhesion shall meet the performance standard stated in A(1)(e) above and shall be tested at the following locations:
 - 1 each on the top center of the lid;
 - 1 each on either flat side of the body;
 - 1 each on either round end of the body;

Once the adhesion test is completed, the Seller shall repaint the test-affected areas.

3.4.2 Rivet Installation and Inspection

A . Seller shall develop and implement a rivet installation procedure. The procedure shall address, at a minimum, the rivet installation process, installation tool upset adjustment, and daily recording method. The recording should include, as a minimum, the rivet's original length, upset length, calculated differential, and date of verification.

B . Prior to the daily use of the rivet installation tool, the tool shall be adjusted as required by the tool manufacturer using an upset value of $0.222" \pm 0.015$ in "free air." Once adjusted, verify tool setup by upsetting a rivet into a test plate and visually inspect the rivet as required by the tool manufacturer (bulge profile, cracks, thread damage, etc.).

Note: The test plate shall be equal to the requirements in 2.3 for both thickness and installation hole diameter.

Note: If a hand-operated header tool is utilized, the Supplier shall inspect and measure 100% of the installed rivets per Section 3.4.2 (C).

C. If rework, replacement, or verification of a rivet is required, the overall length of the rivet in the installed condition shall be $0.911" \pm 0.035$ or the as installed upset value (Initial length - Installed length) shall be $0.217" \pm 0.02$.

- D. The last rivet installed in each unit shall be inspected per Section 3.4.2 (C).
- E. Rivets shall be installed after painting/coating.

4.0 FIELD EXECUTION

The Standard Waste Box Handling and Operation Manual (WP 08-PT.01) provides instructions for User's handling, use, and inspection of the SWB.

5.0 QUALITY ASSURANCE REQUIREMENTS

5.1 Quality Assurance Program

The following quality elements have been established, as a minimum, to satisfy the requirements of 49 CFR 173.474, Quality Control for Construction of Packaging. Additionally, the Supplier shall plan, implement, and maintain a QA program in accordance with NQA-1-1989.

All basic requirements of NQA-1 shall be addressed in the Seller's QA program, except Design Control. Additional requirements specific to the SWB are provided as follows:

Suspect/counterfeit items and materials shall not be used.

5.1.1 Control of Measuring and Test Equipment

Calibration of Measuring and Test Equipment (M&TE) shall be traceable to the National Institute of Standards and Technology (NIST) or other approved nationally recognized standard.

5.1.2 Handling, Storage and Shipping

The SWB shall be stored indoors and shall be stored and shipped with:

- Bolts and gasket material individually wrapped and inside the SWB
- Plugs in each SWB coupling
- Lid installed with a minimum of 4 bolts (one at each corner)

Storage shall include a tamper evident seal (tape from lid to body) to prevent loss/tampering of removable components such as bolts or gasketing.

5.1.3 Inspection Requirements

Final inspection and acceptance by the Buyer will be conducted at the Seller's facility prior to shipment unless otherwise specified in purchase documents.

The Seller shall be responsible for all inspections and tests, (visual, dimensional, etc) to ensure finished products meet the requirements of

this specification. The inspection and test results shall be documented in applicable manufacturing travelers and/or inspection reports in accordance with the Seller's quality program.

Note: Constrained assemblies are those held in place either by tooling and/or fixtures for the purposes of assembly or testing (e.g., lid assembly constrained in leak test fixture).

Note: Unconstrained assemblies are those not held in place by tooling and/or fixtures (e.g., body assembly on level surface with no tooling or fixtures restraining the assembly).

The Seller shall ensure each SWB has documented inspection results for the following critical attributes:

- A . The lid panel of the lid assembly (unconstrained) and the body bottom panel of the body assembly (unconstrained) shall be flat or concave (arch directed to the inside of the SWB assembly).
- B . The body assembly height shall be measured by placing the body assembly on a flat surface (unconstrained), placing a full span straight edge across the body tube frame, and measuring the distance from the flat surface to the contact surface of the straight edge. The measurement shall not exceed 36-3/16" and not be less than 35-13/16".
- C . The lid assembly concavity shall be measured by placing the lid assembly on a flat surface (constrained or unconstrained), placing a full span straight edge across the long axis of the lid assembly, and measuring the distance from the center of the lid panel to the contact surface of the straight edge. The measurement shall not exceed 1-1/4" (including weld reinforcement height).
- D . The lid assembly flatness shall be measured by placing the lid assembly on a flat surface (unconstrained), placing a full span straight edge along the lid frame bar (straight), and measuring the distance from the center of the lid frame bar and the contact surface of the straight edge. The measurement shall not exceed 5/8".
- E . The restored internal 3/4"-NPT thread profile (outboard) shall be verified by inserting a notched plug gage and tightening by hand. The thread is within permissible tolerance when the gaging notch of the plug gage is not more than plus 1-1/2 turns or minus 1/2 turn from being flush with the end of the thread.

5.1.4 Control of Special Processes

Non-destructive examination personnel shall be certified per the requirements of ASNT Recommended Practice No. SNT-TC-1A. Personnel holding either Level II or Level III certifications shall perform and sign all test reports.

Visual weld inspection personnel shall be qualified per AWS D1.1.

Welding personnel shall be qualified per AWS D1.1 or ASME Section IX for the processes used.

5.1.5 Documentation Requirements

The Seller shall submit a data package with each completed SWB or for a list of itemized SWBs. At a minimum the data package will include: Certificate of Compliance (C of C), CMTRs, all inspection and test reports, fabrication travelers, and a list of M&TE used.

The Seller's C of C shall be signed by an officer of the Sellers' Organization, certifying the conformance of the supplied items to the requirements of this specification (including contract drawings). The C of C shall be traceable to the serial number(s) of the component(s).

The Seller shall retain the production documentation (i.e., CMTRs, travelers, test/inspection reports, etc.) on each SWB or lot of SWBs for a minimum of 1 year from the date of delivery, unless otherwise directed by the Buyer.

Additional site specific requirements may be specified by the Buyer in the purchase order.

6.0 SUBMITTALS

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This section describes the documents the Seller shall submit to the Buyer, when the documents shall be submitted, and whether the documents shall be submitted for record or approval.

The Seller shall incorporate changes as required by Buyer comments and resubmit for review.

Upon approval of submitted documents, the Seller shall not modify project specific parts of the documents listed on Attachment A without the approval of the Buyer.

ATTACHMENT A - Document Submittal Requirements

| DOCUMENT SUBMITTAL REQUIREMENTS | | | |
|---|-----------------|---|------------|
| SUBMIT DOCUMENTS PRIOR TO THE POINTS INDICATED BY THE CODE BELOW: | | | |
| F - FABRICATION T - TESTING S - SHIPMENT | | C - CONSTRUCTION/INSTALLATION A - FINAL ACCEPTANCE | |
| Document Requirements | See Paragraph | For Approval | For Record |
| 1. Quality Assurance Program Manual | 5.1 | F | |
| 2. Manufacturing Travelers | 3.3 | F | A |
| 3. Welding Procedure | 3.3.2 | F | |
| 4. Leak Test Procedure | 3.3.4A | T | |
| 5. Rivet Installation Procedure | 3.4.2A | F | |
| 6. Certified Material Test Reports Chemical and Mechanical Properties as Required by P.O. | 3.2 | | A |
| 7. Visual Weld Inspection Procedure | 3.3.2 | F | |
| 8. Paint/Coating Pre-Qualification Report Paint/Coating Manufacturer's Application Instructions Specification Certification of less than 0.05% lead | 3.4.1 | F | |
| 9. Paint/coating and Inspection Procedure | 3.4.1B | F | |
| 10. NDE/Inspection Personnel Qualification | 3.3.2, 5.1.4 | F | |
| 11. Welder Qualification | 3.3.2, 5.1.4 | F | |
| 12. Fastener Material Certification (Cap Screws) | 3.2 | S | A |
| 13. Serial Number Traceability | 3.3.3 | F | |
| 14. Supplier's Certificate of Compliance | 5.1.5 | | A |

DOCUMENT SUBMITTAL REQUIREMENTS

SUBMIT DOCUMENTS PRIOR TO THE POINTS INDICATED BY THE CODE BELOW:

F - FABRICATION
T - TESTING
S - SHIPMENT

C - CONSTRUCTION/INSTALLATION
A - FINAL ACCEPTANCE

| Document Requirements | See Paragraph | For Approval | For Record |
|--|---------------|--------------|------------|
| 15. Procedure for Record Storage | 5.1 | F | |
| 16. Inspection/Test Reports | 5.1.3 | | A |
| 17. Measuring and Test Equipment List with Calibration Due Dates | 5.1.5 | | A |
| 18. Final Data Package | 5.1.5 | S | A |

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