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SPECIFICATION
FOR THE
RH-TRU DRUM HANDLING BAG

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For

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U.S. DEPARTMENT OF ENERGY
WASTE ISOLATION PILOT PLANT

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1.0 SCOPE

1.1 Purpose

The purpose of this specification is to convey materials requirements, manufacturing instructions, testing and acceptance criteria for the remote-handled transuranic (RH-TRU) Drum Lifting Bags for 55-gallon drums. Unless otherwise specified on drawings or in procurement documentation, the Drum Lifting Bags (Lifting Bags) shall be designed, manufactured and tested to conform to the requirements of this specification, and comply with any and all codes, standards and test plans referenced in this specification.

1.2 Background

The Lifting Bags were developed as a safe method for remote loading of 55-gallon drums containing RH-TRU waste into the Removable Lid Canister (RLC).

1.3 Definitions

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
C of C	Certificate of Conformance
RLC	Removable Lid Canister
WIPP	Waste Isolation Pilot Plant
WTS	Washington TRU Solutions LLC
Buyer	The Lifting Bag procuring organization
Seller	The Lifting Bag fabricating organization

2.0 APPLICABLE DOCUMENTS

2.1 Codes, Specifications, and Standards

The following codes, procedures, and references shall apply. Latest revisions in effect at the time of contract award shall apply unless otherwise noted.

ASTM D5430-04	Standard Test Methods for Visually Inspecting and Grading Fabrics
ASTM D3786-06	Standard Test Method for Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method

3.0 DESIGN REQUIREMENTS AND PERFORMANCE CRITERIA**3.1 Description**

Remote-handled transuranic (RH-TRU) waste stored in 55-gallon drums are placed into RLCs that are fixed in the upright position. A single 55-gallon drum is inserted into a Lifting Bag. The bagged drums are lifted one at a time with the use of an overhead crane and lowered into the RLC to a maximum payload of three drums.

3.2 Performance Requirements

The Lifting Bags for the lifting and loading of RH-TRU waste drums into the RLC shall be manufactured in accordance with this specification. Minimum performance requirements of this specification are detailed below.

3.2.1 Each Lifting Bag shall accommodate one 55-gallon drum. Drum nominal dimensions are 34 ¼" high x 23 ¾" outer diameter.

3.2.2 Lifting Bags shall load and lift without tearing or distorting.

3.2.3 The Lifting Bag, including straps, shall be designed and constructed to handle a 1,000 lb payload with a minimum safety factor of 1.25 without tearing or yielding.

3.2.4 The Lifting Bag outer dimensions shall allow for insertion of a bagged drum into the cylindrical body of an RLC with limiting internal dimensions of 24 ⅝" in diameter.

3.3 Site and Operating Design Conditions

3.3.1 The Lifting Bags are intended for both indoor and outdoor use at various Department of Energy (DOE) facilities throughout the country. The Lifting Bags shall be designed and constructed to withstand the effects of temperatures and environmental conditions described below.

The equipment shall be designed to function within the following outdoor operating conditions:

Maximum Outdoor Temperature	130°F
Minimum Outdoor Temperature	45°F below zero
Humidity	0-100% RH
Average Wind Speed	20 mph

Site Elevation	0 to 8,000 ft ASL
Outdoor Air Quality	Occasional Airborne Dust

3.4 Reliability and Maintainability

3.4.1 The Lifting Bags shall be designed for 24 hour per day operation within the site operating conditions identified above. Components that can fail shall be identified.

3.5 Assembly Requirements

3.5.1 Materials and Construction

- A. Lifting Bag material shall not be flammable (flash point > 115°F), and shall be non-toxic and non-hazardous.
- B. Lifting Bag materials of construction shall consist of geo-textile 8 oz. coated and woven polypropylene fabric with the appropriate tensile strength, tear resistance, burst resistance to meet the requirement of this specification. All Lifting Bag fabric shall meet the bursting strength requirements of ASTM D3786-06, and the inspection requirements of ASTM D5430-04.
- C. All lifting straps shall have a minimum tensile strength rating of 6,000 lb each.
- D. Geo-textile material shall be used to line the bottom of each Lifting Bag.
- E. All thread used in the construction of the Lifting Bags shall be UV ray resistant.
- F. Lifting Bag material shall have the required strength in seams, straps, and fabric to handle a payload of 1,000 lb with a minimum design safety factor of 1.25 without tearing or yielding.

3.5.2 Lifting Bag Construction

- A. Lifting Bags shall be constructed to be cylindrical in shape with an open top, a minimum internal diameter of 25.0" and a height of 31" and an approximate weight of 4 lb.
- B. Webbing material of a minimum width of 1.88" shall be sewn to the outside surface in a 4-point configuration for a minimum distance of 12". Each length of webbing material shall be sewn into a loop at the top.

- C. Two straps, 180° opposed, shall be strung through the loops of the webbing material which will be joined to make a single-point lifting configuration. The apex of each strap shall be 28.5" above the top edge of the Lifting Bag to obtain 60° angle when lifted. The apex of each loop shall be 12" above the top edge of the Lifting Bag.
- D. Each Lifting Bag shall have a 5.0" geo-textile band sewn around the bottom perimeter of the bag.
- E. Each Lifting Bag shall have an identification tag with the following information:
 - Manufacturer or Supplier
 - Date of manufacture
 - Model
 - Maximum working load limit

3.6 Operational Testing

3.6.1 Lifting Bags shall be tested to verify operational and load bearing requirements are met. The Supplier shall submit for approval a test plan for load testing the Lifting Bags. The test plan shall be approved by the Buyer before the manufacture of Lifting Bags begins. Two options for load testing and sampling the Lifting Bags are outlined in this section.

3.6.2 Load Test and Sampling Option 1

- A. Lifting Bags shall be load tested to a minimum of 125% of the rated weight in accordance with an approved test plan.
- B. For every 100 Lifting Bags or fewer, 5 articles shall be tested. Acceptable quality level is 0% failure.
- C. Post load test inspection of each bag shall be documented. The inspection shall verify the absence of:
 - (1) Tears in bag or strap material
 - (2) Yielding of material, seams or thread
 - (3) Stretching of bag or strap material

3.6.3 Load Test and Sampling Option 2

- A. Lifting Bags shall be tested to destruction using equipment as follows:
 - (1) Lifting Bags are loaded with granular fill material (plastic or other) and hung in a test machine by the lifting straps in a single point lift configuration.

- (2) A pressure plate is lowered to the surface of the fill material.
- (3) Pressure is applied to the fill material via the pressure plate by a hydraulic cylinder.
- (4) The load on each strap is indicated on individual load cells with peak hold capability.
- (5) The sum of the load on each strap at destruction divided by the required load weight determines the safety factor.
- (6) Production lots shall be sampled in accordance with ANSI Z1.4 for the Single Normal, General Inspection Level 1, AQL 1.0 Sampling Plan.

3.6.4 Load testing of Lifting Bags shall be documented on video and recorded on a DVD. All load testing results shall be certified by the Supplier.

3.6.5 Prior to load testing, the following attributes shall be measured and recorded in the data package for each lot:

- A. Two straps approximately $180^\circ (\pm 5^\circ)$ apart.
- B. Double sewn seams throughout.
- C. Strap length 28.5 in. (± 1 in.).

3.7 Packaging and Shipping

3.7.1 The Supplier shall identify, package and ship Lifting Bags supplied under this specification in accordance with the Supplier's packaging and shipping requirements. Packaging shall be clearly marked to indicate the contents, name of Supplier and project name (Washington TRU Solutions RH Project). The Supplier shall be responsible for all shipping, as described in the contract documents.

3.8 Final Acceptance

3.8.1 Final acceptance of Lifting Bags supplied under this specification will be contingent upon receipt of all required submittals. Lifting Bags will be receipt inspected for compliance to this specification and references herein.

4.0 QUALITY ASSURANCE REQUIREMENTS

4.1 Minimum Qualifications of Supplier

The Supplier of Lifting Bags shall demonstrate previous experience in manufacturing and load testing similar applications. The Supplier upon request submit references for successful past performance of such applications.

4.2 Quality Assurance Program

Lifting Bags shall be manufactured under the Supplier's approved quality assurance program. The Supplier shall submit supporting documentation for the quality assurance program. Quality Assurance program at a minimum shall include a measuring and test equipment (M&TE) program for any instrumentation used for load testing.

4.2.1 Control of Measuring and Test Equipment

Calibration of M&TE shall be traceable to the National Institute of Standards and Technology (NIST) or other approved Nationally Recognized Standards.

4.2.2 Control of Processes

The Seller shall prepare instructions, procedures, drawings, checklists, travelers, or other appropriate means to control manufacturing processes. These means shall assure that process parameters are controlled and that specified conditions are maintained and product attributes are repeatable.

5.0 DOCUMENTATION REQUIREMENTS

The Seller shall submit a Data Package with each completed lot of Lifting Bags . At a minimum the Data Package shall include Certificate of Compliance (C of C), all inspection and test reports, manufacturing travelers, and a list of M&TE used with calibration due dates.

The Seller's C of C shall be signed by an officer of the Seller's 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 lot number.

The Seller shall retain the production documentation (e.g., travelers, test/inspection reports) on each lot of Lifting Bags for a minimum of one year from the date of delivery, unless otherwise directed by the Buyer.

Manufacturing process inspections, and shall be readily traceable using a matrix or table referencing applicable inspections and tests.

Additional documentation requirements may be specified in the Purchase Order.

5.1 Submittals Prior to Award of Contract

The Supplier shall submit the following for review by the Buyer prior to award of contract.

5.1.1 Quality Assurance Program Description

5.1.2 Test Plan

5.1.3 Sampling Plan

5.1.4 Material Information for fabric and thread

5.2 Submittals Prior to Fabrication Release

The Supplier shall submit the following for review and approval by the Buyer prior to release for manufacture:

5.2.1 Drawings and/or sketches showing, at a minimum, dimensions of Lifting Bags and straps in the final assembly condition, materials of construction, seaming, etc.

5.3 Submittals Prior to Shipment

5.3.1 Complete data package for each lot of Lifting Bags, including load test report(s), associated documentation (video) and certifications.

5.3.2 Supplier's C of C

Attachment A 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		C – FILLING CONTAINERS	
T – TESTING		A – FINAL ACCEPTANCE	
S – SHIPMENT			
Document Requirements	See Paragraph	For Approval	For Record
Quality Assurance Program Manual	5.1.1	F	
Test Plan	5.1.2	F	
Sampling Plan	5.1.3	F	
Material Information for fabric and thread	5.1.4	F	
Manufacturing Traveler	4.2.2	F	
Drawings	5.2.1	F	
Measuring and Test Equipment List with calibration due dates	4.2.1	T	
Supplier's C of C	5.0		A
Final Data Package	5.3.1	S	A