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TRUPACT-III Standard Large Box 2 Handling and Operation Manual

Cognizant Department: Transportation Project

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1.0 SCOPE

This document outlines the recommended procedures for receipt, pre-use inspection, and operation of a TRUPACT-III Standard Large Box 2 (SLB2). Washington TRU Solutions LLC (WTS) Packaging Integration is the design authority for the SLB2. There are two SLB2 configurations: Top Loading and Bottom Loading.

2.0 GENERAL DESCRIPTION

Both SLB2 configurations are designed for use in a TRUPACT-III, or as stand-alone U.S. Department of Transportation (DOT) 7A Type A packagings. Maximum gross shipping weight is 10,500 pounds (lb) for both configurations.

SLB2 packages are rectangular and have a bolted lid closure. The lid is bolted at the top for closure on Top Loading SLB2s (see Figure 1). The lid is bolted at the bottom for Bottom Loading SLB2s (see Figure 2). Both configurations are basically the same, with the exception that Bottom Loading SLB2s are Top Loading SLB2s turned upside-down, and the skids are located on the lid (Bottom Loading) instead of the body (Top Loading).

The SLB2 has a dual seal arrangement. One seal is at the bolted flange, incorporating a 2 in. wide x ½ in. thick ethylene propylene diene monomer (EPDM) gasket, which attaches to the lid assembly. The other seal is a ½ in. wide x ¾ in. thick EPDM gasket that is incorporated to a "labyrinth" recess in the body.

The closure uses 56 hex flange serrated bolts, gasket compression spacers, and hex flange serrated nuts to attach the lid to the body and to compress the two seals.

The uppermost surface of both configurations have bumpers or a tubular grid to provide stiffening. The tubes are attached by welding. The outer perimeter of the lid is bent at a right angle toward the inner side of the lid. Approximately 2-½ in. in from the perimeter, vertical bars are welded in a rectangular shape to interface with a secondary labyrinth inner seal.

The SLB2 is vented with up to six filter vents. The filter vents are installed in pipe half couplings in the upper edge of body sides. Three bumpers are welded around the perimeter of the body. There are four tubes under the bottom of both configurations to allow forklift handling. There are four body lift clips provided to lift the body or loaded SLB2 with rigging and a crane. The lid has four threaded lift lugs to accommodate swivel hoist rings or shouldered eye bolts for attaching rigging to the lid. Swivel hoist rings are the preferred lifting device; however, some SLB2s manufactured prior to revision C of WTS drawing 165-F-016 series do not allow the swivel hoist rings to be installed properly due to the close proximity of the lid bumpers to the lid lift lugs. The body gussets on each body corner is optionally equipped with a hole for additional rigging to be used only for handling the empty package.

The materials and processes used for the SLB2 are typical in the fabrication industry.

2.1 Authorized Contents

An SLB2 is designed to be directly loaded with TRU waste or to overpack one nominally sized 5 ft x 5 ft x 8 ft box. Allowable payloads are as follows:

- Material Form No. 1: Large components
- Material Form No. 2: Large boxes filled with waste
- Material Form No. 3: Solids of any particle size

For heavy, bulky materials (e.g., concrete chunks, motors, and pumps), equipment or materials with sharp corners or protrusions, or material/equipment geometries that could result in highly localized forces, the shipper must ensure that the contents are securely fastened/positioned within the package (blocked and braced).

When an SLB2 is used as a stand-alone DOT 7A Type A packaging, the user shall comply with the requirements and limits of the documents referenced in Section 3.1.

When an SLB2 is shipped in the TRUPACT-III, the user shall comply with the requirements and limits of the documents referenced in Sections 3.1 and 3.3.

3.0 REFERENCE DOCUMENTS

3.1 DOT 7A Type A Compliance Documents

- Title 49 *Code of Federal Regulations* (CFR) §173.412(a), "Additional Design Requirements for Type A Packages"
- 49 CFR §173.443, "Contamination Control"
- 49 CFR §173.474, "Quality Control for Construction of Packaging"
- 49 CFR §178.350, "Specification 7A; General Packaging, Type A"
- *Final Evaluation Report DOT Specification 7A, Type A Radioactive Material Packaging, Standard Large Box (SLB2)*

3.2 WTS/WIPP Design/Construction Drawings and Specifications

- 165-F-016, Top Loading Standard Large Box 2 Assembly
- 165-F-017, Bottom Loading Standard Large Box 2 Assembly
- E-I-463, Specification for Fabrication of the Standard Large Box 2
- Minimum Filter Vent Specifications - TRUPACT-III TRAMPAC, Section 2.4

3.3 Shipment Compliance Documents

- NRC-Docket-71-9305, *TRUPACT-III Application for Radioactive Materials Package Certificate of Compliance*
- DOE/WIPP-02-3122, *Waste Acceptance Criteria (WAC) for the Waste Isolation Pilot Plant*

3.4 General Documents

- DOE-STD-1090-2004, *Hoisting and Rigging*
- American Society of Mechanical Engineers (ASME) B30.20, *Below-the-Hook Lifting Devices*

4.0 SAFETY PRECAUTIONS

4.1 General Safety Precautions

Only authorized contents are to be transported in SLB2s. During use and handling of the SLB2, proper safety precautions **MUST** be observed. Precautions include, but are not limited to, the following:

- No structural modifications shall be made to the SLB2.
- If hardware replacement is required, hardware specified on the assembly/manufacturing drawing must be used.
- When lifting and handling the SLB2, the procedures and recommendations in this document should be followed.
- Applicable hoisting and rigging requirements should be used (*DOE Hoisting and Rigging Standard*, ASME B 30.20, etc.). Personnel should be positioned safely while the SLB2 is being lifted or moved.
- Swivel hoist rings are the preferred lifting device for lifting the lid of a top loading SLB2; however, some SLB2s manufactured prior to revision C of WTS drawing 165-F-016 series do not allow the swivel hoist rings to be installed properly due to the close proximity of the lid bumpers to the lid lift lugs. In such cases, a ½ in. -13UNC-2A shouldered eye bolt may be substituted as long as the bolt is shouldered with a minimum 3/4 in. thread engagement and in plane with the load path. The rigging should not exceed a 45 vertical degree angle without engineering approval.

- Use only recommended, or Washington TRU Solutions LLC (WTS) engineering approved, solvents for the removal of gasket adhesives, and ensure that they are site-approved products. Follow the solvent manufacturer's health and safety guidelines for the use of their product, as well as all site-specific health and safety.

- The SLB2 lid lift lugs shall be used only for lifting the lid (Top Loading). The body gusset holes shall be used only for maneuvering the package body before payload is loaded (Top Loading). When not in use, lid and body gusset lifting points shall be rendered inoperable by reinstalling the polyethylene plugs provided by the manufacturer. A minimum of one body gusset hole plug is required for each gusset hole. A loaded SLB2 shall be lifted only by the body lift clips or from underneath using a properly rated forklift.

- The SLB2 shall be loaded so that the contents do not block the filter ports.

- The SLB2 shall be loaded to ensure that the contents do not shift and block the filter ports during transport.

- To the extent possible, the SLB2 shall be loaded in a manner that will equally distribute the weight of the payload. Dunnage, which may consist of additional waste, blocking and bracing shall be installed to secure the payload in place, when necessary to prevent shifting of the payload during transport. Equipment or materials with sharp corners, protrusions, or geometries that could result in highly localized forces shall be securely cribbed in position to prevent damage to the SLB2.

4.2 Warnings

Detailed safety warnings are used to promote personnel safety and are denoted by the prefix **WARNING**. Such warning statements and procedures should be followed. A **WARNING** means **FAILURE TO HEED SUCH WARNINGS COULD RESULT IN SERIOUS PERSONNEL INJURY.**

4.3 Cautions

Cautions before a step are denoted by the prefix **CAUTION**. Cautions alert personnel that failure to comply with the caution **COULD RESULT IN DAMAGE TO CONTENTS OR PACKAGING.**

5.0 PRELOADING TOOLS, SUPPLIES, AND SPARE PARTS

5.1 Recommended Tools (Commercially Available)

- Pull pin (drift pin or bull pin), sized to center holes at a distance greater than 2 in. apart, ⅜ in. point

- Socket, ¾ in.

- Square drive socket wrench, ½ in.

- Calibrated torque wrench capable of 65 lb-ft of torque, ½ in.

- Hex bit socket for swivel hoist ring, ⅜ in. tip

- Open/box end wrench, or similar type of backup wrench, ¾ in.

- Appropriately sized socket for filter vent installation

- 2 in. X 11.5 NPSM tap

- Flat wood or plastic gasket placement tool, ⅜ in. wide, of sufficient length to facilitate labyrinth gasket installation.

- Swivel Hoist Ring (four required) rated at a minimum of 400 lb each (for lid lift lugs) with ½ in. -13 in. UNC-2A x .75 in. long thread. Swivel hoist rings shall be torqued to manufacturer's recommendations. Swivel hoist rings are available from:

  Actec
  17181 Gale Avenue, Unit C
  City of Industry, CA 91745
  phone (800) 752-7229 or (626) 581-3424
  part No. 46008 or 46644.

  Or

  Ried Tool
  2256 Black Creek Road
  Muskegon, MI 49444-2684
  phone (800) 253-0412 or (231) 777-3951
  part No. SHR-23004 or SHR-23322.

- Optional shouldered eyebolts as an alternative to swivel hoist rings (four required) rated at a minimum of 400 lbs each (for lid lift lugs) with ½ in. -13 UNC-2A X .75 in. thread length. Shouldered eye bolts available from The Crosby Group, Tulsa, OK (918) 834-4611

5.2 Recommended Spare Parts (Available from Seller)

The following spare parts are recommended to be on hand for SLB2 loading operations. It is not necessary to have all the parts for each SLB2.

- Bolts, ½ in.-13UNC-2A x 1.75 in. hex flange serrated (56 each required total)
- Nuts, ½ in.-13UNC-2B hex flange serrated (56 each required total)
- Gasket compression spacer (56 each required total)
- Labyrinth gaskets
- Flange gaskets
- Touch-up paint

5.3 Recommended Supplies (Commercially Available)

NOTE

Filter vents, sample port and coupling plugs, as applicable - for sealing the threads, a thread sealant tape or compound is recommended. However, a liquid anaerobic thread sealant is acceptable.

- Thread sealant or pipe thread sealing compound
- RTV (multipurpose, or WTS Engineering approved equal) adhesive
- RTV silicone gasket maker material (LOCTITE 598 is recommended) for making repairs
- Spay adhesive (3M®77, or WTS Engineering approved equal)
- Tamper Indicator (required when for stand-alone DOT 7A use)

5.4 Recommended Approved Filter Vents and Sample Port (Supplied by User or Shipper)

Minimum Filter Vent Specifications - 2 in. x 11.5 NPSM Nuclear Filter Technology, Inc. filters model NucFil 016SSHP or equivalent WTS Packaging Integration (also see TRUPACT-III TRAMPAC, Section 2.4).

Sample port, 2"-11.5 NPSM Nuclear Filter Technology, Inc. model 016-SP.

6.0 HANDLING PREREQUISITES

6.1 Pre-Use Inspection

6.1.1 Ensure each serial numbered SLB2 is traceable to the seller's Certificate of Compliance (C of C) required by Specification E-I-463.

6.1.2 Inspect the SLB2 for any major damage (e.g., significant deformation, punctures, tears) which would render the SLB2 unuseable. Do not use the SLB2, if major damage is found.

NOTE

If the SLB2 was prepared for outdoor storage by the supplier (see E-I-463, Specification for Fabrication of the Standard Large Box 2, Section on Handling, Storage, and Shipping), extra gaskets may have been placed inside the SLB2. Storage shall include a tamper evident seal (tape from lid to body) to indicate potential loss/tampering of removable components such as bolts or gaskets. Refer to Subsections 7.4.1.4 and 7.4.1.6 for Top Loading gasket installation, and Subsections 7.4.2.5 and 7.4.2.6 for Bottom Loading gasket installation.

NOTE

If the SLB2 is stored outdoors, at least one of the filter ports must be vented to prevent bulging of the SLB2 side panels due to internal pressurization induced by a rise in temperature. The SLB2 should be vented in a way which precludes the ingress of water and debris.

NOTE

If long-term outdoor storage is anticipated, consideration to the service condition of the lid fasteners should be given. A minimum of ASTM B 633 Type II, Service Condition 1, is specified for general applications. However, higher service conditions (2, 3, or 4) should be considered for long-term outdoor storage.

6.1.3 Verify all assembly components and materials listed in Subsection 6.2.1 are present. If the items are stored inside the SLB2, this will require removing lid (Top Loading) or body (Bottom Loading) per Section 7.2.

6.1.4 Verify the required lifting equipment, rigging and related components for SLB2 handling and for lid removal are properly rated.

6.2 Prerequisite Actions

6.2.1 Verify the following parts and materials are available in the required quantity, are the proper configuration, and are not damaged:

- Bolts, ½ in.-13UNC-2A x 1.75 in. hex flange serrated (56 each required total)
- Nuts, ½ in.-13UNC-2B hex flange serrated (56 each required total)
- Gasket compression spacers (56 each required total)
- Labyrinth gasket (1 each)
- Flange gasket (1 each)
- RTV adhesive (multipurpose)
- RTV silicone gasket maker material (LOCTITE 598 is recommended) for making repairs to gaskets
- Filters, 2 in. -11.5 NPSM Nuclear Filter Technology, Inc. (model NucFil 016HP or WTS Packaging Integration approved equal)
- Sample port, 2"-11.5 NPSM Nuclear Filter Technology, Inc. model 016-SP

6.2.2 Verify 2 in. X 11.5 NPSM filter vents and sample port can be threaded into the filter port couplings. It may be necessary to chase the threads using a 2 in. -11.5 NPSM tap if the filter gasket does not seat.

7.0 HANDLING

7.1 Lifting

WARNING

While the SLB2 is being lifted, all personnel must be kept clear from the suspended load. Failure to do so could cause serious personnel injury.

CAUTION

Forklift and/or lifting and rigging equipment must have adequate capacity rating, be in good condition, and be operated in accordance with applicable industry standards and/or the DOE *Hoisting and Rigging Standard*, to avoid damaging lifting equipment or SLB2.

7.1.1 Overhead Lifting

WARNING

Before lifting the SLB2 to the transport height, the user must verify by a short test lift that all rigging and attachments are adequate. Failure to do so could cause serious personnel injury.

7.1.1.1 The SLB2 is designed to be lifted by four body lift clips on the corners of the package. The hook attachments on the slings used to grip the four lift clips should be a minimum of 3 in. wide across the load bearing area to equally distribute the load across the length of the body lift clips.

7.1.2 Forklift Lifting

The SLB2 is designed to be lifted from the bottom with a forklift.

Forklifts shall be appropriately rated for a minimum of the total gross weight of the SLB2(s) at a 36 in. load center.

7.1.2.1 To lift the SLB2, place the forklift tines under the SLB2 between the skids.

WARNING

Failure to ensure full, balanced support of the SLB2 could cause SLB2 damage and/or personnel injury.

7.1.2.2 Lift the SLB2 just enough to ensure that the forklift can initiate a balanced lift.

7.1.2.3 If the lift is not balanced, slowly lower the SLB2 back on the packaging skids and adjust the lift as needed.

7.2 Lid Removal (Top Loading) or Body Removal (Bottom Loading)

WARNING

When separating the SLB2 lid from the body, there may be adhesion between the lid, the flange gasket (if installed), and the body.

Safe work practices should be used when removing lid to avoid equipment damage and/or personnel injury.

NOTE

Separate instructions are provided for preparing Top Loading SLB2s and Bottom Loading SLB2s for use. The difference is that the lid is removed from Top Loading SLB2s and the body is removed from Bottom Loading SLB2s.

7.2.1 Top Loading SLB2 Lid Removal

7.2.1.1 Position the Top Loading SLB2 with the skids on a level surface.

7.2.1.2 Remove all installed hex flange bolts and nuts, placing them where they will not be damaged or lost.

WARNING

Failure to ensure that all of the four ½ in. swivel hoist rings or shouldered eyebolts are adequately rated and properly installed in the four lid lift lugs could cause equipment damage and/or personnel injury.

NOTE

To remove or install the lid on Top Loading SLB2s, four ½ in. swivel hoist rings or shouldered eyebolts, rated at a minimum of 400 lb each, must be installed in the four lid lift lugs.

7.2.1.3 Insert a swivel hoist ring or shouldered eyebolt in each of the four lid lugs and torque to manufacturer's recommendations.

WARNING

When handling the body or lid, failure to ensure that all rigging is adequate, appropriate, and securely attached could cause equipment damage and/or personnel injury.

7.2.1.4 Attach suitable rigging, capable of lifting 400 lb to each swivel hoist ring or shouldered eyebolt (1,600 lb total for all four riggings). Lid weight is 500 lb.

WARNING

Pinch points are present between lid and body flange. Fingers must be kept clear to avoid injury.

7.2.1.5 Lift the lid straight up to clear the body (2 in. minimum). A straight lift is necessary to avoid damaging the labyrinth seal areas of both the body and the lid.

WARNING

Lid lift lugs are intended to be used when the lid is in the horizontal position. If the lid is repositioned for convenience/safety when installing the gasket, the operation must be performed in accordance with applicable industry standards and/or the DOE *Hoisting and Rigging Standard*. Caution must be exercised to avoid equipment damage and or personal injury.

CAUTION

Lid and body labyrinth seal components extend beyond the bolting flange. The lid must be placed on suitable support blocking (greater than 2 in. high), inboard of the lid labyrinth, to avoid contact with the ground/floor and subsequent damage to the lid. Damage to the lid labyrinth may prevent reassembly of the SLB2 and proper interface with the gasket sealing surface.

7.2.1.6 Reposition the lid, if necessary, for gasket installation, and brace it securely.

7.2.1.7 If gasket compression spacers have become detached from the lid, they may be installed using a moderate coating of RTV silicone. Refer to subsection 7.4.1.5.

7.2.2 Bottom Loading SLB2 Body Removal

7.2.2.1 Position the Bottom Loading SLB2 with the skids on a level surface.

7.2.2.2 Remove all installed flange bolts and nuts, placing them where they will not be damaged or lost.

WARNING

When handling the body or lid, failure to ensure that all rigging is adequate, appropriate and securely attached could cause equipment damage and/or personnel injury.

7.2.2.3 Attach suitable rigging rated at a minimum of 1,500 lb each with a 3 in. wide hook to each of the four body lift clips. SLB2 nominal body weight is 2,100 lb. Body lift clips are located in the upper section of each corner of the body.

WARNING

Pinch points are present between the lid and body. Fingers must be kept clear to avoid injury.

CAUTION

Body and lid labyrinth seal components extend beyond the bolting flange, so they can be damaged when separating the body and lid if the body is not placed on suitable support blocking. Damage may prevent reassembly of the SLB2 and proper interface with gasket sealing surfaces.

7.2.2.4 Lift the body straight up to clear the lid (2 in. minimum). A straight lift is necessary to avoid damage or binding in the labyrinth seal areas of both the body and the lid.

WARNING

If the body is repositioned for convenience/safety when installing the gasket, the operation must be performed in accordance with applicable industry standards and/or the DOE *Hoisting And Rigging Standard*. Caution must be exercised to avoid equipment damage and/or personal injury.

7.2.2.5 Reposition the body, if necessary, for gasket installation, and brace it securely.

7.2.2.6 If gasket compression spacers have become detached from the lid, they may be installed using RTV silicone. Refer to subsection 7.4.2.5.

7.3 Installation of Filter Vents, Sample Port and Coupling Plugs

NOTE

Minimum Filter Vent Specifications - see Section 5.4. All pipe couplings not equipped with filter vents or an approved sample port shall be plugged with coupling pipe plugs. The quantity of filters installed, from one to six, will be governed by the usage requirements of TRUPACT-III TRAMPAC, Section 2.4.

NOTE

Each filter vent and sample port should thread all the way into the filter port coupling until the gasket seals. It may be necessary to chase the threads with the appropriate tap in order to obtain full thread engagement. The pipe coupling plug threads must engage a minimum of three full threads.

7.3.1 Apply a thread sealant (see Section 5.3) to the filter vent body pipe threads, or coupling pipe plugs as applicable. Install filter vents, sample port and coupling plugs, as applicable from the **OUTSIDE** into each of the six filter port couplings and hand-tighten. See Subsection 6.2.2.

7.3.2 Torque the filter vents, sample port and coupling pipe plugs, as applicable to 15 lb-ft +/-2 lb-ft.

7.3.3 Remove all excess pipe thread sealant from the exterior and interior of the SLB2.

7.4 SLB2 Closure

NOTE

Separate instructions are provided for Top Loading SLB2 closure and for Bottom Loading SLB2 closure. The difference is that the lid is installed on Top Loading SLB2s and the body is installed on Bottom Loading SLB2s.

7.4.1 Top Loading SLB2 Closure

NOTE

Prior to installing gaskets, it is the responsibility of the user to verify the gasket shelf life has not expired or is within the allowable shelf life range as described in Section 9.3.

NOTE

For Top Loading SLB2s, installation of the labyrinth gasket is recommended after the payload is loaded.

If this is not feasible due to ALARA (as low as reasonably achievable) or other concerns, special care must be taken to prevent dirt or debris from entering the labyrinth and contaminating the gasket.

7.4.1.1 Position the Top Loading SLB2 body with the skids on a level surface. Position the lid where it is securely supported, with the seal surface accessible for seal installation.

7.4.1.2 Load the payload and any dunnage materials into the SLB2 body. Refer to Section 8.0 for dunnage, blocking and bracing requirements.

7.4.1.3 Install the ½ in. wide x ¾ in. thick labyrinth gasket after wiping the labyrinth area in the body clean.

NOTE

The labyrinth gasket does not have adhesive. Ensure that ends of adjoining gasket pieces overlap, and are configured as shown on drawing 165-F-016-W5 using a small amount of RTV silicone in the joint. Do not stretch the gasket.

7.4.1.4 Insert the ½ in. wide x ¾ in. thick gasket into the labyrinth by pushing it all the way to the bottom of the labyrinth using a flat wood or plastic tool approximately ⅜ in. wide.

NOTE

Steps 7.4.1.5 through 7.4.1.7 may have been performed during fabrication. If not, the RTV silicone should be allowed to set for at least one hour, or as recommended by the manufacturer, before installing the gasket.

7.4.1.5 Install the 2 in. wide x ½ in. thick flange gasket on the lid by first wiping the lid sealing area and the body flange sealing area clean. Secure the gasket compression spacers on the lid centered over each bolt hole using RTV silicone as an adhesive.

7.4.1.6 Remove backing material from the 2 in. wide x ½ in. thick flange gasket to expose the pressure sensitive adhesive for attachment to the lid.

7.4.1.7 Starting from each corner, place individual gasket pieces (four each) in position, with the adhesive side contacting the lid. Press the gasket material in place over each of the gasket compression spacers, and interlocking the mitered corners at each end.

7.4.1.8 Reposition the lid with lid lift lugs upward. Place the lid on a clean surface (stands or blocks) inboard of the labyrinth, such that it is not resting on the gasket or the labyrinth.

WARNING

Failure to ensure that each swivel hoist ring or shouldered eyebolt is properly installed in each of the lid lift lugs could cause equipment damage and/or personnel injury.

NOTE

To allow installation of the lid on Top Loading SLB2s, four ½ in. swivel hoist rings or shouldered eyebolts, rated at a minimum of 400 lb each, must be installed in the four lid lift lugs.

7.4.1.9 Install the specified ½ in. swivel hoist ring or shouldered eyebolts in each of the four lid lift lugs and torque to manufacturer's recommendations.

WARNING

When handling the body or lid, failure to ensure that all rigging is adequate, appropriate, and securely attached could cause equipment damage and/or personnel injury.

7.4.1.10 Attach suitable rigging to the swivel hoist rings or shouldered eyebolts rated at a minimum of 400 lb each. SLB2 nominal Lid weight is 500 lb.

WARNING

Pinch points are present between lid and body. Fingers must be kept clear to avoid injury.

7.4.1.11 Lower the lid into place, making sure the lid labyrinth is properly engaged with the body labyrinth and that the lid and body bolt holes are properly aligned. The overall length of the SLB2 shall not exceed 108 inches. It may be necessary to adjust the position of the lid in relation to the body bumpers to maintain within this envelope. Gaskets may partially compress due to the lid weight. Bolts are used to fully compress the gaskets.

WARNING

Lid lift lugs are for lifting the lid only.

To avoid damaging the SLB2 or causing injury to personnel, force should not be placed on them when the lid is attached to the body.

7.4.1.12 To render the lid lift lugs unusable, remove all of the swivel hoist rings or shouldered eyebolts and reinstall the polyethylene plugs provided by the manufacturer.

7.4.1.13 Install the 56 hex head flange bolts and flange nuts, tightening until snug.

7.4.1.14 Pre-torque all bolts to 30 lb-ft, starting from the middle of the lid edges and working outward.

7.4.1.15 Torque all bolts to 55 lb-ft (-0, +10 lb-ft), starting from the middle of the lid edges and working outward.

NOTE

A tamper indicator seal is not required for shipments inside a Type B package.

7.4.1.16 If the SLB2 is being used as a stand-alone DOT 7A Type A package, apply a tamper indicator seal or other tamper indicator device as required by 49 CFR §173.412(a). This may be tamper-indicating paint applied to one or more hex head flange bolts and nuts.

7.4.2 Bottom Loading SLB2 Closure

NOTE

For Bottom Loading SLB2s, the gaskets must be installed prior to setting the payload in place.

Special care must be taken to prevent dirt and debris from contaminating the gasket.

NOTE

Prior to installing gaskets, it is the responsibility of the user to verify the gasket shelf life has not expired or is within the allowable shelf life range as described in Section 9.3.

7.4.2.1 Position the Bottom Loading SLB2 lid with the skids on a level surface, Position the body in a way that the bolting flange seal surface is protected from damage.

WARNING

When handling the body or lid, failure to ensure that all rigging is appropriate and securely attached could cause equipment damage and/or personnel injury.

7.4.2.2 Invert the body so that it is resting on the grid of 1-1/2 in. square bumper tubes, with the sealing surfaces facing upward.

7.4.2.3 Install the ½ in. wide x ¾ in. thick labyrinth gasket by first wiping the labyrinth area in the body clean.

NOTE

The labyrinth gasket does not have pressure sensitive adhesive. It is recommended that a small amount of RTV silicone be applied to the bottom surface of the body labyrinth before installing the gasket to retain the gasket in place.

7.4.2.4 Insert the ½ in. wide x ¾ in. thick labyrinth gasket into the labyrinth by pushing it all the way to the bottom of the labyrinth using a flat wood or plastic tool approximately ⅜ in. wide. Ensure that ends of adjoining gasket pieces overlap, and are configured as shown on drawing 165-F-017-W5 using a small amount of RTV silicone in the joint. Do not stretch the gasket.

NOTE

Steps 7.4.2.5 through 7.4.2.7 may have been performed during fabrication. If not, the RTV silicone should be allowed to set for at least one hour, or as recommended by the manufacturer, before installing the gasket.

7.4.2.5 Install the 2 in. wide x ½ in. thick flange gasket on the lid by first wiping the lid sealing area and the body flange sealing area clean. Secure the gasket compression spacers on the lid centered over each bolt hole using RTV silicone as an adhesive.

7.4.2.6 Remove backing material from the 2 in. wide x ½ in. thick flange gasket to expose the pressure sensitive adhesive for attachment to the lid.

7.4.2.7 Starting from each corner, place individual gasket pieces (four each) in position, with the adhesive side contacting the lid. Press the gasket material in place over each of the gasket compression spacers, and interlocking the mitered corners at each end.

7.4.2.8 Load the payload and any dunnage materials onto the SLB2 lid. Refer to Section 8.0 for dunnage, blocking and bracing requirements. Maintain sufficient distance from lid labyrinth members to allow fit-up with the body labyrinth.

WARNING

When handling the body or lid, failure to ensure that all rigging is appropriate and securely attached could cause equipment damage and/or personnel injury.

7.4.2.9 Position the body for assembly on to the lid with sealing surfaces facing down and in a way that protects the seal surfaces from damage.

7.4.2.10 Attach suitable rigging rated at a minimum of 1,500 lb each with a 3 in. wide hook to each of the four body lift clips. SLB2 nominal body weight is 2,100 lb. Body lift clips are located in the upper section of each corner of the body.

WARNING

Pinch points are present between lid and body. Fingers must be kept clear to avoid injury.

7.4.2.11 Lower the body onto the lid, centering it over the lid. Make sure the lid labyrinth is properly engaged with the body labyrinth and that the lid and body bolt holes are properly aligned. The overall length of the SLB2 shall not exceed 108 inches. It may be necessary to adjust the position of the lid in relation to the body bumpers to maintain within this envelope.

7.4.2.12 Install the 56 hex head flange bolts and flange nuts, tightening until snug.

7.4.2.13 Pre-torque all bolts to 30 lb-ft, starting from the middle of the lid edges and working outward.

7.4.2.14 Torque all hex head flange bolts and flange nuts to 55 lb-ft (-0, +10 lb-ft), starting from the middle of the lid edges and working outward.

NOTE

A tamper indicator seal is not required for shipments inside of a Type B package.

7.4.2.15 If the SLB2 is being used as a stand-alone DOT 7A Type A package, apply a tamper indicator seal or other tamper indicator device as required by 49 CFR §173.412(a). This may be tamper-indicating paint applied to one or more hex head flange bolts and nuts.

7.5 Securing SLB2 to a Conveyance Vehicle

The SLB2, when used as a stand-alone packaging, works well with most vehicles. The following steps describe how the SLB2 may be loaded and secured to a conveyance vehicle. The user shall be responsible for ensuring the equipment and methods are fit for the intended purpose and meet applicable DOT requirements for over-the-road transport.

7.5.1 Lift the SLB2 into position onto the conveyance vehicle according to Section 7.1.

7.5.2 Install suitable bracing to prevent longitudinal or lateral movement of the SLB2 in accordance with DOT requirements.

NOTE

The rigging must be anchored to the SLB2 by the body lift clips. This applies to both Top Loading and Bottom Loading SLB2s.

7.5.3 Secure the SLB2 to the vehicle with webbing or other suitable rigging.

7.5.4 Verify that all rigging and equipment is secure before shipment.

8.0 PAYLOAD HANDLING/LOADING

8.1 Large Components and Direct Loading

8.1.1 Proper installation of payload in the SLB2 is the responsibility of the shipper. To the extent possible, the SLB2 shall be loaded in a manner that will equally distribute the weight of the payload.

8.1.2 Dunnage, which may consist of additional waste, blocking and bracing shall be installed to secure the payload in place, when necessary to prevent shifting of the payload during transport. Equipment or materials with sharp corners, protrusions, or geometries that could result in highly localized forces shall be securely cribbed in position to prevent damage to the SLB2.

8.1.3 Close SLB2 in accordance with Section 7.4.

9.0 MAINTENANCE, INSPECTION AND REPAIR

Section 9.1 shall be done performed prior to installing gaskets on the SLB2. Refer to Subsections 7.4.1.3 through 7.4.1.7 for Top Loading gasket installation, and Subsections 7.4.2.3 through 7.4.2.7 for Bottom Loading gasket installation. Section 9.2 gives instructions for the repair of the flange gasket. (Refer to Figures 1 and 2).

9.1 Maintenance and Inspection

During the inspection of the SLB2, if defective parts or components are found, they must be replaced using original specification materials and methods to maintain DOT 7A Type A certification. In such cases, contact the manufacturer for replacements.

9.1.1 Inspect all body lift clips and lift lugs for damage or signs of fatigue. If there is evidence of fatigue or damage to any of these components, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.

9.1.1.1 Inspect all flanged hex bolts and flanged nuts for damage or signs of fatigue. If damage or evidence of fatigue are found, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.

9.1.1.2 Contact the manufacturer for correct replacement parts and replace per the appropriate drawing or specification, and in accordance with this manual.

9.1.2 Inspect the flange gasket. Replace it with a new gasket if the gasket is damaged or shows signs of deterioration or deformation (including compression set). The gasket material should be free of cracks and pliable, and should meet the nominal dimensional requirements. Verify that the gasket shelf-life has not expired or is within the allowable shelf life range as described in Section 9.3.

9.1.3 Inspect the labyrinth gasket. Replace the labyrinth gasket if it was installed with the SLB2 lid installed. Gasket replacement is necessary due to the localized and extensive compression (75%) of the SLB2 lid labyrinth on the gasket.

9.1.4 Remove the previously installed flange gasket manually by stripping the gasket from the body lid flange. During gasket removal, it is likely that the gasket compression spacers will become detached. Verify all 56 gasket compression spacers can be accounted for, and stage them for reinstallation following step 9.1.2.1 [B].

9.1.4.1 Clean the body gasket seating area and labyrinth as follows:

[A] Remove any residual gasket components or adhesive, using a flexible spatula, putty knife, or similar tool.

[B] Apply a light coat of low-intensity cleaning solvent (such as denatured alcohol or a general purpose adhesive remover containing a near equal mixture of Naphtha and Xylene). Adhesive remover of this type is commonly available at automotive parts stores. Use of acetone or other strong solvents is to be avoided as it will remove the paint/coating.

9.1.5 Install gaskets and gasket compression spacers in accordance with subsections 7.4.1.3 through 7.4.1.7 for Top Loading SLB2, or 7.4.2.3 through 7.4.2.7 for Bottom Loading SLB2.

9.1.6 Inspect all filter vents for damage. Replace as needed.

9.1.6.1 Verify all filter vents, sample port and pipe coupling plugs, as applicable are torqued in accordance with Subsection 7.3.2.

9.1.7 Inspect all SLB2 interior and exterior surfaces for signs of damage or distortion. If damage is found that could affect the containment integrity of the SLB2, tag or label the unit as unusable and segregate away from conforming units. Contact the manufacturer for repair procedures. Refer to Section 10.0 for disposition.

9.1.8 Inspect all SLB2 interior and exterior surfaces for signs of corrosion. If signs of corrosion that could impair the containment are found, tag or label the unit as unusable and segregate away from conforming units. Contact the manufacturer for repair procedures. Refer to Section 10.0 for disposition.

9.1.9 Inspect the condition of all sealant applied between bumper tubes, and body and lid panels. If sealant removal and reapplication is required, clean the affected area and reapply sealant as needed.

9.1.10 Verify the SLB2 identification serial number is in place, the package is marked with the name and address of the manufacturer in accordance with 49 CFR §178.350© and §178.3 and all markings are in good condition.

9.2 Gasket Repair

Gaskets may be repaired using an RTV silicone gasket maker material (LOCTITE 598 is recommended). The gasket maker material may also be used to fill gaps in the gasket material up to the manufacturers recommended gap, but not to exceed ¼ in.

9.3 Gasket Shelf Life, Storage and Adhesive

NOTE

The information in this section has been approved by the manufacturer of the SLB2 gaskets, and is provided to clarify the allowable shelf life of SLB2 gaskets based on the gasket material only, exclusive of the adhesive. Justification for use of gaskets beyond the shelf life provoded by the gasket manufacturer is based on the following:

The gasket shelf life is indicated on the certificate of conformance (C of C) provided by the gasket manufacturer. According to the gasket C of C, the shelf life for the SLB2 body flange gasket is limited to one year due to the shelf life of the pressure sensitive adhesive (PSA). The SLB2 labyrinth gasket has no PSA, and has a shelf life of up to five years, providing the gaskets have been stored in accordance with the conditions described in this section.

The PSA on the body flange gasket is used as an operational aid for holding the gasket in place during installation. The PSA serves no other purpose, and is not considered to be part of the containment boundary or the Type A packaging design.

To maximize the shelf life of both body flange and labyrinth gaskets, the gaskets should be stored in a dry location where they are protected against light, radiation, humidity and vapors. The ideal storage temperature is 70°F +/- 10° although storage temperatures between 60°F and 90°F are acceptable.

Body flange gaskets, whether installed or not installed may be used beyond the shelf life of the PSA, providing less than five years has elapsed from date of manufacture, and they meet the inspection criteria in subsection 9.1.2.

Due to the extensive compression of the labyrinth gasket by the lid labyrinth when the lid is installed, labyrinth gaskets shall be replaced if the labyrinth gasket was installed with the SLB2 lid installed.

If the body flange gasket meets the shelf life criteria of this section and the inspection criteria in subsection 9.1.2,but the PSA adhesion is inadequate, spray adhesive, 3M® 77, (or WTS Engineering approved equal) may be used to adhere the gasket to the SLB2 lid.

10.0 USER QUALITY ACCEPTANCE CRITERIA

If the requirements/criteria of Section 9.1 are **NOT** met, a Discrepancy Report shall be prepared and dispositioned per user's Quality Assurance procedures before next use of the SLB2.

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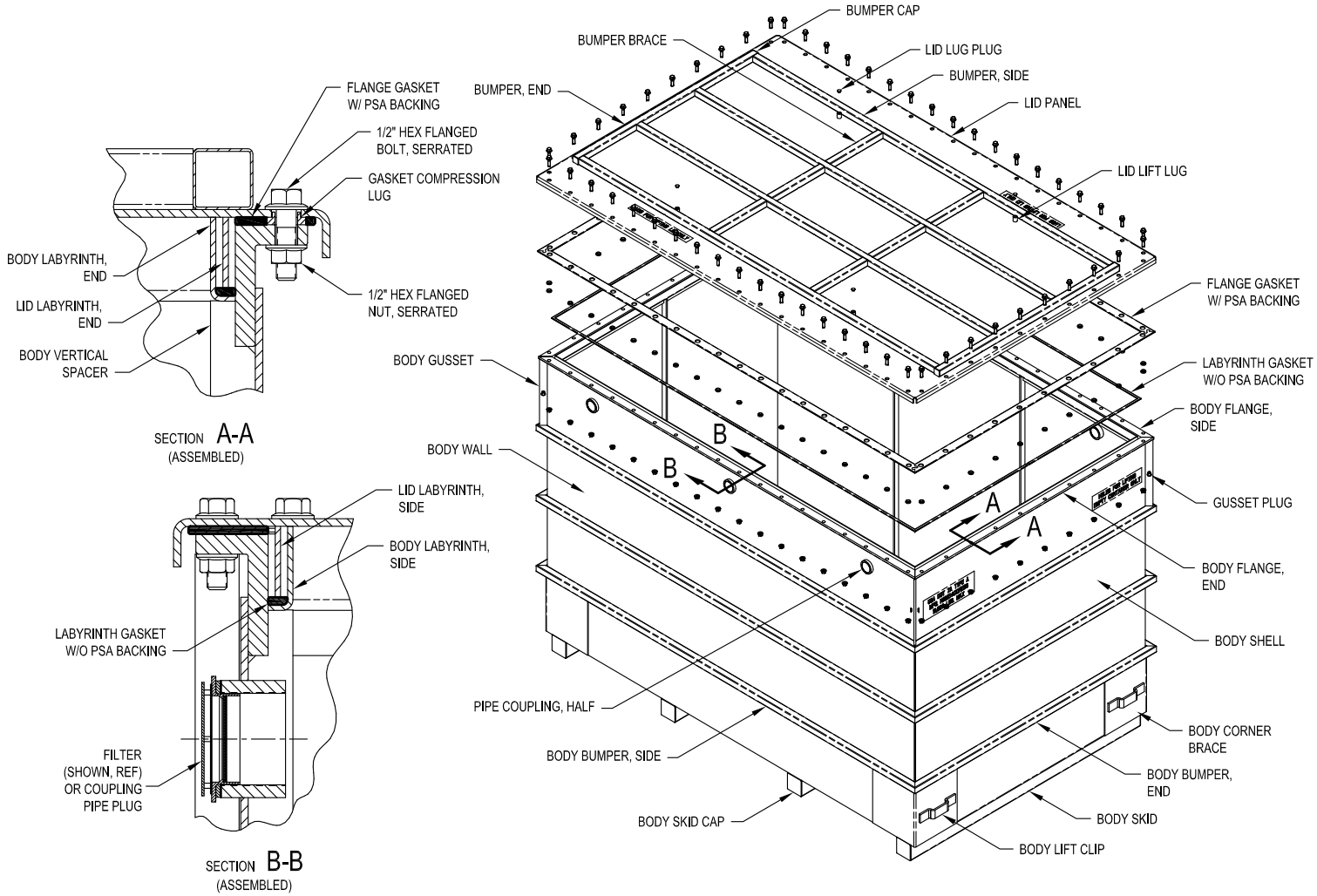
Figure 1. Top Loading SLB2 Isometric View



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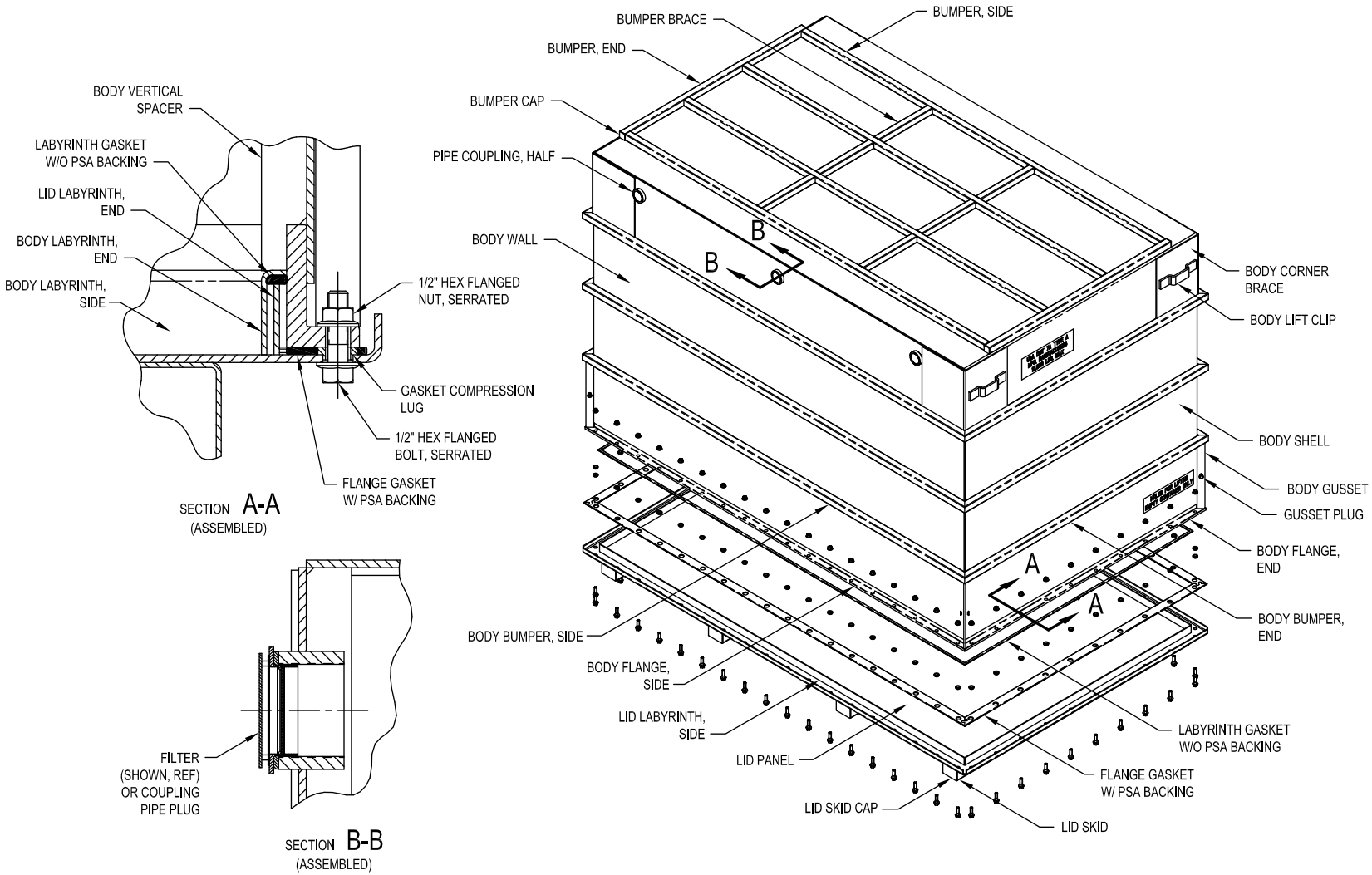
Figure 2. Bottom Loading SLB2 Isometric View