
**Oak Ridge National Laboratory (ORNL)
Transportation and Packaging Management (TPM)
Container Preparation and Filling Instructions/Checklist**

DOT Specification 6M Drum (see [Appendix A](#) for drawing)

ORNL-PKG-26, Rev. 2

Issued: 2/27/1997

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NOTE 1: The Department of Transportation (DOT) Specification 6M Drum (screw cap 2R container and leak-testable, flange type 2R container) is authorized for solid Type B materials with a heat load not exceeding 10 watts in Title 49 CFR ¶173.416 and for solid fissile materials in Title 49 CFR ¶173.417. The DOT Specification 6M Drum consists of an outer metal drum and an inner DOT Specification 2R container held in position by insulating material. Refer to Title 49 CFR ¶178.354 for the specification.

NOTE 2: Plutonium in excess of 20 Ci per package must be in solid form and must be packaged in the leak-testable, flange type style of 6M drum. The 6M drum with the screw cap 2R is not authorized for Plutonium in excess of 20 Ci. Refer to Title 10 CFR ¶71.63 for special requirements for shipping Plutonium.

NOTE 3: The DOT Specification 6M drum will be referred to as a "6M drum" and the DOT Specification 2R Container will be referred to as a "2R" throughout this instruction.

A. Packaging the DOT Specification 6M Drum

**Packaging
Operations**

1. Ensure that external and internal contamination limits are within Oak Ridge National Laboratory (ORNL) site limits by:
 - o Reviewing existing Health Physics (HP) tag or documentation, or
 - o Requesting new HP survey.
2. Inspect the following visually for damage, dents, defects, etc.:
 - o 2R including the lid;
 - o External and internal threads of the screw-cap 2R;
 - o Internal threads and flange bolt threads of the flange type 2R;
 - o O'rings in the flange of the flange type 2R;
 - o Seals at the leak check port of the flange type 2R;
 - o Insulating material (celotex, fiberboard, etc.);
 - o Outer drum for defects such as rust and dents;
 - o Gasket in the lid of the outer drum for wearing or tears;
 - o Nameplate on the outer drum to ensure a continuous weld or other suitable material seals the edges of the nameplate; **and**

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Packaging Operations

A. Packaging the DOT Specification 6M Drum (cont.)

2. Inspect the following visually: *(cont.)*
 - " Nameplate on the outer drum for the following information:
 - % "DOT-6M Type B";
 - % "Fissile Radioactive Materials";
 - % "Radioactive Materials" as appropriate;
 - % The gauge of metal, rated capacity of the drum, and the year of manufacture, i.e., 12-30-94;
 - % "max gross weight = XXX," owner's name and address, and trefoil symbol.
3. Report any deficiencies to the Packaging Supervisor.
4. Ensure that all vent holes (four minimum) are 0.5 inches in diameter and are covered with weatherproof tape or a fusible plug.
5. Load the solid fiberboard rings into the drum until the minimum thickness required per 49 CFR ¶178.354-3(a) (1) is achieved. *If the container volume is such that a bearing plate is required per 49 CFR ¶178.354-3(e), the ring containing the plywood insert must be installed so that the plywood is in contact with the inner 2R vessel.*
6. Load the middle fiberboard rings. These rings have a center cavity cut out hole in the center of the rings. If the 2R vessel has an external closure cap, load the fiberboard rings with the smaller inside diameter center cavity hole cut out into the drum first. For a 2R vessel with a plug closure, load all of the fiberboard rings with the center cavity hole cut out.
7. Securely position the material within the 2R.

Fissile material in normal form must be in a tightly sealed metal can or polyethylene bottle.
8. Place impact absorbers in the bottom and top of the 2R and between inner containers, if applicable, to position the inner containers in the center of the 2R.
9. **IF** the 6M drum is a Screw Cap 2R Container, **THEN** **GO TO** [Section B](#) of this instruction.

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Packaging
Operations

A. Packaging the DOT Specification 6M Drum (cont.)

10. **IF** the 6M Drum is a Leak-Testable, Flange Type 2R Container, **THEN GO TO [Section C](#)** of this instruction.

B. Packaging the DOT Specification 6M Drum--Screw Cap 2R Container

1. Apply non-hardening compound capable of withstanding 149° C (300° F) without loss of efficiency as a luting compound to the pipe threads of the screw cap 2R.
2. Place the pipe cap on the 2R and tighten until at least five (5) threads are engaged.
3. Torque the lid of the screw cap 2R to 15 (+5, -0) foot-pounds.
4. **GO TO [Section D](#)** of this instruction.

C. Packaging the DOT Specification 6M Drum--Leak-Testable, Flange Type 2R Container

Packaging
Operations

1. Apply vacuum grease to both o'rings.
2. Place the lid on the 2R.
3. Torque each of the eight 1-1/8" bolts on the flanged 2R to 30 (+/-5) foot-pounds.
4. Perform a leak check on the flanged 2R (according to the Croft, Inc. CALT 5 operating procedure for the leak test equipment) for Type B quantities of Plutonium or at the direction of the Packaging Supervisor.
5. **IF** the leak test is unsuccessful, **THEN**
Open the 2R, re-inspect the o'rings and/or replace the o'rings and repeat steps C.1 through C.4 until the leak test is successful.
6. **GO TO [Section D](#)** of this instruction.

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D. Packaging the DOT Specification 6M Drum

Packaging Operations

1. Place the top spacer in the drum on top of the 2R.
2. Load the remaining solid fiberboard rings. These fiberboard rings will have 1" finger holes installed. *If a plywood bearing plate is inset in one of the top rings, this must be placed so that the plywood is in contact with the top of the 2R vessel.* All rings with finger holes are intended to be placed above the 2R vessel to allow for access to the 2R vessel.
3. Place the lid on the 6M drum positioning the cover and the gasket so an uninterrupted seal is assured.
4. Tap around the closing ring with a hammer while tightening the bolt to the following torque:
 - " 5/8" - 40 (+/-5) ft-lb
 - " 5/16" - 15 (+5, -0) ft-lb

NOTE: To prevent the bolt from unintentional loosening during transport, the jam, or lock, nut must be positioned against the non-threaded lug (between the two lugs.) tighten against the non-threaded lug to form a secured lock. Check for secure fit and proper tightness of the ring.

5. Secure the drum and attempt to slide, or rotate, the ring. any sliding of the ring may indicate an oversize ring, or improper torque.
6. Verify that the gross weight of the drum does not exceed the allowable limit.

Each drum is marked with the maximum allowable gross weight on the permanent data plate attached to the drum.

7. Attach a plain wire seal for nonaccountable materials or a controlled, numbered seal for accountable materials, if required.

The seal wire should be threaded through the hole in the center buckle so that the buckle cannot be opened without breaking the wire.

8. Record the controlled, numbered seal for accountable materials, if required.

Prepared by: ORNL TPM Organization

Approved by: Jeff Shelton

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Jeff Shelton, Manager (576-6401)
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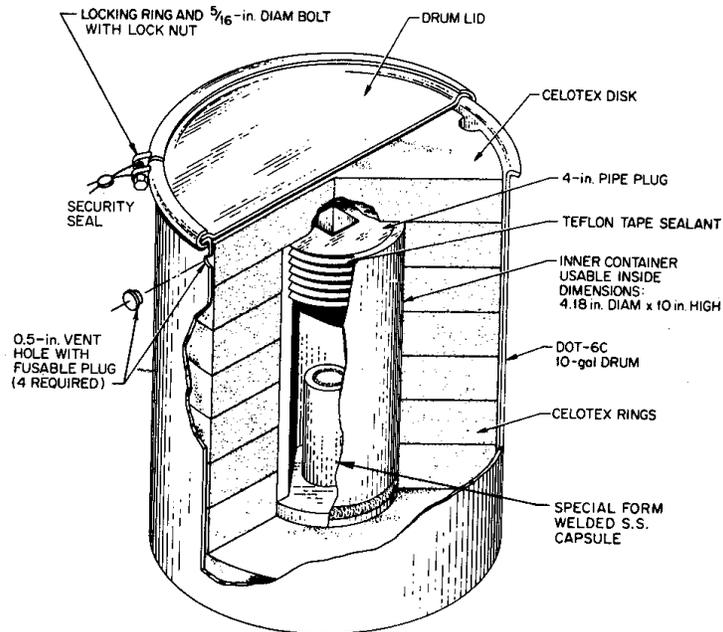
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Appendix A DOT Specification 6M Drum



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