



U.S. Department  
of Transportation  
**Research and  
Special Programs  
Administration**

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400 Seventh St., S.W.  
Washington, D.C. 20590

Mr. Mike Houston  
Quality Assurance Manager  
FBF Nuclear Containers  
P.O. Box 51026  
Knoxville, TN 37950-1026

Ref. No. 03-0123

Dear Mr. Houston:

This responds to your letter requesting clarification of the radioactive materials packaging construction requirements under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). I apologize for the delay in responding. Your questions are paraphrased and answered as follows:

Q1. In the general construction requirements for Type B Specification 6M packagings under § 178.354-3, paragraph (b) specifies that each inner containment vessel must conform to Specification 2R or equivalent with a maximum usable inside diameter of 13.3 cm (5.25 inches), minimum usable inside diameter of 10 cm (4 inches), and a minimum height of 15 cm (6 inches). This appears to contradict the maximum inside diameter values specified for Specification 2R under § 178.360-3(a). Which value is correct?

A1. Unless further limited by the specific outer packaging construction requirements (e.g., §§ 178.352-3 and 178.354-3), the maximum inside diameter for a Specification 2R inner containment vessel is 30 cm (12 inches), exclusive of flanges for handling or fastening devices, as specified in the § 178.360-3(a). For a Specification 6M outer packaging, the maximum usable inside diameter value for its inner containment vessel is limited to 13.3 cm (5.25 inches) as specified in § 178.354-3.

Q2. The manufacture requirements specified in § 178.360-2 for Specification 2R inner containment vessels permit one or both ends of the vessel to be permanently closed by a welded or brazed plate. The § 178.360-3(a) table does not specify minimum thickness values for welded or brazed plates. What is the minimum thickness value required for a steel plate welded to a Specification 2R inner containment vessel that is constructed of steel pipe in accordance with ANSI Schedule 40 (Schedule 40) and has an inside diameter of 5 inches?



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178.354-3  
178.360-3

A2. The minimum thickness value required for a steel plate welded to a Specification 2R inner containment vessel would be the same as the value specified in Schedule 40 for the nominal wall thickness of the body of the containment vessel. Under Schedule 40, a 5-inch (nominal) steel pipe is required to have a wall thickness of 0.258 inches (nominal) and has an inside diameter measuring 5.05 inches.

Q3. Schedule 40 steel pipe is not available with an inside diameter that is greater than 5 inches but less than or equal to 5.25 inches. Piping with an inside diameter greater than 5 inches but less than or equal to 5.25 inches is available constructed of steel tubing. What is the minimum wall thickness value for a Specification 2R inner containment vessel that is constructed of steel tubing and has an inside diameter of 5.25 inches?

A3. As specified in § 178.354-3(b) for a Specification 6M packaging, each inner containment vessel must conform to Specification 2R or equivalent (cast iron and brass are prohibited). Provided the steel tubing is of equivalent integrity, its use would be permitted. Although the minimum wall thickness is not specified in § 178.354-3(b) or the § 178.360-3(a) table for piping with an inside diameter of 5.25 inches, it is our opinion that the minimum wall thickness would be 6 mm (0.25 inch), consistent with the minimum thickness specified in § 178.352-3(b) for a Specification 2R inner containment vessel further packaged in a Specification 6L packaging. This opinion is consistent with the values specified in Schedule 40.

Q4. What is the minimum thickness value for a steel plate welded to a Specification 2R (equivalent) inner containment vessel that is constructed of steel tubing and has an inside diameter of 5.25 inches?

A4. The minimum thickness value required for a steel plate welded to a Specification 2R (equivalent) inner containment vessel would be the same as the value specified for the nominal wall thickness of the body of the containment vessel and no less than 6 mm (0.25 inch).

For your information, Docket HM-230, "Compatibility with the Regulations of the International Atomic Energy Agency," was published as a final rule on January 26, 2004. This final rule allows the continued use of an existing Type B packaging constructed to DOT Specification 6M until October 1, 2008, provided it is manufactured prior to October 1, 2004, and conforms in all respects to the requirements of the HMR in effect on October 1, 2003.

I trust this satisfies your inquiry. Please contact us if we can be of further assistance.

Sincerely,

A handwritten signature in cursive script that reads "Hattie L. Mitchell". The signature is written in dark ink and is positioned above the typed name.

Hattie L. Mitchell  
Chief, Regulatory Review and Reinvention  
Office of Hazardous Materials Standards



FBF NUCLEAR CONTAINERS, LLC.

Stevens

Ed Mazzullo, Director  
Office of Hazardous Materials Standards, DHM-10  
U. S. Department of Transportation  
400 Seventh St. SW  
Washington, DC 20590

§ 178.354-3 05-05-03

§ 178.360-3

Packagings for RAM  
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Dear Ed,

I am the Quality Assurance Manager for FBF Nuclear Containers, LLC. Our Manufacturer's Registration Number is M5603. We are manufacturers of DOT Type A and Type B packages. I have a few questions pertaining to the 6M Type B Package. I have discussed these issues extensively with Mr. Fred Ferate, of the Office of Hazardous Materials Technology. Fred recommended that I submit my questions in the form of a request for a letter of clarification. I appreciate the help Fred and DOT have been thus far.

I will start my request with a discussion relating to the criteria found in 49CFR 178.354 & 178.360.

Subject: Specification 6M; metal packaging: 49CFR 178.354-3 (a) (2) (b): General Construction Requirements for 2R Vessels when used with the 6M Package, and 49CFR 178.360-3 (a) 2R Vessel Dimensions.

Discussion:

When a DOT 6M Type B Package is manufactured utilizing the maximum allowable Inside Diameter of 5.25" as Per 178.354-3 (a) (2) (b), the 2R Specification does not specifically address the minimum wall thickness to be used for a 5.25" Inside Diameter. Please review the criteria below:

**6M 2R Vessel Criteria from 178.354-3 (a) (2) (b):** - "Inner Containment Vessel must conform to specification 2R or equivalent (cast iron or brass are prohibited), with a maximum usable inside diameter of 13.3 cm (5.25 inches), minimum usable inside diameter of 10 cm (4 inches), and a minimum height of 15 cm (6 inches).

**Specification 2R Inside Containment Vessel Dimensional requirements from 49CFR 178.360-3 (a):** "The inside diameter of the vessel may not exceed 30 cm (12 inches) exclusive of flanges for handling or fastening devices and must have wall thickness and length in accordance with the following:

(Please refer to table shown in 178.360-3 (a))."

Note: The table in 178.360-3 (a) does address "Wall thickness minimum-Flanged Closure". The criteria for wall thickness given are: "Not less than that prescribed for schedule 40 Pipe". The chart found in the 2R specification (49CFR 178.360-3 (a)) does not give a specific minimum wall thickness for a 5.25" I.D. 2R vessel. Note: 5.25" schedule 40 is not available in Pipe. You can get tubing (Not Pipe) with a 5.25" inside diameter, however, tubing has no schedule.



**FBF NUCLEAR CONTAINERS, LLC.**

**Question 1:**

Are the dimensions for 2R maximum inside diameters, threaded closures, wall thickness minimum, and maximum length dimensions shown in table in 178.360-3 (a) only applicable when no specific dimensional criteria for minimum and maximum inside diameters, 2R vessel wall thickness and or maximum 2R length are given elsewhere in the CFR (e.g., 178.354-3 (a) (2) (b))? If so, the following additional questions arise concerning the minimum wall thickness for the 2R vessel and bottom plate for the 2R vessel when a welded plate is desired.

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**Subject:** Specification 6M; metal packaging: 49CFR 178.360-2: 2R Vessel wall thickness Manufacturing requirements for permanent welded plates used on 2R Vessels:

**Discussion:**

**Paragraph 178.360-2:** "The ends of the vessel must be fitted with screw-type closure or flanges (see 178.360-4), except that one or both ends of the vessel may be permanently closed by a welded or brazed plate. Welded or brazed seams are authorized".

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**Question 2:**

For construction of a DOT 6M Type B vessel when a welded or brazed steel plate permanent closure is used on one or both ends of the 2R vessel as allowed by 178.360-2, what is the minimum wall thickness allowed for the welded steel plate when used with a 5" I.D. 2R Vessel constructed with 5" I. D. Schedule 40 Pipe for the 2R?

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**Question 3:**

For construction of a DOT 6M Type B vessel when a welded or brazed steel plate permanent closure is used on one or both ends of the 2R vessel as allowed by 178.360-2, what is the minimum wall thickness allowed for the welded steel plate when used with a 5.25" I.D. 2R Vessel constructed with 5.25" I. D. tubing for the 2R?

The above questions were specific to the welded or brazed steel plate permanent closure. For further clarity for wall thickness of the containment vessel, I have one additional question:

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**Question 4:**

What is the minimum wall thickness allowed for a DOT 6M Type B 2R when a 5.25" inside diameter steel tube is used for the 2R vessel?

Thank You for your help concerning these matters.

Regards,

*Mike Houston*

Mike Houston

FBF Nuclear Containers

Quality Assurance Manager