



U.S. Department  
of Transportation

**Pipeline and  
Hazardous Materials Safety  
Administration**

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

JUN 7 2006

Mr. Stan Hodges  
RWE NUKEM Corporation  
3800 Fernandina Road  
Suite 200  
Columbia, SC 29210

Reference No.: 06-0084

Dear Mr. Hodges:

This responds to your letter concerning the use of freight containers as Industrial packages Types 2 or 3 (Type IP-2) or (Type IP-3) under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Your questions are paraphrased and answered as follows:

Q1. Paragraph 627 of the International Atomic Energy Agency's (IAEA) Regulations for the Safe Transport of Radioactive Material (TS-R-1) authorizes the use of freight containers as Industrial packages Types 2 or 3 (Type IP-2) or (Type IP-3) provided they are designed to conform to the standards prescribed in the International Organization for Standardization's (ISO) standard ISO 1496-1. Paragraph 627 also requires freight containers to be designed such that if subjected to the tests prescribed in ISO 1496-1 and the accelerations occurring during routine conditions of transport they would prevent:

- (a) loss or dispersal of the radioactive contents; and
- (b) loss of shielding integrity which would result in more than a 20% increase in the radiation level at any internal surface of the freight container.

What type of calculation would be needed to prove the requirements have been met?

A1. Any of the methods described in paragraphs 701 and 702 of IAEA's TS-R-1 (incorporated by reference in § 171.7) may be used to demonstrate compliance with the test standards. Paragraph 701 describes methods to demonstrate compliance with the performance standards and paragraph 702 requires appropriate methods of assessment of the test results to ensure compliance with the performance and acceptance standards. Compliance with the test standards may be accomplished by any one of the following methods:

(1) Performance of tests with specimens representing LSA-III material, or special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests shall simulate as closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport.



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(2) Reference to previous satisfactory demonstrations of a sufficiently similar nature.

(3) Performance of tests with models of appropriate scale incorporating those features which are significant with respect to the item under investigation when engineering experience has shown results of those tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as the penetrator diameter or the compressive load, shall be taken into account.

(4) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

Q2. May closed packages be placed inside a freight container if the packages are properly blocked and braced to prevent movement relative to the accelerations occurring during routine conditions of transport?

A2. The answer is yes, provided the shipper, using any of the methods described in paragraphs 701 and 702 of TS-R-1, can demonstrate that the conditions in paragraph 627 of TS-R-1 have been satisfied.

Q3. If a freight container is equipped with passive vents, are the passive vents required to be blanked off and HEPA filters installed when closed containers of radioactive materials are transported in the freight container?

A3. The answer is no, provided the freight container and its radioactive contents have successfully met the IAEA TS-R-1 paragraph 627 test requirements.

I trust this satisfies your inquiry.

Sincerely,



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

Corbin  
8173.403  
RAM

**Williams, James <PHMSA>**

**From:** Stan Hodges [shodges@rwe.nukem.com]  
**Sent:** Thursday, April 13, 2006 9:48 AM  
**To:** Williams, James <PHMSA>  
**Subject:** RE: IAEA Requirements for IP-2 Containers

06-0084

Jim:

Our company name and address is provided below:

RWE NUKEM Corporation  
3800 Fernandina Road  
Suite 200  
Columbia, SC 29210  
803-214-5800

I have also inserted the name/address in the initial e-mail message that I sent you a couple of days ago.

Stan Hodges  
Sr Project Manager  
(O) 803-214-5848  
(M) 803-318-7493 (Note - New Number)  
(F) 803-214-5804

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**From:** James.Williams@dot.gov [mailto:James.Williams@dot.gov]  
**Sent:** Wednesday, April 12, 2006 3:06 PM  
**To:** Stan Hodges  
**Subject:** RE: IAEA Requirements for IP-2 Containers

Stan,

Could you add your company name and address to this email.

Jim Williams  
Radioactive Materials Branch, PHH-23  
Office of Hazardous Materials Technology, Room 8430  
Pipeline and Hazardous Materials Safety Administration  
U.S. Department of Transportation  
400 Seventh Street, S.W.  
Washington, D.C. 20590  
James.Williams@dot.gov

4/13/2006

(202) 366-6177

-----Original Message-----

**From:** Stan Hodges [mailto:shodges@rwe.nukem.com]  
**Sent:** Monday, April 10, 2006 10:30 AM  
**To:** Williams, James <PHMSA>  
**Subject:** IAEA Requirements for IP-2 Containers

Jim:

Thanks for taking the time to discuss Section 627 of the IAEA regulations with me today. Here is the section from the updated IAEA regulations that allow the utilization of freight containers as Type IP-2 containers provided that they conform to the standards prescribed in the ISO document ISO 1496/1. The section does however note that they shall be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routine conditions of transport they would prevent: (i) loss or dispersal of the *radioactive contents*; and (ii) loss of shielding integrity which would result in more than a 20% increase in the *radiation level* at any external surface of the *freight containers*.

How do we prove this? What type of calculation would you need to do to prove items (i) and (ii) below?

627. *Freight containers* may also be used as *Type IP-2* or *Type IP-3*, provided that:

- (a) The *radioactive contents* are restricted to solid materials;
- (b) They satisfy the requirements for *Type IP-1* specified in para. 621; and
- (c) They are designed to conform to the standards prescribed in the International Organization for Standardization document ISO 1496/1: "Series 1 Freight Containers — Specifications and Testing — Part 1: General Cargo Containers" [9] excluding dimensions and ratings. They shall be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routine conditions of transport they would prevent:
  - (i) loss or dispersal of the *radioactive contents*; and
  - (ii) loss of shielding integrity which would result in more than a 20% increase in the *radiation level* at any external surface of the *freight containers*.

Would placing closed packages inside of the freight container be sufficient if the packages were properly blocked and braced to not move relative to the accelerations occurring during routine conditions of transport?

- ↳ Freight containers are typically provided standard with passive vents. For containers that were being utilized to ship radioactive packages (even in closed containers inside of the freight container), should the passive vents be blanked and HEPA filter(s) installed on the freight containers?

Please note that we plan to ship containers with this exclusion either the first or second week of May 2006 to a nuclear power station in Spain via Liverpool, England. If at all possible, we would like DOT's response as soon as possible.

Stan Hodges  
Sr Project Manager  
(O) 803-214-5848  
(M) 803-318-7493 (Note - New Number)  
(F) 803-214-5804  
RWE NUKEM Corporation  
3800 Fernandina Road

4/13/2006

## Input from Jim Williams

The DOT interpretation is any of the method(s) provided in paragraphs 701 and 702 of the IAEA TS-R-1 Regulations may be used to demonstrate compliance with the paragraph 627 requirements.

Para 701 Demonstration of compliance with the performance standards required in Section VI shall be accomplished by any of the methods listed below or by a combination thereof.

- (a) Performance of tests with specimens representing LSA-III material, or special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests shall simulate as closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport.
- (b) Reference to previous satisfactory demonstrations of a sufficiently similar nature.
- (c) Performance of tests with models of appropriate scale incorporating those features which are significant with respect to the item under investigation when engineering experience has shown results of those tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as the penetrator diameter or the compressive load, shall be taken into account.
- (d) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

Para 702

After the specimen, prototype or sample has been subjected to the tests, appropriate methods of assessments shall be used to ensure the requirements of this section have been fulfilled in compliance with the performance and acceptance standards prescribed in Section VI.

In accordance with paragraphs 627 of the IAEA TS-R-1 Regulations, freight containers may also be used as IP-2 or IP-3 packages, only as long all of the following four conditions are met:

- a) The radioactive contents of the freight container are limited solid materials.
- b) The freight container meets the requirements for an IP-1 package.
- c) The freight container is designed to conform to the standards prescribed in: "Series 1 Freight Containers - Specifications and Testing - Part 1: General Cargo Containers for General Purposes; excluding dimensions and ratings. It should be noted that freight containers approved in accordance with the International Maritime Organization International Convention for Safe Containers are not necessarily equivalent to the testing prescribed by ISO 1496-1.
- d) The freight container is designed such that if subjected to the tests prescribed in ISO 1496-1, as well as accelerations occurring during routine conditions of transport, there would be no loss or dispersal of the radioactive contents nor loss of shielding integrity which would result in more than a 20% increase in radiation levels on any external surface of the freight container. It should be noted that the test conditions of accelerations occurring during routine conditions of transport are in addition to the testing prescribed by ISO 1496-1 because the ISO Standard does not include dynamic tests.

As long as the four conditions described in paragraph 627 of the IAEA TS-R-1 Regulations can be demonstrated to be satisfied by the shipper using any of the method(s) provided in paragraphs 701 and 702, then placing properly blocked and braced closed packages inside a freight container would satisfy the Type IP-2 or IP-3 requirements.

Freight containers with passive vents may or may not need HEPA filters(s) and/or to be blanked off to satisfy the Type IP-2 or IP-3 requirements. Satisfactory demonstration of the requirements is incumbent on the shipper, on a case-by-case basis. As long as all the requirements of paragraph 627 can be demonstrated to be met, e.g., taking into account intermediate package containment systems, the freight containers would not necessarily need to be HEPA filtered or blanked off.