



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue SE  
Washington, DC 20590

JUN 30 2011

Mr. Ed Van Schoick  
18213 Bittern Ave.  
Lutz, FL 33558

Ref. No.: 11-0103

Dear Mr. Van Schoick:

This responds to your letter requesting clarification of the Hazardous Material Regulations (HMR; 49 CFR Parts 171-180) applicable to fluorine. Specifically, you ask whether the closure requirements in § 173.40(c) apply to cylinders containing fluorine.

The answer is yes. As specified in § 173.301(c), cylinders containing toxic gases and toxic gas mixtures meeting the criteria of Division 2.3 Hazard Zone A or B must conform to the requirements of § 173.40. While the Hazardous Materials Table references § 173.302 for non-bulk packaging requirements for fluorine, this does not except cylinders containing fluorine from the applicable requirements of § 173.40, including the closure requirements described in paragraph § 173.40(c).

I hope this answers your inquiry. If you need additional assistance, please contact the Standards and Rulemaking Division.

Sincerely,

A handwritten signature in black ink, appearing to read "Ben Supko".

Ben Supko  
Chief, Standards Development Branch  
Standards and Rulemaking Division

Leary  
§173.40  
§172.101  
Packaging  
11-0103

## 2<sup>nd</sup> DRAFT revised

Office of Hazardous Materials Standards  
PHMSA Attn: PHH-10  
US Department of Transportation  
1200 New Jersey Ave., SE  
Washington, DC 20590-0001

I would like to request clarification of the valve requirements specified in 49CFR173.40(c) *closures* as they may or may not apply to fluorine, compressed, UN1045 in nonbulk packagings.

The opening sentence in paragraph 173.40 states “When this section is referenced for a Hazard Zone A or B hazardous material elsewhere in this subchapter, the requirements in this section are applicable to cylinders used for that material”. Paragraph 173.40 consists of five subparagraphs and may be referenced by a Hazard Zone A or B material in part, or in its entirety. Subparagraph 173.40(a) *Authorized cylinders*, subparagraph 173.40(b) *Outage and pressure requirements*, subparagraph 173.40(d) *Additional handling protection* and subparagraph 173.40(e) *Interconnection* address those four topics as they relate to materials in Hazard Zone A or B. Subparagraph 173.40(c) *Closures*, addresses plugs or valves, but only for cylinders containing certain Hazard Zone A materials.

Examples of Hazard Zone A gases that reference 173.40 in its entirety include arsine, cyanogen chloride, phosphine, hydrogen selenide, phosgene, all n.o.s. compressed gases in Hazard Zone A, all n.o.s. liquefied gases in Hazard Zone A, etc. Each of these gases references 173.192 in column 8B of the Hazardous Materials Table in 172.101. Paragraph 173.192 *Packaging for certain toxic gases in Hazard Zone A* states “When paragraph 172.101 of this subchapter specifies a toxic material must be packaged under this section, only the following cylinders are authorized”. Subparagraph 173.192(b) states “Packagings must conform to the requirements of 173.40”. With respect to gases, a packaging includes the cylinder and the closure (plug or valve). See paragraph 171.8 *Packaging*.

In column 8B of the Hazardous Materials Table, hydrogen cyanide, anhydrous, references paragraph 173.195 *Hydrogen cyanide, anhydrous, stabilized* where it states in subparagraph 173.195(c) “Packagings for hydrogen cyanide must conform to 173.40”. This would include the cylinder and the valve.

Column 8B of the Hazardous Materials Table references paragraph 173.198 for nickel carbonyl. Subparagraph 173.198(b) states “Packagings for nickel carbonyl must conform to 173.40”. Again, this would include the cylinder and the valve.

Examples of Hazard Zone A materials that reference only portions of 173.40 include bromine pentafluoride which references 173.228 in column 8B of the Hazardous

Materials Table. Subparagraph 173.228(b) states “A material in Hazard Zone A must be transported in a seamless specification cylinder conforming to the requirements of 173.40. However, a welded cylinder...” Clearly just the cylinder is being addressed and not the entire packaging. See paragraph 171.8 *Cylinder*.

Column 8B in the Hazardous Materials Table references 173.337 for nitric oxide. Subparagraph 173.337(a) states “Nitric oxide must be packaged in cylinders conforming to the requirements of 173.40...” Again, just the cylinder portion of the packaging is being addressed.

Column 8B in the Hazardous Materials Table references paragraph 173.302 for numerous gases including Hazard Zone A materials: diborane, fluorine and sulfur tetrafluoride. Of these three gases, both diborane and fluorine are subject to additional restrictions as noted in subparagraphs 173.302(d) and 173.302(e) respectively, neither of which reference 173.40 for their packagings.

Subparagraph 173.302a(d) *Diborane and diborane mixtures* addresses fill restrictions and the last sentence states “Cylinder valve assemblies must be protected in accordance with 173.301(h)”. That sentence reveals that the DOT is aware that the valves on diborane cylinders do not conform to the specifications in 173.40(c) in that there are two valves on each cylinder and neither of them thread directly into the cylinder, which is a requirement of 173.40(c). Paragraph 173.301(h) *Cylinder valve protection* is referenced instead of the more rigorous protection required in 173.40(d). This is not an oversight. It is intentional. The valves (closures) on diborane cylinders are not required to meet the specifications of paragraph 173.40(c).

A generic gas classed the same as diborane, e.g., Compressed gas, toxic, flammable, n.o.s. Inhalation Hazard Zone A, 2.3, UN1953 references 173.192 in column 8B. Clearly the packaging would be different from diborane and all of 173.40 would apply. If diborane was intended to meet the closure requirements in 173.40(c), 173.192 would be referenced in column 8B instead of 173.302.

Subparagraph 173.302a(e) *Fluorine* specifies which cylinders may be used and limits the contents by pressure or mass, whichever is lower. There is no mention of any valve restrictions and no reference to 173.40 with regard to the packaging.

A generic gas classed the same as fluorine, e.g. Compressed gas, toxic, oxidizing, corrosive, n.o.s. Inhalation Hazard Zone A, 2.3, UN3306 references paragraph 173.192 in column 8B in the Hazardous Materials Table rather than 173.302. This difference demonstrates, as in the case with diborane, that fluorine is not intended to comply with the closure requirements of 173.40(c) either.

Paragraph 173.302(a) states that “A cylinder filled with a non-liquefied compressed gas (except gas in solution) must be offered for transportation in accordance with the requirements of this section and paragraph 173.301”. In paragraph 173.301(c) *Toxic gases and mixtures* it states “Cylinders containing toxic gases and toxic gas mixtures meeting the criteria of division 2.3 Hazard Zone A or B must conform to the requirements of paragraph 173.40 and CGA S-1.1 and CGA S-7”. This has led to some confusion. However, a careful reading of 173.301(c) reveals that it applies to the cylinder

not the packaging. CGA S-1.1 and CGA S-7 specify the type, quantity and location of Pressure Relief Devices (PRDs) required on cylinders. PRDs are forbidden on Hazard Zone A gases. Therefore, these two references apply to the Hazard Zone B gases referenced in 173.301(c). Since it does not say "Packagings containing toxic gases and toxic gas mixtures..." It is only addressing the cylinder requirements contained in 173.40 not the closure/valve.

Materials that are required to use the closures specified in 173.40(c) have paragraphs that specifically refer to 173.40 for their packagings, e.g. 173.195 for hydrogen cyanide, anhydrous; 173.198 for nickel carbonyl etc. or they reference paragraph 173.192. Otherwise, 173.40(c) does not apply.

Thank you for your attention to this matter.

Ed Van Schoick  
18213 Bittern Ave  
Lutz, FL. 33558  
813-269-9279  
713-817-8033 cell