



U.S. Department  
of Transportation  
**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue, SE  
Washington, D.C. 20590

MAR 5 2008

Mr. Dave Bailey  
Chief Engineer  
Fort Vale Engineering Ltd  
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UK BB9 0SG

Ref. No. 07-0147

Dear Mr. Bailey:

This is in response to your email on July 20, 2007 regarding the Hazardous Materials Regulations (HMR; 49 CFR 171-180) applicable to shear sections on IM101 and UN portable tanks. Your questions are summarized and answered as follows

**Q1. You understand that the shear section or sacrificial device on UN portable tanks must break at no more than 70% of the load that would cause failure to the internal self closing stop valve in accordance with § 178.274(e)(1) . You ask if the removal of 30% of the wall section would result in a 70% stress reduction? If so, would this also satisfy the portable tank shear section requirement in § 178.270-12(d)?**

**A1. Reduction of the wall section by 30% may satisfy the 70% stress requirement specified in § 178.274(e)(1) provided an analysis of the shear section strength and expected performance shows that the shear section would break at no more than 70% of the load that would cause failure to the internal self closing stop valve. Section 178.270-12(d) requires a shear section to be located outboard of each internal discharge valve seat and within 10.2cm (4 inches) of the vessel. The shear section must break under strain without affecting the product retention capabilities of the tank and any attachments. It is the manufacturer's responsibility to perform an analysis of the shear section design, dimensions, and expected performance to determine the orientation of the shear section installation required to meet the minimum requirements of §§ 178.274(e)(1) and 178.270-12(d).**

**Q2. As far as you can determine the only shear section calculation available is TTMA RP 86-98, "Emergency Valve Shear Section Strength Calculation". Is the use of the TTMA RP 86-98 calculation considered the best practice for calculating the valve shear section strength for portable tanks?**

**A2. The HMR requirement applicable to portable tank shear sections is a performance standard. Under the HMR, various methods of analysis or test may be used to evaluate the expected**

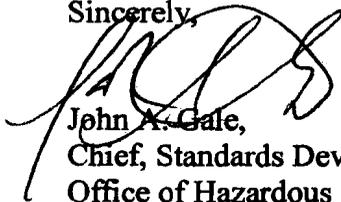
strength and performance of the shear section relative to the strength of internal self closing stop valve, and their configuration on the tank. The HMR do not specifically reference the TTMA RP 86-98 shear section strength calculation. However, it is the opinion of this office that the TTMA RP 86-98 shear section strength calculation is an acceptable method for calculating the expected performance of a shear section for compliance with the HMR.

Q3. In a Safety Advisory Notice (62 FR 37638), PHMSA clarified that internal discharge valves and shear sections are safety devices required on the bottom-outlets of IM portable tanks in hazardous material service to prevent significant release of lading when damage is sustained at the filling/discharge connection. You ask for confirmation that the performance standard does in fact allow for some leakage of the tanks lading, and that the groove is intended to protect the tank.

A3. Provided the shear section or sacrificial device breaks at no more than 70% of the load that would cause failure of the internal self closing stop valve, some leakage of lading may occur. The shear section is intended to protect the tank from catastrophic failure when damage to the filling/discharge connection is sustained.

I hope this satisfies your inquiry. If we can be of further assistance, please contact us.

Sincerely,



John A. Gale,  
Chief, Standards Development  
Office of Hazardous Materials Standards

Eichenlaub  
 § 173.32  
 § 178.270-12 (d)  
 § 178.274  
 Portable Tanks  
 07-0147

**Drakeford, Carolyn <PHMSA>**

**From:** Mazzullo, Ed <PHMSA>  
**Sent:** Monday, July 23, 2007 8:37 AM  
**To:** Drakeford, Carolyn <PHMSA>  
**Cc:** Hochman, Charles <PHMSA>; Betts, Charles <PHMSA>; Gale, John <PHMSA>; Gorsky, Susan <PHMSA>; Mazzullo, Ed <PHMSA>; Mitchell, Hattie <PHMSA>  
**Subject:** FW: shear grooves

**From:** Dave Bailey [mailto:dbailey@fortvale.com]  
**Sent:** Friday, July 20, 2007 2:51 PM  
**To:** Mazzullo, Ed <PHMSA>  
**Subject:** shear grooves

Dear Ed

I have been given your contact details by Charles Hochman with regards to the expectations of the DOT with respect to the design and function of shear sections for IM101 and UN portable tanks chapters CFR 49 chapters 178.270-12 (d) and 178.274 (e) (1) respectively.

My first question relates to the design of the shear sections. From discussions with Charles Hochman I understand that the 70 stress requirement for failure notated in 178.274 (e) (1) originates from the DOT 407 road tanks sections 178.345-1 (a) 178.345-8 (a) (4) a extract from these paragraphs regarding the shear section is below

" Shear section means a sacrificial device fabricated in such a manner as to abruptly reduce the wall thickness of the adjacent piping or valve material by at least 30 percent."

Charles intimated that the removal of 30% of the valve body wall section would be sufficient. Can you confirm then in simple terms that the removal the 30% wall section would result in the 70% stress reduction and therefore the groove would conform to the 178.270-12 (d) and 178.274 (e) (1)

As far as we can determine the only shear section calculation available is. TTMA RP 86-98 "Emergency Valve Shear Section Strength Calculation".

In lieu of any alternative methods other than the wall reduction above we have used the TTMA RP 86-98 calculation to determine the 70% shear stress reduction. Would you regard the use of this calculation as the best practice to calculate the valve shear section?

My second area is regarding the shear groove performance

I would like to understand the DOT's expected and accepted performance of the shear grooves. Below is a extract from the DOT in which a realistic view of some leakage may occur and that the groove is to protect the tank.

I would like to have conformation that this is the acceptance criteria used by DOT

[Federal Register: August 1, 1997 (Volume 62, Number 148)]

8/1/2007

[Notices]

[Page 41481-41482]

From the Federal Register Online via GPO Access [wais.access.gpo.gov]

[DOCID:fr01au97-164]

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DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

[Notice 97-6]

*Safety Advisory: Certified IM 101 and IM 102 Steel Portable Tanks  
With Bottom Outlets Without Internal Discharge Valves or Shear Sections*

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Safety advisory notice; correction.

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SUMMARY: RSPA published a safety advisory notice in the Federal Register (62 FR 37638) under notice 97-6 on July 14, 1997. The words "capable of being closed from a location" were inadvertently omitted in the advisory notice for material quoted from 49 CFR 173.32c(g)(2). This document corrects this error and, for the convenience of readers, reprints the text of the July 14, 1997 notice in its entirety, as follows:

*This is to notify owners and users of DOT specification IM 101 and IM 102 portable tanks with filling or discharge connections below the normal liquid level that these tanks may be used for shipping hazardous materials only if they have internal discharge valves and shear sections. Internal discharge valves and shear sections are safety devices required on the bottom-outlets of IM portable tanks in hazardous material service to prevent significant release of lading when damage is sustained at the filling/discharge connection. Without those safety features, damage to a bottom outlet is far more likely to result in loss of a tank's entire lading.*

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8/1/2007

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