

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the
Working Party on the Transport of Dangerous Goods

Geneva, 15-19 September 2008
Item 2 of the provisional agenda

TANKS

Instant-closing internal safety device

Transmitted by the European Liquefied Petroleum Gas Association (AEGPL)
(reproduced as transmitted)

SUMMARY

Executive summary: At the request of the March 2008 Joint Meeting, an informal ad hoc ADR Working Group Meeting was managed by AEGPL in June 2008 in Brussels in order to examine paragraph 6.8.3.2.3 of RID / ADR regarding non-return valves.

Action to be taken: Amend 6.8.2.3.2.

Related documents: ECE-TRANS-WP15-AC1-07-BE-inf16e (Belgium)
ECE-TRANS-WP15-AC1-08-BE-inf33e (AEGPL)

Background

In March 2007, the Joint Meeting decided to amend paragraph 6.8.2.3.2 regarding the use of non-return valves in pipes used for filling and discharging tank-vehicles (ECE-TRANS-WP15-AC1-07-BE-inf16e).

As many existing tank-vehicles do not conform to this new requirement but have nevertheless proven to be safe, AEGPL proposed at a Joint Meeting in March 2008 that these vehicles be allowed to remain in service provided they are maintained in accordance with the required safety levels (ECE-TRANS-WP15-AC1-08-BE-inf33e of AEGPL). At the request of the Tank Working Group, the Joint Meeting (resolution n° 8) decided to hold an informal ad hoc ADR Working Group Meeting (WG Meeting) in order to:

- examine paragraph 6.8.3.2.3 of RID / ADR regarding non-return valves,

- make a new proposal for the September 2008 Joint Meeting Session.

Ad hoc Working Group Meeting

The WG Meeting was managed by AEGPL in Brussels on 6 June 2008 (9:00 – 15:30).

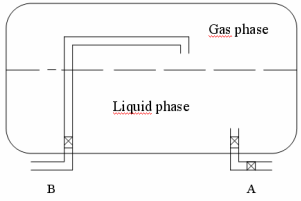
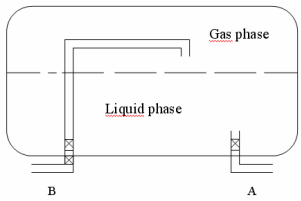
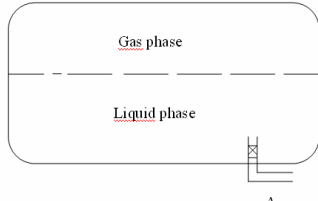
The following participants attended the meeting (see annex 1):

- Wilhelm-August Buckermann (Deutscher Verband Flüssiggas e. V.),
- Paul De Hertefelt (APRAGAZ),
- Kees de Putter (Vehicle Standards Development),
- Daniel Geudin (GARDNER DENVER),
- Jörg Ludwig (Federal Institute for Materials Research and Testing),
- Claude Monin (AEGPL),
- Henryk Ognik (Ministry of Transport),
- Helmut Rein (Federal Ministry of Transport, Building and Urban Affairs),
- Patrick Segarra (AEGPL)
- Arlette Seywert (CARCOSERCO – CLCCR),
- René Suray (AEGPL - FEBUPRO),
- Marc Tondeur (APRAGAZ),
- René Waerzeggers (FOD Mobiliteit en Vervoer),
- Andreas Wursig (BAM).

Participants appointed Jörg Ludwig as Chairman.

Three documents were prepared by AEGPL Members before the WG meeting and circulated to participants (See annexes 2, 3 and 4).

During the meeting, 3 options regarding the foot valves and the non return valves were considered:

Option 1	Option 2	Option 3
1 foot valve in liquid phase (A) 1 foot valve in gas phase (B)	1 foot valve in liquid phase (A) 1 non return valve in gas phase (B)	1 foot valve in liquid phase (A)
		

In the view of participants, paragraph 6.8.2.3.2 does not allow non return valves or bottom valves. The objective of the WG was therefore to find a solution for the future. A discussion on the use and conformity of these 2 devices was held on the basis of the 3 documents and in the configuration of option 2.

As a result, the participants proposed to modify 6.8.3.2.3 (see formulation below).

An additional week was given to participants to allow for editorial changes and slight modification, by emails. 1 alternative proposal was issued and amended by 3 different modifications (see annex 5), but none of these proposals was supported.

Ad hoc Working Group Proposal

The participants of the WG proposed unanimously the following wording (modification in bold character):

The internal stop valve of all filling and **all** discharge openings of tanks with a capacity greater than 1 m³, intended for the carriage of liquefied flammable and/or toxic gases shall be instant-closing and shall close automatically in the event of an unintended movement of the tank or in the event of fire. It shall also be possible to operate the **internal stop valve** by remote control.

However, on tanks used for the transport of liquefied flammable gases, the internal stop valve may be replaced with an internal spring loaded non return valve (equipped with an appropriate sealing ^()) for filling openings into the vapour phase of the tank.*

Foot note: ^() not allowed the use of metal to metal sealing.*

Annexes:

- 1. Attendance list
- 2. Working document of Germany
- 3. Working document of the UK (1)
- 4. Working document of the UK (2)
- 5. Alternative proposals

Annex 1: Attendance list

Non Return Valve Meeting
6 June 2008
AEGPL
Brussels

Attendance list

Name	Signature
W.A. Buckermann	
P. De Hertefelt	
K. de Putter	
D. Geudin	
J. Ludwig	
C. Monin	
H. Ognik	
H. Rein	
P. Segarra	
A. Seywert	
R. Suray	
M. Tondeur	
R. Waerzeggers	
A. Wursig	

Annex 2: working document of Germany

SUMMARY	
Executive summary:	The prohibition of the use of a non-return valve as an instant-closing internal safety device in a filling pipe is, for safety reasons, considered to be without grounding and contradictory to the long-standing codes of approval practice in many countries.
Action to be taken:	Amendment of paragraph 6.8.3.2.3.
Related documents:	INF.16 from March 07; minutes of Joint Meetings held on March 07, September 07 and March 08.

Proposal

New text is in bold characters:

*“6.8.3.2.3 **All filling and all discharge openings of tanks with a capacity greater than 1 m³ intended for the carriage of liquefied flammable and/or toxic gases shall be equipped with an instant-closing internal safety device which closes automatically in the event of an unintended movement of the shell or of fire and therefore prevents a product leaving the tank. If the closing devices are provided with facilities for opening. It shall also be possible to operate the closing device by remote control.**”*

Introduction

In many ADR states, where road tank-vehicles are used as distribution vehicles, the filling of these tanks is carried out using pipes that lead to the gas phase. This method, using a separate pipe for filling and a non-return valve as an instant-closing internal safety device, was introduced more than 30 years ago and has performed well in practice ever since.

Justification

This method of filling has clear advantages with respect to pressure load during filling and also because it avoids the necessity of vapour return.

A comparison to technical procedures where filling is carried out either via a bottom valve (liquid phase) or via a separate pipe with a non-return valve produced the following results: with the bottom valve, the spring-loaded internal closing device is opened via a control device and is consequently held open by both the filling pressure and the control device. In the event of unintended movement of the tank, in case of fire or any other unforeseen incident, the control device must first of all be deactivated, either manually or, in the case of fire, via a safety fusible element. Only then, can the bottom valve's spring pressure ensure that the tank is safely sealed. In any case, the bottom valve remains open as long as the pressure in the filling pipe is greater than the spring's reset force. Activating the control device can only close the tank when there is little or no persisting filling pressure.

With a non-return valve, the internal seal is only opened by the pressure in the filling pipe that has surmounted the spring pressure and internal tank pressure. The tank is sealed securely when, similar to a bottom valve, the filling pressure is lower than the internal pressure and the spring load. A control device is rendered unnecessary, since its main function is to open the internal seal for discharging.

In both cases, and regardless of the valves used, the necessary closing of the valves is only achieved when the filling pressure is lower than the internal tank pressure. Since all valves are spring-loaded and because the filling pressure normally exceeds the spring pressure, the valves are held open by force and gas is filled into the tank until the pressure is released.

As long as it corresponds to commonly used bottom valves in terms of the spring's reset force, a "non-return valve" as an internal shut-off device in the filling pipe is, for these reasons, an equivalent solution.

Attached is a description of the most commonly used valves.

Safety

Same safety level or even higher.

Feasibility

Avoiding problems in retrofitting existing tanks; continuing current practices.

Annex 3: working document of the UK (1)

SUMMARY

Executive summary: Many different methods are employed to ensure that Road Tankers cannot be moved with transfer hoses connected and their valves open but very few are equipped with a device that will close the valves if the tanker was moved with its brakes still applied. As far as LPG is concerned, EN 12252 requires a number of measures that ensures an equal or better level of safety than is required by ADR Clause 6.8.3.2.3.

Action to be taken: Delete or amend paragraph 6.8.3.2.3.

Related documents: INF.16 from March 07; minutes of Joint Meetings held on March 07, September 07 and March 08.

Proposal 1

Delete 6.8.3.2.3.

Proposal 2

Modify 6.8.3.2.3, with the proposed additional wording in bold characters:

“6.8.3.2.3 All filling and all discharge openings of tanks with a capacity greater than 1 m³ intended for the carriage of liquefied flammable and/or toxic gases shall be equipped with an instant-closing internal safety device which closes automatically in the event of an unintended movement of the shell or fire. It shall also be possible to operate the closing device by remote control or shall comply with the requirements of EN 12252 (clauses 6.1.3, 10.1 and 10.2).”

Justification

The above clause was introduced into ADR from RID, however there are considerable differences in the operation of Road and Rail Tankers, plus their braking systems.

Rail tankers load and unload in fixed facilities, in many cases several tankers are loaded or unloaded simultaneously.

LPG tankers are loaded in fixed facilities, but very few are unloaded in this way. Most are engaged in the distribution to end users, with deliveries being made at domestic premises and industrial sites.

The parking brakes on modern road tankers are applied by springs (in each brake unit), with air being used to release the brakes, this gives a fail-safe system.

Within the ADR States many different methods are employed to ensure that Road Tankers cannot be moved with transfer hoses connected and their valves open, but very few are equipped with a device that will close the valves if the tanker was moved with its brakes still applied.

Where fixed loading and unloading facilities are used it is relatively easy to employ an automatic shut-down system to stop the product transfer and to close the valves if the tanker moves. However this is not easy or practical to achieve with tankers that are being used for distribution to end users, with many deliveries being made from public roadways.

EN 12252 requires a number of measures that ensures an equal or better level of safety than is required by ADR Clause 6.8.3.2.3 .

6.1.3.1 All connections to the tank in excess of 1.5 mm diameter, other than those for pressure relief valves those fitted with blank flanges or plugs, shall incorporate a primary shut-off system.

6.1.3.2 The primary shut-off system shall be of a design intended to limit the release of the tank's content in the event of external damage.

6.1.3.3 The primary shut-off system required depends upon the purpose of the tank connection as follows:

a) Discharge/filling to liquid phase:

A normally closed internal shut-off valve opened by hydraulic, pneumatic or mechanical power from the road tanker. The valve shall be designed for rapid closure on command (see 10.2). The system shall incorporate a thermally sensitive device or other means that will ensure positive closure in the event of a fire and shall incorporate an excess flow valve facility.

b) Filling to vapour phase:

The road tanker filling connection shall be provided with:

- A non return valve or a series of non-return valves in combination with a manual shut-off valve, or
- A normally closed internal shut-off valve opened by hydraulic, pneumatic or mechanical power from the road tanker along with an anti-drive-away system/emergency shut-down system.

6.1.3.4 In the liquid discharge line at least one hand operated or remotely operated valve shall be positioned as close as reasonable to the tank outlet after the internal shut-off valve.

6.1.3.5 The remotely operated shut-off valves shall be in the closed position during transport.

10.1.1 A system shall be provided which will prevent the road tanker from being driven away while any of the following conditions apply:

- a) The LPG pump is running;
- b) The liquid discharge internal shut-off valve is open;
- c) The master switch is isolated.

10.1.2 Road-tankers for customer deliveries (*distribution*) shall be equipped with an interlock, which ensures that the discharge hose is fully retracted before the road-tanker can be moved.

- a) Remote shut-off activated by radio (see 10.2);
- b) Emergency Shut-Down system (ESD) or drive away protection, activated by opening of the valve cabinet door;
- c) Acoustic alarm, initiated when the driver attempts to drive away while the LPG pump is still running or the hose is not fully retracted;
- d) An interlock that ensures that delivery hoses are disconnected and made secure before the road tanker is driven.

10.2 The LPG equipment of the road tanker shall include an ESD system initiated by a minimum of two manual devices located at convenient positions on the road tanker and adequately labelled to indicate their use, or one manual device located on the road tanker combined with either:

- a rip cord (emergency cord) laid down on the ground beside the LPG road tanker during filling and discharge or
- remote systems.

The ESD system shall immediately initiate the shut-down of the discharge pump and the primary shut-off valve on the tank.

The only protection that the above does not provide is the automatic valve closure if the tanker is moved by another vehicle running into it, but the additional requirements of EN 12252 and the length of hose used for transfer operations ensure safety is not compromised.

Annex 4: working document of the UK (2)

ADR was created from RID and includes within it some things that were never actually appropriate for road transport or implemented for road transport. One of these is the fitting of a valve which closes if the road tanker moves - this is not fitted and never has been fitted, but is present on all rail tank wagons. Its justification for rail tank wagons is clear - a wire from the footvalve of a European tank wagon is clamped to the rail track. If the wagon is accidentally shunted while the valve is open, the wire pulls the valve closed. Hence the question is not, whether this should be replaced with a non-return valve, it is whether we should remove the requirement completely.

A modern truck will not move unless somebody gets in and drives it - somewhat different from the rail wagon situation. Many modern trucks have a system that prevents even this situation by interlocking the opening of the valve and control cabinet door with the truck brakes, so they can not be released while the door is open and a hose connected. Other modern trucks have remote radio controlled operation of valve and pump to enable complete emergency shutdown by the operator in any emergency and the device is polled for operator response, so that if he does not press a button when a sound is generated, the operation shuts down.

As the foot-valve on a road tanker may be used for both withdrawal and filling, a non-return valve will not fulfill a purpose as it only allows one-way flow. If separate filling and withdrawal lines existed then two non-return valves would be satisfactory.

In my view the simple solution is to align with actual practice and remove the clause completely.

Annex 5: Alternative proposals

Alternative proposal n° 1 (K. de Putter)

However, on tanks used for the transport of liquefied flammable gases, the internal stop valve with remote control may be replaced by a non return valve for filling openings into the vapor phase of the tank only. The non return valve shall be positioned internally in the tank, be spring loaded so that the valve is closed if the pressure in the filling line is [2] bar or lower than the tankpressure and be equipped with an appropriate sealing^().*

Alternative proposal n° 2 (W. Buckermann)

However, on tanks used for the transport of liquefied flammable gases, the internal stop valve may be replaced with an internal spring loaded appropriate non return valve (equipped with an appropriate sealing ^()) for filling openings into the vapor phase of the tank.*

Alternative proposal n° 3 (H. Rein)

However, on tanks used for the transport of liquefied flammable gases, the internal stop valve with remote control may be replaced by a non return valve for filling openings into the vapor phase of the tank only. The non return valve shall be positioned internally in the tank, be spring loaded so that the valve is closed if the pressure in the filling line is [2] bar or lower and be equipped with an appropriate sealing ^().*

Alternative proposal n° 4 (R. Suray)

However, on tanks used for the transport of liquefied flammable gases, the internal remote controlled stop valve, placed in the loading line ending into the vapour phase of the tank, may be replaced by an internal spring loaded non return valve (equipped with an appropriate sealing) ^().*

Alternative proposal n° 5 (K. de Putter)
[ADR only]

However on tanks used for the transport of liquefied flammable gases, the internal stop valve with remote control may be replaced by a non return valve for filling openings into the vapour phase of the tank only. The non return valve shall be positioned internally in the tank, be spring loaded [so that the valve is closed if the pressure in the filling line is equal or lower than the tank pressure] and be equipped with an appropriate sealing ^().*

Comments on the 1st alternative *[ADR only]*: the situation for moving the tank is quite different between rail tank wagons and road tankers. It was more likely that rail tank wagons accidentally were moved (shunted). From this point of view not allowing for rail tank wagons may be necessary. Another thing is the interchangeability when loading the tank wagon. Tank wagons are more internationally used than LPG road tankers. It is the question if internationally loaders would like to see alternative loading procedures.

Comments on the 2nd alternative *[so that...pressure]*: the point of this text is to make sure that the use of excess flow valves is impossible for this application as first closure. The difference is the pressure in relation to the tank and piping when they will be closed.
