P-1609

Jeffrey M. Sims • President
Truck Trailer Manufacturers Association • 1020 Princess Street • Alexandria VA 22314-2247 • 703-549-3010 • Fax 703-831-8794

November 28, 2012

Cynthia L. Quarterman - Administrator

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, DC 20590

Dear Administrator Quarterman;

The Truck Trailer Manufacturers Association (TTMA) is an international trade association representing approximately 90% of the trailers manufactured in the United States. We would like to offer this petition to change the regulations as currently written for bench testing reclosing pressure relief devices.

Current Situation:

Under 49CFR§180.407 – *"Requirements for test and inspection of specification cargo tanks"* DOT specification cargo tanks are required to have their Reclosing Pressure Relief Devices (PRDs hence forth) periodically inspected and tested. The test requirements are laid out in §180.407(d)(3):

> *(3) All reclosing pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation. All reclosing pressure relief valves on cargo tanks carrying lading corrosive to the valve must be removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve required to be removed and tested must open at no less than the required set pressure and no more than 110 percent of the required set pressure, and must reseat to a leak-tight condition at no less than 90 percent of the start-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification.*

And also in §180.407(g)(1)(ii):

> *(ii) All self-closing pressure relief valves, including emergency relief vents and normal vents, must be removed from the cargo tank for inspection and testing.*
>
> *(A) Each self-closing pressure relief valve that is an emergency relief vent must open at no less than the required set pressure and no more than 110 percent of the required set pressure, and must reseat to a leak-tight condition at no less than 90 percent of the start-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification.*
>
> *(B) Normal vents (1 psig vents) must be tested according to the testing criteria established by the valve manufacturer.*

(C) Self-closing pressure relief devices not tested or failing the tests in this paragraph (g)(1)(ii) must be repaired or replaced.

The purpose of these requirements seems to be to ensure that PRDs on DOT specification cargo tanks in service continue to perform as needed to ensure the safety of the package, a purpose that TTMA is fully supportive of. Unfortunately, the wording of these sections creates a number of problems that we would like to address.

Problems:

1) Set-to-discharge versus start-to-discharge: In 2009, as a part of Docket No. PHMSA-2006-25910 (HM-218E), in an attempt to harmonize language, the term "set-to-discharge" was removed and "start-to-discharge" was substituted (see 74 Federal Register, April 9, 2009, p. 16138). The discharge pressure referenced is used to figure the minimum pressure at which the PRD should reseat. By changing to "start" from "set", the reseating pressure seems to have been changed from a design requirement, set by the requirements of the specification and design of the tank, to one based on what a given vent actually does under test.

This creates undue complication to the PRD test procedure and lends nothing toward ensuring that the PRD is properly functioning. Instead of testing a given PRD knowing its reseating requirements, operators must perform the test of a given PRD, calculate the reseating requirement from the value they tested and then retest. It makes no sense to require that a given PRD that tests 1% higher in discharge pressure have to have a 1% higher reseating pressure than a comparable PRD when they will both be then authorized for identical hazardous service, sometimes on the same cargo tank motor vehicle with the identical product beneath it. In fact, we believe that by making the reseating pressure less obvious, safety is compromised as it is more likely that this critical check will be performed in error.

2) "The required set pressure": This term is used in the requirements without explanation. For current specification cargo tanks, this isn't much of a problem, as the operator can refer to the requirements for set pressure as laid out in the current code such as §178.346-3(c) for PRDs on DOT 406 cargo tanks. However, the code allows for continuing operation of existing cargo tanks made to older specifications in §180.405(c) and a great many older cargo tanks continue in service. The sections of the code for these older cargo tanks are no longer published, so determining "the required set pressure" is problematic. Once again there is room for confusion and misinterpretation that may cause this critical safety check to be performed in error.

Even for current specification cargo tanks, there is room for confusion with the "110 percent" allowance in §180.407 sections and the same 10% allowance for DOT 400 cargo tanks laid out in §178.345-10(d) {given as 120% to 132% of MAWP}. Indeed, a FMCSA document has come to our attention that mistakenly guides inspectors to look for a start to discharge pressure for a 35 psi DOT 407 tank as a minimum of 42 psi (the lowest value given for required set pressure, 120% of MAWP) and a maximum of 50.8 psi (the top end of the test allowance combined with the top end of the allowable set pressure, 110% of 132% of MAWP). This view of the code will create an unsafe condition for that tank, as a PRD at the top end is no longer functioning as designed by the manufacturer and is only beginning to open very near the cargo tanks test pressure (52.5 psig for a 35 psi DOT 407).

That FMCSA should find a need to produce this clarifying document points to the lack of transparency to the code as currently written. That the document seems to allow unsafe PRDs to be passed as functioning is doubly troubling as the requirements need proper enforcement to be able to ensure safety.

Proposed Solution:

The intent is to clarify the existing requirements for testing reclosing pressure relief devices (PRDs) and simplify the language to facilitate the best possible testing and enforcement of the code. Provision is made for the vast majority of specification cargo tanks and PRDs in service, while retaining language to account for very old specifications still in service with allowance for "pressure prescribed for the applicable cargo tank specification" that is in the current language.

The additional detail in the proposed regulation would drive the paragraph levels too deep if kept in the original level 1 paragraphs. Also, the current structure of the regulation requires duplication of requirements. We are petitioning to replace the current PRD test requirements in §§180.407(d)(3) and 180.407(g)(1)(ii) with a pointer to a new paragraph 180.407(j) which would detail PRD test requirements.

With the proposed regulation, testers working on a given tank, knowing its specification, MAWP and the type of vents mounted would be able to know what the requirements for opening and reseating pressures when beginning the test. Enforcement will have an easier to interpret set of requirements for PRDs. Safety will be enhanced by more checks of PRDs being done in a more consistent manner.

§180.407 Requirements for test and inspection of specification cargo tanks.

* * * * *

(d) * * *

(3) All reclosing pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation. All reclosing pressure relief valves on cargo tanks carrying lading corrosive to the valve must be removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve required to be removed and tested must be tested according to the requirements set forth in §180.407(j).

* * * * *

(g) * * *

(1) * * *

(ii) All self-closing pressure relief valves, including emergency relief vents and normal vents, must be removed from the cargo tank for inspection and testing according to the requirements set forth in §180.407(j).

* * * * *

(j)*Pressure Vent Bench Test.* When required by this section, pressure relief valves must be tested for proper function as follows:

(1) Each self-closing pressure relief valve that is an emergency relief vent must open and reseat to a leak-tight condition at the pressures prescribed for the applicable cargo tank specification or at the following pressures:

(i) For MC 306 cargo tanks:

(A) With MC 306 reclosing pressure relief valves: must open at not less than 3psi and not more than 4.4 psi and must reseat to a leak tight-condition at no less than 2.7 psi.

(B) With reclosing pressure relief valves modified as provided in 180.405(c) to conform with DOT 406 specifications: according to the pressures set forth for a DOT 406 cargo tank in 178.346 of this subchapter.

(ii) For MC 307 cargo tanks:

(A) With MC 307 reclosing pressure relief valves: must open at not less than the cargo tank MAWP and not more than 110% of the cargo tank MAWP and must reseat to a leak tight-condition at no less than 90% of the cargo tank MAWP.

(B) With reclosing pressure relief valves modified as provided in 180.405(c) to conform with DOT 407 specifications: according to the pressures set forth for a DOT 407 cargo tank in 178.347 of this subchapter.

(iii) For MC 312 cargo tanks:

(A) With MC 312 reclosing pressure relief valves: must open at not less than the cargo tank MAWP and not more than 110% of the cargo tank MAWP and must reseat to a leak tight-condition at no less than 90% of the cargo tank MAWP.

(B) With reclosing pressure relief valves modified as provided in 180.405(c) to conform with DOT 412 specifications: according to the pressures set forth for a DOT 412 cargo tank in 178.348 of this subchapter.

(iv) For MC 330 or MC 331 Cargo Tanks: must open at not less than the required set pressure and not more than 110% of the required set pressure and must reseat to a leak-tight condition at no less than 90% of the required set pressure.

(v) For DOT 400-series cargo tanks: according to the pressures set forth for the applicable cargo tank in 178.345 of this subchapter.

(vi) For cargo tanks not specified in this paragraph: must open at not less than the required set pressure and not more than 110% of the required set pressure and must reseat to a leak-tight condition at no less than 90% of the required set pressure or the pressure prescribed for the applicable cargo tank specification.

(2) Normal vents (1 psig vents) must be tested according to the testing criteria established by the valve manufacturer.

(3) Self-closing pressure relief devices not tested or failing the tests in this paragraph (j)(1) must be repaired or replaced.

* * * * *

Notes:

MC306 Notes: the requirements for this specification required that pressure vents open at no less than 3 psi and protect the tank by flowing at 5 psi. Vent manufacturer typically accomplished this by setting the vents at 4 psi. Properly functioning vents should test opening at no less than 3 psi (as per the original requirement) and no more than 4.4 psi (110% of the original set pressure). Properly functioning vents should reseat to a leak-tight condition at 2.7 psi (90% of the required set pressure)

MC307 & MC 312 Notes: the requirements for these specifications required that pressure vents open at no less than the tank MAWP. Properly functioning vents should test opening at no less than the tanks MAWP (as per the original requirement) and no more than 110% of the MAWP (110% of the original set pressure). Properly functioning vents should reseat to a leak-tight condition at 90% of the MAWP (90% of the required set pressure).

§180.405(c) Notes: Many of MC 306, 307 & 312 tanks still in service have had their vents upgraded to the applicable DOT 400-series vent as provided for in this provision. This provides room for confusion as the set pressure requirements of a properly functioning DOT 400-series pressure relief device is different from the requirements for the original MC 300-series specification pressure relief device. Properly functioning upgraded pressure relief devices should open and reseat according to the levels for the applicable DOT 400-series requirement.

MC 330 & MC 331 Notes: As the last changes to this part of the regulation were made with these tanks in mind, and the text as written seems to work well for that class of cargo tank, a minimum of change to the existing language was adopted, with the exception of unifying the reseating requirements by the cargo tank's specification rather than relying on the tested value of the PRD.

DOT 400-series Notes: as the current requirements for these tanks are still in print in the code, users are directed to the appropriate section of the current regulation.

All Other Cargo Tank Notes: very few of these tanks are still in operation, however to provide for the eventuality that one is still in operation, without detailing every possible combination of venting and tanks between MC 300, 301, 302, 303, 304, 305, 310 or 311 and all the allowable vents for each specification, a catch-all paragraph with a very general requirement is made. While these cargo tanks will not gain the benefits of the detailed testing description proposed in the rest of the section, there is no loss from the current requirements.

§180.407(j)(2) & (3) Notes: These are carried over from the current version of §180.407(g)(1)(ii)(B) & (C). These requirements were not present for vents tested due to corrosion as currently required under §180.407(d)(3) however in the unlikely event that a tank equipped with a normal vent (1 psig vent) is loaded with a lading corrosive to the valve, good practice should call for it to be inspected and tested as well.

Technical Bulletin Notes:

While we await action on this petition, the Truck Trailer Manufacturers Association felt in necessary to ease the confusion surrounding this issue with a Technical Bulletin to advise testers of the correct way to bench test PRDs. All of the major manufacturers of PRDs who are members of TTMA participated creating this document, which is the unanimous consensus on the subject.

I am enclosing a copy of our *TB No. 126-12 Bench Testing Reclosing Pressure Relief Devices* for your reference.

Thank you for considering this petition. If you have any questions concerning this petition, please do not hesitate to contact me.

Sincerely,

John Freiler
Engineering Manager
Truck Trailer Manufacturers Association

Enclosure: DOT version for BENCH TESTING OF PRESSURE RELIEF DEVICES.pdf
TB 126-12 Bench Testing PRDs.pdf

BENCH TESTING OF PRESSURE RELIEF DEVICES UNDER CFR TITLE 49 PART 180

This document explains the proper thresholds for the bench testing of Pressure Relief Devices (PRDs) that is required under CFR Title 49 Part 180. For the purposes of this document, we will be using the regulations applicable to the DOT 407 cargo tanks and a PRD device that is marked at 35 psig. These calculations must be completed prior to the bench test of the PRD.

Determining Set Pressure

Section 178.345-10(d)(1) establishes the primary pressure relief system requirements. This section specifies that the set pressure for a PRD is a range from no less than 120% of the Maximum Allowable Working Pressure (MAWP) to no more than 132% of the MAWP of the cargo tank.

For our example, the set pressure can range between 42 psig and 46.2 psig.

No less than 120%: 35 psig x 120% = 42 psig
No more than 132%: 35 psig x 132% = 46.2 psig

Determining Open At and Reseat Thresholds

Section 180.407(g)(1)(ii)(A) establishes the thresholds a PRD must meet during the pressure test. It specifies that the PRD must open at no less than the required set pressure and no more than 110% of the required set pressure.

PRD Open at Calculation

In our example, we determined that the set pressure was between 42 and 46.2 psig. The regulations require that the PRD open at no less than the set pressure and no more than 110% of the set pressure.

No less than set pressure = 42 - 46.2 psig
No more than 110% = 46.2 psig (42 x 110%) – 50.8 psig (46.2 x 110%)

So during the bench test the PRD must open at no less than 42 psig and no more than 50.8 psig.

NOTE: it is legal for a tester to use the set pressure range as the threshold for the test. The tester may choose to be more stringent than the regulations require. For example, the tester may choose to use 42-46.2 psig in the example above as the limit for the PRD to open at, instead of allowing for the entire range of 42-50.8 psig.

PRD Reseat Calculation

Section 180.407(g)(1)(ii)(A) requires that the PRD reseats at no less than 90% of the start-to-discharge pressure (or the pressure prescribed for the cargo tank specification).

For our example, the start-to-discharge pressure is a range of 42 psig to 50.8 psig, so the PRD must reseat between 37.8 psig (42 x 90%) and 45.7 (50.8 x 90%). The actual number will not be known until the test is conducted.

Documentation

A bench test of the PRDs is required during the pressure test of a DOT specification cargo tank (Section 180.407(g)(1) and during the external visual inspection when transporting lading corrosive to the tank (Section 180.407(d)(3)). All specification cargo tank tests and inspections must be documented on a report. Section 180.417(b)(2)(iii) requires the report to include "…information about pressure relief devices that are removed, inspected, and tested or replaced, when applicable (type of device, set to discharge pressure, pressure at which device opened, pressure at which device re-seated, and a statement of disposition of the device (e.g., reinstalled, repaired, or replaced))…"

The table below provides the information necessary to determine the set pressure of a PRD for each of the DOT cargo tank specifications.

Specification	Set Pressure		Reference
	No less than:	No more than:	
DOT406	110% MAWP	138% MAWP	178.346-3
DOT407	120% MAWP	132% MAWP	178.345-10(d)(1)
DOT412	120% MAWP	132% MAWP	178.345-10(d)(1)

For the 400 series, once the set pressure is determined, then refer to Section 180.407(g)(1)(ii)(A) to determine at what pressure range the PRD must open and close within.

For MC300 series cargo tanks, each specification identifies the open and close pressures of PRDs.

Specification	PRD must Open at:	PRD must Close at:	Reference
MC306	No less than 3 psig	3 psig or below	178.341-4(d)(2)
MC307	Less than or equal to MAWP	Not identified in specification. Use 180.407(g)(1)(ii)(A)	178.342-4
MC312	Between MAWP and 130% of MAWP	Not identified in specification. Use 180.407(g)(1)(ii)(A)	178.343-4
MC330/331	At least MAWP. Section 180.407(g)(1)(ii)(A) limits it to no more than 110% of MAWP.	Not identified in specification. Use 180.407(g)(1)(ii)(A)	178.337-9(a)(3)
MC338	No lower than 130% and no higher than 150% of MAWP.	Not identified in specification. Use 180.407(g)(1)(ii)(A)	173.318(b)(4)(i)

MC307 and MC312 -- Venting capacity must limit internal pressure to no more than 130% of MAWP

For the BETTS 8” Surge Suppression Relief Valve, the Betts manual states that during the bench test, the cover must move 3/8” before any venting takes place. The manual states that the tester is not to record the pressure at which the cover first moves.

TTMA TECHNICAL BULLETIN

TRUCK TRAILER MANUFACTURERS ASSOCIATION
8506 WELLINGTON RD. / SUITE 101
MANASSAS, VA 20109
(703)549-3010 www.ttmanet.org

TB No. 126 **November 15, 2012**

Title: Bench Testing Reclosing Pressure Relief Devices

Previous Editions: Originally issued November 2012.

1.0 Preface:

1.1 No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system without written permission from the Truck Trailer Manufacturers Association.

1.2 Recommended Practices and Technical Bulletins are furnished by the TTMA as a guide to general practices in the manufacture, use, and repair of truck trailers. However, the scope of the TTMA's Recommended Practices and Technical Bulletins is not exhaustive of all general practices in the manufacture, use, and repair of truck trailers and there may exist such general practices which do not appear in either the Recommended Practices or Technical Bulletins.

1.3 Recommended Practices and Technical Bulletins represent the state-of-the-art that existed at the time of its preparation. Users of Recommended Practices and Technical Bulletins should familiarize themselves with advancements in practices that have occurred subsequent to the Recommended Practice's or Technical Bulletin's publication date.

1.4 The TTMA has not undertaken any evaluation of all the conceivable ways in which Recommended Practices or Technical Bulletins may be used by manufacturers, users, or repairers of truck trailers nor the consequences of such uses. Everyone who uses Recommended Practices or Technical Bulletins must first satisfy himself or herself that his or her safety, the safety of others, or the safety of the truck trailer and any other equipment will not be jeopardized by their use of information contained within the Recommended Practices or Technical Bulletins.

1.5 The Recommended Practices and Technical Bulletins may contain terms or words with specialized meanings. Definitions for such terms or words may be found in TTMA RP No. 36 - Tank Trailer and Tank Container Nomenclature or TTMA RP No. 66 - Trailer Nomenclature.

1.6 Within the Recommended Practices and Technical Bulletins, "shall" is used wherever conformance with the TTMA publication requires that there be no deviation from the specific recommendation. "Should" is used wherever deviation from the specific recommendation is permissible in complying with the TTMA publication.

1.7 Conformity with TTMA publications by manufacturers, users and repairers of truck trailers is voluntary and any non-conformity with such publications is not indicative of the non-conforming practice being deficient.

1.8 Any inclusion of Recommended Practices or Technical Bulletins within any contract, document or standard is voluntary, and any such inclusion shall not imply any endorsement or approval by the TTMA due to the multitude of ways in which the Recommended Practices or Technical Bulletins may conceivably be used.

2.0 Purpose:

This Technical Bulletin provides guidelines for bench testing reclosing pressure relief valves on DOT specification cargo tanks. The equipment described may be modified to test vacuum relief, but doing so is beyond the scope of this technical bulletin.

3.0 Definitions:

Bench Testing: A test to determine function that is performed at a convenient location off the cargo tank that the reclosing pressure relief valve is normally attached to.

Reclosing Pressure Relief Valves: A valve designed to open at a given pressure, relieving that pressure from a tank and reclosing once the pressure drops sufficiently. Also known as Vents, Pressure actuated fills (PAF), Emergency vents.

Pressure Relief Devices: Any device designed to automatically relieve pressure from a tank at a predetermined set of conditions. They include reclosing pressure relief valves and non-reclosing devices such as fusible caps, fusible plugs, and rupture discs.

MAWP: Maximum Allowable Working Pressure of the cargo tank. Stamped on the tank's specification plate. Also known as Design Pressure on 300 series tanks.

4.0 Background:

4.1 Properly functioning pressure relief valves are important to the safe operation of a cargo tank. Single-use pressure relief devices (e.g. fusible caps or rupture discs) cannot be tested for function and are not subject to this Technical Bulletin. Reclosing pressure relief valves (e.g. spring loaded vent or pressure actuated fill, etc.) shall be removed from the cargo tank periodically to verify that the valve is still performing as required.

4.2 During External Visual Inspection and Testing, §180.407(d)(3) states:

(3) All reclosing pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation. All reclosing pressure relief valves on cargo tanks carrying lading corrosive to the valve must be removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve required to be removed and tested must open at no less than the required set pressure and no more than 110 percent of the required set pressure, and must reseat to a leak-tight condition at no less than 90 percent of the start-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification.

4.3 During a Pressure Test, §180.407(g)(1)(ii) states:

(ii) All self-closing pressure relief valves, including emergency relief vents and normal vents, must be removed from the cargo tank for inspection and testing.

(A) Each self-closing pressure relief valve that is an emergency relief vent must open at no less than the required set pressure and no more than 110 percent of the required set pressure, and must reseat to a leak-tight condition at no less than 90 percent of the start-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification.

(B) Normal vents (1 psig vents) must be tested according to the testing criteria established by the valve manufacturer.

(C) Self-closing pressure relief devices not tested or failing the tests in this paragraph (g)(1)(ii) must be repaired or replaced.

5.0 Suitable bench testing equipment.

5.1 A bench testing set-up shall consist of (A) Test Chamber: a small volume or tank to hold air pressure, (B) Mount: means to securely attach the pressure relief valve to the test chamber, and (C) Air Control: means to controllably introduce, measure and exhaust pressurized air into and out of the test chamber.

5.2 Test Chamber: This may be a small air receiver tank, a pipe nipple with one end sealed, a manhole ring welded to blanked plate, or similar volume. The volume enclosed by the tank should be as small as practical in order to reduce the total energy contained in the compressed air for the test as well as to speed testing.

The test chamber should be strong enough to withstand, without deformation or cracking, at least 150% of the highest set-pressure relief valve possibly tested. The vessel shall be protected from seeing pressures in excess of this level by a pop-safety valve or regulating the air inlet, such that if a valve under test fails to open at all and the air inlet is kept open the test chamber will safely contain the pressure.

5.3 Mount: Usually a means of duplicating the mount used to attach the reclosing pressure relief valve to the tank. A threaded nipple or a weld collar & clamp ring are typical examples. The mount shall secure the valve to be tested to the test chamber in such a way that it can withstand the highest possible forces from pressure for which the test chamber is designed. The mount shall also include a means of forming a pressure-tight seal between the test chamber and valve, usually a rubber gasket or the like. The mount should hold the valve to be tested in the same attitude as when it's installed on the tank.

5.4 Air Control:

5.4.1 Location: air control valves, exhaust valves, pop-safety valves and pressure gauges shall be located in such a way as to protect the operator performing the test from dangerous expulsions of air and debris from exhausted air, sudden opening of the tested valve, etc.

5.4.2 Size & Strength: Air control fittings should be as small as practical to provide reasonable air flow into and out of the test chamber. ¼" NPT is typical. All fittings shall be pressure rated at least as much as the test chamber.

5.4.3 Inlet: Shall consist of a valve for controlling compressed air into the test chamber. Air coming in should be regulated to a maximum of the pressure the test chamber was designed for.

5.4.4 Exhaust: Shall consist of a valve that can exhaust the test chamber to atmosphere.

5.4.5 Pressure Gauge: Shall be connected to the test chamber to read the pressure within. Full scale on the gauge should be no more than the pressure the test chamber was designed for. Full scale should also be less than five times the lowest pressure being measured: see 6.4 below. The pressure gauge should be calibrated to verify it is reading true any time it is suspected of reading wrong or at least annually. Example: A test chamber designed to test up to 40 psig valves and thus at least strong enough to withstand 60 psig should have a gauge with a

top reading of no more than 60 psig. That 0-60 psig gauge should not be used to measure opening or reseating less than 12 psig.

6.0 Pre-Test Checks.

6.1 Determine the cargo tank specification (DOT 407, MC 307, etc.) and Maximum Allowable Working Pressure (MAWP) of the cargo tank to which the reclosing pressure relief valve is mounted. Determine the manufacturer and model number for the valve, the stamped set pressure and the specification for which the valve was made.

6.2 The reclosing pressure relief valve shall be removed from the tank and inspected for damage, corrosion or clogging. If the valve is not clean, it shall be cleaned to remove any chemical residue or build-up. Only valves appearing in good order shall be tested. Consult with the valve manufacturer to determine out-of-service conditions for a given valve design.

6.3 The connection between the valve and the tank shall be fully open to the tank with no obstructions or reductions in diameter unless approved in writing by the valve manufacturer.

6.4 Consult the following table to determine allowable opening and reseating pressures.

Tank Specification***	Valve Specification**	Minimum Opening Pressure	Maximum Opening Pressure	Minimum Reseating Pressure
MC 306*	MC 306*	3 psig	4.4 psig	2.7 psig
MC 306*	DOT 406*	3.63 psig	4.55 psig	3.3 psig
MC 307	MC 307	MAWP	110% of MAWP	90% of MAWP
MC 307	DOT 407	120% of MAWP	132% of MAWP	108% of MAWP
MC 312	MC 312	MAWP	110% of MAWP	90% of MAWP
MC 312	DOT 412	120% of MAWP	132% of MAWP	108% of MAWP
DOT 406*	DOT 406*	3.63 psig	4.55 psig	3.3 psig
DOT 407	DOT 407	120% of MAWP	132% of MAWP	108% of MAWP
DOT 412	DOT 412	120% of MAWP	132% of MAWP	108% of MAWP

* Values provided are for a DOT 406 cargo tank with a MAWP of 3.3 psig or a MC306 cargo tank with a MAWP of 3 psig. If the MAWP of the cargo tank being tested does not match these values, consult with the valve or tank manufacturer or a design certifying engineer.

** The code allows in 49CFR§180.405(c)(2) for pressure relief devices and outlet to be modified to newer equivalent specification. Pressure relief valves so modified shall be tested to conform to the new specification.

*** For a tank specs older than these listed (e.g. MC 300, MC 304, etc.): if the outlets have been upgraded as per the note above, test the valve according to the valve's specification. Otherwise consult the valve or tank manufacturer or a design certifying engineer for the appropriate pressures.

7.0 Testing method.

7.1 Mount the reclosing pressure relief valve. Use appropriate gaskets to ensure that there is no leak between the valve and the test chamber.

7.2 Gradually increase the pressure. Open the inlet valve such that the pressure in the test chamber is going up on the pressure gauge at about 20% of full scale every 10 seconds, or approximately as fast as the second hand on a watch. Look and listen for any leaks around the mounting of the valve: if detected, close the inlet valve, open the exhaust valve and adjust the valve's mount as required.

7.3 Detect and note the actual opening pressure. Consult with the valve manufacturer on the level of detection required: some manufacturers use a "start-to-leak" pressure for their vents and will use a leak detection fluid to reveal opening pressure, while most others use a pressure of "continuous flow" as determined by seeing, feeling or hearing. Use the recommended method to detect the actual opening pressure and note it. If the pressure is outside the range allowed as determined in 6.4 above, it must either be repaired or replaced.

7.4 Close the inlet and observe for reseating pressure. Once new air is not being introduced to the test chamber, the valve will continue to allow some air to escape and the pressure to fall. Wait until the gauge is longer falling: this is the reseating pressure. If the reseating pressure is below the minimum reseating pressure as determined in 6.4 above, it must be either repaired or replaced.

7.5 Open the exhaust valve and allow the test chamber pressure to fall to completely. Remove the pressure relief valve.

8.0 Results.

8.1 To report on the test, the following shall be noted: pressure relief valve manufacturer and model number, stamped set pressure, tested opening pressure and tested reseating pressure. Finally note the disposition of the valve: if it failed any of the tests, note that it's either repaired or replaced. Otherwise, note it as OK to remount.

8.2 If the valve needs repair: the valve manufacturer should be contacted for directions on how to repair the valve. Once repaired, the valve should be tested as if it was just removed from the tank to prove the effectiveness of the repair. If the valve cannot be repaired, it shall be replaced.

8.3 If the valve is OK to remount, or a replacement is selected, mount the pressure relief valve on the tank using the appropriate gaskets/seals.