



Marine Safety Information Bulletin

Commandant
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Vapor Pressure Relief Valve Testing on Pneumatic Systems

Due to a mishap from improper testing of a vapor safety relief valve on a compressed air system, the Coast Guard Office of Commercial Vessel Compliance (CG-CVC) reminds all those concerned of the risks and best practices in conducting or witnessing the testing of relief valves. While this information is based on testing compressed air systems using vapor relief valves, the guidance is also relevant to safety valves in other pressure systems, except boilers¹. In summary, Marine Inspectors should be aware of the following:

- 1) A Marine Inspector should not allow removal or alteration of a secondary safety device to facilitate a test of the intended safety device²;
- 2) All systems are different, and the attending Marine Inspector should become familiar with each system and the valve settings *before* testing;
- 3) The attending Marine Inspector is observing the test only, and the appropriate vessel representative should perform all functional tests; and
- 4) The attending Marine Inspector should verify that all relief valves meet the design, installation, and performance criteria in 46 CFR Subchapter F.

Mishap summary: While preparing for a test, the relief valve on the associated compressor was removed because it had a lower set-point than the relief valve on the air receiver being tested. Unfortunately, the isolation valve between the compressor and the air receiver was mistakenly left closed during the test, resulting in a dead-head situation, causing the compressor to rupture, and sending shrapnel throughout the space. Fortunately, no one was injured.

Section 61.10-5(i) of 46 CFR requires checking the settings of safety or relief valves periodically based on Certificate of Inspection (COI) issuance³. The most common way to meet this requirement is witnessing the valve operate under pressure by bench testing (that is, with the valve removed, witnessing a pneumatic pressure test using a test rig in a controlled manner) or in-situ testing (that is, witnessing an operational test of the valve under pressure as installed).

However, if *not* operationally pressure testing the valve, the Marine Inspector should verify the following:

- 1) The valve set-point, as shown on the name plate or other documentation, is set to relieve at a pressure which does not exceed the “maximum allowable working pressure” (MAWP) of the pressure vessel or piping system in accordance with 46 CFR 54.15-10(a);
- 2) There is no apparent defect, deterioration, or damage of the valve;
- 3) The valve is of the proper type (for example, vapor type valves for vapor systems); and,
- 4) The hand relief mechanism is exercised by an appropriate vessel representative to ensure the valve functions.

If a pressure test is called for, Marine Inspectors may require bench testing if performing an in-situ pressure test is considered unsafe or as otherwise agreed to by the vessel representative. Requiring a bench test in lieu of in-situ test should be determined on a case-by-case basis and should not be required as a blanket policy. Instead, the risks and any mitigating factors should be considered when deciding on the type of test. Nonetheless, the Marine Inspector shall communicate with the vessel and company representative well ahead of the inspection to prepare for all contingencies (for example, the ability to remove and bench test valves or install new valves if determined necessary during the inspection). Valves undergoing bench testing should be witnessed by a Marine Inspector, class surveyor or performed at a testing

¹ This MSIB does not apply to testing boiler safety valves which require gagging in order to properly test; see VVNCOE MI Notice 01-13, dated June 3, 2013.

² Should not remove, isolate, or gag a relief valve or alter a system that disables a safety device - except for adjusting the set-point of a compressor limit switch.

³ Or any time a valve is suspect because of apparent deterioration, damage, defect, lack of recent testing, or unsuitability, the valve should be tested or replaced.

facility acceptable to the OCMI (for example, facility accredited as a Testing Organization by the National Board of Boiler and Pressure Vessel Inspectors).

Marine Inspectors should adhere to the following best practices when witnessing an in-situ pressure test:

- 1) Never directly assist or conduct a test, only witness the test conducted by an appropriate vessel or company representative.
- 2) Refrain from providing specific instructions on how to carry out the test, but stop any test if a safety concern is apparent (for example, the test is not proceeding as planned, pressure exceeds MAWP of the pressure vessel, or the person conducting or supervising the test is unfamiliar with the equipment or testing procedure).
- 3) Ensure use of proper personal protective equipment (PPE) including eye protection, hardhats, and hearing protection and understand the test procedure and associated risks (for example, what equipment will be in use, direction of the vapor when discharging from the relief valve, and any alterations of the system to facilitate a test).
- 4) Ensure the person in-charge of the test (either conducting or directly supervising) is a properly credentialed engineer⁴ who is familiar with the equipment and test procedure.
- 5) Prior to witnessing a test, the lead Marine Inspector⁵ should initiate a discussion and walkthrough, as appropriate, with all persons involved (e.g., vessel and company personnel, other marine inspectors, trainees, class surveyors, 3rd party technicians, etc) and address any concerns prior to commencing the test. In many cases, testing of multiple relief valves will occur sequentially with isolation valve arrangements changing between tests. In these cases, a single discussion and system trace is appropriate, but the person in-charge of the test should have a clear understanding of the testing sequence, including valve re-alignments, and explain this to the lead Marine Inspector. As part of this discussion and walkthrough, the following should be conducted:
 - a. Review the test procedures⁶,
 - b. Determine what gauge⁷ will be referenced during the test,
 - c. Understand the expected sequence of events including when to abort a test if the correct outcome is not achieved or a safety concern becomes apparent (for example, pressure exceeds valve set-point range limit, the vapor or fluid is not flowing as intended, a leak is evident, or the MAWP of the pressure vessel or piping is exceeded prior to the relief valve actuating).
 - d. Decide how to communicate during the test taking into account noise level and location of equipment.
 - e. Witness the person in-charge of the test align and trace⁸ the system, from compressor to pressure vessel, immediately prior to the test, so that the system remains unchanged, and verify the following:
 - (1) all valves are properly aligned,
 - (2) the discharge from the relief valve will not create an unsafe condition,
 - (3) the relief valve is of the proper type,
 - (4) the hand relief mechanism is exercised to ensure the valve can open, and
 - (5) there are no apparent damage, deterioration, or defects within the system or individual components.

OCMIs should review unit specific procedures for conformance with this MSIB and review authorized marine inspectors witnessing these tests (for example, a T-boat inspector may be qualified to witness a test on a T-boat but because of the risks involved and technical expertise required, a machinery inspector may be better suited).

This information bulletin was developed by Office of Commercial Vessel Compliance, Commandant (CG-CVC-1) with input and assistance of from the Office of Safety and Environmental Health, Safety Program Management Division (CG-1131) and HSWL (SC) Oakland Detachment. Questions concerning this bulletin may be directed to 202-372-1272 or cg-cvc-1@uscg.mil.

⁴ The credentialed/licensed engineer need not actually perform the test, which may be performed by a junior crewmember or technician, but, should be onsite and attending throughout the test and directly supervising the person performing the test.

⁵ MI leading the inspection who is qualified as a Machinery Inspector or otherwise qualified for that vessel type.

⁶ SMS, PSTP or other written procedures, if in existence, or, at the minimum, a detailed verbal explanation of the intended procedures; the person in-charge of the test should demonstrate, by explaining the procedure to the lead marine inspector, an understanding of how to properly and safely conduct a test.

⁷ Verification of the gauge calibration should also be made.

⁸ The primary purpose of tracing is to ensure all valves are properly aligned and there is no other apparent impediment to a successful test; consulting drawings is recommended if any questions or concerns are found while tracing the system.