

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 06-17

- c. The Federal Water Pollution Control Act (33 U.S.C. § 1251 *et seq.*) directs the President to issue regulations and establish a “National Response System” that, among other things, establishes “procedures, methods, and equipment and other requirements for equipment to prevent discharges of oil and hazardous substances from vessels and from onshore and offshore facilities, and to contain such discharges[.]”
 - d. Pursuant to a delegation from the Secretary of Homeland Security, the Coast Guard has exercised this authority by promulgating regulations (References (b) and (c)) that require, among other things, waterfront marine transfer piping and hose systems to be tested at regular intervals. These tests can either be conducted by facility personnel or a third party entity. The Coast Guard verifies that required tests are conducted via on-site records checks.
2. ACTION. Captains of the Port (COTP) and Officers in Charge, Marine Inspection (OCMI) are encouraged to bring this circular to the attention of Coast Guard facility inspectors and waterfront facility owners and operators within their areas of responsibility. Existing approved alternative test methods should not be canceled simply because they are not mentioned in this NVIC. The COTP should regularly review approved alternatives for pipeline and hose testing against current guidelines and industry best practices to determine the suitability and continued acceptance of those alternatives.
 3. DIRECTIVE(S) AFFECTED. No Directives are affected. Reference (a) is hereby canceled.
 4. DISCUSSION.
 - a. The Coast Guard is responsible for oil pollution prevention at MTR facilities (Department of Homeland Security Delegation No. 0170.1 (June 20, 2003)). Reference (b) applies to each facility that is capable of transferring oil or hazardous materials, in bulk, to or from a vessel, where the vessel has a total capacity, from a combination of all bulk products carried, of 250 barrels or more. Reference (c) applies to the transfer of oil or hazardous material on the navigable waters or contiguous zone of the United States to, from, or within each vessel with a capacity of 250 barrels or more.
 - b. At facilities regulated pursuant to references (b) and (c), oil transfer piping systems must be tested from the dock loading arm or manifold up to the first valve encountered after the pipe enters the secondary containment area required under 40 CFR 112.7 (see 33 CFR 154.500 and 33 CFR 156.170).
 - e. Enclosure (1) to this circular is intended to provide clarification of existing facility related pipeline and hose testing guidance consistent with the most recent Coast Guard regulations. Since this guidance was first promulgated, referenced standards have been updated and test and inspection technologies and methodology has improved. The USCG has been approving pipe testing alternatives based on reference (d) and (e) since 1998.
 5. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is intended to provide operational guidance for Coast Guard personnel and is not intended to nor does it impose legally-binding requirements on any party outside the Coast Guard.

6. MAJOR CHANGES. The purpose of this NVIC is to update the information in reference (a) and provide expanded information and recommendations for the COTP to consider when determining acceptability of proposed alternative test methods for MTR pipe and hose tests and inspections.
7. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATION.
 - a. The development of this directive and the general policies contained within it have been thoroughly reviewed by the originating office and are categorically excluded under current USCG categorical exclusion (CE) # 33 from further environmental analysis, in accordance with Section 2.B.2. and Figure 2-1 of the National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDTINST M16475.1 (series).
 - b. This directive will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment. All future specific actions resulting from the general policies in this Manual must be individually evaluated for compliance with the National Environmental Policy Act (NEPA), Council on Environmental Policy NEPA regulations at 40 CFR Parts 1500-1508, DHS and Coast Guard NEPA policy, and compliance with all other environmental mandates.
8. DISTRIBUTION. No paper distribution will be made of this Circular. An electronic version is located on the following Coast Guard website: <http://www.dco.uscg.mil/Our-Organization/NVIC/>.
9. RECORDS MANAGEMENT CONSIDERATIONS. This NVIC has been thoroughly reviewed during the directives clearance process, and it has been determined there are no further records scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. §3101 et seq., NARA requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This policy does not create a significant or substantial change to existing records management requirements.
10. FORMS/REPORTS. None.
11. REQUEST FOR CHANGES. USCG personnel may recommend changes by writing via the chain of command to: Commandant (CG-FAC); U. S. Coast Guard Stop 7501; 2703 Martin Luther King Jr. Ave., SE; Washington, DC 20593-7501.

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Encl: (1) U.S. Coast Guard Pipeline and Hose Testing Guidance for Facilities

MARINE TRANSPORTATION RELATED (MTR) FACILITIES HANDLING OIL OR HAZARDOUS MATERIAL IN BULK

U. S. COAST GUARD PIPELINE AND HOSE TESTING GUIDANCE FOR FACILITIES

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U. S. COAST GUARD PIPELINE AND HOSE TESTING GUIDANCE FOR FACILITIES

1 INTRODUCTION

- 1.1 This document provides expanded pipeline and hose testing guidance, originally promulgated in COMDT Letter 16451 of 3 Aug 1994 (Reference (a)), in a manner consistent with existing regulations found in 33 CFR 154 and 33 CFR 156 (References (b) and (c)), to help identify and eliminate pollution risks.

2 DEFINITIONS

- 2.1 The definitions found at 33 CFR 154.105 apply unless otherwise noted.

3 ALTERNATIVES AND EXEMPTIONS

3.1 ALTERNATIVES

In accordance with 33 CFR 154.107 and 33 CFR 156.107, if compliance with the requirements set forth in References (b) and (c) are economically or physically impractical and alternative procedures, methods or equipment provide an equivalent level of safety and protection from pollution, a facility may submit an application for approval of alternative procedures to the COTP. The COTP is the final approval/disapproval authority for alternatives. See Sections 4.2, 4.3, 4.4, 4.5 and 5.3 for further guidance on alternative test and inspection procedures.

3.2 EXEMPTIONS

In accordance with 33 CFR 154.108 and 33 CFR 156.110, if compliance with the requirements set forth in References (b) and (c) are not economically or physically practical, alternative testing procedures do not exist and the likelihood of a discharge is minimal as a result of an exemption, a facility may submit an application for an exemption from all or part of 33 CFR part 154 or 33 CFR part 156 to Commandant (CG-5P), via the COTP.

4 PIPELINES

4.1 STATIC LIQUID TESTING REQUIREMENTS FOR PIPELINE HANDLING OIL AND HAZARDOUS MATERIAL IN BULK

- 4.1.1 To ensure integrity and safety, 33 CFR 156.170 requires annual static liquid pressure testing for equipment used in bulk oil and hazardous material transfer operations. Equipment subject to this requirement includes: pipelines, loading arms, manifolds, metallic hoses and non-metallic transfer hoses. As noted above, an exemption may be granted, or the COTP may approve an alternative testing methodology or test and inspection procedure. Pressure testing is a gross test (a test that covers an entire section of piping at once versus a very specific test such as a weld inspection) that provides general information of the

pipeline's susceptibility to leakage and its overall strength.

- 4.1.2 These guidelines contain minimum requirements for conducting the static liquid test, in accordance with 33 CFR 156.170. Specific test and acceptance criteria, safety requirements, and engineering and design specifications are found in Reference (d), American Society of Mechanical Engineers Code for Pressure Piping, ASME B31.3 is an approved American National Standards Institute (ANSI) industry standard. The standard is incorporated by reference (IBR) as ANSI B31.3 (33 CFR 154.106(b)(3)). ANSI (the American National Standards Institute) is the official entity that works on writing standards published by and for ASME (The American Society of Mechanical Engineers). The B31.3 standard is referred to in API 570 (Reference (e)) and other industry standards, as ASME B31.3 or ANSI B31.3 and are identical.

4.1.2.1 REQUIREMENTS FOR THE STATIC LIQUID TEST

- A. 33 CFR 156.170(c)(4) requires that a transfer pipe system be tested annually by the facility at 1.5 times the Maximum Allowable Working Pressure (MAWP). The MAWP is the designed working pressure of the pipe. Unlike transfer hoses¹, there is no established minimum MAWP for a transfer pipeline. The operating pressure (i.e., the upper pressure at which the facility decides to limit their operations) may be substituted for the MAWP if the facility operator can demonstrate to the COTP's satisfaction that mechanical safeguards, such as relief valves or pump controls, are in place to limit pump pressure to a value below the MAWP. This should include written documentation attesting to the sufficiency of the safeguards.

- 1) Caution should be exercised during the static liquid test to avoid any part of the piping system be subjected to a stress greater than 90 percent of its specified minimum yield strength (SMYS) at test temperature. (Reference (c) and (d))
- 2) The test pressure should not exceed the maximum rated pressure of any component in the system that has not been disconnected or isolated under paragraph D.3 below.

B. Test medium (Reference (c) and (d))

- 1) The static liquid test is normally performed using water. However, other liquid test mediums may be used without requesting an alternative approval from the COTP.
- 2) If the liquid is flammable, its flash point should be at least 49°C (120°F).
- 3) The test medium should be compatible with the cargo handled

¹ 33 CFR 154.500 provides specific requirements for transfer hose MAWP.

and the piping material.

- 4) The temperature of the test medium should be compatible with the normal temperatures of the products transferred under the given ambient conditions.
- 5) Consideration should be given to the toxicity of the liquid, its potential for pollution if spilled, and the safety of personnel in the vicinity.

C. Test criteria (References (c) and (d))

- 1) For pipe that can be visually examined, the test pressure shall be maintained for a minimum of 10 minutes and held for such additional time as may be necessary to conduct the examination for leakage.
- 2) For pipe that is buried or insulated and cannot be visually examined, the pressure should be maintained for 1 hour.
- 3) Ensure all items (i.e., valves, pumps, etc.) that should not be subjected to the test pressure have been disconnected or isolated by blanking or other suitable means.
- 4) If the testing medium in the system is subject to thermal expansion during the test, provisions shall be made for immediate safe relief of excess pressure. Effects of temperature changes shall be taken into account when recording test pressures.
- 5) During cold weather, upon completion of the static liquid test, the lines, valves, and fittings should be drained completely of liquid prone to freezing to avoid damage to the pipeline.

D. Acceptance criteria (References (c) and (d))

- 1) The pipe and all joint sections should maintain the test pressure for the duration of the test without damage or permanent distortion.
- 2) No leakage is allowed during the static leak test. The entire pipeline section and component parts, to the extent possible, must be visually inspected for leaks².
- 3) Any line section or component part that leaks during the test should be repaired or replaced to the satisfaction of the COTP

² See section 4.1.2.1.C.2, above, test criteria for buried (underground) or insulated pipe.

and re-tested.

4.2 ALTERNATIVE TESTING AND INSPECTION PROTOCOLS FOR PIPELINE AT FACILITIES HANDLING OIL AND HAZARDOUS MATERIAL IN BULK

4.2.1 The COTP may consider and approve alternative procedures, methods, or equipment standards proposed by the facility operator if the proposal meets the requirements set forth in 33 CFR 156.107(a)(1), (2) and (3). All testing methods, other than a static liquid test, may be considered as an alternative. If the COTP determines that a testing alternative is appropriate, then it may be approved without further review if the plan for using that method is consistent with this policy.

4.2.2 Alternatives to a liquid pressure test, in accordance with 33 CFR 156.170 and this guidance, normally should not be approved for initial installations, following any alteration or repair to the system, or when a facility is in a caretaker status and requests to resume operations.

4.2.3 Alternatives may be approved when compliance with static liquid test requirements is economically or physically impractical and alternatives provide an equivalent level of safety and protection from pollution.

4.2.3.1 Examples of conditions when alternatives may be appropriate:

- A. The length of the transfer piping makes the costs of conducting the liquid pressure test and/or disposing of contaminated liquid excessive;
- B. The product medium is reactive with water and other liquid test mediums, and testing would risk harm to personnel and property;
or,
- C. Exclusive lines used to transfer hazardous materials would be contaminated by the test medium.

4.2.3.2 Once it is determined an alternative testing procedure may be warranted, the following information should be considered in evaluating the request:

- A. The age of the piping and dimensions of the system;
- B. The commodities transferred and the system's operations;
- C. The history of the system including the system's compliance performance and past unintentional discharges and releases;
- D. Access to the transfer piping: whether system is buried, elevated, insulated, etc.;

- E. The presence of any relief valves in the piping system and their routine maintenance schedule;
- F. Proximity to environmentally sensitive areas;
- G. The date of the last static liquid test; and
- H. The system MAWP, system operating pressure, and relief valve settings.

4.2.3.3 Specific alternative procedures may be included in the Facility Operations Manual required by 33 CFR 154.300, or kept with the approved Operations Manual. The COTP may rescind approval for alternative testing procedures at any time if he or she believes that safety and/or pollution prevention requirements are not adequately met.

4.3 EXEMPTIONS

4.3.1 Requests for exemptions shall be forwarded with an endorsement from the COTP up the Chain of Command to Commandant (CG-5P) via (CG-FAC-2). Requests for testing alternatives outside the scope of the guidance in this document may be forwarded to Commandant (CG-FAC-2) by the COTP for technical review. Commandant (CG-FAC-2), in coordination with other appropriate offices in Coast Guard Headquarters, will provide recommendations to the COTP on such requests. The approval authority for alternatives remains at the COTP level.

4.4 PNEUMATIC PRESSURE TESTING ALTERNATIVE FOR PIPELINE SYSTEMS

4.4.1 Alternative testing of pipeline systems using pneumatic pressure testing may be appropriate and may be considered on a case-by-case basis by the COTP. In evaluating such requests the COTP may wish to consult recognized industry references including References (c) and (d). These standards include guidelines on liquid pressure testing and pneumatic pressure testing procedures applicable to piping systems.

4.4.2 Unlike the static liquid pressure test, pneumatic pressure testing involves the compression of a gas. This compressed gas may constitute an enormous amount of stored energy, which, in the event of a failure, releases suddenly with tremendous force.

4.4.3 The pneumatic pressure test can be an acceptable alternative for testing pipeline facilities provided the following minimum safety precautions are taken. COTP's should normally require:

4.4.3.1 Test pressure and duration: The pneumatic test pressure should be conducted at 110% of the design pressure. The pressure should be

maintained for at least 10 minutes. (Reference (c) and (d)).

NOTE: If for some reason, the operating pressure of the system is substantially less than the design pressure of the piping, and the system operating pressure is normally limited by a relief valve, consideration may be given to limiting the pneumatic test pressure to 110% of system operating pressure or MAWP.

4.4.3.2 Test medium

- A. The gas used as a testing medium, if not dry air, should be non-flammable, non-toxic, and compatible with any cargo residue in the pipe material.
- B. The temperature of the gas should be compatible with the pipe material.

4.4.3.3 Other considerations

- A. For pipe that can be visually examined, the portion of the pipe system to be tested should be examined before pressure is applied to ensure that it is completely blanked and that all parts of the system not subject to the test pressure are disconnected or isolated by valves or other suitable means.
- B. The pressure in the system should gradually be increased to not more than half of the test pressure, after which the pressure is increased in steps of approximately one tenth of the test pressure until the required test pressure has been reached.
- C. Due to the hazards discussed in paragraph 4.4.2, special precautions to ensure the safety of personnel and property must be taken whenever a pneumatic pressure test is conducted. A safe working perimeter, in accordance with any local code(s) or Federal safety regulations, should be established around the pipe systems to be tested and should allow only essential personnel to enter the area for purposes of conducting the test or examining the pipe for leaks.
- D. If the testing medium in the system is subject to thermal expansion during the test, provisions shall be made for the immediate safe relief of excess pressure. Effects of temperature changes shall be taken into account when interpretations are made of recorded test pressures.
- E. A vapor recovery system may be required and/or other measures to prevent release of harmful or contaminated gas to the environment during the course of and at the conclusion of the test.

4.4.3.4 Acceptance criteria

- A. The pipe should maintain the test pressure for the duration of the test without damage or permanent distortion.
- B. No leakage is allowed during the pneumatic leak test. For pipe that can be visually examined, leakage should be checked by the use of a reliable method such as a liquid soap solution or a calibrated pressure gage.
- C. Should a leak occur during the test, the line section or component part shall be repaired or replaced and re-tested.

4.4.3.5 Hazardous Materials. Pipelines must be purged of hazardous material products before testing to the extent that a material failure or leakage during the test will not create a hazard.

4.4.3.6 Certification. A professional engineer or industry certified test and inspection personnel should certify the results of tests that meet COTP approved alternative pneumatic testing requirements.

4.5 API 570 IN SERVICE TEST AND INSPECTION PROCEDURES AS AN ALTERNATIVE TO ANNUAL PRESSURE TESTING OF PIPING SYSTEMS (Reference (e))

4.5.1 The procedures outlined in Reference (e) may be suitable as an alternative proposal to the annual static liquid pressure tests required by 33 CFR 156.170 when approved by the COTP. Reference (e) is an in service inspection, rating, repair and alteration piping system guide based upon a monitoring system for a representative sampling of inspection locations on selected piping at various intervals with specific intent to reveal a reasonably accurate assessment of the condition of the piping system.

4.5.2 Reference (e) outlines test and inspection procedures based on use of Non-Destructive Testing (NDT) and inspection of the entire piping system in accordance with Fitness for Service and Risk Based Inspection planning. A test and inspection plan proposed as an alternative to 33 CFR 156.170 that is based on Reference (e) should consider inclusion of, but need not be limited to, the following:

4.5.2.1 Certification of the design of the entire system in accordance with Reference (d), including

- A. References to acceptable material specifications and component standards, including dimensional requirements and pressure-temperature ratings;
- B. Requirements for design of components and assemblies, including

piping supports;

- C. Requirements and data for evaluation and limitation of stresses, reactions, and movements associated with pressure, temperature changes and other forces;
- D. Guidance and limitations on the selection and application of materials, components, and joining methods;
- E. Requirements for the fabrication, assembly and erection of piping; and
- F. Requirements for examination, inspection and testing of piping.

4.5.2.2 Use of API Certified Piping Inspectors. Annex A of Reference (e) contains the qualifications for, and process to obtain, certification as an API piping inspector.

4.5.2.3 An NDT inspection plan should be based upon an evaluation of present and possible types of damaged mechanisms. The methods and extent of NDT in the plan should be evaluated to assure that it can adequately identify the damage mechanism and the severity of the damage. Examinations should be scheduled at intervals that consider the:

- A. Type of damage;
- B. Rate of damage;
- C. Tolerance of the equipment to the type of damage;
- D. Maximum intervals as defined in codes and standards; and
- E. Extent of examination.

4.5.2.4 Pressure testing. Although pressure testing is not normally conducted as part of routine API 570 in service testing protocols, when conducted, pressure tests should be performed in accordance with the requirements of Reference (d).

4.5.2.5 Risk based assessments of the probability of piping failure should be completed to determine inspection intervals and type and extent of future inspection/examinations.

4.5.2.6 The inspection tasks and schedule required to monitor identified damage mechanisms and assure the pressure integrity of the piping system. The plan should:

- A. Define the type of inspection needed;
 - B. Identify the next inspection date for each inspection type;
 - C. Describe the inspection methods and NDT technique;
 - D. Describe the extent and locations of inspection and Non-Destructive Examination (NDE) and Corrosion Monitoring Locations (CMLs);
 - E. Describe the surface cleaning requirements needed for inspection and examinations for each type of inspection;
 - F. Describe the requirements of necessary pressure test; and
 - G. Describe any required repairs known or previously planned before the upcoming inspection.
- 4.5.2.7 The different types of inspections and surveillance appropriate depending on the circumstances and the piping system. These include:
- A. Internal visual inspection;
 - B. Monitoring and inspection while system is being used;
 - C. Thickness measurement inspection: thickness measurement inspections should obtain thickness readings on a representative sampling of CMLs. This representative sampling should include data for all the various types of components and orientations found in each circuit.
 - D. External visual inspection;
 - E. Corrosion Under Insulation (CUI) inspection;
 - F. Vibrating piping inspection;
 - G. Supplemental inspection; and
 - H. Injection piping inspection.
- 4.5.2.8 Audits of owner/operator organization to periodically determine if the authorized inspections agency is meeting the requirements of the inspection code.
- 4.5.2.9 Inspection of valves, welds, supports, joints, flanges, and auxiliary equipment (pumps).
- 4.5.2.10 Testing and inspection of pressure-relieving devices at intervals that

are frequent enough to verify the valves perform reliably in the particular service conditions.

4.5.2.11 Testing and inspection of safety equipment and pressure monitoring and relief equipment. This equipment should be tested and repaired by a repair organization experienced with these types of equipment.

4.5.2.12 Interval/frequency of inspection³

- A. The frequency and extent of inspection on piping circuits whether above or below ground depends on the forms of degradation that can affect the piping and the consequence of a piping failure.
- B. The inspection interval should be reviewed and adjusted as necessary after each inspection or significant change in operating conditions. General corrosion, localized corrosion, pitting, environmental cracking, and other applicable forms of deterioration shall be considered when establishing inspection intervals.
- C. Reference (d) is based upon monitoring a representative sampling of inspection locations on selected piping at various intervals with specific intent to reveal a reasonably accurate assessment of the condition of the piping system.

4.5.2.13 Inspection data evaluation and analysis

- A. Pressure containing components found to have degradation that could affect their load carrying capability should be evaluated for continued service.
- B. Long-term and short-term corrosion rates should be compared to see which results in the shortest remaining life as part of inspections data assessment.
- C. If calculations indicate that an inaccurate rate of corrosion has been assumed, the rate to be used for the next period should be adjusted to reflect the actual rate found.

4.5.2.14 Data recording: The use of a computer-based system for storing, calculating, and analyzing data should be considered in view of the volume of data that will be generated as part of a piping inspection program.

4.5.2.15 Materials and stress analysis

³ See Section 4.4.3 for more information regarding inspection interval and COTP approval.

- A. Piping stress analysis can identify the most highly stressed components in a piping system. This information can be used to concentrate inspection efforts at the locations most prone to fatigue damage.
- B. Piping should be supported and guided so that its weight is carried safely, it has sufficient flexibility for thermal expansion or contraction, and it does not vibrate excessively. Piping stress analysis to assess system flexibility and support is not normally performed as part of a piping inspection. However, many existing piping systems were analyzed as part of their original design or as part of a re-rating or modification, and the results of these analyses can be useful in developing inspection plans.

4.5.2.16 Recordkeeping and availability for inspection

- A. Piping system owners/operators should maintain permanent and progressive records of their piping systems and pressure-relieving devices. Records should be maintained throughout the service life of each piping system.
- B. Piping system and pressure-relieving device records should contain five types of information pertinent to mechanical integrity:
 - 1) Fabrication, construction and design information;
 - 2) Inspection history;
 - 3) Repair, alteration and re-rating information;
 - 4) A list of repair or replacement recommendations that impact piping integrity should be kept current; and
 - 5) Fitness-for-service assessment documentation.

4.5.2.17 Section 9 of Reference (e) provides detailed information on test and inspection of buried process piping. Significant external deterioration can be caused by corrosive soil conditions and the inspection can be hindered by the inaccessibility of the affected areas of the piping. Buried piping inspection types and methods include:

- A. Above ground visual surveillance;
- B. Close interval potential survey;
- C. Piping coating holiday survey;
- D. Soil resistivity;

- E. Cathodic protection monitoring;
- F. In-line inspection using “smart” or “intelligent pigging;”
- G. Video cameras; and
- H. Excavation.

4.5.3 COTP conditions for approval of API 570 as an alternative test and inspection method will vary on a case by case basis and may include consideration of the following:

- 4.5.3.1 Visual inspection of the complete transfer piping system (refer to inspection intervals in Reference (e), Section 6, Tables 2 and 3) should be conducted and documented annually.
- 4.5.3.2 An API Certified Pipeline Inspector should conduct inspection and testing; the results shall be reviewed and approved by a Piping Engineer.
- 4.5.3.3 A revolving in-service inspection program, where a percentage of the facility’s lines are pressure tested annually, should address the complete system during a maximum five-year interval.
- 4.5.3.4 Test results and visual examination reports should be maintained at the facility for the duration of the pipeline service life, and should be readily available for examination by the COTP. Approved alternative pipeline testing procedures should be maintained with test results required by 33 CFR154.740(c).

5 HOSES

5.1 TESTING REQUIREMENTS FOR NON-METALLIC TRANSFER HOSES

5.1.1 In an transfer system, the flexible non-metallic hoses that run between the facility's manifold and the vessel's deck manifold are separate and distinct from the MTR piping system. The following guidelines contain minimum requirements for testing transfer hoses.

- 5.1.1.1 When the facility supplies a hose for transfer, these tests are to be done annually by the facility and are applicable to non-metallic flexible hoses for oil and hazardous material.
- 5.1.1.2 Transfer hoses should be removed for testing and inspection. 33 CFR 156.170(c)(1) outlines specific requirements for inspecting transfer hoses.
- 5.1.1.3 The static liquid test is normally performed using water. However,

other compatible liquid test mediums may be used without requesting approval as an alternative from the COTP.

- 5.1.2 Guidelines for liquid pressure testing of hoses are presented in Section 5.2.
- 5.1.3 Refer to 33 CFR 156.170 for other testing requirements.
- 5.1.4 Alternative test methods may be available for hoses and may be reviewed and approved by the COTP. Note the recommendations in section 5.4 concerning the rejection of alternative pneumatic testing of hose assemblies.
- 5.1.5 Any request for exemption from the liquid pressure testing requirement for hoses other than those outlined in the regulations or by this policy should be referred to the Assistant Commandant for Prevention Policy (CG-5P) via the chain of command with a recommendation from the COTP.

5.2 LIQUID PRESSURE TESTING OF MTR HOSES (Reference (d) and (f))

5.2.1 Test pressure

- 5.2.1.1 **Minimum Test Pressure.** Hoses used under pressure must be inspected and liquid pressure tested annually at 1.5 the MAWP of the assembly, but generally not less than 225 psi. Per Reference (f), this figure (225 psi) represents 1.5 times the minimum rated working pressure of 1.0 MPa (150 psi) specified for the manufacture of transfer hoses used at marine terminals. (Note: See Section 5.3, below, for testing hoses used in gravity systems where the operating pressure for transfers is less than the minimum pressure of 150 psi).
- 5.2.1.2 **Minimum Design Burst Pressure.** The minimum design burst pressure of transfer hose assemblies must be at least four times the sum of the relief valve setting (or four times the maximum pump pressure when no relief valve is installed in the system) plus the static head pressure of the transfer system, at the point where the hose is installed (33 CFR 154.500(a)).
- 5.2.1.3 **Maximum Allowable Working Pressure.** The MAWP for each hose assembly must be more than the sum of the pressure of the relief valve setting (or the maximum pump pressure when no relief valve is installed) plus the static head pressure of the transfer system, at the point where the hose is installed (33 CFR 154.500(b)).
- 5.2.1.4 **Rated Working Pressures.** For installations where the MAWP exceeds 1.0 MPa (150 psi), each hose assembly must have a rated working pressure equal to or greater than the sum of the system relief valve pressure setting (or the maximum pump pressure if no relief valve is installed) plus the static head pressure as required for facility hose assemblies under 33 CFR 154.500(b).

- 5.2.1.5 Yield Strength. At no time should the hose be subjected to a stress > 90% of its yield strength at test temperature (Reference (d)).
- 5.2.2 Test medium (Reference (d))
 - 5.2.2.1 If the liquid is flammable, its flash point shall be at least 49°C (120°F).
 - 5.2.2.2 The test medium must be compatible with the cargoes handled and the transfer hose tube as recommended by the hose manufacturer.
 - 5.2.2.3 The temperature of the test medium must be compatible with the normal temperatures of the products transferred under the given ambient conditions.
 - 5.2.2.4 Consideration should be given to the toxicity of the liquid, its potential for pollution if spilled, and the safety of personnel in the vicinity.
- 5.2.3 Test duration. Pressure shall be continuously maintained for a minimum of 10 minutes and held for such time as may be necessary to conduct the examination for leakage.
- 5.2.4 Acceptance criteria (33 CFR 156.170 (c))
 - 5.2.4.1 The hose must maintain the test pressure for the duration of the test without damage or permanent distortion.
 - 5.2.4.2 No leakage is allowed during the test.
- 5.3 ALTERNATIVE TESTING METHOD FOR TRANSFER HOSES (Reference (f))
 - 5.3.1 At facilities where transfers are conducted exclusively by gravity, the facility may submit a request to use, and the COTP may consider and approve, an alternative testing procedure for the purposes of the annual test required by 33 CFR 156.170 for the hose that runs between the facility's manifold and the vessel's deck manifold. For the purpose of the test, a MAWP could be determined by a gravity operating pressure less than the minimum 150 psi MAWP for transfer hoses. This would be acceptable, provided the following conditions are considered prior to approval:
 - 5.3.1.1 The hose should be labeled "GRAVITY ONLY."
 - 5.3.1.2 The hose is maintained at a fixed operating pressure (e.g., relief valve set pressure for the entire piping system).
 - 5.3.1.3 The hose is tested annually at 1.5 times the maximum operating pressure of the system (e.g., in a gravity hose system with a MAWP of 50 psi with a relief valve set pressure of 50 psi, the test pressure would be 75 psi).

- 5.3.1.4 The material condition of the hose is visually inspected annually IAW 33 CFR 156.170(c).
- 5.3.1.5 The alternative is only granted for those hoses used to transfer product from a facility to a vessel where no pumps are connected during the transfer.
- 5.3.1.6 If the components that comprise the transfer system are changed, the alternative is rescinded and a new request must be made.
- 5.3.1.7 All other-requirements for testing pressure hoses apply.

5.4 PNEUMATIC PRESSURE TESTING OF HOSES

- 5.4.1 Hydrostatic testing at a minimum of 1.5 times MAWP using a compatible liquid test medium is the only testing method recommended by the Rubber Manufacturers Association for non-metallic transfer hoses used to transfer oil or hazardous liquids at facilities. (Reference (f)). **Pneumatic pressure testing of hoses is not recommended.**
- 5.4.2 Applications for alternative testing procedures using pneumatic pressure testing of oil or liquid chemical/HAZMAT non-metallic transfer hoses normally should **not be approved.**

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