Tentative Interim Amendment

NFPA 58
Liquefied Petroleum Gas Code
2011 Edition

Reference: 5.2.1.11, 6.6.6, A.6.6.6, and 14.3.1.4
TIA 11-1
(SC 10-8-23/TIA Log #986)

Note: Text of the TIA issued and incorporated into the text of 5.2.1.11, 6.6.6, A.6.6.6, and 14.3.1.4 therefore no separate publication is necessary.

1. Revise text to read as follows:

5.2.1.11 ASME containers installed underground, partially underground, or as mounded installations shall incorporate provisions for cathodic protection and shall be coated with a material recommended for the service that is applied in accordance with the coating manufacturer’s instructions.

6.6.6 Installation of Underground and Mounded Containers.

6.6.6.1* ASME container assemblies intended for underground installation, including interchangeable aboveground–underground container assemblies, shall be installed underground in accordance with 6.6.6.1(A) through 6.6.6.1(L).
(A through H unchanged.)

(I)* A corrosion protection system shall be installed on new installations of underground steel containers, unless technical justification is provided to and is approved by the authority having jurisdiction. The corrosion protection system shall include:
(1) A container coating complying with 5.2.1.11
(2) A cathodic protection system that consists of a sacrificial anode(s) or an impressed current anode
(3) A means to test the performance of the cathodic protection system

(J)* Cathodic protection systems installed in accordance with (I) above shall be monitored by testing and the results documented. Confirming tests shall be described by one of the following:
(1) Producing a voltage of -0.85 volts or more negative, with reference to a saturated copper-copper sulfate half cell
(2) Producing a voltage of -0.78 volts or more negative, with reference to a saturated KCl calomel half cell
(3) Producing a voltage of -0.80 volts or more negative, with reference to a silver-silver chloride half cell
(4) Any other method described in Appendix D of Title 49 of the Code of Federal Regulations, Part 192.

(K)* Sacrificial anodes installed in accordance with (I) above shall be tested in accordance with the following schedule:
(1) Upon installation of the cathodic protection system, unless prohibited by climactic conditions, in which case testing shall be done within 180 days after the installation of the system.
(2) For continued verification of the effectiveness of the system, 12 to 18 months after the initial test.
(3) Upon successful verification testing and in consideration of previous test results, periodic follow-up testing shall be performed at intervals not to exceed 36 months.
(4) Systems failing a test shall be repaired as soon as practical unless climactic conditions prohibit this action, in which case the repair shall be made not more than 180 days thereafter. The testing schedule shall be restarted as required in (1) and (2) above and the results shall comply with 6.6.6.1(J).
(5) Documentation of the results of the two most recent tests shall be retained.
Where an impressed current cathodic protection system is installed, it shall be inspected and tested in accordance with the following schedule:

1. All sources of impressed current shall be inspected and tested at intervals not exceeding two months.
2. All impressed current cathodic protection installations shall be inspected and tested annually.

Prior to burial, the container shall be visually examined for damage to the coating. Damaged areas shall be repaired with a coating recommended for underground service and compatible with the existing coating.

Partially underground, unmounded ASME containers shall be installed as follows:
1. The portion of the container below the surface of the ground, and for a vertical distance of at least 3 in. (75 mm) above that surface, shall comply with the corrosion protection requirements of 6.6.6.1(I) through (M). The aboveground portion of the container shall comply with 6.6.1.4.

Mounded containers shall be installed as follows:
1. Mounded containers shall comply with the corrosion protection requirements of 6.6.6.1(I) through (M).

For information on the proper sizing and installation of corrosion protection systems for containers and piping systems, see the following:


Corrosion protection systems include not only the anode system, but also the coating on the container and a means to test the performance of the system. All elements contribute to the overall performance of the system and are needed in order to provide the most comprehensive protection to the container.

The sacrificial galvanic anode system protects the container from corrosion by generating a low voltage electrical current which protects the container while the anode deteriorates over time. While Impressed Current Systems can also be used, those systems are typically used on containers larger than 2,000 gallon (WC), and are not found on typical residential or commercial ASME underground container installations.

It is important that, when a cathodic protection system is designed, there is a clear understanding of the limits of the surface area and materials being protected. Electrical isolation of the container from metallic piping may be necessary using a dielectric fitting or other component designed for that purpose. For example, the cathodic system that protects a steel tank that is not electrically isolated from the attached metallic piping system will be forced to provide protection for the connected piping system as well. Therefore, the sacrificial anode will have to be sized to protect both the container and the piping. Additionally, if the piping is of a different material (such as copper) from the container, further complications could result and it is possible that the steel may corrode even though a sacrificial anode is connected to the container.

Once the monitoring tests required by 6.6.6.1(K) have been performed, the results can be compared to the criteria listed in this paragraph. The system is functioning properly if it develops -0.85V or greater negative voltage when tested with a copper/copper sulfate reference electrode.

The use of a copper-copper/sulfate half cell to confirm that the cathodic protection system is functioning properly is anticipated to be the most common method of testing sacrificial anode systems on propane containers. Other standard reference half cells can be
substituted for the saturated cooper-copper sulfate half cell. In addition to the standard reference half cells, other means of testing cathodic systems can be employed and they are explained in more detail in Title 49 of the Code of Federal Regulations, Part 192, Appendix D.

**A.6.6.1(K)** The installation of a cathodic protection system on an underground container introduces a need to periodically verify that the system is functioning properly and protecting the container from corrosion. Sacrificial anode systems are anticipated to be the most frequently installed systems for propane underground storage containers. The testing program required for sacrificial anode systems is consistent with nationally recognized practices [see A.6.6.1(I)]. Initial testing is required as soon as practical after installing the system and then the verification test is required approximately 12-18 months after the initial testing was done. The time periods for the initial and verification tests are allowed to be adjusted to accommodate installations that, due to inclement weather, unsuitable soil conditions or other environmental conditions, cannot be tested immediately.

If the initial test and verification test are successful, a suitable period for follow-up testing of the system should be established. A review of available standards, federal and state regulations and recommended practices indicates that a maximum time period of 3 years is an acceptable interval for periodic testing. Should a test of the installation not achieve the required results, the sacrificial anode system must be repaired and the testing program begun again.

Training material on the installation and testing of cathodic protection systems can be found in the following publications:

1. Propane Education and Research Council (PERC) video titled, “Cathodic Protection Systems.”
2. Propane Education and Research Council (PERC) Publication “Cathodic Protection Manual and Quiz #20689590.”

The requirement in (K) (5) is to provide protection for the container owner and to permit the AHJ to verify that the container is in compliance with the code. Retaining test results also permits easy verification of the continued effectiveness of the cathodic protection system. The retention of the two most recent tests will permit comparison with the current test results, resulting in a trend curve of performance for the system. The observed trend may be used to increase the testing frequency as needed.

**A.6.6.1(L)** Impressed current cathodic protection systems are typically engineered systems that must be maintained and inspected according to a more frequent schedule. The requirements contained in this section are based on information published in the NACE documents referenced in A.6.6.1(I). In 6.6.1(L)(1), evidence of proper functioning may be current output, normal power consumption, or a signal indicating normal operation. In 6.6.1(L)(2), a preventive maintenance program to minimize in-service failure is necessary. Inspections should include a check for electrical shorts, ground connections, meter accuracy, efficiency, and circuit resistance. The effectiveness of isolating devices and continuity bonds should be evaluated during the periodic surveys. This can be accomplished by on-site inspection or by evaluating corrosion test data.

3. Add new text as follows:

**14.3.1.4** The written procedures shall address the following requirements, where applicable:

8. Underground containers (See 6.6.1 (J) through (L).)

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**Effective Date:** August 25, 2010

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/codelist)

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