UL 142

STANDARD FOR SAFETY

Steel Aboveground Tanks for Flammable and Combustible Liquids

UL Standard for Safety for Steel Aboveground Tanks for Flammable and Combustible Liquids, UL 142

Tenth Edition, Dated May 17, 2019

Summary of Topics

This revision of ANSI/UL 142 dated January 21, 2021 includes the following changes in requirements:

– Revising Section 35 – 38 requirements for revised OSHA references to correct current inaccuracies; 36.1, 36.3 – 36.5, Section 37, Section 38, 52.1.1

– Add requirements for double wall manways for aboveground tanks; 9.6, Figure 9.5, Table 9.5

– Revise Table 23.1 to reverse a change made in error

– Leakage Test revisions to differentiate between requirements for Performance and Production testing; 42.2.1

– Addition of section for Alignment of Structural Members; Section 50A

– Editorial corrections; 1.3, 8.5, 8.6, Table 8.1, 8.9, 12.2, 12.3, 23.4, 52.1.1, 53.4

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated August 7, 2020 and November 13, 2020.

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UL 142

Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids

The first edition was titled Horizontal and Vertical Aboveground Storage Tanks for Hazardous Liquids. The second edition was titled Aboveground Storage Tanks for Hazardous Liquids.

Fourth Edition – December, 1972
Fifth Edition – December, 1981
Sixth Edition – September, 1987
Seventh Edition – April, 1993
Eighth Edition – July, 2002
Ninth Edition – December, 2006

Tenth Edition

May 17, 2019

This ANSI/UL Standard for Safety consists of the Tenth Edition including revisions through January 21, 2021.

The most recent designation of ANSI/UL 142 as an American National Standard (ANSI) occurred on January 21, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 142 on August 11, 1989. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover steel primary, secondary and diked type atmospheric storage tanks intended for the storage of noncorrosive, stable flammable and combustible liquids with a specific gravity (spg) not exceeding 1.0 in aboveground applications, except for tanks storing liquids with a specific gravity that exceeds 1.0, covered in Section 12.

1.2 Each tank type may be fabricated in a combination of various shapes (cylindrical, rectangular or obround) and orientations (horizontal, vertical) with or without multiple compartments, as covered in this Standard.

1.3 These tanks are intended for installation and use in accordance with the Flammable and Combustible Liquids Code, NFPA 30; the Standard for Installation of Oil-Burning Equipment, NFPA 31; the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A; the Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA 37; the Uniform Fire Code, NFPA 1; and the International Fire Code published by the International Code Council.

1.4 The tanks covered by these requirements are fabricated, inspected and tested for leakage before shipment from the factory as completely assembled vessels.

1.5 These requirements do not apply to tanks covered by the Specification for Field-Welded Tanks for Storage of Production Liquids, API 12D; and the Specification for Shop-Welded Tanks for Storage of Production Liquids, API 12F.

1.6 These requirements do not cover special evaluations for resistance to hurricanes, tornadoes, earthquakes, floods, or other natural disasters; or resistance to vehicle impact.

1.7 These requirements do not cover portable tanks intended for transporting flammable or combustible liquids (such as shipping containers), or mobile use applications (such as mounted on a trailer). These types of products are covered by separate UN, DOT, or equipment product standards.

2 General

2.1 Units of Measurement

2.1.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2 Undated References

2.2.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

3 Glossary

3.1 For the purpose of this standard the following definitions apply.

3.2 ABOVEGROUND TANK (ABOVEGROUND STORAGE TANK or AST) – A storage tank that is intended for installation above grade, at grade or below grade without backfill.

3.3 ATMOSPHERIC TANK – A storage tank that has been designed to operate at pressures from − 0.5 psig to 1.0 psig (− 3.4 kPa to 6.9 kPa) measured at the top of the tank.

3.4 DIKE – A single wall construction forming a bottom and sides with open or closed top intended to provide secondary containment of aboveground tank(s) but not intended to be pressurized for leak testing. Dike types include combinations of rectangular or cylindrical shapes or horizontal or vertical orientations. Open top dike constructions do not have covers to prevent precipitation or debris from entering the dike area. Closed top dike constructions have covers to resist precipitation or debris from entering the dike area.

3.5 DIKED TANK – A primary or secondary containment tank within a steel open or closed dike intended to provide at least 110 percent containment capacity of the primary tank(s) and spill containment.

3.6 EMERGENCY VENT – A storage tank opening or device that automatically relieves excessive internal pressure due to an external fire exposure or blockage of the normal vent.

3.7 INTERSTITIAL SPACE (ANNULAR SPACE or INTERSTICE) – A space between the walls of a multiple wall tank that is capable of communicating fluid from a leak in an adjacent wall to a collection point for monitoring.

3.8 NORMAL VENT – A storage tank opening or device that automatically relieves internal pressure or vacuum during normal storage (atmospheric pressure equalization) and during normal operations (fill or withdraw). Normal vents are designed so as not to exceed 1.0 psig (6.9 kPa) pressure and minus 0.5 psig (minus 3.4 kPa) in the tank.

3.9 PERFORMANCE TESTS – A complete evaluation conducted on a limited quantity of representative tanks. These tests are intended to verify compliance with all applicable performance requirements in a standard.

3.10 PRIMARY CONTAINMENT – The ability of a tank design and construction to contain a liquid while in normal use.

3.11 PRIMARY CONTAINMENT TANK – The wall of a tank construction that provides primary containment.

3.12 PRODUCTION TESTS – A limited evaluation conducted on each tank prior to shipping. These tests are intended to verify compliance with production requirements in a standard, such as leakage.

3.13 SECONDARY CONTAINMENT – The ability of a tank design or construction to contain a liquid only in abnormal use (from primary containment leakage or rupture).

3.14 SECONDARY CONTAINMENT ABOVEGROUND TANK FOR FLAMMABLE LIQUIDS – A primary containment aboveground tank contained within a steel secondary containment shell forming an interstitial (annular) space, which is capable of being monitored for leakage into the space from either the interior or exterior walls. Secondary containment aboveground tank types include: horizontal cylindrical, vertical cylindrical, and rectangular.

3.15 STORAGE TANK (TANK) – A vessel having a liquid capacity that exceeds 60 gal (230 L), is intended for stationary installation, and is not used for processing.

3.16 TANK ACCESSORY – Optional devices or components of an aboveground tank intended to provide a specific function, such as walking or climbing access, load bearing support, spill containment, venting or heating.

CONSTRUCTION – ALL TANKS

4 Capacities and Dimensions

4.1 Capacities, dimensions, and construction details shall comply with the applicable requirements of this standard.

4.2 Capacities per foot of length or height of cylindrical shells are given in Table A1 of Annex A for convenience in checking capacities of tanks of various diameters.

4.3 The total (actual) capacity of a tank shall not be:

a) Less than the rated nominal capacity and

b) More than 105 percent of the rated nominal capacity.

5 Materials

5.1 A tank shall be constructed of commercial or structural grade carbon steel per 5.2 or Type 304 or 316 stainless steel per 5.3. Only new material shall be used.

5.2 Carbon steel shall be in accordance with (a), (b), or both:

a) Comply with the Specification for Carbon Structural Steel, ASTM A36M; or Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1011/A1011M; or Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, ASTM A635/A635M.

b) Have a carbon content of 0.3 percent or less, or a carbon equivalency (CE) of 0.53 percent or less as determined by the formula below, and mechanical strength and welding characteristics at least equivalent to one of the steels specified in 5.2(a).

$$CE = C + \frac{(Mn + Si)}{6} + \frac{(Cr + Mo + V)}{5} + \frac{(Ni + Cu)}{15}$$

in which:

(C = Carbon, Mn = Manganese, Si = Silicone, Cr = Chromium, Mo = Molybdenum, V = Vanadium, Ni = Nickel and Cu = Copper)

5.3 Stainless steel shall comply with the Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip, ASTM A167; or Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels, ASTM A240/A240M.

5.4 The thickness of steel is to be determined by five micrometer readings equally spaced along the edge of the full piece as rolled. Thickness is to be determined on the plate or sheet not less than 3/8 inch (9.5 mm) from a cut edge and not less than 3/4 inch (19.1 mm) from a mill edge.

6 Joints

6.1 Joint types for specific tank geometries shall be selected from Table 6.1 and shall comply with the constructions referenced in the appropriate Figures.