



UL 58

STANDARD FOR SAFETY

Steel Underground Tanks for Flammable and Combustible Liquids

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UL Standard for Safety for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58

Tenth Edition, Dated January 31, 2018

Summary of Topics

This New Edition of UL 58 is being issued to address the editorial maintenance of UL Standards for Safety.

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JANUARY 31, 2018

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UL 58

**Standard for Steel Underground Tanks for Flammable and Combustible
Liquids**

The First through Third editions were titled Construction and Performance of Underground Storage Tanks.

The Fourth edition was titled Underground Storage Tanks.

First Edition – October, 1925
Second Edition – September, 1929
Third Edition – February, 1937
Fourth Edition – April, 1949
Fifth Edition – December, 1961
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Seventh Edition – October, 1976
Eighth Edition – April, 1986
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Tenth Edition

January 31, 2018

The Department of Defense (DoD) has adopted UL 58 on January 21, 1992 . 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 horizontal atmospheric-type steel tanks intended for the storage underground of flammable and combustible liquids.

1.2 These requirements cover single wall tanks, secondary containment tanks, multiple compartment single wall and multiple compartment secondary containment tanks.

1.3 The tanks covered by these requirements are intended for installation in accordance with the National Fire Protection Association Standard for the Installation of Oil-Burning Equipment, NFPA 31, the Flammable and Combustible Liquids Code, NFPA 30, the Automotive and Marine Service Station Code, NFPA 30A, the Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA 37, the Fire Code, NFPA 1, and the International Fire Code, published by the International Code Council.

1.4 Tanks covered by these requirements are cylindrical tanks that 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 Standard for Welded Steel Tanks for Oil Storage, API 650, nor tanks intended for use in chemical and petrochemical plants.

1.6 This Standard does not cover corrosion protection which may be required by local, state or federal authorities. Corrosion protection systems installed at the factory on carbon steel underground storage tanks are covered in the Standard for External Corrosion Protection System for Steel Underground Storage Tanks, UL 1746.

2 Units of Measurements

2.1 When a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component.

3.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

3.3 A component shall be used in accordance with its rating established for the intended conditions of use.

3.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

4 Undated References

4.1 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.

5 Glossary

5.1 For the purpose of this standard, the following definitions apply.

5.2 TYPE I TANK – A primary tank wrapped by an exterior steel shell that is in direct contact with the primary tank; where, the exterior shell is wrapped from 300 to 360 degrees of the primary tank circumference.

5.3 TYPE II TANK – An outer tank physically separated from the inner primary containment tank by standoffs; where, the inner tank is completely contained within the outer tank.

CONSTRUCTION

ALL TANKS

6 Capacities and Dimensions

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

6.2 Tables 1 and 2 of Appendix A give capacities for cylindrical tanks in gallons per foot of length and in liters per meter of length. For a tank with conical heads, the total capacity is obtained by adding one-third the height of the heads to the shell length. For a compartment tank, the total tank capacity is the sum of the capacity of each compartment.

6.3 The total 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.

6.4 The total capacity is to be determined at the level of the lowest opening when the tank is in the intended installation position.

6.5 The overall length of a tank shall not be greater than 8 times its diameter.

7 Steel Thickness

7.1 General

7.1.1 Tanks shall comply with the Roark Equation or the External Pressure Test described in 20.1.

7.1.2 The minimum steel shell thickness for a primary tank is 0.123 inches (3.12 mm). The minimum steel shell thickness for a secondary tank is 0.093 inches (2.36 mm).

7.1.3 The minimum head thicknesses for all tanks, except the outer head of Type I tanks, are noted in Table 7.1. The minimum head thicknesses for the outer head of Type I tanks are noted in Table 7.2.

7.1.4 When the external pressure test, described in 20.1 is conducted successfully, the minimum steel thickness for the shell is reduced 25% from the calculated value using the Roark equation for the same length and diameter tanks.

Exception: Tanks with a length to diameter ratio exceeding 6 to 1 shall not have reductions in the shell thickness.

Table 7.1
Tank head thickness

Tank diameter,		Minimum head thickness,	
Inches	(m)	Inches	(mm)
Up to 64	(Up to 1.62)	.123	(3.12)
64.1 to 90	(1.63 to 2.28)	.167	(4.24)
90.1 to 126	(2.29 to 3.20)	.240	(6.10)
126.1 to 144	(3.20 to 3.66)	.302	(7.67)

Table 7.2
Type I tank outer head thickness

Tank diameter		Minimum head thickness	
Inches	(m)	Inches	(mm)
Up to 64	(Up to 1.62)	0.123	(3.12)
64.1 to 96	(1.63 to 2.44)	0.167	(4.24)
96.1 to 144	(2.45 to 3.66)	0.240	(6.10)

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7.2 Roark equation

7.2.1 The calculated pressure from the Roark equation shall be equal to or greater than the external pressure at the bottom of the tank surrounded by only water and submerged 5 feet (1.52 m) or at a depth equal to the manufacturer's specified maximum burial depth, whichever is greater. The buckling pressure shall be calculated using the following equation:

$$\text{Roark equation: } P = [.807 E_s t_s^2 / (Lr)] [(1 - \nu^2)^{-3} (t_s / r)^2]^{.25}$$

in which:

P is buckling pressure, psi

E_s is modulus of elasticity of steel (29.5 x 10⁶ psi for structural grade A36 carbon steel)

t_s is thickness of steel tank shell (inches)

L is length of tank (inches)

r is radius of tank (inches), and

ν is Poisson's Ration (0.287 for structural grade A36 carbon steel)

Reference: Roark's Formulas for Stress and Strain, 6th Edition, Warren Young, Table 35, Case 19b, Page 690

7.2.2 Using the Roark formula, minimum steel shell thickness (*t_{s min}*) or the maximum tank length (*L_{max}*) can be calculated using the following equations, respectively:

$$t_{s \min} = [(P_1 L r^{3/2} (1 - \nu^2)^{3/4}) / (.807 E_s)]^{.4}$$