



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
Eleventh Edition, Dated December 12, 2025

Summary of Topics

This new Eleventh Edition of ANSI/UL 142 dated December 12, 2025 includes the following changes in requirements:

- ***Addition of Stainless-Steel Pipe to [Table 7.1](#)***
- ***Inclusion of Alternate Pipe Standards; [7.8](#)***
- ***Clarification of Emergency Venting Requirements; [8.4](#), [8.6](#), [Table 8.1](#), and [8.7](#)***
- ***Inclusion of Alternate Manway Constructions; [9.7](#)***
- ***Clarification of Maximum Height in [Table 9.3](#);***
- ***[Table 17.3](#) Correction;***
- ***Editorial Correction for [Table 19.1](#);***
- ***Additional Requirements for Vertical Tanks with Low-sloped Bottoms; [19.4.3](#).***
- ***Clarification on Longitudinal Standoff Requirements; [25.6](#)***
- ***Addition of Calculation Option for Accessories Other than Ladders; [39.4](#) and [40.2](#)***
- ***Revise Pressure Gauge Specification in Hydrostatic Strength Test; [45.2.1](#)***
- ***Add Calculation Option for Top Load Test; [19.3](#), [22.2](#), [30.2](#), and Section [46](#)***
- ***Revision of Marking, [55.5](#);***
- ***Addition of Compartment Tank Construction Requirements; [8.11](#) and Section [15](#)***
- ***Defining the term "CALCULATIONS"; [3.5](#), and***
- ***Tanks with operating pressure in excess of 1 psi and less than 15 psi; [1.1](#), Section [14](#), and [55.1.1\(h\)](#)***

This new edition incorporates editorial changes, including renumbering and reformatting to align with current style.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated October 18, 2024, February 21, 2025, June 6, 2025, and October 10, 2025.

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December 12, 2025

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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.

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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 These requirements additionally cover steel primary, secondary and diked type atmospheric storage tanks intended for the storage of noncorrosive, stable flammable and combustible liquids which operate at a pressure over 1 psi and less than 6 psi (low pressure tanks) are covered in Section [14](#).

1.3 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.

1.4 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.

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

1.6 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.

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

1.8 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 Referenced publications

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.

2.2.2 The following publications are referenced in this Standard:

API 12D, *Specification for Field-welded Tanks for Storage of Production Liquids*

API 12F, *Specification for Shop-welded Tanks for Storage of Production Liquids*

API 2000, *Venting Atmospheric and Low-pressure Storage Tanks*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASME B16.5, *Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard*

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*

ASME B36.10, *Welded and Seamless Wrought Steel Pipe*

ASTM A240/A240M, *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*

ASTM A36M, *Standard Specification for Carbon Structural Steel*

ASTM A53/A53M, A134, A135, or A139 *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*

ASTM A635/A635M, *Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for*

ASTM A865, *Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints*

ASTM A1011/A1011M, *Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength*

International Fire Code

NFPA 1, *Fire Code*

NFPA 30, *Flammable and Combustible Liquids Code*

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*

NFPA 31, *Standard for the Installation of Oil-Burning Equipment*

NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*

OSHA, 29 CFR, Part 1910, Subpart D, *Walking Working Surfaces*

The Pressure Vessel Design Handbook

UL 157, *Gasket and Seals*

UL 969, *Marking and Labeling Systems*

UL/ULC 2583, *Fuel Tank Accessories for Flammable and Combustible Liquids*

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 AUTHORITY HAVING JURISDICTION (AHJ) – The governmental body responsible for the enforcement of any part of this Standard or the official or agency designated by that body to exercise such a function.

3.5 CALCULATIONS – A documented and recognized application of engineering methods and practices for analysis of structural integrity.

3.6 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.

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

3.8 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.

3.9 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.

3.10 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.

3.11 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.

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

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

3.14 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.

3.15 PROFESSIONAL ENGINEER – A person who is licensed or otherwise authorized by a state engineering association to provide engineering services to the public in that state.

NOTE: The AHJ may require a third-party engineering review if the geographic location for which the product/equipment is being installed is different from the professional engineer's geographic region and licensing of engineering practice, and if there are regional concerns that may not have been addressed by the original engineering review. For more information refer to the National Council of Examiners for Engineering and Surveying (NCEES).

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

3.17 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.

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

3.19 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 % 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 ASTM A36M or ASTM A1011/A1011M or ASTM A635/A635M.
- b) Have a carbon content of 0.3 % or less, or a carbon equivalency (CE) of 0.53 % 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 ASTM A167 or 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.

Table 6.1
Joint Types

Tank type	Joint types				
	Shells Figure 6.1	Heads Figure 6.2	Bottom Figure 6.3	Roof Figure 6.4	Corner Figure 6.5
Horizontal cylindrical (primary and secondary)	All ^a	All	—	—	—
Vertical cylindrical (primary and secondary)	All ^a	—	All	All	—
Rectangular (primary and secondary)	All	—	—	—	All
Diked (open and closed top)	All	—	—	—	All
^a Shell joint No. 6 shall not be used on tanks with a diameter greater than 65 inches (1.65 m) unless it is used on the shell of the secondary containment tank where the secondary containment shell is in direct contact with the primary tank.					

Figure 6.1
Shell Joints



NO. 1

Double-welded U, V, bevel, or square groove butt joint.



NO. 2

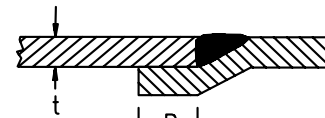
Full penetration and complete fusion.



NO. 3

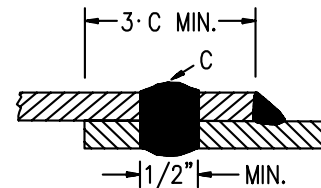
Double-welded full fillet lap joint, or single-welded full fillet lap joint on outside with 1-inch (25.4-mm) intermittent weld spaced not over 12 inches (0.3 m) on inside; minimum overlap, "A" - 1/2 inch (12.7 mm) for tank diameters 48 inches (1.2 m) or less, 3/4 inch (19.1 mm) for tank diameters over 48 inches (1.2 m).

S2054C



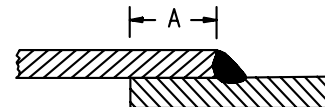
NO. 4

Groove weld equivalent in thickness to "t"; full penetration and complete fusion; minimum overlap, "B" - 1/2 inch (12.7 mm).



NO. 5

Full fillet weld on outside; "C" is 1/2 inch (12.7 mm) minimum diameter lock weld spaced not over 12 inches.



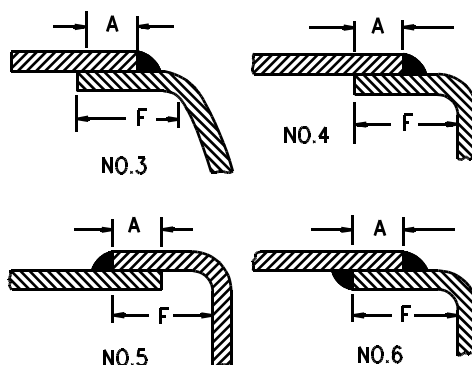
NO. 6

Single-welded full fillet lap joint; minimum overlap, "A" - 1/2 inch (12.7 mm) for tank diameters 48 inches (1.2 m) or less, 3/4 inch (19.1 mm) for tank diameters over 48 inches (1.2 m). This joint shall not be used on tanks with a diameter greater than 65 inches (1.65 m) unless it is used on the shell of the secondary containment tank where the secondary containment shell is in direct contact with the primary tank.

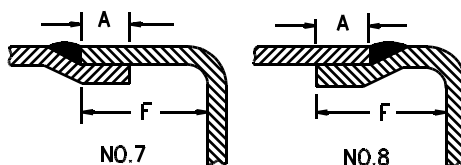
Figure 6.2
Head Joints for Horizontal Cylindrical Tanks



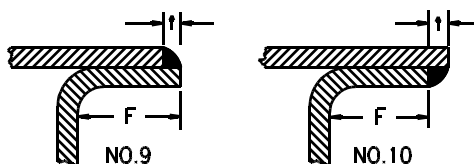
Double-welded U, V, bevel or square groove butt joint; full penetration and complete fusion.



Single-welded full fillet lap joint, single-welded full fillet lap joint on outside with 1-inch (25.4 mm) intermittent weld spaced not over 12 inches (0.3 m) on inside, or double-welded full fillet lap joint; minimum overlap, "A" – 1/2 inch (12.7 mm); "F" is five times head thickness or greater, but not less than 1/2 inch (12.7 mm).



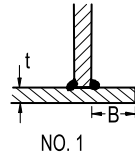
Groove weld equivalent in thickness to that of head or shell; minimum overlap, "A" – 1/2 inch (12.7 mm); "F" is five times head thickness or greater, but not less than 1/2 inch (12.7 mm).



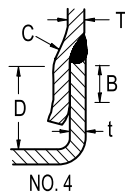
Full fillet weld; "t" – not less than thickness of shell; "F" is five times head thickness or greater, but not less than 1/2 inch (12.7 mm).

S2055B

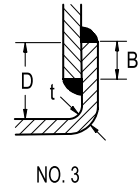
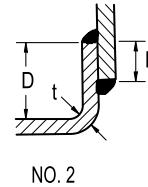
Figure 6.3
Bottom Joints for Vertical Cylindrical Tanks



Double-welded full fillet joint; minimum overlap, "B" - 1/2 inch (12.7 mm) or 1-1/2 t, whichever is greater.



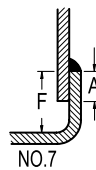
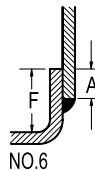
Groove weld at least equivalent in thickness to that of thinner member joined; minimum overlap, "B" - 1/2 inch (12.7 mm) or 1-1/2 t, whichever is greater; depth of offset, "C" - equals T; "D" is 5 t or greater, but not less than 1/2 inch (12.7 mm).



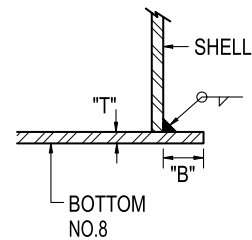
Double-welded full fillet lap joint; minimum overlap, "B" - 1/2 inch (12.7 mm) or 1-1/2 t, whichever is greater; "D" is 5 t or greater, but not less than 1 inch (25.4 mm).



Double-welded U, V, bevel, or square groove butt joint; full penetration and complete fusion.



Single-welded full fillet lap joint, single-welded full fillet lap joint on outside with 1-inch (25.4 mm) intermittent weld spaced not over 12 inches (0.3 m) on inside; minimum overlap, "A" - 1/2 inch (12.7 mm); "F" is five times head thickness or greater, but not less than 1/2 inch (12.7 mm).

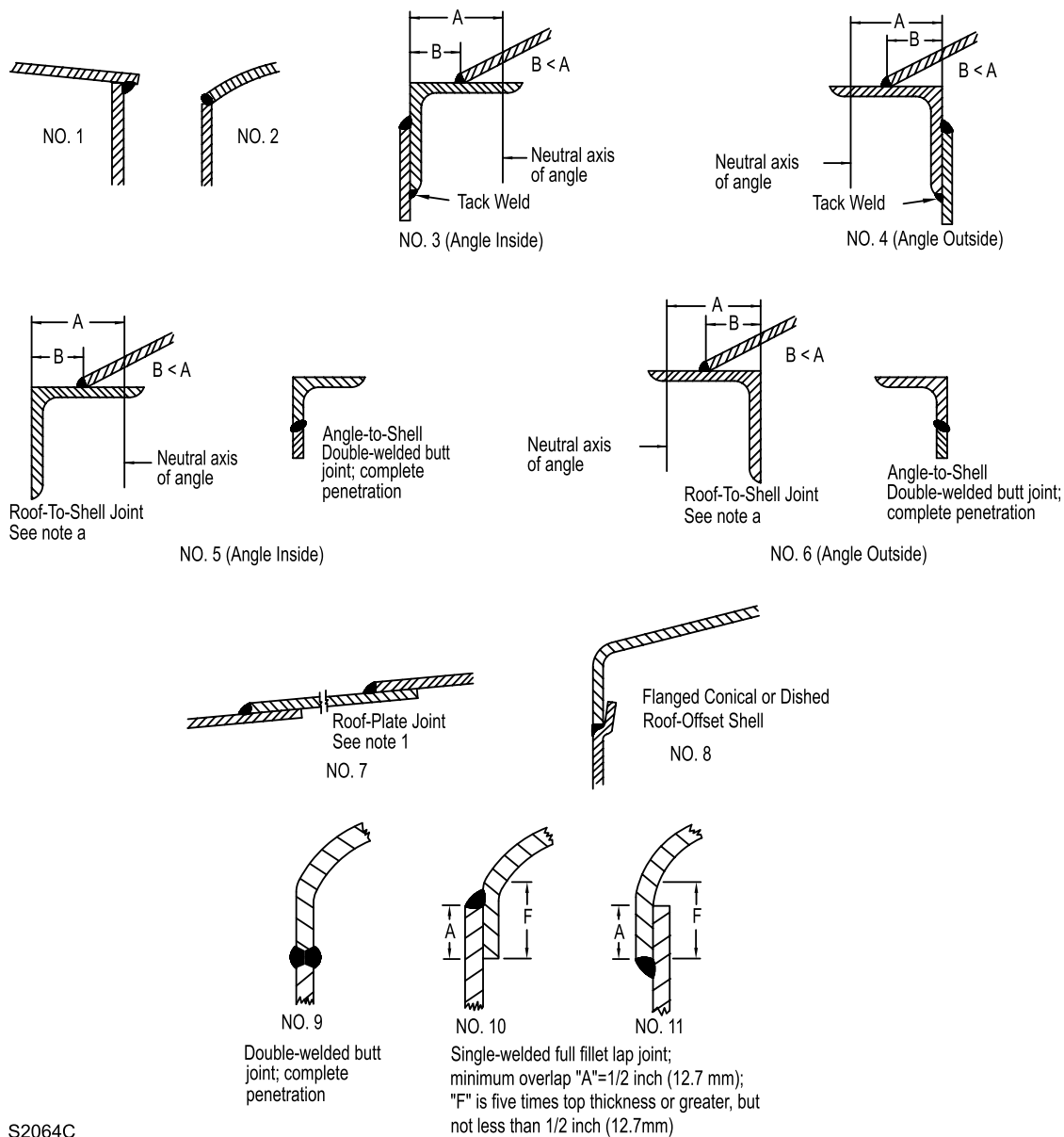


Welded full fillet joint
"B" = 1/2 inch (12.7mm) or 1 1/2 T, whichever is greater.

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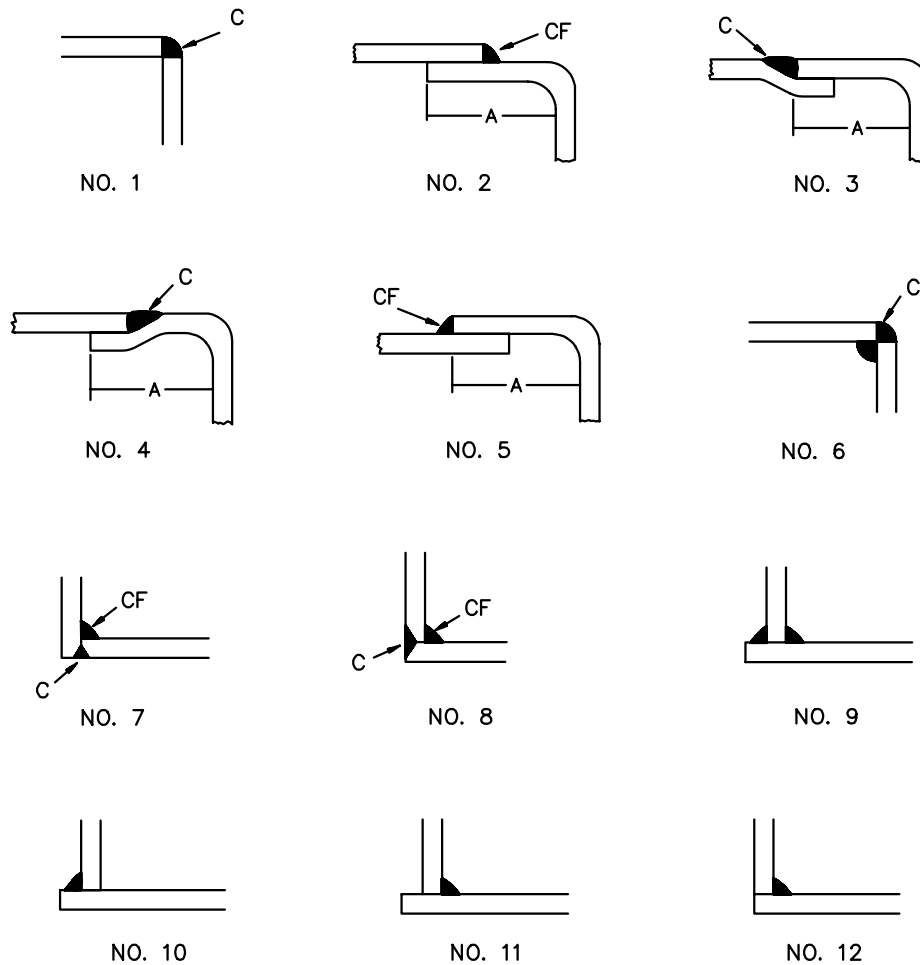
NOTE: Joint No. 8 also permissible for primary tanks up to 24 feet high

Figure 6.4
Roof Joints for Vertical Cylindrical Tanks



NOTE: Unless otherwise indicated, all welds are to be full fillet welds, at least the thickest of the thinnest material.

Figure 6.5
Corner Joints



SM518A

C – Continuous weld.

CF – Shall be continuous full fillet welds.

A – Not less than 1/2 inch (12.7 mm).

7 Tank Connections

7.1 A tank connection shall be provided for each opening as illustrated in [Figure 7.1](#) or [Figure 7.2](#) by:

- a) Welding a steel pipe coupling, threaded steel flange, or standard pipe nipple to the tank; or
- b) A steel flange welded to a length of pipe that, in turn, is welded to the tank.

The reinforcing plates illustrated in [Figure 7.2](#) are optional.