UL 80

STANDARD FOR SAFETY

Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids

UL Standard for Safety for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids, UL 80

Twelfth Edition, Dated September 21, 2007

SUMMARY OF TOPICS

This reaffirmation of ANSI/UL 80 dated October 14, 2024 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated August 16, 2024.

The first and second editions were titled Design and Construction of Inside Tank Equipment for Oil Burners. The third edition was titled Inside Storage Tanks for Oil Burners. The fourth and fifth editions were titled Inside Tanks for Oil-Burner Fuel. The sixth through ninth editions were titled Steel Inside Tanks for Oil-Burner Fuel. The tenth and eleventh editions were titled Steel Tanks for Oil-Burner Fuel.

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UL 80

Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids

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Twelfth Edition

September 21, 2007

This ANSI/UL Standard for Safety consists of the Twelfth Edition including revisions through October 14, 2024. The most recent designation of ANSI/UL 80 as a Reaffirmed American National Standard (ANS) occurred on October 14, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 80 on January 2, 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover steel primary, steel secondary, and steel diked type atmospheric storage tanks from 60 to 660 gallons (227 to 2500 L) intended primarily for the storage and supply of heating fuels for oil burning equipment, or alternately for the storage of diesel fuels for compression ignition engines and motor oils (new and used) for automotive service stations, in aboveground applications.

1.2 Each tank type shall be permitted to be fabricated in various shapes (cylindrical, rectangular or obround), orientations (horizontal, vertical) and may have integral options (tank supports or accessories), as covered in this Standard.

1.3 These shop fabricated tanks are completely fabricated, inspected and tested for leakage before shipment from the factory as completely assembled vessels except for options intended for field assembly in accordance with the manufacturers instructions.

1.4 Each tank shall be permitted to be fabricated as a double bottom tank as covered in this Standard.

1.5 These tanks are intended for installation and use in accordance with the Standard for the Installation of Oil-Burning Equipment , ANSI/NFPA 31, the Flammable and Combustible Liquids Code, ANSI/NFPA 30, the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A, the Uniform Fire Code, ANSI/NFPA 1, and the International Fire Code published by the International Code Council.

1.6 These requirements do not apply to tanks covered by the Standard for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58, the Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, UL 142, the Standard for Fire Resistant Tanks for Flammable and Combustible Liquids, UL 2080, the Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids, UL 2085, or the Outline of Investigation for Non-Metallic Oil Burner Fuel Tanks, SU 2258.

1.7 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 or the Standard for Welded Steel Tanks for Oil Storage, API 650.

1.8 These requirements do not cover storage of waste oils or other combustible liquids with different fire, physical, or material compatibility properties with respect to the intended liquids in 1.1, and do not cover fuel blends with more than 20 percent of bio diesel fuel. These requirements do not cover storage of flammable liquids.

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

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 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.

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

2.4 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.

3 Glossary

3.1 For the purposes of this Standard, the following definitions apply.

3.2 ABOVEGROUND TANK (also known as 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 atmospheric through a gauge pressure of 1.0 psig (6.9 kPa) measured at the top of the tank.

3.4 BIO DIESEL – General description of various Class II to IIIB range of long chain fatty acid ester fuels complying with ASTM D6751 processed from vegetable oils or animal fats in pure form (B100). Bio diesel may also be blended with heating fuels or diesel fuels (B1-B99) denoting the percent volume of bio diesel in the mix.

3.5 BOTTOM SUPPLY CONNECTION – A storage tank bottom opening that is intended to provide a means to supply fuel to oil burning equipment or oil to a dispensing device by gravity in addition to providing a means to automatically drain water from the tank.

3.6 DIESEL FUELS – General description of various Class II petroleum distillate grades complying with ASTM D975 including No. 1 and No. 2 Diesel Fuel (also known as on-road diesel, including low sulfur diesel, ultra low sulfur diesel, and bio diesel blends) typically intended for powering compression ignition engines.

3.7 DIKE – A single wall construction forming a bottom and high sides with open or closed top intended to provide integral support and secondary containment of an aboveground tank or tanks but not capable of being pressurized for leak testing. Dikes 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.

3.8 DIKED PRIMARY TANK – An aboveground primary tank within an open or closed dike intended to provide at least 110 percent containment capacity of the primary tank or tanks and spill containment.

3.9 DIKED SECONDARY TANK – An aboveground secondary tank within an open or closed dike intended to provide at least 110 percent containment capacity of the primary tank or tanks and spill containment.

3.10 DOUBLE BOTTOM TANK – A primary tank with an additional bottom capable of being pressurized and has means for venting and monitoring for leaks in the interstitial space, but does not provide complete secondary containment.

3.11 HEATING FUELS – General description of various Class II petroleum distillate grades complying with ASTM D396 or ASTM D3699, including No. 1 and No. 2 Fuel Oils or K1 Kerosene (also known as oil burner fuel, including low sulfur distillates and bio diesel blends), typically intended for use in oil burning equipment.

3.12 INTERSTITIAL SPACE – The volume between two tank walls that is capable of communicating fluid from a leak in the primary tank to a collection point for purposes of monitoring and venting.

3.13 MOTOR OILS – General description of various Class III petroleum distillate or synthetic grades including lube oils, hydraulic oils or transmission oils typically used as lubricating, cooling, or working fluids in motor vehicle applications.

3.14 OBROUND – Obround tanks are cylindrical tanks with flat portions of the shell and head on two opposing sides, as shown in Figure 12.2.

3.15 PERFORMANCE TESTS – A complete evaluation conducted on a limited quantity of representative "worst case" tanks intended to verify compliance with all applicable performance requirements in a Standard. Performance tests are typically destructive.

3.16 PRIMARY CONTAINMENT – The ability of an enclosed design or construction to contain a liquid while in normal use without leakage.

3.17 PRIMARY CONTAINMENT TANK (also known as PRIMARY TANK or SINGLE WALL TANK) – A single wall tank construction that provides primary containment. Primary containment tank types include cylindrical, rectangular or obround shapes and vertical or horizontal orientations.

3.18 PRODUCTION TESTS – A limited evaluation conducted by the tank manufacturer on each tank after complete assembly but prior to shipping intended to verify compliance with critical production requirements in a Standard, such as leakage. Production tests are not destructive.

3.19 SECONDARY CONTAINMENT – The ability of a design or construction to contain a liquid to a minimum of 300 degrees (for cylindricals and obrounds), 95 percent height (for rectangulars and verticals), or 110 percent primary capacity (for dikes) only in abnormal use (from primary containment leakage or rupture)without leakage.

3.20 SECONDARY CONTAINMENT TANK (also known as SECONDARY TANK or DOUBLE WALL TANK) – A double wall tank construction with interstitial space that provides secondary containment that is capable of being pressurized for leak testing. Secondary containment tank types include cylindrical, rectangular or obround shapes, and vertical or horizontal orientations.

3.21 STORAGE TANK (also known as TANK) – A vessel having a liquid capacity of at least 60 gal (230 L), is intended for fixed installation, and is not used for processing.

3.22 TANK ACCESSORY – Optional devices or components of an aboveground tank intended to provide a specific function, such as venting, heating, load bearing, or special containment. Tank accessories are either integrally connected or field assembled to the tank and may be emergency vents, hot wells, lift lugs, spill containers or other types.

3.23 TANK ORIENTATIONS – General description of the position of an aboveground tank. Horizontal tanks typically are longer and wider than high. Vertical tanks typically are higher than wide.

3.24 TANK SHAPES – General description of the geometry of an aboveground tank. Cylindrical tanks are tubes formed with rolled shells and equivalent circular heads. Rectangular tanks are boxes formed with flat right angled sides. Obround tanks are cylindrical tanks with flat portions of the shell and head on 2 opposing sides.

3.25 TANK SUPPORT – Optional structural members of an aboveground tank intended to bear the weight of, raise above grade and/or stabilize the tank and its contents. Tank supports are integrally connected to the tank by welds, bolts, or threaded pipe, and may be saddle, leg, flat, skid, or other types.

3.26 USED OILS – General description of oils such as those drained from motor vehicles or cooking appliances after use that do not contain water, gas or other contaminants that change the oil Class or may adversely affect the storage tank.

3.27 VENT OPENING – A storage tank top opening that is intended to provide both normal venting (equalizing pressure from fill, withdraw or atmospheric changes typically up to 1.0 psig) and emergency venting (relief of excessive pressure from external fire exposure typically not to exceed 2.5 psig).

3.28 WASTE OIL – General description of oils such as those drained from motor vehicles or cooking appliances after use that contain some amounts of water, gasoline, diesel, or other contaminants that change the oil Class or may adversely affect the storage tank.

4 Units of Measurement

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

5 References

5.1 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.

6 Tank Components

6.1 The following tank components shall be permitted to be provided as either an attached part of a complete tank, or packed with a tank for assembly per the manufacturers instructions at the installation site. When provided, these components shall comply with all applicable requirements of the Standards identified below:

a) Fuel Filters or Oil Deairators in accordance with the Standard for Strainers for Flammable Fluids and Anhydrous Ammonia, UL 331, rated at least 25 psig, for use with combustible liquids described in the Scope, and intended for connection to the burner supply.

b) Fusible Link Valves or Shutoff Valves in accordance with the Standard for Valves for Flammable Fluids, UL 842, rated at least 25 psig, for use with the combustible liquids described in the Scope, and intended for connection to the burner supply.

c) Liquid Level Gauges in accordance with the Standard for Liquid-Level Indicating Gauges for Oil Burner Fuels, UL 180, rated at least 25 psig, for use with the combustible liquids described in the Scope, and intended for use in top openings.

7 Tank Accessories

7.1 The following tank accessories shall be permitted to be provided as either an attached part of a complete tank, or packed with a tank for assembly per the manufacturers instructions at the installation site. When provided, these accessories shall comply with all applicable requirements identified below:

a) Spill Containers shall be steel leak tight constructions integral to the tank with attached covers, and shall have a minimum 1 gallon (3.8 L) capacity for use around top openings such as fill and vents.

b) Piping for leg supports shall be minimum schedule 40 ASME B36.10M black pipe in sizes and threads to fit the integral leg brackets and shall comply with the requirements in Sections 17 – 22.

CONSTRUCTION

8 Size and Form

8.1 A tank of this class shall be cylindrical, obround, rectangular, or of another form which complies with all applicable performance tests, but shall not exceed a primary tank capacity of 660 gallons (2500 L). The marked nominal capacity shall be within 95 – 100 percent of the actual capacity.

8.2 A primary or secondary cylindrical tank shall have a maximum diameter of 48 inches (1.21 m) and shall be permitted to have flat, stamped, or dished heads.

8.3 A primary or secondary obround tank shall be formed in accordance with Figure 12.2, and shall be permitted to have flat, stamped, or dished heads between 38 to 48 inches in the greater dimension, and 18 to 28 inches in the lesser dimension.

8.4 A primary or secondary rectangular tank shall be formed with all sides flat at right angles, except for tops to allow drainage, with any one side not less than 12 inches or more than 90 inches.

8.5 Secondary tanks shall have containment to at least 300 degrees or 95 percent height of the primary tank and an interstitial space capable of being vented and monitored. The secondary tank walls are permitted to be in direct contact or separated by supporting members.

8.6 The secondary shall not have any drains or shell penetrations except for welded through connections for burner supply piping or top fittings from the primary tank or the secondary interstitial vent.

8.7 The secondary shall be of a construction that provides liquid communication to the monitor area.

8.8 The secondary top opening shall be permitted to combine venting and monitoring.

8.9 Diked tanks shall have containment of at least 110 percent of the primary tank, spill coverage of at least 1 inch beyond the primary tank projected area, and a wall height of at least 1/2 the primary tank height (with supports).

8.10 The dike shall not have any drains or wall penetrations except for welded and supported through connections for burner supply piping from the primary tank.

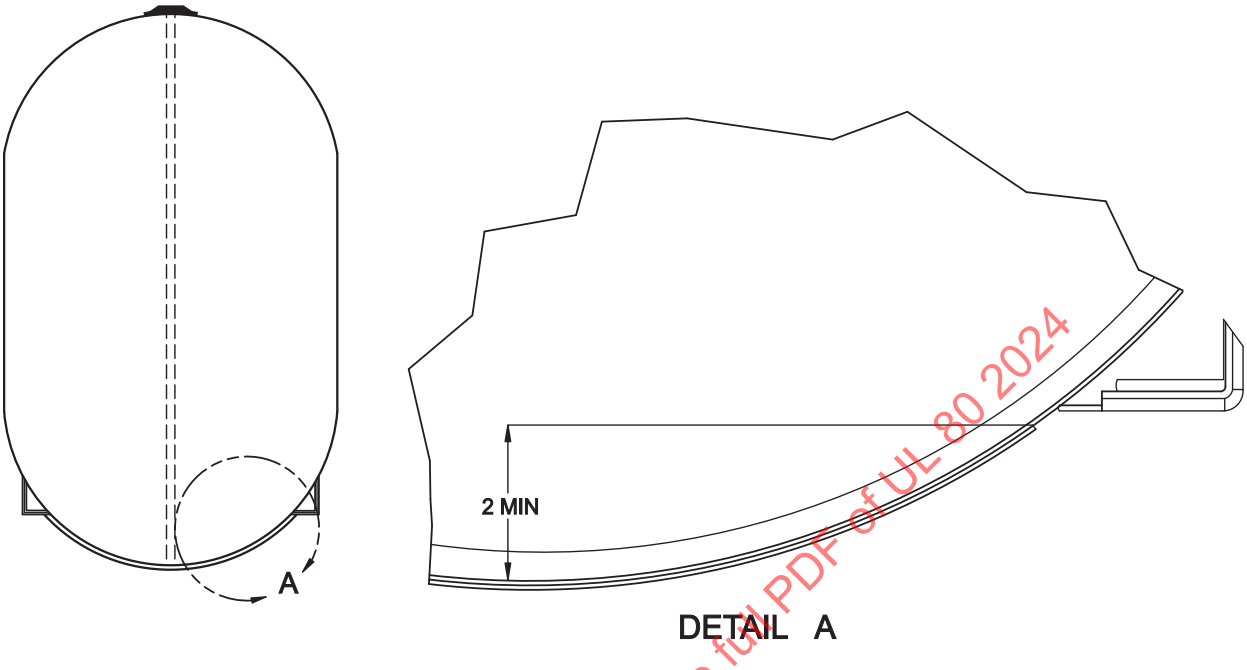
8.11 The dike shall be permitted to be of either an open or closed top design with or without baffles or supports but shall not prevent venting or liquid flow.

8.12 The dike shall have tank hold downs.

8.13 The additional bottom of double bottom tanks, when used, shall cover the tank bottom at least 2 inches (51 mm) above the lowest liquid level of the primary tank and not less than 1 inch (25.4 mm) from each head. Figure 8.1 illustrates a typical double bottom design.

Figure 8.1

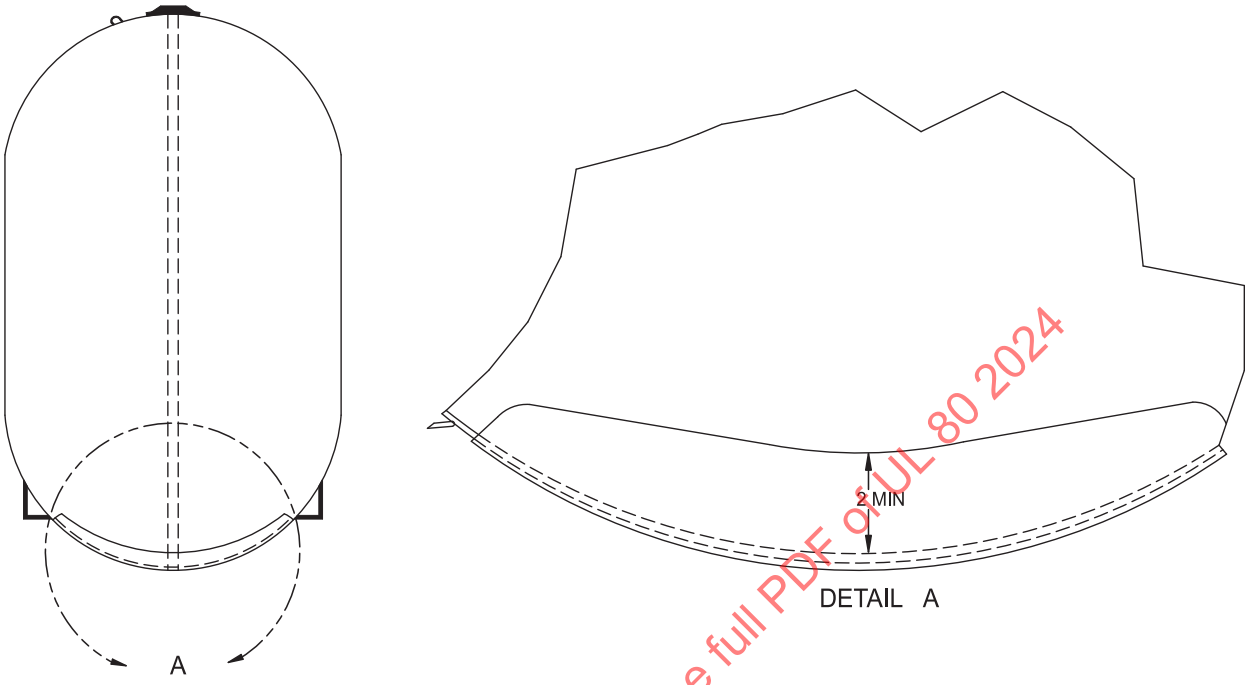
Typical double bottom obround tank – end view



8.14 Double bottom tanks, as an option, shall have the heads double contained a minimum of 2 inches (51 mm) from the lowest liquid level. Figure 8.2 illustrates a typical double bottom design with a double contained head.

Figure 8.2

Typical double bottom obround tank with double contained head – end view



8.15 The interstice of a double bottom tank shall be of a construction that provides either separate or combined venting and leak monitoring. Bottom supply or drain connections shall be welded to both the primary shell and double bottom.

9 Materials

9.1 A tank shall be constructed of commercial or structural grade carbon steel in accordance with 9.2, or type 304 or 316 stainless steel in accordance with 9.3. The minimum thickness of steel employed in tanks of various capacities shall be shown in Table 9.1. Only new material shall be used.

Table 9.1
Thickness of steel

Capacity		Minimum thickness inches (mm)	
U. S. gallons	L	Carbon Steel	Stainless Steel
60 to 550	227 to 2080	0.093 (2.36)	0.071 (1.80)
551 to 660	2085 to 2500	0.123 (3.12)	0.086 (2.18)

9.2 Carbon steel shall be in accordance with (a) or (b), or in accordance with (a) and (b):

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 A635/635M; or

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 (a).

$$CE = C + (Mn + Si) / 6 + (Cr + Mo + V) / 5 + (Ni + Cu) / 15$$

where:

C = Carbon

Si = Silicone

Mo = Molybdenum

Ni = Nickel

Mn = Manganese

Cr = Cromium

V = Vanadium

Cu = Copper

9.3 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.

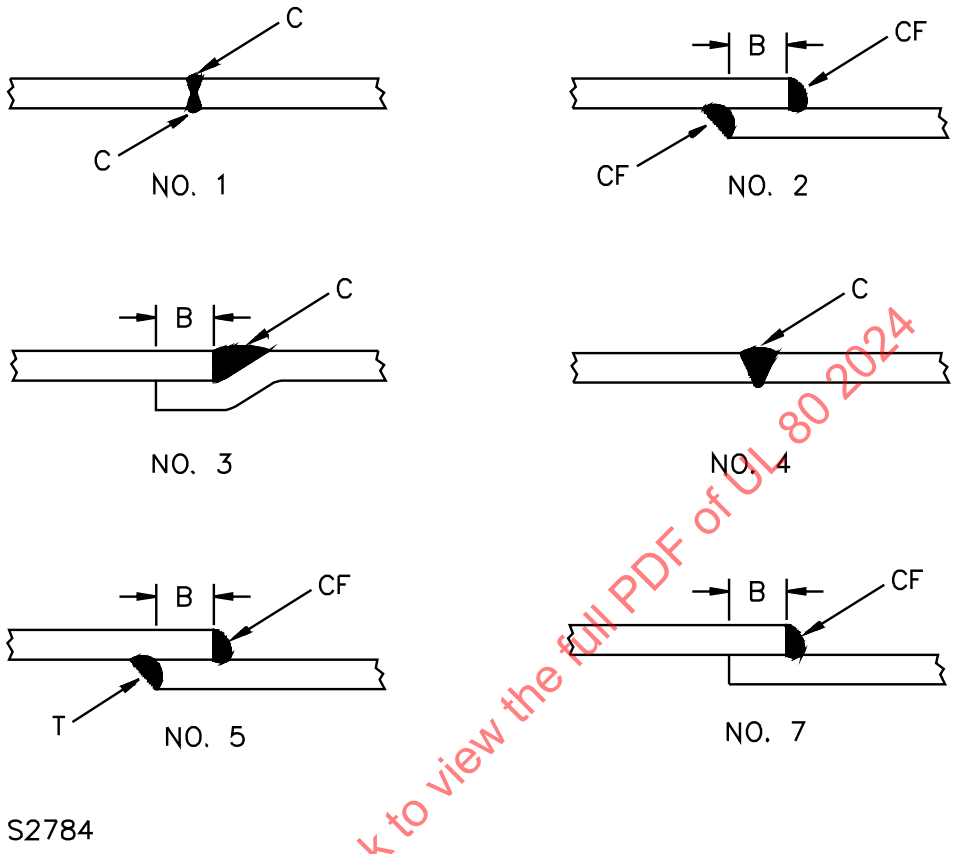
9.4 The thickness of steel is to be determined by five micrometer readings spaced equally along the edge of the full piece as rolled. Thickness is to be determined on the plate or sheet not less than 3/8 inch (9.5 mm) from a cut edge and not less than 3/4 inch (19.1 mm) from a mill edge.

10 Shell Seams

10.1 Shell seams shall be one of the forms shown by Figure 10.1 for any tank type, shape, and orientation.

Figure 10.1

Shell seams



B – Overlap 1/2 inch (12.7 mm) minimum.

C – Continuous weld.

CF – All lap welds shall be continuous full fillet welds.

T– Tack weld 1-inch (25.4 mm) spots not over 12 inches (305 mm) apart.

11 Head Joints

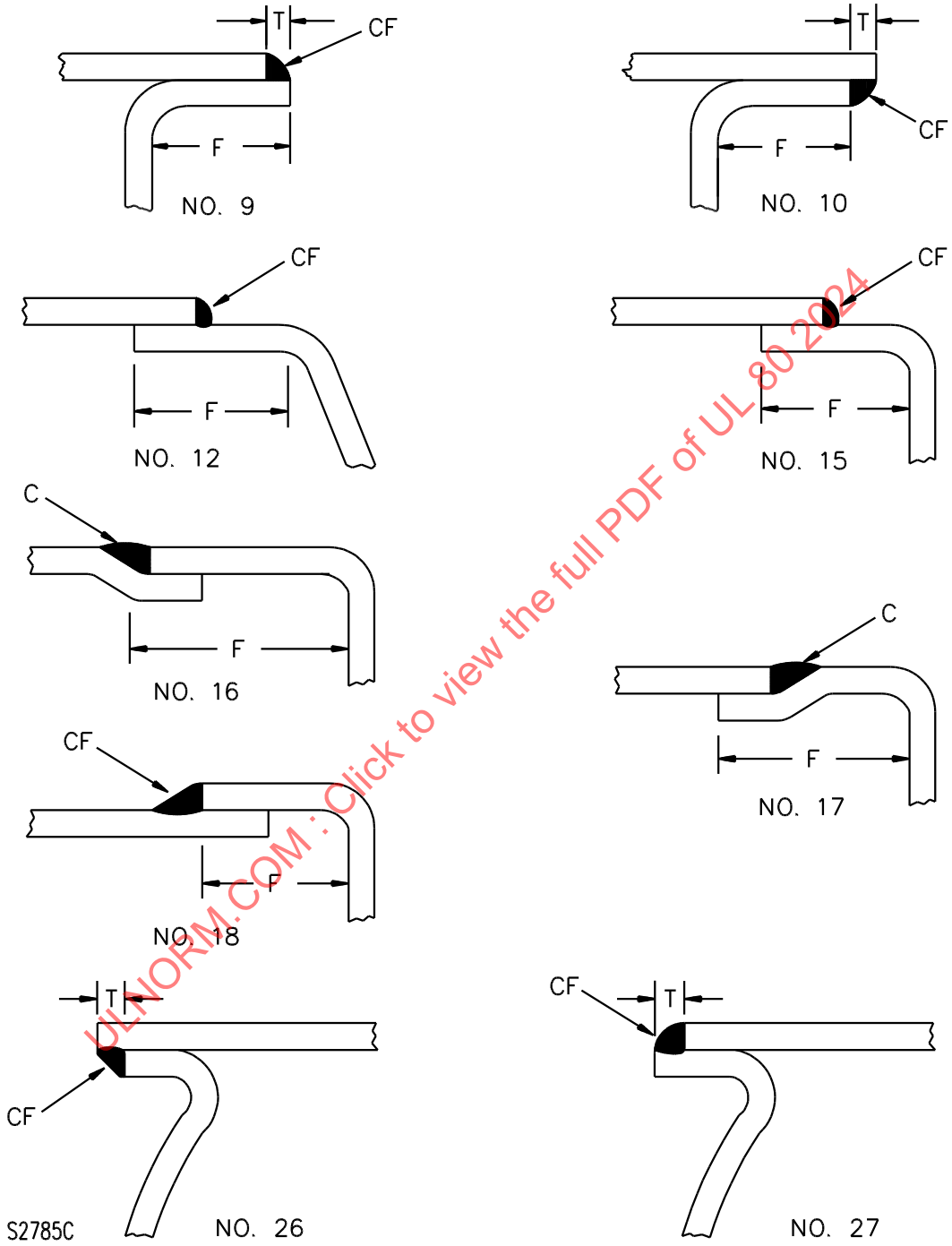
11.1 Head joints shall be one of the forms shown by Table 11.1 as appropriate for the tank type, shape, and orientation.

Table 11.1
Head joints

Tank type	Tank shapes		
	Cylindrical	Obround	Rectangular
Primary	Figure 11.1 Heads or Figure 11.2 Bottoms	Figure 11.1 Heads or Figure 11.2 Bottoms	Figure 11.3 Corners
Secondary	Figure 11.1 Heads or Figure 11.2 Bottoms	Figure 11.1 Heads or Figure 11.2 Bottoms	Figure 11.3 Corners
Dikes	Figure 11.1 Heads Figure 11.2 Bottoms	Figure 11.1 Heads Figure 11.2 Bottoms	Figure 11.3 Corners

Figure 11.1

Head joints



C – Continuous weld.

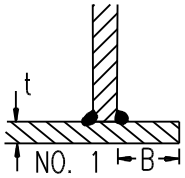
CF – Shall be continuous full fillet welds.

F – Not less than 1/2 inch (12.7 mm).

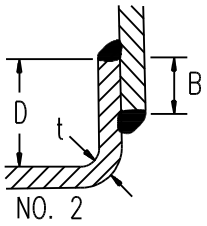
T – Not less than thickness of shell.

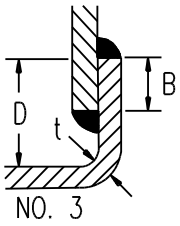
Figure 11.2

Bottom joints

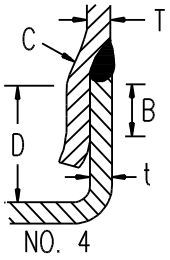


Double-welded full fillet joint; minimum overlap, "B" – 1/2 inch (12.7 mm) or 1-1/2 t, whichever is greater.





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).



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

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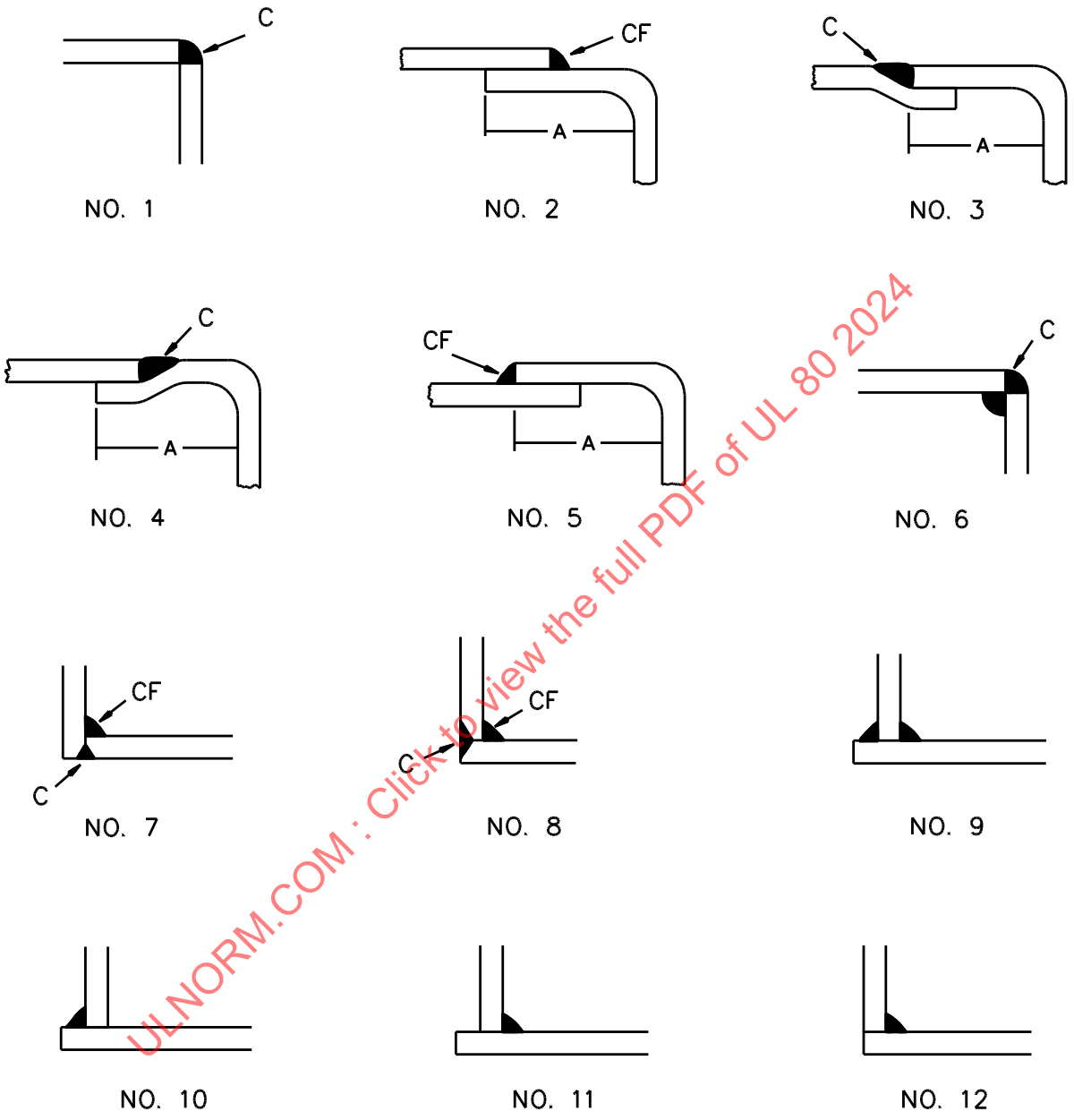
Figure 11.3

Corner joints



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C – Continuous weld.

CF – Shall be continuous full fillet welds.

A – Not less than 1/2 inch (12.7 mm).

12 All Tank-To-Pipe Connections

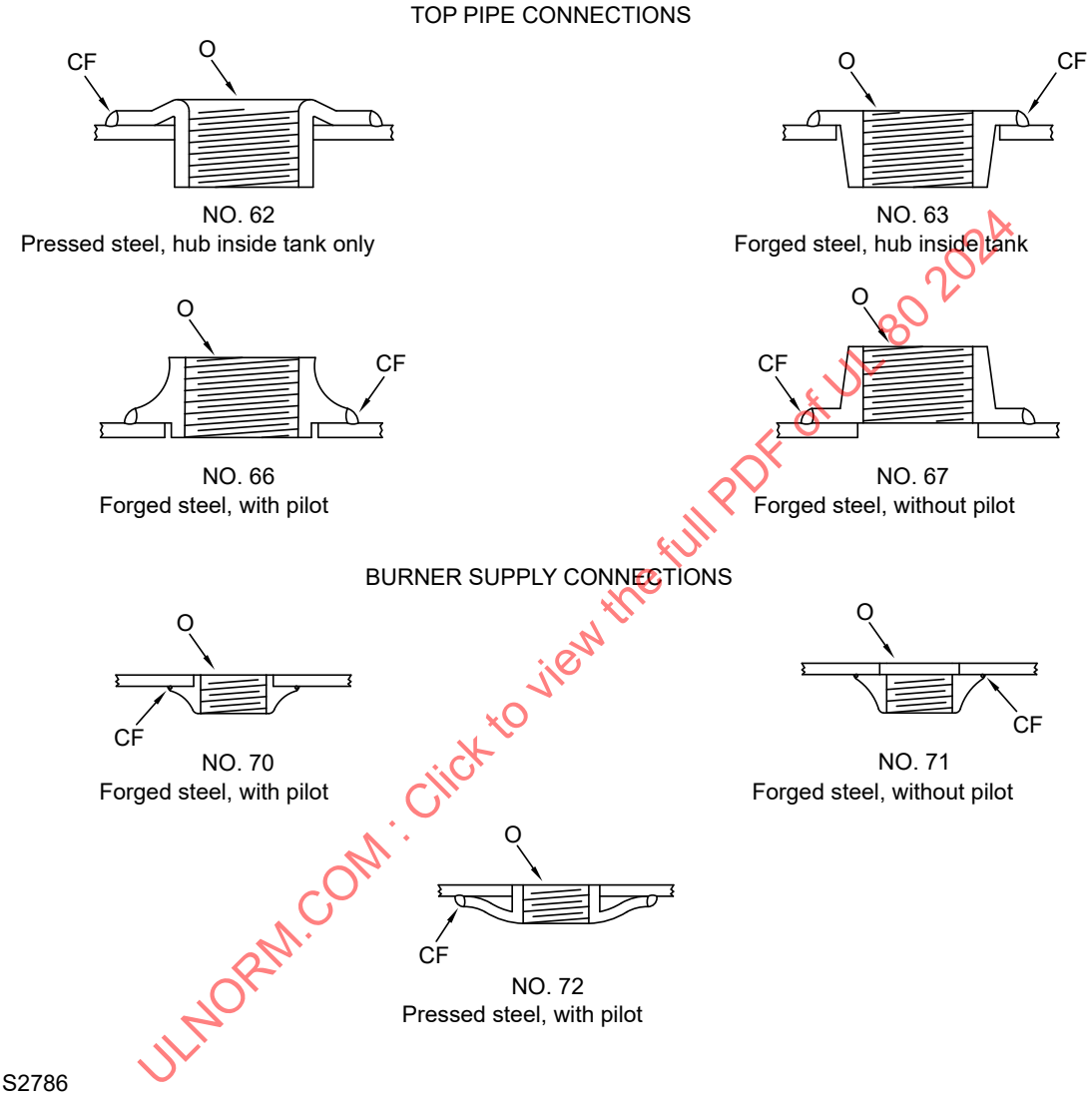
12.1 All pipe connections shall be pipe coupling designs in accordance with the Standard for Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10 in accordance with Figure 12.1, and threaded in accordance with the Standard for Pipe Threads, General Purpose (inch), ANSI/ASME B1.20.1 with minimum thickness and length in accordance with Table 12.1.

12.2 All tank-to-pipe connecting fittings shall be continuously welded to the tank shell with any hub sections installed on the inside of the tank in accordance with Figure 12.1.

12.3 All pipe connection openings in a tank shall be closed with wood plugs, metal or plastic plugs or caps to reduce thread damage and resist moisture or debris from entering the tank while in storage or transit.

Figure 12.1

Top pipe connections



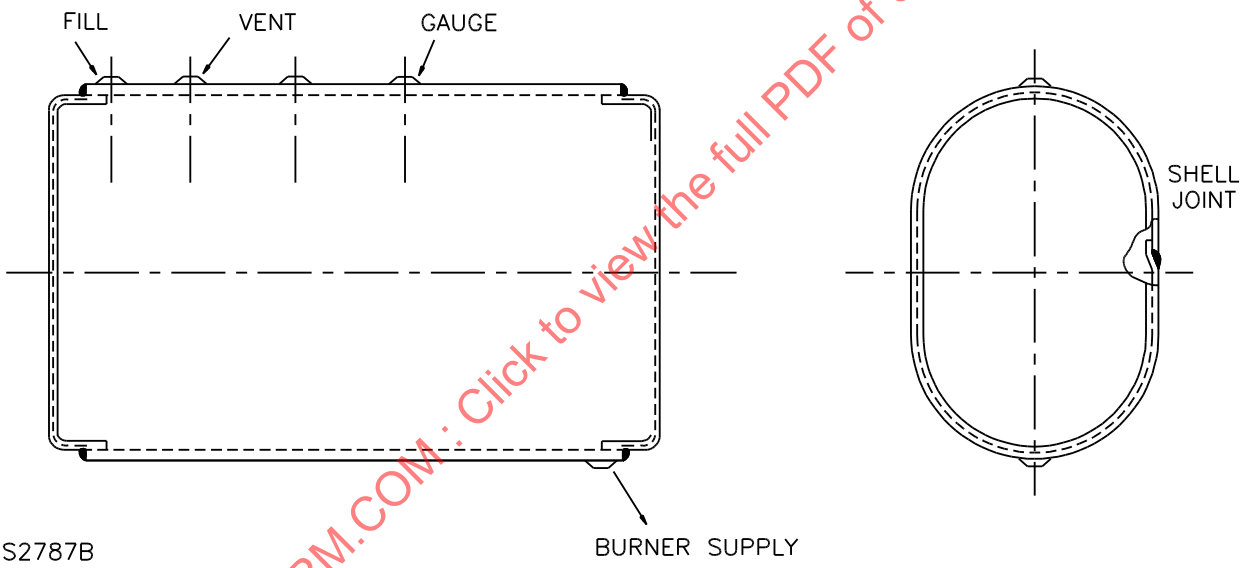
CF – Continuous full fillet weld.

O– Minimum length of thread (see Table 12.1).

Table 12.1
Pipe connections

American Standard Pipe Size, ANSI B36.10 nominal, inches	Minimum length of thread		Minimum thickness of flange section of pressed-steel fittings	
	Inches	(mm)	Inches	(mm)
1/2	11/32	(8.7)	0.093	(2.36)
3/4	11/32	(8.7)	0.093	(2.36)
1	11/32	(8.7)	0.093	(2.36)
2	7/16	(11.1)	0.123	(3.12)
2-1/2	7/8	(22.2)	0.167	(4.24)
3	7/8	(22.2)	0.167	(4.24)

Figure 12.2
Typical obround storage tank



NOTE: The shell and head joints shown are typical. Welds that meet the intent of the requirements are described in Sections 10 and 11.

13 Top Fill, Vent, and Gauge Connections

13.1 All primary tanks shall have at least three threaded openings per Figure 12.1 Nos. 62, 63, 66, or 67 provided in the tank top for field installation of fill piping, vent piping, and a liquid level gauge. These and any additional top openings shall be above the highest liquid level.

13.2 All primary tank top connections shall be of equal size not less than nominal 2 inch [2.375 inch (60.33 mm) O.D.] pipe size. Horizontal tank top connections shall be located along the longitudinal centerline.