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ANSI/CAN/UL/ULC 180:2021

STANDARD FOR SAFETY

Combustible Liquid Tank Accessories

Approved American National Standard
ANSI

ANSI/UL 180-2021

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SCC FOREWORD

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UL Standard for Safety for Combustible Liquid Tank Accessories, ANSI/CAN/UL/ULC 180

Ninth Edition, Dated March 15, 2019

Summary of Topics

This revision of UL/ULC 180 dated August 25, 2021 includes the following changes in requirements:

– Revision to the Manufacturing and Production Leakage Test; 20.1

– Clarification of B100 Rating Option; 16.5.2 and 21.1

– Clarification of Sample Exposures to Applicable Test Liquids & Fuels; 16.5.3

– Addition of UL 62368-1 as an Alternative to UL 60950-1; 9.2

– Editorial correction; 22.1

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

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated January 8, 2021 and March 26, 2021.

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March 15, 2019

This ANSI/CAN/UL/ULC Safety Standard consists of the Ninth Edition including revisions through August 25, 2021.

The most recent designation of ANSI/UL 180 as an American National Standard (ANSI) occurred on August 25, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This standard has been designated as a National Standard of Canada (NSC) on August 25, 2021.

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Documents
Document Sharing Hub

Full document details: UL 180 2021

CONTENTS

Preface **5**

INTRODUCTION

1 Scope 7
2 Units of Measurement 8
3 References 8
4 Glossary 9

CONSTRUCTION

5 General Design and Materials 11
6 Aboveground Piping System Construction 12
7 Fill Signal Devices 13
8 Fill Pipe Covers & Vent Pipe Caps 13
9 Electrical Components 14
10 Liquid Level Gauge 14
11 Optional Liquid Level Gauge Signals 15

PERFORMANCE

12 General Performance 15
12.1 Test Samples 15
12.2 Test Conditions 16
12.3 Test Tanks 16
12.4 Test Pipe 16
12.5 Pressure Tests 16
12.6 Test Fluids 16
12.7 Damage Assessment 16
13 Aboveground Pipe System Pressure Tests 19
13.1 General 19
13.2 Leakage Test 19
13.3 Hydrostatic Test 19
14 Functional Operation Tests 19
14.1 Functional Operation Tests, General 19
14.2 Fill Signal Test 20
14.3 Liquid Level Gauge Test 22
14.4 Fill & Vent Cap Tests 22
15 Assembly and Use Tests 22
15.1 General 22
15.2 Drop Test 23
15.3 Torque and Connection Test 23
15.4 Impact Test 23
15.5 Puncture Test 24
15.6 Pipe Torque Test 24
15.7 Pull Test 25
15.8 Crush Test 25
15.9 Bend Test 26
16 Exposure and Compatibility Tests 27
16.1 General 27
16.2 Thermal Aging Test 28
16.3 UV Light Exposure Test 28

AVA Documents
Document Sharing Hub

Full document details: UL 180 2021

16.4 Salt Fog Exposure Test 29
16.5 Fuels & Fluids Compatibility Tests 30
16.6 Repeat Functional Operation after Exposure and Compatibility Tests 31
16.7 Metallic Stress Crack Test 32
16.8 Nonmetallic Stress Crack Test 32
17 Special Tests 32
17.1 General 32
17.2 Pressure/Vacuum Strength Test 33
17.3 Rain Test 33
17.4 Icing Test 35
17.5 Endurance Test 35
17.6 Interstitial Communication Test 35
17.7 Flow Test 36
18 Pipe Cyclic Use Test 36
18.1 General 36
18.2 Vibration Test 36
18.3 Surge Test 37
18.4 Flex Tests 37
19 Fire Test 38

MANUFACTURING AND PRODUCTION TESTS

20 General 39

MARKINGS AND INSTRUCTIONS

21 General Marking Information 39
22 General Instruction Information 41

APPENDIX A (NORMATIVE) – TEST FUEL FORMULATIONS

A1 Representative Aggressive Combustible Liquids Test Fuel Mixtures 43

APPENDIX B (INFORMATIVE) – OPTIONAL CLIMATE CHANGE ADAPTATION REQUIREMENTS

B1 General 44
B2 Temperatures 44
B3 UV Light 44
B4 Rain, Snow & Ice 44
B5 Climate Change Factors Not Applicable to this Standard 44

APPENDIX C (INFORMATIVE) – REFERENCE PUBLICATIONS

Documents
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Full document details: UL 180 2021

Preface

This is the Ninth Edition of the ANSI/CAN/UL/ULC 180, Standard for Combustible Liquid Tank Accessories.

UL is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

This Standard has been developed in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization. ULC Standards is accredited by the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

Only metric SI units of measurement are used in this Standard. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

Appendix A, identified as normative, forms a mandatory part of this Standard.

Appendices B and C, identified as informative, are for information purposes only.

This ANSI/CAN/UL/ULC 180 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages

This Joint American National Standard and National Standard of Canada is based on, and now supersedes, the Eighth Edition UL 180, Standard for Liquid-Level Gauges for Oil Burner Fuels and Other Combustible Liquids, and the First Edition of ULC/ORD-C180-97, Other Recognized Document for Liquid Level Gauges and Indicators for Fuel Oil and Lubricating Oil Tanks.

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This Edition of the Standard has been formally approved by the Joint UL/ULC Technical Committee (TC) on Combustible Liquid Tanks and Accessories, TC 2258.

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This list represents the TC 2258 membership when the final text in this standard was balloted. Since that time, changes in the membership may have occurred.

TC 2258 Membership

Name	Representing	Interest Category	Region
Beaulieu, Michel	Roth Industries Inc.	Producer	USA
Bourassa, Eric	Granby Industries L.P.	Non-voting	Canada
Corliss, Chuck	NH Department of Environmental Services	AHJ	USA
Deschamps, Claude	Régie du Bâtiment du Québec (RBQ)	AHJ	Quebec
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This Standard is intended to be used for conformity assessment.

The intended primary application of this standard is stated in its scope. It is important to note that it remains the responsibility of the user of the standard to judge its suitability for this particular application.

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INTRODUCTION

1 Scope

1.1 This Standard covers construction and performance requirements for the tank accessories identified in Clause 1.2, for use on atmospheric aboveground tanks not exceeding 19,927 L (5,000 U.S. gal) which are intended for the storage and supply of heating fuels for oil burning equipment, diesel fuels for compression ignition engines, motor oils (new or used) for automotive service stations, and similar combustible liquid applications.

In addition to this Standard's traditional safety requirements for tank accessories that primarily evaluate functional operation, structural integrity, and mitigate fire and environmental hazards from loss of liquid containment under expected normal conditions; optional construction and/or performance requirements, and associated ratings, intended to address more severe conditions associated with the effects of Climate Change are included in Appendix B.

1.2 These requirements cover the following tank accessories intended for installation in, on or connected to the storage tank or supply tank in accordance with the manufacturer's instructions:

a) Liquid Level Gauges – mechanical float, low-voltage electric, or other types with integral or remote indicators;

b) Fill Signal Devices –indicating devices with audible and/or visual signals, including "whistle vent" alarms;

c) Aboveground Piping Systems – aboveground pipe and fittings for tank fill & venting and supply of utilization equipment, including flexible hose; and

d) Fill Pipe Covers & Vent Pipe Caps.

1.3 These requirements do not cover any tank accessories for products covered by the requirements of:

a) UL 565 and ULC/ORD-C565 for electrical liquid level gauges for flammable liquid tanks;

b) UL 1238 and CAN/CSA-C22.2 No. 61010-1 for electrical fill signal devices for flammable liquid tanks;

c) UL 971, UL 971A, or CAN/ULC-S679 for underground piping systems, or UL 2039 or CAN/ULC-S633 for flexible connector pipe;

d) UL 1238 and CAN/ULC-S675.1 or CAN/ULC-S675.2 for leak detection devices for flammable liquid tanks;

e) UL 2583 for fill pipe covers, pressure vacuum vents or emergency vents for flammable liquid tanks;

f) UL 2085 and CAN/ULC-S661 for spill containment devices for flammable liquid tanks;

g) UL 2085 and CAN/ULC-S663 for overfill prevention devices for flammable liquid tanks;

h) UL 331 and ULC/ORD-C331 for filters and strainers for flammable and combustible liquids; or

i) UL/ULC 1369 for requirements applicable to larger diameter piping for flammable and combustible liquids intended for motor vehicle fueling and generator supply applications.

1.4 The products covered by this Standard are intended for installation and use in accordance with the applicable Codes and Regulations as determined by the Authority Having Jurisdiction (AHJ), such as:

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a) In the United States:

1) Flammable and Combustible Liquids Code, NFPA 30;

2) Code for Motor Fuel Dispensing Facilities and Garages, NFPA 30A;

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

4) Uniform Fire Code, NFPA 1;

5) International Fire Code published by the International Fire Council; and/or

6) Other applicable federal and state regulations for combustible liquid tank accessories.

b) In Canada:

1) The National Fire Code of Canada;

2) CAN/CSA-B139, Installation Code for Oil Burning Equipment;

3) CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products; and/or

4) Provincial or other Regulations.

1.5 Except for optional Climate Change Adaptation requirements in Appendix B, these requirements do not cover special evaluations for resistance to, or use after, earthquakes, floods, high wind events, or other natural disasters; or resistance to vehicle impact.

NOTE 1: See the Note at the beginning of Appendix B for further information on the terms “Adaptation” and “Mitigation”, as they pertain to Climate Change.

1.6 These requirements do not cover evaluation of either resistance to, or emission of, electromagnetic interference, or compliance with Federal Communications Commission (FCC) or Industry Canada Department of Communications regulations for electrical products with local or remote signal features, or the effectiveness of optional wired or wireless signal communications to remote service providers or central station monitors.

1.7 These requirements do not cover any applications with flammable liquids, or for electric gauging or signaling, use in hazardous (classified) locations, or waste oils that may contain high levels of contaminants and/or flammable liquids.

1.8 These requirements do not cover the use of accessories with waste oils or other combustible liquids with different physical or material compatibility properties than they are evaluated for, but do cover use with bio diesel blends up to 20 %, or up to 100 % bio diesel if optionally tested.

2 Units of Measurement

2.1 When a value for measurement is followed by a value in other units in parentheses, the second unit is only approximate. The first stated value is the requirement.

3 References

3.1 Refer to Appendix C for a list of publications referenced in this Standard. 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. When the latest edition of a Standard is not applicable, the appropriate edition is indicated accordingly in Appendix C.

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4 Glossary

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

4.2 ABOVEGROUND – Physically located on or above the earth's surface. Aboveground location ratings include:

a) Indoor – Locations generally protected after installation from physical damage, extreme temperatures, precipitation and sunlight, which typically include inside buildings that are occupied and environmentally controlled; and

b) Outdoor – Locations generally unprotected after installation from physical damage, extreme temperatures, precipitation and sunlight, which for pipe runs can include on exterior structures, within below grade sumps, and underground where routed through chase piping (but not direct burial).

4.3 ABOVEGROUND PIPING SYSTEMS – Combinations of small diameter pipe, tubing, or hose and their connection or termination fittings for containment and transfer of combustible liquids in applications identified in the scope of this Standard. Aboveground piping system may be of different containment designs for different application types:

a) Fill & Vent Pipe – Intended for transfer of liquids from a delivery truck to a supply tank and venting of displaced vapors in the tank during fill operations. Vent pipe also provides combined normal and emergency venting of the tank. These pipes are typically rigid types in the 25.4 mm to 101.6 mm (1.0 in to 4.0 in) size range;

b) Flexible Hose – Special highly flexible hose connectors of short length/small diameter intended for transfer of liquids typically from a supply pipe end to the utilization equipment, where tight bending and frequent disconnection for installation and maintenance is required. Flexible hose are typically elastomeric hose with metal braid sleeves in a 1/4" to 3/8" size range;

c) Special piping/tubing – Engineered piping or tubing that does not conform to common tubing standards (i.e. Schedule or SDR) for dimension or wall thickness as part of an engineered piping system for filling and venting of above ground combustible liquid tanks; or

d) Supply Pipe – Intended for transfer of liquids from a fuel storage tank or supply tank to utilization equipment, such as an oil burner or diesel generator. These pipes are typically flexible in the 9.5 mm to 25.4 mm (3/8 in to 1.0 in) size range.

4.4 COMBUSTIBLE LIQUIDS – A wide range of Class II and III liquids that has a closed cup flash point equal to or above 37.8 °C (100 °F). Combustible Liquid types include:

a) Bio Diesel – General description of various Class II to IIIB range of long chain fatty acid ester fuels complying with the ASTM D6751, Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, processed from vegetable oils or animal fats in pure form (B100). Bio diesel may also be blended with heating fuels or diesel fuels (B1 to B99) denoting the percent volume of bio diesel in the mix;

NOTE: "triglyceride fuels" using alternative oil sources and production processes are covered under the ASTM D6751 blendstock or ASTM D975 and ASTM D396 finished fuel specifications.

b) Diesel Fuels – General description of various Class II petroleum distillate grades complying with the Standard Specification for Diesel Fuel Oils, ASTM D975, or CGSB-3.520, 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;

NOTE: these fuels may contain up to 5 % biodiesel (B5) without identification of the blend percentage, and 6 % to 20 % biodiesel (B6 to B20) is covered under ASTM D7467, but also without identification of the blend percentage.

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c) Heating Fuels – General description of various Class II petroleum distillate grades complying with the Standard Specification for Fuel Oils, ASTM D396, or CGSB-3.2; or the Standard Specification for Kerosene, ASTM D3699 or CGSB-3.3, including No. 1 and No. 2 Fuel Oils (also known as oil burner fuel, including low sulfur distillates and bio diesel blends); or K1 Kerosene typically intended for use in oil burning equipment;

NOTE: only ASTM D396 Grade 1 & 2 or CGSB-3.2 Heating Fuel may contain up to 5 % biodiesel without identification of the blend percentage, and ASTM D396 Grade B6 to B20 may contain between 6 % and 20 % biodiesel without identification of the blend percentage, but ASTM D3699 or CGSB-3.2 Kerosene is not permitted to have any biodiesel.

d) Motor Oil – 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; and

e) Used Oil – 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 or supply tank.

4.5 FILL PIPE COVER – A transition fitting with mating top cover intended to be fixed on the end of a threaded tank fill pipe to resist rain entry and vapor escape. The twist on/off cap completely covers the opening but can be removed during fill operations.

4.6 FILL SIGNAL DEVICE – A device that provides an automatic and continuous audible or visual indication to the delivery truck operator that the tank has reached the rated fill level. Whistle vent alarms are venturi type fill signal devices that are installed into the top vent opening prior to the vent pipe and produce a whistle to indicate proper venting during the fill operation.

4.7 HIGH (LINE) VOLTAGE – Any plug outlet or field wired source of electricity from the power grid, nominally 115 volts and 60 hz.

4.8 LOW (CLASS 2) VOLTAGE – An electrical potential of not more than 30 Vac (rms) or 42.4 V (dc or peak ac) supplied by:

a) An energy-limiting direct plug-in, cord connected or field wired Class 2 transformer;

b) A dry cell battery having output characteristics no greater than those of an energy-limiting Class 2 transformer;

c) The combination of an isolated transformer secondary winding and a fixed impedance or reliable regulating network which complies with the performance requirements of an energy-limiting Class 2 transformer; or

d) The combination of a rechargeable battery and a fixed impedance or reliable regulating network which complies with the performance requirements of an energy-limiting Class 2 transformer.

4.9 PIPE CONTAINMENT DESIGNS – Aboveground piping systems having different liquid containment levels and optional jacket features as follows:

a) Primary (aka Single Wall) Pipe – A single wall pipe construction intended for long term normal containment of combustible liquids. Primary pipe designs are typically of flexible tubing connected with standard flare compression fittings, or rigid pipe connected with standard threaded or welded fittings, or engineered systems (special fittings and tools/equipment); or

NOTE: Engineered Systems are products, so don't require a Professional Engineer Stamp, such as for designs.

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b) Jackets – A nonmetallic coating factory-applied to the outer wall of the above pipe designs that provides external corrosion protection with, or without, optional leak detection and interstitial communication features;

c) Secondary (aka Double Wall) Pipe – A separate single wall pipe construction that surrounds the primary pipe and is intended to contain combustible liquids under abnormal conditions (such as primary pipe rupture), and provides leak monitoring and interstitial communication.

d) Coaxial – A pipe construction consisting of integral primary pipes and secondary pipes with a defined interstitial space that provides leak monitoring and interstitial communication.

4.10 QUALIFIED PERSON – A worker specifically trained by the manufacturer to perform proper assembly and installation of its products in the field in accordance with the specified instructions. The qualified person is not required to be an employee of the manufacturer.

4.11 SIZE (Pipe Size or Fitting Size) – Nominal or trade dimensions (in or mm) of connector pipe and fittings based on inside diameters or thread.

NOTE: Nominal or trade sizes may not be equivalent to the actual measurements.

4.12 SPECIAL FITTING – Connection of pipe/tube and fittings which are not common types, such as threaded, flanged or welded, and typically require manufacturer supplied components, tools and instructions or training for proper assembly.

4.13 SWING JOINT – A connection or joint design which permits occasional movement of the pipe to relieve stresses.

4.14 SWIVEL JOINT – A connection or joint design which permits frequent movement of the pipe during normal functional use.

4.15 UNION JOINT – A connection or joint design which permits pipe adjustments only during installation or maintenance.

4.16 VENT PIPE CAP – A fitting intended to be fixed on the end of a threaded tank vent pipe to resist rain and insect entry while providing adequate venting capacity during fill operations and fire events.

CONSTRUCTION

5 General Design and Materials

5.1 Tank accessories shall be designed and constructed to resist damage and/or malfunction from expected assembly, installation, environmental and other use conditions for their intended application(s) in accordance with the applicable performance tests described in this Standard.

5.2 Tank accessories are permitted to be designed for indoor or outdoor locations, or indoor use only, but shall be capable of assembly, installation and inspection by consumers, unless qualified persons are required by the marking and instruction details.

5.3 Tank accessories are permitted to be constructed from any combination of materials meeting all applicable performance requirements in this Standard for the marked use and location rating, unless otherwise indicated for the specific tank accessory construction detail. Any test exemptions for some materials are specified in the Performance Sections 12 – 19.

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6 Aboveground Piping System Construction

6.1 All Piping Systems shall meet the following requirements as appropriate for the design type and general material(s). Primary pipes and fittings shall only be of metal. All piping systems containment types shall be rated at least 345 kPa (50 psig).

6.1.1 All piping systems constructed with common stock pipe & fittings shall be evaluated for each different connection method (threaded, welded or flare), but are permitted to be sold separately provided the markings & instructions identify the component combinations and minimum connection parameters evaluated.

6.1.2 All piping systems shall be capable of transitioning at the end fittings to threaded pipe connections of NPT, NPTF, BSPT, BSPP or similar common trade types. Solder shall not be used as a means to join pipes and fittings. Piping systems may have union joints or swing joints, but swivel joints are not permitted, except for flexible hose.

6.1.3 Piping systems constructed from tubing and rated for outdoor use, except for stainless steel types, shall be provided with an extruded cover with, or without, optional shrink fit end sleeves. The covers shall be of the types below, tested with the complete system assembly, and evaluated for the rated function according to:

a) Corrosion Protection (CP) only – Section 15, Assembly & Use Tests, Section 16, Exposure & Compatibility Tests;

b) Leak Transmission (LT) (transfers leaks for end detection) – The above CP tests and Subsection 17.6, Interstitial Communication Test; or

c) Secondary Containment (SC) (sec containment & leak detection) – The above CP and LT tests and Section 13 Pressure Test on Secondary.

6.2 Tubing shall be flexible, intended for flare connections using common flare tools & mating fittings, shall be within a (6.35 mm to 25.4 mm (0.25 in to 1.0-in) size range, supplied in minimum lengths of 6.1 m (20 ft), and meet one of the following construction specifications. “quick-connect” and “push-to-connect” fittings or similar types that are easily disconnected are not permitted:

a) Copper – Types “L” or “ACR” conforming to ASTM B68, B75, B88, B280, B743 or B837;

b) Brass – Types “L” or “ACR” conforming to ASTM B135; or

c) Stainless Steel – Types 304/304L or 316/316L conforming to ASTM A269, ASTM A554 or ASTM A778.

6.3 Pipes shall be rigid, intended for threaded connections using common tools/equipment & mating fittings, shall be within a 25.4 mm to 101.6 mm (1.0 in to 4.0 in) size range, supplied in minimum lengths of 1.2 m (4 ft), and meet one of the following construction specifications.

a) Carbon Steel – Minimum Sch 40 conforming to ASTM A53 & A53M, or ASME B36.10M;

b) Stainless Steel – Minimum Sch 40 Types 304/304L or 316/316L conforming to ASTM A312; or

c) Manufacturer specific pipe/tubing dimensions, wall thickness and pressure rating per engineered system requirements.

6.4 Engineered piping systems that require either special pipes/tubes, fittings, or connection methods or tools/equipment supplied by the manufacturer and/or require assembly by qualified persons, shall meet

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