



UL 506

STANDARD FOR SAFETY

Specialty Transformers

UL Standard for Safety for Specialty Transformers, UL 506

Fourteenth Edition, Dated June 2, 2017

Summary of Topics

This revision of ANSI/UL 506 dated January 28, 2022 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 UL'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 December 3, 2021.

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Fourteenth Edition

June 2, 2017

This ANSI/UL Standard for Safety consists of the Fourteenth Edition including revisions through January 28, 2022.

The most recent designation of ANSI/UL 506 as a Reaffirmed American National Standard (ANS) occurred on January 26, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 506 on December 22, 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 ignition transformers for use with gas burners and oil burners and specialty step-up transformers used in applications such as insect electrocuting. Transformers incorporating overcurrent or over-temperature protective devices, transient voltage surge protectors, or power factor correction capacitors are also covered by these requirements. These transformers are intended to be used in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements do not cover liquid-immersed transformers, variable voltage autotransformers, transformers having a nominal primary rating of more than 600 volts, transformers having overvoltage taps rated over 660 volts, cord and plug connected transformers, garden light transformers, voltage regulators, swimming pool and spa transformers, or other special types of transformers covered in requirements for other electrical devices or appliances.

1.3 These requirements do not cover:

- a) Autotransformers used in industrial control equipment, which are evaluated in accordance with the Standard for Industrial Control Equipment, UL 508.
- b) Class 2 or Class 3 transformers, which are evaluated in accordance with the Standard for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1, and the Standard for Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3.
- c) Toy transformers, which are evaluated in accordance with the Standard for Toy Transformers, UL 697.
- d) Transformers for use with radio- and television-type appliances, which are evaluated in accordance with the Standard for Transformers and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances, UL 1411.
- e) Transformers for use with high intensity discharge lamps, which are evaluated in accordance with the Standard for High-Intensity-Discharge Lamp Ballasts, UL 1029.
- f) Transformers for use with fluorescent lamps, which are evaluated in accordance with the Standard for Fluorescent-Lamp Ballasts, UL 935.
- g) Ventilated transformers for general use or non-ventilated transformers for general use (other than compound filled or exposed core types), which are evaluated in accordance with the Standard for Dry-Type General Purpose and Power Transformers, UL 1561.
- h) Dry-type distribution transformers rated over 600 volts, which are evaluated in accordance with the Standard for Transformers, Distribution, Dry-Type – Over 600 Volts, UL 1562.
- i) Transformers incorporating rectifying or waveshaping circuitry evaluated in accordance with the Standard for Power Units Other Than Class 2, UL 1012.
- j) Transformers of the direct plug-in type evaluated in accordance with the Standard for Class 2 Power Units, UL 1310.
- k) Transformers for use with electric discharge and neon tubing, which are evaluated in accordance with the Standard for Neon Transformers and Power Supplies, UL 2161.
- l) General purpose and industrial control transformers evaluated in accordance with the Standard for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1, and the Standard for Low Voltage Transformers – Part 2: General Purpose Transformers, UL 5085-2.

2 General

2.1 Components

2.1.1 Except as indicated in [2.1.2](#), a component of a product covered by this standard shall comply with the requirements for that component. See Appendix [A](#) for a list of standards covering components generally used in the products covered by this standard.

2.1.2 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.

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

2.1.4 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.

2.2 Units of measurement

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

2.2.2 Unless otherwise indicated, all voltage and current values mentioned in this standard are root-mean-square (rms).

2.3 Undated references

2.3.1 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 COMPOUND-FILLED TRANSFORMER – A transformer in which the windings are enclosed with an insulating fluid that becomes solid, or remains plastic, at intended operating temperatures.

3.3 ENCAPSULATED COIL – A coil that is enclosed with an insulating fluid that becomes solid.

3.4 EXPOSED CORE TRANSFORMER – A transformer with exposed core lamination.

3.5 NONVENTILATED DRY-TYPE TRANSFORMER – A dry-type transformer other than of the compound-filled or exposed core-type that is constructed so as to provide no intentional circulation of ambient air through the transformer and is intended to operate at normal ambient room air pressure.

3.6 VENTILATED DRY-TYPE TRANSFORMER – A dry-type transformer that is constructed so that ambient air may circulate through the enclosure to cool the transformer core and windings.

3.7 WINDING – A continuous conductor made up of a number of turns magnetically coupled to a magnetic core, to which a voltage is either applied or induced. Two or more such conductors that are permanently factory connected together to form intermediate voltage taps, current taps, or the like are considered to be a single winding. The winding can consist of single or parallel-wound conductors.

ALL TRANSFORMERS

CONSTRUCTION

4 Mechanical Assembly

4.1 A transformer shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected. A risk of fire, electric shock, or injury to persons shall not result from a reduction of spacings, loosening or displacement of parts, or other serious defect due to total or partial collapse of the transformer.

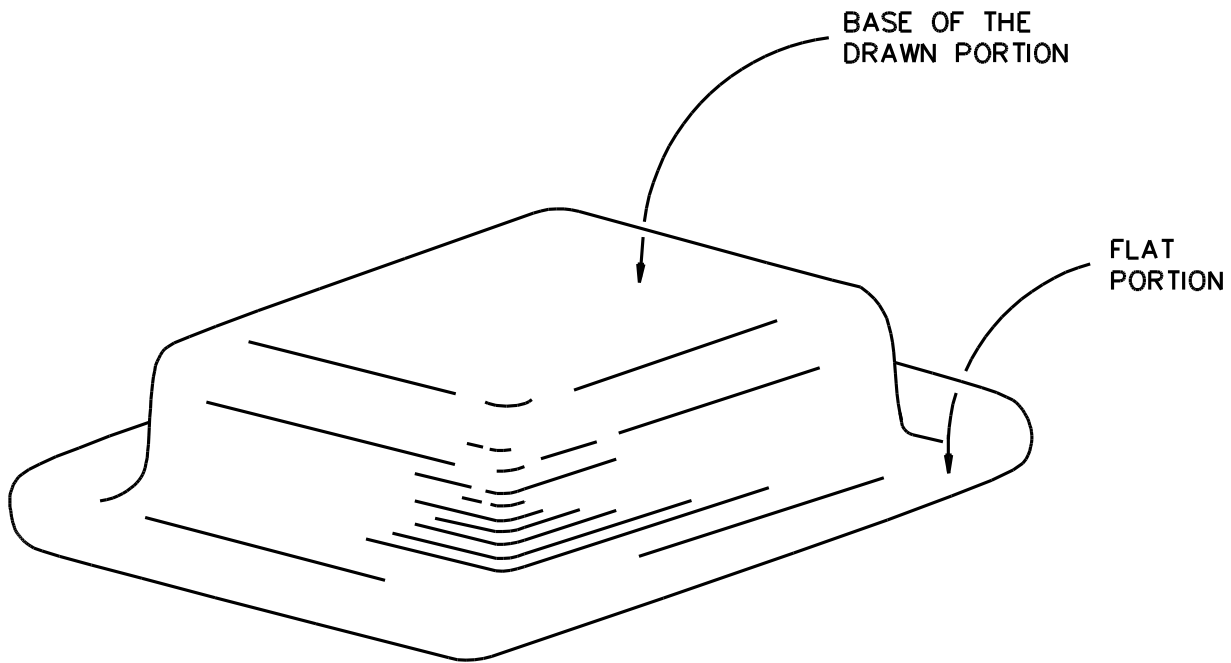
5 Enclosure

5.1 In addition to the overall enclosure, the requirements in [5.2](#) – [5.15](#) apply to those portions of an enclosure surrounding a terminal or wiring compartment.

5.2 A sheet steel enclosure shall be formed from stock having a thickness of not less than 0.026 inch (0.66 mm) if uncoated or not less than 0.029 inch (0.74 mm) if zinc coated.

Exception: Sheet steel having a thickness of not less than 0.020 inch (0.51 mm) if uncoated or not less than 0.023 inch (0.58 mm) if zinc coated may be used for drawn end bells having a maximum width or length of 2-1/4 inches (57.2 mm) on the flat portion and 1-1/2 inches (38.1 mm) at the base of the drawn portion. [Figure 5.1](#) illustrates these portions of an end bell.

Figure 5.1
End bell



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5.3 A sheet aluminum enclosure shall be formed from stock having a thickness of not less than 0.040 inch (1.02 mm).

5.4 The thickness of a sheet steel enclosure is determined by taking the numerical average of five micrometer readings equally spaced across the full width of the sheet as rolled.

5.5 The thickness of an enclosure of nonferrous sheet metal shall provide strength and rigidity not less than that of an enclosure of sheet steel as described in [5.2](#).

5.6 A cast iron enclosure shall not be less than 1/8 inch (3.2 mm) thick at any point and of greater thickness at reinforcing ribs and edges of doors or covers.

5.7 A cast iron enclosure shall not be less than 1/4 inch (6.4 mm) thick at tapped holes for conduit.

5.8 If threads for the connection of conduit are tapped all the way through a hole in a transformer enclosure, or if an equivalent construction is used, there shall not be less than 3-1/2 or more than 5 threads in the metal. The construction shall enable the secure attachment of a standard conduit bushing.

5.9 If threads for the connection of conduit are tapped only part of the way through a hole in the enclosure, there shall not be less than 5 full threads in the metal. There shall be a smooth, well-rounded inlet hole to provide a passage equivalent to that provided by a standard conduit bushing.

5.10 A transformer intended to be supported by rigid metal conduit shall have conduit hubs with not less than 5 full threads or other equivalent supporting means of such strength that these parts would comply with the requirements specified in the Pullout, Bending, and Twisting Tests, Section [16](#).

5.11 A knockout for the connection of conduit to a wiring compartment of a transformer shall be constructed in accordance with [Table 5.1](#).

Table 5.1
Dimensions of conduit bushings and diameter of knockouts and widths of flat surrounding surfaces

Trade size of conduit, inches	Bushings				Knockout diameter				Minimum width of flat surrounding surface,	
	Overall diameter,		Height,		Minimum,		Maximum,			
	inches	(mm)	inches	(mm)	inches	(mm)	inches	(mm)	inch	(mm)
1/2	1	(25.4)	3/8	(9.5)	0.859	(21.82)	0.906	(23.01)	0.13	(3.4)
3/4	1-15/64	(31.4)	27/64	(10.7)	1.094	(27.79)	1.141	(29.98)	0.16	(4.1)
1	1-19/32	(40.5)	33/64	(13.1)	1.359	(34.52)	1.406	(35.71)	0.20	(5.0)
1-1/4	1-15/16	(49)	9/16	(14.3)	1.719	(43.66)	1.766	(44.86)	0.27	(7.0)
1-1/2	2-13/64	(56)	19/32	(15.1)	1.969	(50.01)	2.016	(51.21)	0.31	(7.8)
2	2-45/64	(68.7)	5/8	(15.9)	2.453	(62.31)	2.50	(63.50)	0.36	(9.2)
2-1/2	3-7/32	(81.8)	3/4	(19.1)	2.953	(75.01)	3.00	(76.20)	0.30	(7.8)
3	3-7/8	(98.4)	13/16	(20.6)	3.578	(90.88)	3.625	(92.08)	0.33	(8.3)
3-1/2	4-7/16	(113)	15/16	(23.8)	4.094	(103)	4.156	(105)	0.34	(8.6)
4	4-31/32	(126)	1	(25.4)	4.609	(117)	4.672	(118)	0.38	(9.7)
5	6-7/32	(158)	1-3/16	(30.2)	5.688	(144)	5.750	(146)	0.48	(12).2
6	7-7/32	(183)	1-1/4	(31.8)	6.781	(172)	6.844	(173)	0.56	(14.2)

5.12 There shall be space provided within a terminal or wiring compartment for a standard conduit bushing to be mounted on rigid metal conduit connected to the compartment.

5.13 Wires within an enclosure, compartment, raceway, or the like shall be located or guarded to reduce the risk of contact with any sharp edge, burr, fin, or moving part, that may cause damage to the conductor insulation.

5.14 Wiring space or other compartments provided for field wiring shall be free of any sharp edge, burr, fin, moving part, or sharp point of a sheet metal screw that may cause damage to the conductor insulation or cause a cut-type injury.

5.15 An edge, projection, or corner of an enclosure, opening, frame, guard, knob, or handle of a device shall be smooth and rounded and not sharp to cause a cut-type injury when contacted during intended use or maintenance.

6 Corrosion Resistance

6.1 The internal and external surfaces of an enclosure of iron or steel, other than stainless steel, shall be corrosion resistant. Examples of corrosion resistance means that comply with these requirements are galvanizing, plating, and enameling.

Exception No. 1: An interior surface covered by compound need not be additionally resistant to corrosion.

Exception No. 2: A Type 1 or Type 2 enclosure need not be additionally resistant to corrosion if it complies with the rust resistance test described in the Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations, UL 50.