UL 1561

STANDARD FOR SAFETY

Dry-Type General Purpose and Power Transformers

UL Standard for Safety for Dry-Type General Purpose and Power Transformers, UL 1561

Fourth Edition, Dated March 2, 2011

Summary of Topics

This revision of ANSI/UL 1561 dated August 31, 2023 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 June 16, 2023.

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UL 1561

Standard for Dry-Type General Purpose and Power Transformers

Prior to the first edition, the requirements for the products covered by this standard were included in a supplement to the Standard for Specialty Transformers, UL 506.

Prior to March 27, 1987, the first edition was titled the Standard for Large General Purpose Transformers.

First Edition – January, 1986
Second Edition – April, 1994
Third Edition – March, 1999

Fourth Edition

March 2, 2011

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through August 31, 2023.

The most recent designation of ANSI/UL 1561 as a Reaffirmed American National Standard (ANS) occurred on August 31, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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 ULSE's Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover:

a) General purpose and power transformers of the air-cooled, dry, ventilated, and nonventilated types to be used in accordance with the National Electrical Code, ANSI/NFPA 70. Constructions include step up, step down, insulating, and autotransformer type transformers as well as air-cooled and dry-type reactors or

b) General purpose and power transformers of the exposed core, air-cooled, dry, and compound-filled types rated more than 10 kVA to be used in accordance with the National Electrical Code, ANSI/NFPA 70. Constructions include step up, step down, insulating, and autotransformer type transformers as well as air-cooled, dry, and compound-filled type reactors.

1.2 These requirements do not cover ballasts for high intensity discharge (HID) lamps (metal halide, mercury vapor, and sodium types) or fluorescent lamps, exposed core transformers, compound-filled transformers, liquid-filled transformers, voltage regulators, general use or special types of transformers covered in requirements for other electrical equipment, autotransformers forming part of industrial control equipment, motor-starting autotransformers, variable voltage autotransformers, transformers having a nominal primary or secondary rating of more than 600 volts, or overvoltage taps rated greater than 660 volts.

1.3 These requirements do not cover transformers provided with waveshaping or rectifying circuitry. Waveshaping or rectifying circuits may include components such as diodes and transistors. Components such as capacitors, transient voltage surge suppressors, and surge arresters are not considered to be waveshaping or rectifying devices.

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. See Appendix A for a list of standards covering components used in the products covered by this standard.

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 Units of Measurement

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

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

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

5.3 ENCAPSULATED COIL – A coil that

a) Is enclosed with an insulating fluid that becomes solid and

b) Can be used in either a ventilated or nonventilated transformer.

5.4 EXPOSED CORE TRANSFORMER – A transformer with exposed core laminations.

5.5 K-FACTOR – A rating optionally applied to a transformer indicating its suitability for use with loads that draw nonsinusoidal currents. The K-factor equals:

$$\sum_{h=1}^{\infty} I_h (pu)^2 h^2$$

in which:

I_h(pu) is the rms current at harmonic "h" (per unit of rated rms load current) and

h is the harmonic order.

K-factor rated transformers have not been evaluated for use with harmonic loads where the rms current of any singular harmonic greater than the tenth harmonic is greater than 1/h of the fundamental rms current.

5.6 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 air pressure.

5.7 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.

CONSTRUCTION

6 Mechanical Assembly

6.1 A transformer shall be complete when it is shipped from the factory.

Exception No. 1: A transformer that is complete for indoor use may have provision for a field-added rainproof hood if the transformer is marked in accordance with 38.9.2 and 38.9.3.