



C22.2 No. 66.3-06
(reaffirmed 2020)

Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers



Legal Notice for Standards

Canadian Standards Association (operating as "CSA Group") develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document's fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party's intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group's and/or others' intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



Update No. 1

C22.2 No. 66.3-06

November 2012

Note: For information about the **Standards Update Service**, go to **shop.csa.ca** or e-mail **techsupport@csagroup.org**.

Title: *Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers* — originally published April 2006

The following revisions have been formally approved and are marked by a vertical line in the margin on the attached replacement pages:

Revised	Title page, copyright page, Contents, Preface, Clauses 1.3, 29.2, and 34.1, and Table 7
New	Clauses 11.6 and D1.4 and Figure D1.1
Deleted	None

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.



CSA Group
CSA C22.2 No. 66.3-06
First Edition



Underwriters Laboratories Inc.
UL 5085-3
First Edition

Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

April 17, 2006

(Title Page Reprinted: November 30, 2012)



ANSI/UL 5085-3-2012

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as "CSA Group") and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

ISBN 1-55436-211-3 © 2006 CSA Group

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This Standard is subject to periodic review, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquires@csagroup.org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

To purchase CSA Group Standards and related publications, visit CSA Group's Online Store at shop.csa.ca or call toll-free 1-800-463-6727 or 416-747-4044.

Copyright © 2012 Underwriters Laboratories Inc.

The most recent designation of ANSI/UL 5085-3 as a Reaffirmed American National Standard (ANS) occurred on November 30, 2012. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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 <http://csds.ul.com>.

To purchase UL Standards, visit Comm 2000 at http://www.comm-2000.com/help/how_to_order.aspx or call toll-free 1-888-853-3503.

CONTENTS

Preface	5
1 Scope	7
4 Construction	7
6 Enclosure	8
6.1 General	8
8 Connections	9
8.2 Wiring terminals	9
8.5 Leads	9
11 Spacings and Insulation	10
11.2 Insulating material for mounting of low voltage live parts	10
11.3 Coil insulation	10
11.4 Insulation in lieu of spacings	10A
11.5 Spacings	10A
11.6 Separation of internal wiring circuits	10A
12 Switches, Protective Devices, and Wiring Devices	10B
12.3 Protective devices	10B
12.4 Separate current-limiting impedances	12
12.5 Overtemperature protective devices	12
17 Markings	12
17.1 General	12
17.3 Ratings	12
17.4 Details	13
18 Tests	14
27 Open Circuit Secondary Voltage Test	15
28 Output Current and Power Test	16
28.1 Maximum current output of inherently limited transformers	16
28.2 Maximum current of non-inherently limited transformers	17
28.3 Maximum power of non-inherently limited transformers	17
29 Calibration Test of Overcurrent Protective Devices	19
30 Rated Secondary Current Test	19
31 Rated Output Heating Test	19
32 Dielectric Voltage-Withstand Test	21
32.1 General	21
32.2 Induced potential	22
33 Overload Heating Test	22
33.1 General	22
33.2 Procedure	23
34 Dielectric Voltage-Withstand After Overload Heating Test	24
35 Overload Test of Overcurrent or Overtemperature Protective Devices	24
36 Endurance Test of Automatically Reset Overtemperature Protective Devices	24
37 Strain Relief Test	25
Annex A (Informative)	
A1 Production Line Dielectric Voltage Withstand Test	31

Annex C (Informative)

C1 French Translations of Markings32

Annex D (Normative)

D1 Class 3 Transformers33
D1.1 General33
D1.2 Marking33
D1.3 Tests34
D1.4 Leakage current test36

Preface

This is the harmonized CSA Group and UL standard for low voltage transformers. It is the first edition of CSA C22.2 No. 66.3 and the first edition of UL 5085-3. This harmonized standard has been jointly revised on November 30, 2012. For this purpose, CSA Group and UL are issuing revision pages dated November 30, 2012.

This harmonized standard was prepared by a Technical Harmonization Committee comprised of members from CSA Group, Underwriters Laboratories Inc. (UL), and representatives of the low voltage transformer manufacturing industry. The efforts and support of the members of the Technical Harmonization Committee are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This standard was reviewed by the CSA Subcommittee on C22.2 No. 66, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This Standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of harmonization

This standard uses the IEC format but is not based on, nor is it to be considered equivalent to, an IEC standard. This standard is published as an equivalent standard for CSA Group and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Reasons for Differences from IEC

The Technical Harmonization Committee identified the following IEC Standard within the scope of this standard: IEC 61558-1 (1998-07), Safety of power transformers, power supply units, and similar - Part 1: General requirements.

The THC determined that the safe use of transformers and reactors is critically dependent on the electrical system in which they are intended to be installed. Significant investigation is required to assess safety and system compatibility issues that may lead to harmonization of traditional North American transformers and reactors with those presently addressed in the known IEC standards. The THC agreed such future investigation might be facilitated by completion of harmonization of North American standards for transformers and reactors.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one literal interpretation has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

CSA Group Effective Date

The effective date for CSA Group will be announced through CSA Informs or a CSA Group certification notice.

UL Effective Date

This Standard is now in effect.

Parts

The Standard for Low Voltage Transformers is divided into the following parts:

Part Number	Standard Title	Standard Number
1	General Requirements	CSA C22.2 No. 66.1/UL 5085-1
2	General Purpose Transformers	CSA C22.2 No. 66.2/UL 5085-2
3	Class 2 and Class 3 Transformers	CSA C22.2 No. 66.3/UL 5085-3

NOTES –

1. Part 1 covers the general requirements for transformer characteristics, marking, construction, and tests. Additional specific requirements are provided in the subsequent parts.
2. Part 2 and Part 3 supplement requirements and/or modify the corresponding clauses in Part 1 and should be applied together with Part 1. The numbered clauses in Part 2 and Part 3 correspond to the numbered clauses in Part 1.

PART 3: CLASS 2 AND CLASS 3 TRANSFORMERS

1 Scope

1.1 As noted in Low Voltage Transformers – Part 1: General Requirements, UL 5085-1, or CSA C22.2 No. 66.1, Low Voltage Transformers – Part 1: General Requirements, the requirements in Part 3 cover Class 2 transformers for use with Class 2 circuits in accordance with the National Electrical Code, ANSI/NFPA 70, or the Canadian Electrical Code, Part I, CSA C22.1. They are intended for connection to essentially sinusoidal supply sources.

Advisory Note: For transformers intended for use in the United States, these requirements also cover Class 3 transformers for use with Class 3 circuits in accordance with the National Electrical Code, ANSI/NFPA 70, unless otherwise specified in this standard. See Annex D for Class 3 requirements.

1.3 In addition to the items specified in Clause 1.3 of Part 1, the requirements of Part 3 do not cover:

- a) Power supplies (a transformer provided with a rectifier is considered a power supply);
- b) Toy transformers;
- c) Cord and plug connected transformers other than Class 3;
- d) Direct plug-in transformers;
- e) Transformers intended for use in audio, radio, or television type appliances; or
- f) Other special types of transformers covered in requirements for other electrical devices or appliances.

Advisory Note: The requirements of Part 3 do not cover transformers intended for use in the United States having a nominal primary rating of more than 600 V and transformers having overvoltage taps rated over 660 V.

1.7 This part is intended to be used in conjunction with Part 1. The numbering of the clauses in Part 3 corresponds to the numbered clauses in Part 1. The requirements in Part 1 apply unless modified by Part 3.

1.8 A Class 2 transformer that includes a separate current-limiting impedance such as a resistor or a positive temperature coefficient device (PTC) is covered by these requirements.

1.9 A Class 2 transformer that includes a resonance regulating circuit is covered by these requirements.

4 Construction

4.2 A Class 2 transformer shall have only one secondary winding, which shall be insulated from the primary winding. A winding having intermediate taps is considered a single winding.

Note 1: Two or more secondary windings may be considered as a single winding and interposing insulation between the secondary windings is not required if the windings, when interconnected, are in compliance with the performance requirements for a single-winding construction.