

INTERNATIONAL STANDARD



This extended version of IEC 61558-2-3:2023 includes the content of the references made to IEC 61558-1:2017

GROUP SAFETY PUBLICATION

**Safety of transformers, reactors, power supply units and combinations thereof –
Part 2-3: Particular requirements and tests for ignition transformers for gas and
oil burners**

Document Preview

[IEC 61558-2-3:2023](https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023)

<https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023>





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International Standards
standards.iteh.ai
Document Preview

[IEC 61558-2-3:2023](https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023)

<https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023>



INTERNATIONAL STANDARD



This extended version of IEC 61558-2-3:2023 includes the content of the references made to IEC 61558-1:2017

GROUP SAFETY PUBLICATION

**Safety of transformers, reactors, power supply units and combinations thereof –
Part 2-3: Particular requirements and tests for ignition transformers for gas and
oil burners**

Document Preview

[IEC 61558-2-3:2023](https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023)

<https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.180

ISBN 978-2-8322-7162-9

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	9
INTRODUCTION TO IEC 61558-1:2017.....	12
INTRODUCTION.....	15
1 Scope.....	16
2 Normative references.....	17
3 Terms and definitions.....	20
3.1 Transformers.....	20
3.2 General terms.....	24
3.3 Operations and protections.....	25
3.4 Circuits and windings.....	27
3.5 Ratings.....	28
3.6 No-load values.....	30
3.7 Insulation.....	30
3.8 Touch current and protective earthing conductor current.....	34
4 General requirements.....	34
5 General notes on tests.....	35
6 Ratings.....	37
7 Classification.....	38
8 Marking and other information.....	39
9 Protection against electric shock.....	45
9.1 General.....	45
9.2 Protection against contact with hazardous-live-parts.....	45
9.2.1 Determination of hazardous-live-parts.....	45
9.2.2 Accessibility to hazardous-live-parts.....	46
9.2.3 Accessibility to non hazardous-live-part.....	49
9.3 Protection against hazardous electrical discharge.....	49
10 Change of input voltage setting.....	49
11 Output voltage and output current.....	50
12 No-load output voltage.....	51
13 Short-circuit voltage.....	51
14 Heating.....	51
14.1 General requirements.....	51
14.1.1 Temperature-rise test.....	51
14.1.2 Alternative temperature-rise test.....	53
14.1.3 Determination of steady-state conditions.....	56
14.2 Application of 14.1 or 14.3 according to the insulation system.....	58
14.3 Accelerated ageing test for undeclared class of insulation system.....	58
14.3.1 General.....	58
14.3.2 Heat run.....	59
14.3.3 Vibration.....	59
14.3.4 Moisture treatment.....	59
14.3.5 Measurements.....	59
15 Short circuit and overload protection.....	60
15.1 General requirements.....	60
15.1.1 Short circuit and overload test method.....	60

15.1.2	Alternative short circuit and overload test method	62
15.2	Inherently short-circuit proof transformers	62
15.3	Non-inherently short-circuit proof transformers	62
15.4	Non-short-circuit proof transformers	64
15.5	Fail-safe transformers	64
16	Mechanical strength	65
16.1	General	65
16.2	Stationary transformers	65
16.3	Portable transformers (except portable transformers with integral pins for introduction in socket-outlet in the fixed wiring)	65
16.4	Portable transformers provided with integral pins for introduction in socket-outlets of the fixed wiring	66
16.4.1	General requirements	66
16.4.2	Portable transformers provided with integral pins according to EN 50075 (IEC plug type C) for introduction in socket-outlets of the fixed wiring	67
16.5	Additional requirements for transformers to be used in vehicles and railway applications	68
16.5.1	Transformers to be used in vehicles and railway applications	68
16.5.2	Test requirements for the transportation of transformers	69
17	Protection against harmful ingress of dust, solid objects and moisture	69
17.1	Degrees of protection provided by enclosures (IP code)	69
17.1.1	General requirements	69
17.1.2	Tests on transformers with enclosure	71
17.2	Humidity treatment	73
18	Insulation resistance, dielectric strength and leakage current	74
18.1	General	74
18.2	Insulation resistance	74
18.3	Dielectric strength test	74
18.4	Insulation between and within windings	75
18.5	Touch current and protective earthing conductor current	75
18.5.1	General	75
18.5.2	Touch current	76
18.5.3	Protective earthing conductor current	77
19	Construction	77
19.1	General construction	77
19.2	Flammability of materials	78
19.3	Short-circuit characteristics of portable transformers	78
19.4	Class II transformer contact prevention of accessible conductive parts	78
19.5	Class II transformer insulation reassembling after service	78
19.6	Loosening of wires, screws or similar parts	79
19.7	Resistor or capacitor connection with accessible conductive parts	79
19.8	Bridging of separated conductive parts by resistors or capacitors	79
19.9	Insulating material separating input and output windings	80
19.10	Accidental contact protection against hazardous-live-parts provided by isolating coating	80
19.11	Insulating material of handles, operating levers, knobs and similar parts	81
19.12	Winding construction	82
19.13	Fixing of handles, operating levers and similar parts	86
19.14	Fixing of covers providing protection against electric shock	86

19.15	Strain on fixed socket-outlets caused by pin-transformers connection	86
19.16	Portable transformers for use in irregular or harsh conditions	86
19.17	Drain hole of transformers protected against ingress of water	86
19.18	Plug connected transformers protected against ingress of water	86
19.19	Flexible cable or flexible cord connection for class I portable transformers	86
19.20	SELV- and PELV-circuit separation of live parts.....	87
19.21	Protection against contact for FELV-circuit.....	87
19.22	Protective earthing regarding class II transformers	88
19.23	Protective earthing regarding class III transformers	88
20	Components	88
21	Internal wiring.....	93
22	Supply connection and other external flexible cables or cords	94
23	Terminals for external conductors.....	100
24	Provisions for protective earthing.....	102
25	Screws and connections	103
26	Creepage distances, clearances and distances through insulation.....	106
26.1	General.....	106
26.2	Creepage distances and clearances.....	107
26.2.1	General	107
26.2.2	Windings covered with adhesive tape	107
26.2.3	Uncemented insulating parts.....	107
26.2.4	Cemented insulating parts	107
26.2.5	Enclosed parts (e.g. by impregnation or potting)	108
26.3	Distance through insulation.....	109
27	Resistance to heat, fire and tracking.....	121
27.1	General.....	121
27.3	Resistance to abnormal heat under fault conditions	121
27.4	Resistance to fire	121
27.4.1	General	121
27.4.2	External accessible parts.....	121
27.4.3	Internal parts	122
27.5	Resistance to tracking.....	122
28	Resistance to rusting	122
Annex A (normative)	Measurement of creepage distances and clearances.....	124
Annex B (normative)	Testing a series of transformers	128
B.1	General.....	128
B.2	Requirements	128
B.3	Constructional inspection	129
Annex C (void)	130
Annex D (void)	131
Annex E (normative)	Glow-wire test	132
E.1	General.....	132
E.2	Severity	132
E.3	Conditioning.....	132
E.4	Test procedure.....	132
Annex F (normative)	Requirements for manually operated switches which are parts of transformers assembly.....	133

F.1	General.....	133
F.2	Switches tested as a separate component	133
F.3	Switches tested as part of the transformer	133
Annex G (normative) Tracking test.....		136
G.1	General.....	136
G.2	Test specimen	136
G.3	Test apparatus.....	136
G.4	Procedure	136
Annex H (normative) Electronic circuits.....		137
H.1	General.....	137
H.2	General notes on tests (addition to Clause 5).....	137
H.3	Short circuit and overload protection (addition to Clause 15).....	137
H.4	Creepage distances, clearances and distances through insulation (addition to Clause 26)	139
Annex I (informative) Dimensions for rectangular cross-section connectors of transformers, basic dimensions and coordination		141
Annex J (normative) Measuring network for touch-currents		144
Annex K (normative) Insulated winding wires		145
K.1	General.....	145
K.2	Type tests	145
K.2.1	General	145
K.2.2	Dielectric strength test.....	145
K.2.3	Flexibility and adherence	145
K.2.4	Heat shock	146
K.2.5	Retention of dielectric strength after bending.....	146
K.3	Testing during manufacturing.....	147
K.3.1	General	147
K.3.2	Routine test	147
K.3.3	Sampling test.....	147
Annex L (normative) Routine tests (production tests).....		148
L.1	General.....	148
L.2	Protective earthing continuity test	148
L.3	Checking of no-load output voltage	148
L.4	Dielectric strength test	148
L.5	Checking of protective devices mounting	149
L.6	Visual inspection.....	149
L.7	Repetition test after routine dielectric strength test	149
Annex M (informative) Examples to be used as a guide for 19.1		150
M.1	General.....	150
M.2	Coil-former.....	150
M.2.1	Concentric type	150
M.2.2	Side-by-side type.....	151
M.3	Windings.....	151
M.3.1	Without screen	151
M.3.2	With screen	152
Annex N (informative) Examples for checking points of dielectric strength test voltages.....		153
Annex O (void).....		155

Annex P (informative) Examples for measurement points of creepage distances and clearances	156
Annex Q (informative) Explanation of IP numbers for degrees of protection	159
Q.1 General.....	159
Q.2 Degrees of protection against access to hazardous parts and against solid foreign objects	159
Q.3 Degrees of protection against ingress of water.....	161
Annex R (normative) Explanations of the application of 6.1.2.2.1 of IEC 60664-1:2007	162
R.1 Impulse dielectric test	162
R.2 Example.....	162
Annex S (void)	164
Annex T (void)	165
Annex U (void).....	166
Annex V (informative) Symbols to be used for thermal cut-outs.....	167
V.1 General.....	167
V.2 Non-self-resetting thermal cut-out (see 3.3.4)	167
V.3 Self-resetting thermal cut-out (see 3.3.3)	167
Annex W (normative) Coated printed circuit boards.....	168
W.1 Preamble	168
W.2 General.....	168
W.3 Cold.....	168
W.4 Rapid change of temperature	168
W.5 Additional tests	168
Bibliography.....	169
Index of defined terms	171

IEC 61558-2-3:2023

Figure 1 – IEC 61558 principle.....	13
Figure 2 – Mounting box for flush-type transformer	37
Figure 3 – Test pin (see IEC 61032, test probe 13).....	47
Figure 4 – Standard test finger (see IEC 61032, test probe B)	48
Figure 5 – Example of back-to-back method – Single phase	55
Figure 6 – Example of back-to-back method – Three phase	56
Figure 7 – Amplitude spectrum density for random testing	68
Figure 8 – Normalised spectrum of shock	69
Figure 10 – Test configuration: single-phase equipment on star TN or TT system	77
Figure 11 – Abrasion resistance test for insulating coated layers	81
Figure 12 – Flexing test apparatus	98
Figure 13 – Test arrangement for checking mechanical withstanding of insulating materials in thin sheet layers	112
Figure 101 – Arcing horn	123
Figure A.1 – Example 1.....	124
Figure A.2 – Example 2.....	125
Figure A.3 – Example 3.....	125
Figure A.4 – Example 4.....	125
Figure A.5 – Example 5.....	126
Figure A.6 – Example 6.....	126

Figure A.7 – Example 7.....	127
Figure A.8 – Example 8.....	127
Figure H.1 – Example of an electronic circuit with low-power points.....	140
Figure J.1 – Measuring network for touch-current.....	144
Figure M.1 – Examples for concentric type constructions.....	150
Figure M.2 – Examples for side-by-side type constructions.....	151
Figure M.3 – Examples for winding constructions without screen.....	151
Figure M.4 – Examples for wrapped winding constructions.....	152
Figure M.5 – Examples for winding constructions with screen.....	152
Figure N.1 – Transformer of class I construction with metal enclosure.....	153
Figure N.2 – Transformer of class II construction with metal enclosure.....	154
Figure N.3 – Transformer of class II construction with enclosure of insulating material.....	154
Figure P.1 – Transformer of class I construction.....	156
Figure P.2 – Transformer of class I construction with earthed metal screen.....	157
Figure P.3 – Transformer of class II construction with metal enclosure.....	157
Figure P.4 – Transformer of class II construction with enclosure of insulating material.....	158
Figure V.1 – Restored by manual operation.....	167
Figure V.2 – Restored by disconnection of the supply.....	167
Figure V.3 – Thermal link (see 3.3.5).....	167
Figure V.4 – Self-resetting thermal cut-out.....	167
Table 1 – Symbols used on equipment or in instructions.....	42
Table 101 – Symbols indicating the kind of transformer.....	43
Table 102 – Preferred values of operational parameters.....	51
Table 2 – Values of maximum temperatures in normal use.....	57
Table 3 – Explanation of the maximum winding temperatures required in Table 2.....	58
Table 4 – Test temperature and testing time (in days) per cycle.....	59
Table 5 – Maximum values of temperatures under short-circuit or overload conditions.....	61
Table 103 – Test time for short-circuit test.....	62
Table 6 – Values of T and k for fuses.....	63
Table 7 – Pull force on pins.....	67
Table 8 – Conditions for vibration testing (random).....	68
Table 9 – Amplitude spectrum density ASD values for accelerated life testing.....	68
Table 10 – Frequency values depending on the weight of the specimen.....	68
Table 11 – Excitation values for vibration testing.....	69
Table 12 – Solid-object-proof transformer test.....	71
Table 13 – Values of insulation resistance.....	74
Table 14 – Table of dielectric strength test voltages.....	75
Table 15 – Limits for currents.....	77
Table 16 – Nominal cross-sectional areas of external flexible cables or cords.....	95
Table 17 – Pull and torque to be applied to external flexible cables or cords fixed to stationary and portable transformers.....	99
Table 18 – Torque to be applied to screws and connections.....	104

Table 19 – Torque test on glands.....	106
Table 20 – Clearances in mm	114
Table 21 – Creepage distances in mm	115
Table 22 – Distance through insulation in mm.....	116
Table 23 – Creepage distances and clearance between terminals for external connection	117
Table 104 – Creepage distances and clearances for output terminals	117
Table 24 – Values of FIW wires with minimum overall diameter and minimum test voltages according to the total enamel increase.....	119
Table A.1 – Width of groove values depending on the pollution degree	124
Table F.1 – Peak surge current of additional loads.....	134
Table I.1 – Dimensions of rectangular copper connectors	142
Table K.1 – Mandrel diameter	146
Table K.2 – Oven temperature	146
Table Q.1 – Degrees of protection against access to hazardous parts indicated by the first characteristic numeral.....	160
Table Q.2 – Degrees of protection against solid foreign objects indicated by the first characteristic numeral.....	160
Table Q.3 – Degrees of protection indicated by the second characteristic numeral	161
Table R.1 – Impulse test voltage according to 6.1.2.2.1 of IEC 60664-1:2007	162

(https://standards.iteh.ai)
 Document Preview

[IEC 61558-2-3:2023](https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023)

<https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF TRANSFORMERS, REACTORS,
POWER SUPPLY UNITS AND COMBINATIONS THEREOF –****Part 2-3: Particular requirements and tests for ignition
transformers for gas and oil burners**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This extended version (EXV) of the official IEC Standard provides the user with the comprehensive content of the Standard.

IEC 61558-2-3:2023 EXV includes the content of IEC 61158-2-3:2023, and the references made to IEC 61558-1:2017.

The specific content of IEC 61558-2-3:2023 is displayed on a blue background.

International standard IEC 61558-2-3 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and combinations thereof. It is an International Standard.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) adjustment of structure and references in accordance with IEC 61558-1:2017.

The text of this International Standard is based on the following documents:

Draft	Report on voting
96/577/FDIS	96/580/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

It has the status of a group safety publication in accordance with IEC Guide 104.

This International Standard is to be used in conjunction with IEC 61558-1:2017.

<https://standards.itec.ai/> This document supplements or modifies the corresponding clauses in IEC 61558-1:2017, so as to convert that publication into the IEC standard: *Particular requirements and tests for ignition transformers for gas and oil burners*.

A list of all parts in the IEC 61558 series published under the general title *Safety of transformers, reactors, power supply units and combinations thereof*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

Where this document states "*addition*", "*modification*" or "*replacement*", the relevant text of IEC 61558-1:2017 is to be adopted accordingly.

In this document, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type*;
- explanatory matter: in smaller roman type:

In the text of this document, the words in **bold** are defined in Clause 3.

Subclauses, notes, figures and tables additional to those in IEC 61558-1:2017 are numbered starting from 101; supplementary annexes are entitled AA, BB, etc.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

The contents of the corrigendum 1 (2023-09) have been included in this copy.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61558-2-3:2023](https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023)

<https://standards.iteh.ai/catalog/standards/iec/d187ea39-e23c-4112-8144-0392015b0fbf/iec-61558-2-3-2023>

INTRODUCTION TO IEC 61558-1:2017

This document covers safety requirements for **transformers**. Where the term **transformer** is used, it covers **transformers**, **reactors** and **power supply units** where applicable.

During the development of this document, to the extent possible, the requirements of IEC 60364 (all parts) were taken into consideration, so that a **transformer** can be installed in accordance with the wiring rules contained in that document. However, national wiring rules can differ.

This document recognizes the internationally accepted levels of protection against the possible electrical, mechanical, and fire hazards caused by **transformers** operating under normal conditions in accordance with the manufacturer's instructions. It also covers abnormal conditions which can occur in practice.

A **transformer** complying with this document will not necessarily be judged to comply with the safety principles of this document if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

A **transformer** employing materials or having forms of construction differing from those detailed in this document may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the safety principles of this document.

The document dealing with non-safety aspects of electromagnetic compatibility (EMC) of **transformers** is IEC 62041. However, that document also includes tests that can subject the **transformer** to conditions involving safety aspects.

The objective of IEC 61558-1 is to provide a set of requirements and tests considered to be generally applicable to most types of **transformers**, and which can be called up as required by the relevant part of IEC 61558-2. IEC 61558-1 is thus not to be regarded as a specification by itself for any type of **transformer**, and its provisions apply only to particular types of **transformers** to the extent determined by the appropriate part of IEC 61558-2. IEC 61558-1 also contains normative routine tests.

Each part of IEC 61558-2 in conjunction with this document contains all the necessary requirements for the **transformer** being covered and does not contain references to other parts of IEC 61558-2. For **transformers** with a protection index IP00 and associated **transformers**, it is possible to have circuits corresponding to different parts of IEC 61558-2 within the same construction (e.g. SELV output circuit according to IEC 61558-2-6 and a 230 V output circuit according to IEC 61558-2-4). However, if the **transformer** is covered by different parts IEC 61558-2, to the extent reasonable, the relevant part of IEC 61558-2 is applied to each function/application separately. If applicable, the effect of one function on the other is taken into consideration.

If an appropriate part of IEC 61558-2 does not exist for a particular **transformer** or group of **transformers**, the nearest applicable part may be used as a guide to the requirements and tests.

However, individual countries may wish to consider its application, to the extent reasonable, to transformers not mentioned in the IEC 61558-2 series, and to transformers designed on new principles.

Where the requirements of any of the clauses of a part of IEC 61558-2 refer to IEC 61558-1 by the phrase "This clause of Part 1 is applicable", this phrase means that all the requirements of that clause of IEC 61558-1 are applicable, except those requirements that are clearly not applicable to the particular type of **transformer** covered by that part of IEC 61558-2.