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PEOPLE'S REPUBLIC OF CHINA**

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Replacing GB/T 19212.1-2016

**Safety of transformers, reactors, power supply units and
combinations thereof - Part 1: General requirements and tests**

变压器、电抗器、电源装置及其组合的安全 第1部分:通用要求和试验

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Table of Contents

1 Scope	1
2 Normative references	3
3 Terms and definitions	6
4 General	18
5 General notes on tests	18
6 Rating	20
7 Classification	20
8 Marking and other information	21
9 Protection against electric shock	26
10 Change of input voltage setting	29
11 Output voltage and output current on load	29
12 No-load output voltage	30
13 Short-circuit voltage	30
14 Heating	30
15 Short-circuit and overload protection	37
16 Mechanical strength	41
17 Protection against harmful ingress of dust, solid objects and moisture	43
18 Insulation resistance, dielectric strength and leakage current	47
19 Construction	51
20 Components	62
21 Internal wiring	66
22 Supply connection and other external flexible cables or cords	66
23 Terminals for external conductors	72
24 Provision for protective earthing	73
25 Screws and connections	74
26 Creepage distances, clearances and distances through insulation	76
27 Resistance to heat, fire and tracking	89
28 Resistance to rusting	92
Annex A (informative) Cross-reference of the structure of this document and of IEC 61558-1:2017	93
Annex B (informative) Technical deviations between this document and IEC 61558-1:2017 and their reasons	98
Annex C (normative) Routine tests, that is production tests	100

Annex D (normative) Tests on transformer series	101
Annex E (normative) Electronic circuits	103
Annex F (informative) Explanation of the IP code for degrees of protection	106
Annex G (informative) Symbols for thermal circuit-breakers	108
Annex H (informative) Examples of application points of the test voltage in the dielectric strength test	109
Annex I (informative) Example of the use of 19.1	111
Annex J (normative) Insulated winding wires	114
Annex K (normative) Requirements for manual switches used as transformer assembly parts	117
Annex L (normative) Dimensions, basic dimensions and fit of the rectangular section connectors of transformers	119
Annex M (normative) Measurement of creepage distances and clearances	121
Annex N (informative) Examples of measuring points for creepage distances and clearances	124
Annex O (normative) Tracking test	127
Annex P (informative) Explanation of the application of 6.1.2.2.1 of GB/T 16935.1-2008	128
Annex Q (normative) Glow-wire test	130
Annex R (normative) Coated printed circuit boards	131
Bibliography	132

1 Scope

The document lays down the safety requirements, electrical, thermal and mechanical among them, for transformers, reactors, power supply units and combinations of them.

It applies to the following independent or associated, stationary or portable dry-type transformers, power supply units, switch mode power supply units included, and reactors, and to their safety-related combinations; their windings may be encapsulated or non-encapsulated, and they do not form part of a distribution network. A first note distinguishes the three families: a transformer does not change the frequency, although a transformer such as a constant-voltage transformer may have an internal resonant frequency not exceeding 30 kHz; in a power supply unit the internal working frequency and waveform differ from those of the supply and the internal working frequency does not exceed 500 Hz; in a switch mode power supply unit the internal working frequency and waveform differ from those of the supply and the internal working frequency exceeds 500 Hz but does not exceed 100 MHz. The other parts of GB/T 19212 can be found from the introduction of this document.

Item a) covers stationary or portable, single-phase or polyphase, air-cooled, either self-cooled or fan-cooled, independent or associated isolating transformers and safety isolating transformers whose rated supply voltage does not exceed 1 000 V a.c. and whose rated supply frequency does not exceed 500 Hz; unless another part of GB/T 19212 states otherwise, an isolating transformer has a rated output not exceeding 25 kV.A single-phase and 40 kV.A polyphase, and a no-load output voltage and rated output voltage above 50 V a.c. and not exceeding 500 V a.c., or not exceeding 1 000 V a.c. where the national wiring rules or a particular application so provide; a safety isolating transformer has a rated output not exceeding 10 kV.A single-phase and 16 kV.A polyphase, and a no-load output voltage and rated output voltage not exceeding 50 V a.c. between conductors or between any conductor and protective earth. A note adds that isolating or safety isolating transformers are used where the installation rules or the specification of an appliance, motor-driven toys, electric bells, portable power tools and handheld luminaires among them, call for double or reinforced insulation between circuits.

Item b) covers stationary or portable, single-phase or polyphase, air-cooled, independent or associated separating transformers, auto transformers, variable transformers and small reactors with the same limits of 1 000 V a.c. rated supply voltage and 500 Hz rated supply frequency; unless another part of GB/T 19212 states otherwise, for a transformer that is both independent and associated the no-load output voltage and rated output voltage do not exceed 15 kV a.c., and for an independent transformer the rated output voltage is not less than 50 V a.c., while the rated output does not exceed 1 kV.A for a single-phase transformer, 2 kvar for a single-phase reactor, 5 kV.A for a polyphase transformer and 10 kvar for a polyphase reactor. A note adds that separating transformers are used where the installation rules or the appliance specification do not require double or reinforced insulation between circuits, and a further note explains that transformers of type b) are usually intended to be used with an appliance so as to supply a voltage other than the supply voltage for the functional requirements of that appliance, that their protection against electric shock may be provided by other parts of the associated appliance, its enclosure for instance, and that parts of the output circuit may be connected to the input circuit or to protective earth.

Item c) covers stationary or portable, single-phase or polyphase, air-cooled, independent or associated power supply units and switch mode power supply units incorporating one or more transformers of type a) or type b), whose rated supply voltage does not exceed 1 000 V a.c., whose rated supply frequency does not exceed 500 Hz, and whose internal working frequency does not exceed 500 Hz for a power supply unit and 100 MHz for a switch mode power supply unit. Unless another part of GB/T 19212 states otherwise, a power supply unit or switch mode power supply unit incorporating an isolating transformer has a rated output not exceeding 1 kV.A single-phase or polyphase, and a no-load output voltage and rated output voltage above 50 V a.c. or 120 V ripple-free d.c. and not exceeding 500 V a.c. or 708 V ripple-free d.c., or not exceeding 1 000 V a.c. or 1 415 V ripple-free d.c. where the

national wiring rules or a particular application so provide; one incorporating a safety isolating transformer has a rated output not exceeding 1 kV.A and a no-load output voltage and rated output voltage not exceeding 50 V a.c. or 120 V ripple-free d.c. between conductors or between any conductor and protective earth; one incorporating a separating transformer, an auto transformer or a variable transformer has a rated output not exceeding 1 kV.A, and, for a transformer that is both independent and associated, a no-load output voltage and rated output voltage not exceeding 15 kV a.c., the rated output voltage of an independent transformer being not less than 50 V a.c.

The document also applies to transformers, power supply units, switch mode power supply units and reactors incorporating electronic circuits, and to transformers without a limit on the rated output that comply with an agreement between purchaser and manufacturer.

It does not apply to the external circuits and their components intended to be connected to the input and output terminals or to the output socket-outlets of transformers, power supply units, switch mode power supply units and reactors.

Attention is drawn to the following situations: transformers intended for use on vehicles, ships or aircraft may need additional requirements, taken from other applicable standards or national regulations; protective measures against the effect of mould, insects, termites, solar radiation and icing on the enclosure and on the components inside it; the different conditions of transport, storage and operation of transformers; and transformers intended for special environments, tropical environments for instance, for which additional requirements from other applicable standards and national regulations may be adopted.

As transformer technology develops the upper frequency limit may need to be raised, and the document may then be used as a guide.

2 Normative references

The clause lists the documents referred to normatively. The end of that list, on the pages examined, carries IEC 60851-3:2009, IEC 60851-5:2008, IEC 60851-6:2012, IEC 60898 (all parts), with a note referring to GB/T 10963 (all parts), IEC 60906-1, IEC 60990:2016, IEC 61800-5-1, with a note referring to GB/T 12668.501-2013, DIN 43670:1975, DIN 43670-2:1985 and DIN 43671:1975. The earlier part of the list falls on pages that were not among those examined.

3 Terms and definitions

The terms and definitions that follow apply to this document. A note states that further definitions for transformers intended for a particular application are given in the other parts of GB/T 19212.

Where the word transformer is used, it covers, in the applicable cases, transformers, reactors and power supplies.