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SVENSK STANDARD SS-EN 61558-1

Handläggande organ	Fastställd	Utgåva	Sida	Ingår i
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Transformatorer, strömförsörjningsdon och liknande – Säkerhet – Del 1: Allmänna fordringar och provning

Safety of power transformers, power supply units and similar – Part 1: General requirements and tests

Som svensk standard gäller europastandarden EN 61558-1:1997. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61558-1:1997.

Nationellt förord

Europastandarden EN 61558-1:1997

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61558-1, First edition, 1997 - Safety of power transformers, power supply units and similar - Part 1: General requirements and tests**

utarbetad inom International Electrotechnical Commission, IEC.

SS-EN 61558-1 kommer att ersätta SS-EN 60742, utgåva 1, 1995 när alla Delar 2 av SS-EN 61558 som har sin motsvarighet i SS-EN 60742 är fastställda.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61558-1

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Partly supersedes EN 60742:1995

Descriptors: Transformers, protective transformers, safety requirements, ability to withstand short circuit, overload protection, temperature rise, mechanical strength, isolation resistance, earthing

English version

Safety of power transformers, power supply units and similar
Part 1: General requirements and tests
(IEC 61558-1:1997, modified)

Sécurité des transformateurs, blocs d'alimentation et analogues
Partie 1: Règles générales et essais
(CEI 61558-1:1997, modifiée)

Sicherheit von Transformatoren, Netzgeräten und dergleichen
Teil 1: Allgemeine Anforderungen und Prüfungen
(IEC 61558-1:1997, modifiziert)

This European Standard was approved by CENELEC on 1997-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 61558-1:1997 E

Foreword

The text of document 96/47/FDIS, future edition 1 of IEC 61558-1, prepared by IEC TC 96, Small power transformers, reactors and power supply units and special transformers, reactors and power supply units: safety requirements, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61558-1 on 1997-07-01, together with common modifications prepared by the CENELEC BTTF 64-1, Isolating and safety isolating transformers.

This European Standard will supersede EN 60742:1995 when the last part 2 of EN 61558 dealing with EN 60742 will be ratified.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) -

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A to K, ZA and ZB are normative and annexes L to U are informative.
Annexes ZA and ZB have been added by CENELEC.

This part 1 is to be used in conjunction with the appropriate part 2, which contains clauses that supplement or modify the corresponding clauses in this part 1, to provide the relevant particular requirements for each type of product.

Endorsement notice

The text of the International Standard IEC 61558-1:1997 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

Annex ZB (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 50(421)	1990	International electrotechnical vocabulary Chapter 421: Power transformers and reactors	-	-
IEC 60051	series	Direct acting indicating analogue electrical-measuring instruments and their accessories	EN 60051	series
IEC 60065 (mod)	1985	Safety requirements for mains operated electronic and related apparatus for household and similar general use	EN 60065[1] + corr. November	1993 1993
IEC 60068-2-2	1974	Basic environmental testing procedures Part 2: Tests - Test B: Dry heat	EN 60068-2-2[2]	1993
IEC 60068-2-6	1982	Test Fc and guidance: Vibration (Sinusoidal)	HD 323.2.6 S2[3]	1988
IEC 60068-2-32	1975	Test Ed: Free fall	EN 60068-2-32[4]	1993
IEC 60068-2-63	1991	Part 2: Test methods - Test Eg: Impact, spring hammer	EN 60068-2-63	1994
IEC 60076-1 (mod)	1993	Power transformers Part 1: General	EN 60076-1	1997
IEC 60083	1975	Plugs and socket-outlets for domestic and similar general use - Standards	-	-
IEC 60085	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990

1) EN 60065 includes A1:1987 + A2:1989 + A3:1992 to IEC 60065.

2) EN 60068-2-2 includes supplement A:1976 to IEC 60068-2-2.

3) HD 323.2.6 S2 is superseded by EN 60068-2-6:1995, which is based on IEC 60068-2-6:1995.

4) EN 60068-2-32 includes A2:1990 to IEC 60068-2-32:1975.

Publication	Year	Title	EN/HD	Year
IEC 60112	1979	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	HD 214 S2	1980
IEC 60127	series	Miniature fuses	EN 60127	series
IEC 60216	series	Guide for the determination of thermal endurance properties of electrical insulating materials	HD 611 EN 60216	series series
IEC 60227 (mod)	series	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V	HD 21	series
IEC 60245 (mod)	series	Rubber insulated cables - Rated voltages up to and including 450/750 V	HD 22	series
IEC 60269-2	1986	Low-voltage fuses Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)	EN 60269-2	1995
IEC 60269-2-1 (mod)	1987	Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) Sections I to III	HD 630.2.1 S1[5)]	1996
IEC 60269-3	1987	Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)	EN 60269-3	1995
IEC 60269-3-1 (mod)	1994	Part 3-1: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) -- Sections I to IV	HD 630.3.1 S2[6)]	1997
IEC 60309 (mod)	series	Plugs, socket-outlets and couplers for industrial purposes	EN 60309	series
IEC 60317	series	Specifications for particular types of winding wires	EN 60317	series
IEC 60320 (mod)	series	Appliance couplers for household and similar general purposes	EN 60320	series
IEC 60364-4-41 (mod)	1992	Electrical installations of buildings Part 4: Protection for safety Chapter 41: Protection against electric shock	HD 384.4.41 S2	1996

5) HD 630.2.1 S1 is superseded by HD 630.2.1 S2:1997, which is based on IEC 60269-2-1:1996, mod.

6) HD 630.3.1 S2 includes A1:1995 to IEC 60269-3-1.

Publication	Year	Title	EN/HD	Year
IEC 60364-5-51 (mod)	1994	Part 5: Selection and erection of electrical equipment -- Chapter 51: Common rules	HD 384.5.51 S2	1996
IEC 60384-14	1993	Fixed capacitors for use in electronic equipment - Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains	-	-
IEC 60417	1973	Graphical symbols for use on equipment Index, survey and compilation of the single sheets	HD 243 S12[7]	1995
IEC 60449	1973	Voltage bands for electrical installations of buildings	HD 193 S2[8]	1982
IEC 60454	series	Pressure-sensitive adhesive tapes for electrical purposes	EN 60454	series
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 60536	1976	Classification of electrical and electronic equipment with regard to protection against electric shock	HD 366 S1	1977
IEC 60536-2	1992	Part 2: Guidelines to requirements for protection against electric shock	-	-
IEC 60664-1 (mod)	1992	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests	HD 625.1 S1 + corr. November	1996 1996
IEC 60664-3	1992	Part 3: Use of coatings to achieve insulation coordination of printed board assemblies	HD 625.3 S1	1997
IEC 60691	1993	Thermal-links - Requirements and application guide	EN 60691[9]	1995
IEC 60695-2-1/0	1994	Fire hazard testing Part 2: Test methods Section 1/sheet 0: Glow-wire test methods General	EN 60695-2-1/0	1996
IEC 60695-2-1/1	1994	Section 1/sheet 1: Glow-wire end-product test and guidance	EN 60695-2-1/1[10]	1996

7) HD 243 S12 includes supplements A:1974 to M:1994 to IEC 60417.

8) HD 193 S2 includes A1:1979 to IEC 60449.

9) EN 60691 includes A1:1995 to IEC 60691.

10) EN 60695-2-1/1 includes corrigendum May 1995.

Publication	Year	Title	EN/HD	Year
IEC 60707	1981	Methods of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source	HD 441 S1	1983
IEC 60730-1 (mod)	1993	Automatic electrical controls for household and similar use Part 1: General requirements	EN 60730-1 + corr. April + A11 + A12	1995 1997 1996 1996
IEC 60738-1	1982	Directly heated positive step-function temperature coefficient thermistors Part 1: Generic specification	-	-
IEC 60851	series	Methods of test for winding wires	HD 490 EN 60851	series series
IEC 60884-1	1994	Plugs and socket-outlets for household and similar purposes Part 1: General requirements	-	-
IEC 60884-2-4	1993	Part 2: Particular requirements for plugs and socket-outlets for SELV	-	-
IEC 60898	1995[11)]	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations	-	-
IEC 60906-1	1986	IEC System of plugs and socket-outlets for household and similar purposes Part 1: Plugs and socket-outlets 16 A 250 V a.c.	-	-
IEC 60906-3	1994	Part 3: SELV plugs and socket-outlets, 16 A 6 V, 12 V, 24 V, 48 V, a.c. and d.c.	-	-
IEC 60947-7-1	1989	Low-voltage switchgear and controlgear Part 7: Ancillary equipment Section 1: Terminal blocks for copper conductors	EN 60947-7-1 + corr. June + A11	1991 1997 1997
IEC 60990	1990	Methods of measurement of touch-current and protective conductor current	-	-
IEC 60998-1 (mod)	1990	Connecting devices for low-voltage circuits for household and similar purposes Part 1: General requirements	EN 60998-1	1993

11) IEC 60898:1987 + corrigendum May 1988 + A2:1990 + A3:1990 + corrigendum August 1990, modified are harmonized as EN 60898:1991. This European Standard applies with its corrigendum October 1991 and its amendments A1:1991 (IEC 60898:1987/A1:1989) and A11:1994 up to A16:1996.

Publication	Year	Title	EN/HD	Year
IEC 60998-2-1 (mod)	1990	Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units	EN 60998-2-1	1993
IEC 60998-2-2	1991	Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units	EN 60998-2-2	1993
IEC 60999-1 (mod)	1990	Connecting devices - Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors Part 1: General requirements and particular requirements for conductors from 0,5 mm² up to 35 mm² (included)	EN 60999-1 + corr. March	1993 1997
IEC 61000-3-2	1995	Electromagnetic compatibility (EMC) Part 3: Limits -- Section 2: Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)	EN 61000-3-2 + corr. July + A13	1995 1997 1997
IEC 61000-3-3	1994	Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current up to and including 16 A	EN 61000-3-3 + corr. July	1995 1997
IEC 61032	1990	Test probes to verify protection by enclosures	HD 601 S1	1991
IEC 61058-1	1990	Switches for appliances Part 1: General requirements	EN 61058-1	1992
IEC 61140	1992	Protection against electric shock - Common aspects for installation and equipment	-	-
ISO 3	1973	Preferred numbers - Series of preferred numbers	-	-
ISO 4046	1978	Paper, board, pulp and related terms Vocabulary	-	-
ISO 8820	series	Road vehicles - Blade-type electric fuse-links	-	-

CONTENTS

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR –

Part 1: General requirements and tests

1 Scope

1.1 This International Standard deals with all aspects of safety (such as electrical, thermal and mechanical) of:

a) **Stationary** or **portable**, single-phase or polyphase, air-cooled (natural or forced) **isolating** and **safety isolating transformers**, **associated** or otherwise, having a **rated supply voltage** not exceeding 1000 V a.c. and **rated frequency** not exceeding 1 MHz, the **rated output** not exceeding the following values.

NOTE 1 – For higher frequencies, this standard may be used as a guidance document.

For **isolating transformers**:

- 25 kVA for single-phase transformers;
- 40 kVA for polyphase transformers.

For **safety isolating transformers**:

- 10 kVA for single-phase transformers;
- 16 kVA for polyphase transformers.

The **no-load** output voltage and **rated output voltage** do not exceed:

- for **isolating transformers** 500 V a.c. or 708 V ripple free d.c.

NOTE 2 – For **isolating transformers**, the no-load **rated output voltage** may be up to 1000 V a.c. or 1 415 V ripple free d.c. to be in accordance with the national wiring rules or for special purposes.

- for **safety isolating transformers** 50 V a.c. r.m.s. and/or 120 V ripple free d.c. between conductors or between any conductor and earth.

NOTE 3 – **Isolating** and **safety isolating transformers** are used where **double** or **reinforced insulation** between circuits is required by the installation rules or by the appliance specification (for example toys, bells, portable **tools**, handlamps).

Rated values for each type of transformer are indicated in the relevant part 2.

b) **Stationary** or **portable**, single-phase or polyphase, air-cooled (natural or forced) **separating transformers**, auto-transformers, variable transformers and small reactors, associated or not, having a **rated supply voltage** not exceeding 1000 V a.c., a **rated frequency** not exceeding 1 MHz, a rated no-load or load output voltage not exceeding 15 kV a.c. or d.c., and for **independent transformers** not less than 50 V a.c. and/or 120 V ripple free d.c. and a **rated output** not exceeding the following values:

- 1 kVA for single-phase transformers;
- 2 kVAR for single-phase reactors;
- 5 kVA for polyphase transformers;
- 10 kVAR for polyphase reactors;

unless otherwise specified in the relevant part 2.

NOTES

1 **Separating transformers** are used where **double** or **reinforced insulation** between circuits is not required by the installation rules or by the appliance specification.

2 The technological development of transformers might imply a need to increase the higher limit of the **rated frequency**.

3 Normally, the transformers are intended to be associated with equipment to provide voltages different from the supply voltage for the functional requirement of the equipment. The safety insulation may be provided (or completed) by other features of the equipment, such as the **body**. Parts of **output circuits** may be connected to the **input circuit** or to protective earth.

c) **Power supply units** incorporating a transformer of types a) or b).

NOTES

1 This may include units for transforming, rectifying, converting, frequency inverting or their combinations intended for power supplying electrical equipment, except for switch-mode power supplies.

2 Examples of **power supply units** are transformers, battery eliminators and converters for building-in or self-contained. In the latter case they can even be provided with integrated pins, intended to be introduced into fixed socket-outlets.

3 Requirements for transformers for switch-mode power supplies are contained in IEC 1558-2-17.

1.2 This standard is applicable to **dry type transformers**. The windings may be encapsulated or non-encapsulated.

NOTE 1 – For transformers filled with liquid dielectric or pulverised material, such as sand, requirements are under consideration.

This standard is also applicable to transformers associated with specific items of equipment, to the extent decided upon by the relevant IEC technical committees.

Transformers incorporating electronic circuits are also covered by this standard.

This standard does not apply to external circuits and their components connected to terminals or socket-outlets of the transformer.

NOTES

2 Examples are wiring, fuses and switches.

3 Attention is drawn to the fact that:

– for transformers intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;

– for transformers intended to be used in tropical countries, special requirements may be necessary;

– in locations where special environmental conditions prevail, particular requirements may be necessary in accordance with IEC 364-5-51.

2 Normative references

The following normative documents contain provision which, through reference in this text, constitute provisions of this part of IEC 61558. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreement based on this part of IEC 61558 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(421): 1990, *International Electrotechnical Vocabulary (IEV) – Chapter 421: Power transformers and reactors*

IEC 51, *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 65: 1985, *Safety requirements for mains operated electronic and related apparatus for household and similar general use*

IEC 68-2-2: 1974, *Environmental testing – Part 2: Tests – Test B: Dry heat*

IEC 68-2-6: 1982, *Environmental testing – Part 2: Tests – Test Fc and guidance: Vibration (sinusoidal)*

IEC 68-2-32: 1975, *Environmental testing – Part 2: Tests – Test Ed: Free fall (procedure 1)*

IEC 68-2-63: 1991, *Environmental testing – Part 2: Tests – Test Eg: Impact, spring hammer*

IEC 76-1: 1993, *Power transformers – Part 1: General*

IEC 83: 1975, *Plugs and socket-outlets for domestic and similar general use – Standards*

IEC 85: 1984, *Thermal evaluation and classification of electrical insulation*

IEC 112: 1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions*

IEC 127, *Miniature fuses*

IEC 216, *Guide for the determination of thermal endurance properties of electrical insulating materials*

IEC 227, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 245, *Rubber insulated cables of rated voltages up to and including 450/750 V*

IEC 269-2: 1986, *Low voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)*

IEC 269-2-1: 1987, *Low voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Sections I to III*

IEC 269-3: 1987, *Low voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)*

IEC 269-3-1: 1994, *Low voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Sections I to IV*

IEC 309, *Plugs, socket-outlets and couplers for industrial purposes*

IEC 317, *Specifications for particular types of windings wires*

IEC 320, *Appliance couplers for household and similar general purposes*

IEC 364-4-41: 1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electrical shock*

IEC 364-5-51: 1994, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 51: Common rules*

IEC 384-14: 1993, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*

IEC 449: 1973, *Voltage bands for electrical installations of buildings*

IEC 454, *Specification for pressure-sensitive adhesive tapes for electrical purposes*

IEC 529: 1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 536: 1976, *Classification of electrical and electronic equipment with regard to protection against electric shock*

IEC 536-2: 1992, *Classification of electrical and electronic equipment with regard to protection against electric shock – Part 2: Guidelines to requirements for protection against electric shock*

IEC 664-1: 1992, *Insulation co-ordination for equipment within low voltage systems – Part 1: Principles, requirements and tests*

IEC 664-3: 1992, *Insulation co-ordination for equipment within low voltage systems – Part 3: Use of coating to achieve insulation co-ordination of printed board assemblies*

IEC 691: 1993, *Thermal-links – Requirements and application guide*

IEC 695-2-1/0:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 0: Glow-wire test methods – General*

IEC 695-2-1/1: 1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 1: Glow-wire end-product test and guidance*

IEC 707: 1981, *Method of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source*

IEC 730-1: 1993, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 738-1: 1982, *Directly heated positive step-function temperature coefficient thermistors – Part 1: Generic specification*

IEC 851, *Methods of test for windings wires*

IEC 884-1: 1994, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*

IEC 884-2-4: 1993, *Plugs and socket-outlets for household and similar purposes – Part 2: Particular requirements for plugs and socket-outlets for SELV*

IEC 898: 1995, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 906-1: 1986, *IEC System of plugs and socket-outlets for household and similar purposes – Part 1: Plugs and socket-outlets 16 A 250 V a.c.*

IEC 906-3: 1994, *IEC System of plugs and socket-outlets for household and similar purposes – Part 3: SELV plugs and socket-outlets, 16 A 6 V, 12 V, 24 V, 48 V, a.c. and d.c.*

IEC 947-7-1: 1989, *Low-voltage switchgear and controlgear – Part 7: Ancillary equipment – Section 1: Terminal blocks for copper conductors*

IEC 990: 1990, *Methods of measurement of touch-current and protective conductor current*

IEC 998-1: 1990, *Connecting devices for low voltage circuits for household and similar purposes – Part 1: General requirements*

IEC 998-2-1: 1990, *Connecting devices for low voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 998-2-2: 1991, *Connecting devices for low voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

IEC 999-1: 1990, *Connecting devices – Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors – Part 1: General requirements and particular requirements for conductors from 0,5 mm² up to 35 mm² (included)*

IEC 1000-3-2: 1995, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 2: Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current ≤16 A*

IEC 1000-3-3: 1994, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 3: Limitation of voltage fluctuation and flicker in low-voltage power supply systems for equipment with rated current ≤16 A*

IEC 1032: 1990, *Test probes to verify protection by enclosures*

IEC 1058-1: 1990, *Switches for appliances – Part 1: General requirements*

IEC 1140: 1992, *Protection against electric shock. Common aspects for installations and equipment*

ISO 3: 1973, *Preferred numbers – Series of preferred numbers*

ISO 4046: 1978, *Paper, board, pulp and related terms – Vocabulary*

ISO 8820, *Road vehicles – Blade type fuse-links*