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Interested committees:

Title: Draft BS EN 62314 Solid-state relays.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



94/435/CD

COMMITTEE DRAFT (CD)

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IEC 62314 ED2

DATE OF CIRCULATION:

2018-06-08

CLOSING DATE FOR COMMENTS:

2018-08-31

SUPERSEDES DOCUMENTS:

94/430/RR

IEC TC 94 : ALL-OR-NOTHING ELECTRICAL RELAYS

SECRETARIAT:

Austria

SECRETARY:

Mr Bernhard Spalt

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Solid-state relays

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOLID-STATE RELAYS

FOREWORD

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International Standard IEC 62314 has been prepared by technical committee 94: All-or-nothing electrical relays.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

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

- a) addition of load category for DC load;
- b) addition of "sockets" terminal as clause 7.4.4;
- c) requirement for degree of protection as clause 8.9;
- d) update of references.

The text of this standard is based on the following documents:

RR	Report on voting
94/430/RR	94/XXX/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2. The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific document. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

The National Committees are requested to note that for this document the stability date is 20XX.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

SOLID-STATE RELAYS

1 Scope

This International Standard applies to particular all-or-nothing electrical relays denominated solid-state relays intended for performing electrical operations by single step function changes to the state of electric circuits between the OFF-state and the ON-state and vice versa. It is applicable to solid-state relays with rated voltages up to 750 V and with AC or DC output current up to 160 A.

This standard deals with solid-state relays which are intended for incorporation in other products or equipment. As such, solid-state relays are considered to be components and this standard defines the basic safety-related and functional requirements for solid-state relays as stand-alone components.

Such solid-state relays are incorporated in products or equipment which themselves have to comply with the relevant product and/or application standard(s) to meet their intended application. The following are examples of such applications:

- general industrial equipment;
- electrical facilities;
- electrical machines;
- electrical appliances;
- office communications;
- building automation and environmental control;
- automation and process control;
- electrical installation engineering;
- medical engineering;
- telecommunications;
- vehicle engineering;
- transportation engineering;
- lighting control.

Solid-state relays are components (not stand alone devices) and as such do not perform a direct function. Therefore, EMC requirements are not considered in this standard.

NOTE This is in line with the European EMC Directive.

Where the application of a solid-state relay determines additional requirements such as EMC and overcurrent protection, the solid-state relay shall be assessed in accordance with the relevant IEC standard(s).

Solid-state switching devices with monolithic structures fall within the scope of IEC subcommittee 47E and are not covered in this standard.

Semiconductor controllers and contactors fall within the scope of the IEC 60947 series of standards – *Low-voltage switchgear and controlgear* – developed by IEC subcommittee 121A and are not covered in this standard.

Compliance with the requirements of this standard is verified by the type tests indicated.

The object of this standard is to state:

- the characteristics of solid-state relays;

- the requirements which solid-state relays shall comply with reference to
 - a) their operation and behaviour;
 - b) their dielectric properties;
 - c) the degrees of protection provided by their enclosures, where applicable;
- the tests verifying that the requirements have been met, and the test methods to be adopted;
- the information to be given with the solid-state relay or in the manufacturer's documentation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038:2009, *IEC standard voltages* IEC 60050-444:2002, *International Electrotechnical Vocabulary (IEV) – Part 444: Elementary relays*

IEC 60068-2-1:2007, *Environmental testing – Part 2: Tests. Tests A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2: Tests. Tests B: Dry heat*

IEC 60068-2-14:2009, *Environmental testing – Part 2: Tests. Test N: Change of temperature*
Amendment 1:1986

IEC 60068-2-20:2008, *Environmental testing – Part 2: Tests. Test T: Soldering*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
Amendment 1:2009

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3:2016, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60695-2-10:2013, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

214 IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper*
215 *conductors – Safety requirements*

216 IEC 61760-1:2006, *Surface mounting technology – Part 1: Standard method for the*
217 *specification of surface mounting components (SMDs)*

218 IEC 61984:2008, *Connectors – Safety requirements and tests*

219 **3 Terms and definitions**

220 For the purposes of this document, the terms and definitions given in IEC 60050-444 and the
221 following apply. .

222 **3.1 Terms and definitions related to relays**

223 **3.1.1**

224 **solid-state relay**

225 electrical relay in which the intended response is produced by electronic, magnetic, optical or
226 other components without mechanical motion

227 [SOURCE: IEC 60050-444:2002, 444-01-06]

228 **3.1.2**

229 **electrical relay**

230 device designed to produce sudden and predetermined changes in one or more output circuits
231 when certain conditions are fulfilled in the electrical input circuits controlling the device

232 [SOURCE: IEC 60050-444:2002, 444-01-01]

233 **3.1.3**

234 **rated operational voltage**

235 U_e

236 value of voltage which determines the application of the solid-state relay and to which the
237 relevant tests and the load categories are referred

238 **3.1.4**

239 **rated insulation voltage**

240 U_i

241 value of voltage to which dielectric tests and creepage distances are referred

242 **3.1.5**

243 **rated impulse withstand voltage**

244 U_{imp}

245 peak value of an impulse voltage of prescribed form and polarity which the solid-state relay is
246 capable of withstanding without failure under specified conditions of test and to which the
247 values of the clearances are referred

248 **3.1.6**

249 **rated operational current**

250 I_e

251 normal operating current when the solid-state relay is in the ON-state and takes into account
252 the rated operating voltage, the rated frequency (see 4.3), the load category (see 4.4) and the
253 overload characteristics at 40 °C ambient temperature unless otherwise specified

3.1.7**rated uninterrupted current** I_u

value of current, stated by the manufacturer, which the solid-state relay can carry in uninterrupted duty

3.1.8**rated frequency**

supply frequency for which a solid-state relay is designed and to which the other characteristic values correspond

Note 1 to entry: The same solid-state relay may be assigned a number or a range of rated frequencies or be rated for both AC and DC

3.1.9**overload current profile**

gives the current/time coordinates for the controlled overload current

3.1.10**operating capability**

represents the combined capabilities of

- current-commutation and current-carrying in the ON-state, and

- establishing and sustaining the OFF-state (blocking),

at maximum rated voltage under specified load and overload conditions in accordance with load category, overload current profile and specified duty cycles

3.1.11**rated conditional short-circuit current**

value of prospective current, stated by the manufacturer, which the solid-state relay, protected by a short-circuit protective device specified by the manufacturer, can withstand satisfactorily for the operating time of this device under the test conditions specified in the relevant product standard

3.1.12**leakage current** I_l

maximum current (RMS value for AC), stated by the manufacturer, which the solid-state relay can carry in OFF-state condition

3.1.13**ON-state voltage drop** U_d

peak value of voltage, stated by the manufacturer, between solid-state relay terminals in the ON-state condition

3.1.14**ON-state resistance** R_{on}

maximum value of resistance, stated by the manufacturer, between solid-state relay terminals in the ON-state condition

3.2 Terms and definitions related to insulation coordination (see Annex A)**3.2.1****clearance**

shortest distance in air between two conductive parts

[SOURCE: IEC 60664-1:2007, 3.2]

3.2.2**creepage distance**

shortest distance along the surface of the insulating material between two conductive parts

[SOURCE: IEC 60664-1:2007, 3.3, modified – modification of the definition]

3.2.3**functional insulation**

insulation between conductive parts which is necessary only for the proper functioning of the equipment

[SOURCE: IEC 60664-1:2007, 3.17.1]

3.2.4**solid insulation**

solid insulating material interposed between two conductive parts

[SOURCE: IEC 60664-1:2007, 3.4]

3.2.5**basic insulation**

insulation of hazardous-live-parts which provides basic protection against electric shock

Note 1 to entry: Basic insulation does not necessarily include insulation used exclusively for functional purposes.

[SOURCE: IEC 60664-1:2007, 3.17.2, modified – modification of the definition]

3.2.6**supplementary insulation**

independent insulation applied in addition to basic insulation, in order to provide protection against electric shock in the event of a failure of basic insulation

[SOURCE: IEC 60664-1:2007, 3.17.3, modified – modification of the definition]

3.2.7**double insulation**

insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 60664-1, 3.17.4]

3.2.8**reinforced insulation**

insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation may comprise several layers which cannot be tested singly as basic or supplementary insulation.

[SOURCE: IEC 60664-1:2007, 3.17.5]

3.2.9**overvoltage**

any voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions

[SOURCE: IEC 60664-1:2007, 3.7]

3.2.10**overvoltage category**

numeral defining a transient overvoltage condition

Note 1 to entry: Overvoltage categories I, II, III and IV are used, see 4.3.3.2 of IEC 60664-1.

[SOURCE: IEC 60664-1:2007, 3.10]

3.2.11**pollution**

any addition of foreign matter, solid, liquid or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation

[SOURCE: IEC 60664-1:2007, 3.11]

3.2.12**micro-environment**

immediate environment of the insulation which particularly influences the dimensioning of the creepage distances

[SOURCE: IEC 60664-1:2007, 3.12.2]

3.2.13**macro-environment**

environment of the room or other location in which the equipment is installed or used

[SOURCE: IEC 60664-1:2007, 3.12.1]

3.2.14**pollution degree**

numeral characterizing the expected pollution of the micro-environment

Note 1 to entry: Pollution degrees 1, 2 and 3 are used, see A.2.3.

[SOURCE: IEC 60664-1:2007, 3.13]

3.2.15**type 1 protection**

protection against pollution by the use of coating, potting or moulding assuming Pollution degree 1 under the protection

Note 1 to entry: Requirements and tests are given in IEC 60664-3.

Note 2 to entry: Pollution degree 1 is specified in A.2.3.

4 Characteristics of solid-state relays

4.1 Summary of characteristics

The characteristics of solid-state relays shall be stated with the following terms, where such terms are applicable:

- type of solid-state relay (see 4.2);
- rated and limiting values for load circuits (see 4.3);
- load category (see 4.4);
- rated and limiting values for control circuits (see 4.5).

4.2 Type of solid-state relay

The following shall be stated:

- number of poles;
- type of poles.

4.3 Rated and limiting values for load circuits

The rated and limiting values established for solid-state relays shall be stated in accordance with the following, but it need not to be performed to establish all applicable values by tests.

Rated voltages

- rated operational voltage (U_e);
- ON-state voltage drop (U_d);
- rated insulation voltage (U_i).

In no case shall the maximum value of the rated operational voltage exceed that of the rated insulation voltage.

NOTE Where no rated insulation voltage is specified for a solid-state relay, the highest value of the rated operational voltage is considered to be the rated insulation voltage.

- rated impulse withstand voltage (U_{imp}).

The rated impulse withstand voltage of a solid-state relay shall be equal to or higher than the values stated for the transient overvoltages occurring in the circuit in which the solid-state relay is incorporated.

Rated currents

- rated operational current (I_e);
- rated uninterrupted current (I_u);
- leakage current (I_l).

The requirements shall be given by the manufacturer.