SLOVENSKI STANDARD
SIST EN 61496-1:2014/oprA1:2019

01-junij-2019

Varnost strojev - Električno občutljiva zaščitna oprema - 1. del: Splošne zahteve in preskusi

Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests

Sicherheit von Maschinen - Berührungslos wirkende Schutzeinrichtungen - Teil 1: Allgemeine Anforderungen und Prüfungen

Sécurité des machines - Equipements de protection électro-sensibles - Partie 1: Exigences générales et essais

Ta slovenski standard je istoveten z: **EN 61496-1:2013/prA1:2019**

ICS:

13.110	Varnost strojev	Safety of machinery
31.260	Optoelektronika, laserska oprema	Optoelectronics. Laser equipment

SIST EN 61496-1:2014/oprA1:2019 **en,fr,de**

44/845/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61496-1/AMD1 ED3**	
DATE OF CIRCULATION: **2019-03-29**	CLOSING DATE FOR VOTING: **2019-06-21**
SUPERSEDES DOCUMENTS: **44/832/CD, 44/840A/CC**	

IEC TC 44 : SAFETY OF MACHINERY - ELECTROTECHNICAL ASPECTS

SECRETARIAT: United Kingdom	SECRETARY: Mrs Nyomee Hla-Shwe Tun
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING
Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	

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:

Amendment 1 – Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests

PROPOSED STABILITY DATE: 2022

NOTE FROM TC/SC OFFICERS:

The reasons and objectives for amending IEC 61496

The main purpose for these amendments to IEC 61496-1 and -2 is as follows:

1) To clarify that Part one of this standard defines only general requirements for non-contact electro sensitive protective equipment. Part one is intended to be used with a subsequent Part that defines particular requirements based on the sensing technology used for detection.

2) It was discovered that some additional requirements for environmental influences were repeated in parts 2, 3, 4-2 and 4-3. It was decided that these requirements were common to all ESPEs and would be appropriate to include in Part one.

3) Since this standard was written, several new generic standards have been developed that focus on specific environmental influences that can affect functional safety (e.g. EMC, temperature, vibration). Part one has been updated to harmonize with the requirements of the new generic standards, including adjusting terminology and format of tables to match the new standards. It is not intended to change the actual requirements.

4) In the original standard, some of the test procedures for environmental influences were unclear or incomplete. These procedures have been expanded to provide detailed step by step procedures. Where appropriate, references to procedures described in the generic test standards are provided.

5) There are Type 3 AOPDs on the market today. The requirements for Type 3 AOPDs are now included in Part two.

6) Some of functional safety fault protection requirements were un-realistic and were generally not possible to comply with. These requirements have been adjusted slightly.

7) Some small corrections and improvements were included throughout the document.

8) It is not intended that these amendments result in significant changes to the requirements. It is believed that most ESPEs that comply with the existing standards will still be compliant with these reorganized documents.

FOREWORD

This amendment has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

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

FDIS	Report on voting
44/XX/FDIS	44/XX/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result date[1] indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

[1] The National Committees are requested to note that for this publication the maintenance result date is 20xx.

Introduction

Delete the last paragraph.

~~Due to the complexity of the technology used to implement ESPEs, there are many issues that are highly dependent on analysis and expertise in specific test and measurement techniques. In order to provide a high level of confidence, independent review by relevant experts is recommended.~~

1 Scope

Add, after the first paragraph:

This Part 1 is intended to be used with a subsequent part that provides particular requirements based on the sensing technology. Where a part covering the sensing technology does not exist, this Part 1 can be used for guidance.

Example: Part 1 and Part 2 are used for AOPDs, Part 1 and Part 3 are used for AOPDDRs.

Add, before the last paragraph:

This standard does not deal with requirements for ESPE functions not related to the protection of persons (e.g. using sensing unit data for navigation).

3 Terms and definitions

Add, after definition 3.30, the following new definition:

3.31
type test
conformity test made on one or more items representative of the production

[SOURCE: ISO/IEC Guide 2 (14.5 MOD)]

4.1.3 Types of ESPE

Replace the last sentence of the first paragraph with the following text:

It is the responsibility of the machine supplier and/or the user to prescribe which type is required for a particular application.

4.2.2.1 General

Replace the last paragraph with the following text:

At power on, the OSSD(s) shall not be signalled to the ON-state until it has been verified that there are no safety critical faults.

4.2.2.3 Particular requirements for a type 2 ESPE

Delete the paragraph following Note 2:

~~If the periodic test is automatically initiated, the correct functioning of the periodic test shall be monitored. In the event of a fault, the OSSD(s) shall be signalled to go to the OFF-state. If one or more OSSDs does not go to the OFF-state, a lock-out condition shall be initiated.~~

4.2.2.4 Particular requirements for a type 3 ESPE

Replace entire clause with the following text:

A single fault in the sensing device resulting in a complete loss of the stated ESPE detection capability shall cause the ESPE to go to a lock-out condition within the specified response time.

A single fault resulting in a deterioration of the stated ESPE detection capability shall cause the ESPE to go to a lock-out condition within a time period of 5 s following the occurrence of that fault.

A single fault resulting in an increase in response time beyond the specified value or preventing at least one OSSD going to the OFF-state shall cause the ESPE to go to a lock-out condition immediately, i.e. within the response time, or immediately upon any of the following demand events where fault detection requires a change in state:

- on actuation of the sensing function;
- on switch off/on;
- on reset of the start interlock or the restart interlock, if available (see A.5 and A.6);
- on the application of an external test signal, if available.

In cases where a single fault which in itself does not cause a failure to danger is not detected, the occurrence of one additional fault shall not cause a failure to danger. For verification of this requirement, see 5.3.4.

4.2.3.2 Protection against electric shock

Replace the paragraph with the following text:

Protection against electric shock shall be provided in accordance with 6 of IEC 60204-1:2016.

4.2.3.6 Wiring

Add, after clause 4.2.3.6 the following new clause:

4.2.3.7 Fire and flame protection

Fire and flame protection shall be provided in accordance with relevant standards.

Note IEC 60204-1, IEC 60947-1 and IEC 61010-1 are examples of relevant standards that can provide guidance.

4.2.4.1 General

Replace the second paragraph, the NOTE and the third paragraph with the following 2 paragraphs: the following last paragraph:

The OSSD should be so rated that their loads can be switched without the use of arc suppression devices fitted across the loads.

The output circuit of the OSSDs should be adequately protected to prevent failure to danger, for example welded contacts under overcurrent conditions (see 7.2.9 of IEC 60204-1:2016).

4.2.4.3 Solid state OSSDs

Change, in the 5th column of the data table, the value of Output On-state from "6 mA" to "2 mA".

Replace NOTE 3 with the following:

NOTE 3 The values above meet the requirements of IEC 61131-2:2017 (see 3.13 of IEC 61131-2:2017), for a nominal rated supply voltage of 24 V d.c. When other supply voltages are used, this standard may be used as a guide. IEC 61131-2:2017 may be referred to for additional information.

Replace NOTE 4 with the following:

NOTE 4 It is possible that a leakage current greater than 2 mA can lead to a failure to danger.

4.2.5 Indicator lights and displays

Replace the first paragraph with the following text:

Devices shall be provided by the ESPE supplier to:

4.2.9 Common cause failures

Replace the last paragraph with the following text and new NOTE 3:

Where a common semi-conductor substrate is used for more than one channel of a multi-channel system, the "Special architecture requirements for on-chip redundancy" of IEC 61508-2 shall apply.

NOTE 3 For the IEC61508-2:2010 edition, this is Annex E.

4.2.11.2 Requirements

After clause 4.2.11.2, add two new clauses 4.2.12 and 4.2.13 as follows:

4.2.12 Integrity of the ESPE detection capability

The design of the ESPE shall ensure that the detection capability is not decreased below the limits specified by the supplier and in the relevant part of this standard.

4.2.13 Test piece or device

A test piece or device shall be defined as part of the ESPE design for use in verifying the detection capability. The test piece will be defined based on the sensing technology and test requirements as defined in clause 5 of the relevant part of this standard.

4.3.1 Ambient air temperature range and humidity

Add, after the first paragraph the following new paragraph:

When the supplier states that the ESPE can be used in an environment where condensing is possible, the ESPE shall not fail to danger when subjected to a rapid change of temperature and humidity leading to condensation on the optical window. This requirement is verified by the condensing test of 5.4.2.

4.3.2.2 External supply voltage interruptions

Replace clause 4.3.2.2 Heading, text, notes and tables with the following:

4.3.2.2 External supply voltage dips and interruptions

For a.c. powered devices, the requirements of Table 3 apply for supply voltage dips and interruptions in accordance with IEC 61000-4-11:2004+AMD1:2017.

For d.c. powered devices, the requirements of Table 4 apply for supply voltage dips and interruptions in accordance with IEC 61000-4-29:2000.

When a d.c. powered ESPE is designed to be supplied from a specific type of power supply(s) (for example, supplied direct from a safety-related communication interface), the supply voltage dips and interruptions in this clause may be applied to the primary input of the specified power supply instead of direct to the ESPE.

Table 3 – Supply voltage dips and interruptions for AC power ports

test number	U_T residual voltage (%)	Cycles
1	0	1
2	70	25/30
3	40	10/12

Note 1 U_T is the rated voltage for the equipment.

Note 2 “10/12 cycles” means “10 cycles for 50 Hz test” and “12 cycles for 60 Hz test” (and similarly for 25/30 cycles).

Table 4 – Supply voltage dips and interruptions for DC power ports

test number	U_T residual voltage (%)	Dip time (ms)
1	40	10
2	70	10
3	0	20

142 **4.3.2.3 Fast transient/burst**

143 *Replace the heading of clause 4.3.2.3 as follows:*

144 **4.3.2.3 Burst**

145 **4.3.2.3.1 General requirements**

146 *Replace the text and table of this clause with the following:*

147 The ESPE shall continue in normal operation when subjected to burst in accordance with
148 IEC 61000-4-4:2012:

Ports for power lines for d.c. or less than 50 V a.c. Ports for signal lines, etc. with a length exceeding 3 m	Voltage: ± 1 kV Frequency: 5 kHz
Ports for power lines for 50 V a.c. and above	Voltage: ± 2 kV Frequency: 5 kHz

149

150 **4.3.2.3.2 Additional requirements**

151 *Replace the text and table of this clause with the following:*

152 A type 3 or a type 4 ESPE shall not fail to danger when subjected to burst in accordance with
153 IEC 61000-4-4:2012:

Ports for power lines for d.c. and for less than 50 V a.c. Ports for signal lines, etc. with a length exceeding 3 m	Voltage: ± 2 kV Frequency: 5 kHz
Ports for power lines for 50 V a.c. and above	Voltage: ± 4 kV Frequency: 5 kHz

154

155 **4.3.2.4 Fast transient/surge**

156 *Replace the heading of clause 4.3.2.4 as follows:*

157 **4.3.2.4 Surge**

158 **4.3.2.4.1 General requirements**

159 *Replace the text and table of this clause with the following:*

160 The ESPE shall continue in normal operation when subjected to surge in accordance with
161 IEC 61000-4-5: 2014+AMD1:2017:

Ports for signal lines with a length exceeding **30** m or the line is applied outside the building Power ports for d.c. and for less than 50 V a.c.	± 1 kV, common mode
Ports for power lines for 50 V a.c. and above	± 2 kV, common mode ± 1 kV, differential mode