

**SLOVENSKI STANDARD  
SIST EN IEC 61496-3:2019****01-junij-2019****Nadomešča:****SIST-TS CLC/TS 61496-3:2009**

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**Varnost strojev - Električno občutljiva zaščitna oprema - 3. del: Posebne zahteve za aktivne optoelektronske zaščitne elemente, ki se odzivajo na difuzni odboj (AOPDDR) (IEC 61496-3:2018)**

Safety of machinery - Electro-sensitive protective equipment - Part 3: Particular requirements for Active Opto-electronic Protective Devices responsive to Diffuse Reflection (AOPDDR) (IEC 61496-3:2018)

Sicherheit von Maschinen - Berührungslos wirkende Schutzeinrichtungen - Teil 3: Besondere Anforderungen an aktive optoelektronische diffuse Reflektion nutzende Schutzeinrichtungen (AOPDDR) (IEC 61496-3:2018)

Sécurité des machines - Equipements de protection électro-sensibles - Partie 3: Exigences particulières pour les équipements utilisant des dispositifs protecteurs optoélectroniques actifs sensibles aux réflexions diffuses (AOPDDR) (IEC 61496-3:2018)

**Ta slovenski standard je istoveten z: EN IEC 61496-3:2019**

**ICS:**

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

**SIST EN IEC 61496-3:2019****en,fr,de**

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EUROPEAN STANDARD

**EN IEC 61496-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2019

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Supersedes CLC/TS 61496-3:2008

English Version

**Safety of machinery - Electro-sensitive protective equipment -  
Part 3: Particular requirements for active opto-electronic  
protective devices responsive to diffuse Reflection (AOPDDR)  
(IEC 61496-3:2018)**

Sécurité des machines - Equipements de protection électro-sensibles - Partie 3: Exigences particulières pour les équipements utilisant des dispositifs protecteurs optoélectroniques actifs sensibles aux réflexions diffuses (AOPDDR)  
(IEC 61496-3:2018)

Sicherheit von Maschinen - Berührungslos wirkende Schutzeinrichtungen - Teil 3: Besondere Anforderungen an aktive optoelektronische diffuse Reflexion nutzende Schutzeinrichtungen (AOPDDR)  
(IEC 61496-3:2018)

This European Standard was approved by CENELEC on 2019-01-11. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN IEC 61496-3:2019 (E)****European foreword**

The text of document 44/831/FDIS, future edition 3 of IEC 61496-3, prepared by IEC/TC 44 "Safety of machinery - Electrotechnical aspects" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61496-3:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-10-11
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-01-11

This document supersedes CLC/TS 61496-3:2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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The text of the International Standard IEC 61496-3:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

The bibliography of IEC 61496-1:2012 applies, except as follows:

Addition:

IEC 60068-2-64:2008	NOTE	Harmonized as EN 60068-2-64:2008 (not modified)
IEC 60721-3-5:1997	NOTE	Harmonized as EN 60721-3-5:1997 (not modified)
IEC 61508-1:2010	NOTE	Harmonized as EN 61508-1:2010 (not modified)

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

Clause 2 of IEC 61496-1:2012 applies, except as follows.

Addition:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	-
IEC 60068-2-75	-	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	-
IEC TR 60721-4-5	-	Classification of environmental conditions - Part 4-5: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 - Ground vehicle installations	-	-
IEC 60825-1	2014	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	2014
-	-		EN 60825-1:2014/ AC:2017-06	
IEC 61496-1	2012	Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests	EN 61496-1	2013
IEC 62471	-	Photobiological safety of lamps and lamp systems	EN 62471	-
ISO 13855	2010	Safety of machinery - Positioning of safeguards with respect to the approach speeds of parts of the human body	EN ISO 13855	2010
ISO 20471	2013	High-visibility clothing - Test methods and requirements	EN ISO 20471	2013

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Safety of machinery – Electro-sensitive protective equipment –  
Part 3: Particular requirements for active opto-electronic protective devices  
responsive to diffuse reflection (AOPDDR)**

**Sécurité des machines – Équipements de protection électro-sensibles –  
Partie 3: Exigences particulières pour les équipements utilisant des dispositifs  
protecteurs optoélectroniques actifs sensibles aux réflexions diffuses  
(AOPDDR)**

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ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF MACHINERY –  
ELECTRO-SENSITIVE PROTECTIVE EQUIPMENT –

**Part 3: Particular requirements for active opto-electronic protective  
devices responsive to diffuse reflection (AOPDDR)**

## 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.
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International Standard IEC 61496-3 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

This third edition cancels and replaces the second edition published in 2008. This edition constitutes a technical revision.

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

- a) extension of the scope from AOPDDR-2D to AOPDDR-3D;
- b) extension of the scope from Type 3 ESPE to Type 2 ESPE;
- c) implementation of requirements and test procedures for AOPDDR-3D and Type 2 ESPE;
- d) listing of reference boundary monitoring as an optional function of the ESPE;

- e) implementation of instructions for positioning of AOPDDR-3D in respect of parts of the human body;
- f) revised requirement for combinations of single faults with conditions for no failure to danger, see for example 4.2.2.4, last paragraph.

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

FDIS	Report on voting
44/831/FDIS	44/837/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.

This document is to be used in conjunction with IEC 61496-1:2012.

Where a particular clause or subclause of IEC 61496-1:2012 is not mentioned in this document, that clause or subclause applies as far as is reasonable. Where this document states "addition" or "replacement", the relevant text of IEC 61496-1:2012 is adapted accordingly. Clauses and subclauses which are additional to those of IEC 61496-1:2012 are numbered sequentially, following on the last available number in IEC 61496-1:2012. Where no available number exist, the additional subclauses are numbered starting from 101. Supplementary Annexes are entitled AA and BB.

A list of all parts in the IEC 61496 series, published under the general title *Safety of machinery – Electro-sensitive protective equipment*, can be found on the IEC website.

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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 publication. At this date, the publication will be

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

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## INTRODUCTION

An electro-sensitive protective equipment (ESPE) is applied to machinery presenting a risk of personal injury. It provides protection by causing the machine to revert to a safe condition before a person can be placed in a hazardous situation.

This part of IEC 61496 supplements or modifies the corresponding clauses in IEC 61496-1 to specify particular requirements for the design, construction and testing of electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDRs) for the sensing function.

Each type of machine presents its own particular hazards, and it is not the purpose of this document to recommend the manner of application of the ESPE to any particular machine. The application of the ESPE is a matter for agreement between the equipment supplier, the machine user and the enforcing authority. In this context, attention is drawn to the relevant guidance established internationally, for example, IEC 62046 and ISO 12100.

Due to the complexity of the technology, 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 expertise is recommended.

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## SAFETY OF MACHINERY – ELECTRO-SENSITIVE PROTECTIVE EQUIPMENT –

### Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse reflection (AOPDDR)

#### 1 Scope

This part of IEC 61496 specifies additional requirements for the design, construction and testing of electro-sensitive protective equipment (ESPE) designed specifically to detect persons or parts of persons as part of a safety-related system, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDRs) for the sensing function. Special attention is directed to requirements which ensure that an appropriate safety-related performance is achieved. An ESPE can include optional safety-related functions, the requirements for which are given both in Annex A of this document and in Annex A of IEC 61496-1:2012.

This document does not specify the dimensions or configurations of the detection zone and its disposition in relation to hazardous parts for any particular application, nor what constitutes a hazardous state of any machine. It is restricted to the functioning of the ESPE and how it interfaces with the machine.

AOPDDRs are devices that have either

- one or more detection zone(s) specified in two dimensions (AOPDDR-2D), or
- one or more detection zone(s) specified in three dimensions (AOPDDR-3D)

wherein radiation in the near infrared range is emitted by an emitting element(s). When the emitted radiation impinges on an object (for example, a person or part of a person), a portion of the emitted radiation is reflected to a receiving element(s) by diffuse reflection. This reflection is used to determine the position of the object.

Opto-electronic devices that perform only a single one-dimensional spot-like distance measurement, for example, optical proximity switches, are not covered by this document.

This document does not address those aspects required for complex classification or differentiation of the object detected.

This document does not address requirements and tests for outdoor application.

Excluded from this document are AOPDDRs employing radiation with the peak of wavelength outside the range 820 nm to 950 nm, and those employing radiation other than that generated by the AOPDDR itself. For sensing devices that employ radiation of wavelengths outside this range, this document can be used as a guide. This document is relevant for AOPDDRs having a minimum detectable object size in the range from 30 mm to 200 mm.

This document can be relevant to applications other than those for the protection of persons, for example, for the protection of machinery or products from mechanical damage. In those applications, different requirements can be appropriate, for example when the materials that have to be recognized by the sensing function have different properties from those of persons and their clothing.

This document does not deal with electromagnetic compatibility (EMC) emission requirements.

## 2 Normative references

Clause 2 of IEC 61496-1:2012 applies, except as follows.

*Addition:*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC TR 60721-4-5, *Classification of environmental conditions – Part 4-5: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 – Ground vehicle installations*

IEC 60825-1:2014, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 61496-1:2012, *Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests*

IEC 62471, *Photobiological safety of lamps and lamp systems*

ISO 13855:2010, *Safety of machinery – Positioning of safeguards with respect to the approach speeds of parts of the human body*

ISO 20471:2013, *High-visibility clothing – Test methods and requirements*

## 3 Terms and definitions

Clause 3 of IEC 61496-1:2012 applies, except as follows.

*Replacement of 3.3 and 3.4:*

### 3.3

#### **detection capability**

ability to detect the specified test pieces (see 4.2.13) in the specified detection zone

Note 1 to entry: A list of influences which can affect the AOPDDR detection capability is given in 4.2.12.1.

Note 2 to entry: Detection capability is often described by the minimum detectable object size and the object reflectivity. The supplier can state more than one value as the minimum detectable object size, for example depending on distances or mounting conditions. For an AOPDDR-2D the minimum detectable object size is the diameter of the cylindrical test piece.

### 3.4

#### **detection zone**

zone within which the specified test piece(s) (see 4.2.13) is detected by the AOPDDR with a minimum required probability of detection (see 4.2.12.2)

Note 1 to entry: A tolerance zone is necessary to achieve the required probability of detection of the specified test piece(s) within the detection zone.