

# SLOVENSKI STANDARD

## SIST-TS CLC/TS 61496-3:2009

01-januar-2009

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SIST-TS CLC/TS 61496-3:2005

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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)

**iTeh STANDARD PREVIEW**

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

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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)

**Ta slovenski standard je istoveten z: CLC/TS 61496-3:2008**

### ICS:

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

**SIST-TS CLC/TS 61496-3:2009**

**en,fr,de**

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TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
TECHNISCHE SPEZIFIKATION

**CLC/TS 61496-3**

May 2008

ICS 13.110; 31.260

Supersedes CLC/TS 61496-3:2003

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 61496-3:2008)**

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)  
(CEI 61496-3:2008)

Sicherheit von Maschinen -  
Berührungslos wirkende  
Schutzeinrichtungen -  
Teil 3: Besondere Anforderungen an  
aktive optoelektronische diffuse Reflektion  
nutzende Schutzeinrichtungen (AOPDDR)  
(IEC 61496-3:2008)

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This Technical Specification was approved by CENELEC on 2008-03-01.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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**

## Foreword

The text of document 44/572/FDIS, future edition 2 of IEC 61496-3, prepared by IEC TC 44, Safety of machinery - Electrotechnical aspects, in collaboration with the Technical Committee CENELEC TC 44X, Safety of machinery: electrotechnical aspects, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as CLC/TS 61496-3 on 2008-03-01.

This Technical Specification supersedes CLC/TS 61496-3:2003.

The most important changes and improvements compared to CLC/TS 61496-3:2003 are:

- extension of the range of detection capability covered by this part of the standard from 50 mm to 100 mm to the range of 30 mm to 200 mm;
- clarification of requirements for the selection of multiple detection zones (Clause A.10);
- more detailed information about the use of an AOPDDR as a whole body trip device by extension of Clause A.12 and a new Clause A.13;
- improved description of the relationship between ranging accuracy and probability of detection (Annex BB).

This Technical Specification is to be used in conjunction with EN 61496-1.

The following date was fixed:

- latest date by which the existence of the CLC/TS has to be announced at national level (doa) 2008-06-01

Annex ZA has been added by CENELEC.

[SIST-TS CLC/TS 61496-3:2009](https://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18f869e/sist-ts-clc-ts-61496-3-2009)  
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### Endorsement notice

The text of the International Standard IEC 61496-3:2008 was approved by CENELEC as a Technical Specification without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 14121-1            NOTE Harmonized as EN ISO 14121-1:2007 (not modified).

## Annex ZA (normative)

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

**Addition** to Annex ZA of EN 61496-1:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
-	-	High-visibility warning clothing for professional use - Test methods and requirements	EN 471	2003
IEC 60068-2-14 + A1	1984 1986	Environmental testing - Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999
IEC 60068-2-75	1997	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	1997
IEC 60825-1	- <sup>1)</sup>	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	2007 <sup>2)</sup>
IEC 61496-1 (mod)	2004	Safety of machinery - Electro-sensitive protective equipment Part 1: General requirements and tests	EN 61496-1	2004
IEC/TS 62046	- <sup>1)</sup>	Safety of machinery - Application of protective equipment to detect the presence of persons	CLC/TS 62046	2008 <sup>2)</sup>
ISO 13855	2002	Safety of machinery - Positioning of protective equipment with respect to the approach speeds of parts of the human body	-	-

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

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IEC 61496-3

Edition 2.0 2008-02

# 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)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

**XB**

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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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- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61496-3 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects, in collaboration with CENELEC technical committee 44X: Safety of machinery – Electrotechnical aspects.

This second edition cancels and replaces the first edition issued in 2001 and constitutes a technical revision.

The most important changes and improvements compared to the first edition of this part of the standard are:

- extension of the range of detection capability covered by this part of the standard from 50 mm to 100 mm to the range of 30 mm to 200 mm;
- clarification of requirements for the selection of multiple detection zones (Clause A.10);

- more detailed information about the use of an AOPDDR as a whole body trip device by extension of Clause A.12 and a new Clause A.13;
- improved description of the relationship between ranging accuracy and probability of detection (Annex BB).

This International Standard is to be used in conjunction with IEC 61496-1.

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

FDIS	Report on voting
44/572/FDIS	44/578/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.

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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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[https://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18f869e/sist-ts-clc-ts-61496-3-2009](http://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18f869e/sist-ts-clc-ts-61496-3-2009)

This standard has the status of a dedicated product standard and may be used as a normative reference in a dedicated product standard for the safety of machinery.

## 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 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.

Where a particular clause or subclause of part 1 is not mentioned in this part 3, that clause or subclause applies as far as is reasonable. Where this part states "addition", "modification" or "replacement", the relevant text of part 1 should be adapted accordingly.

Supplementary Annexes are entitled AA, BB, etc.

Each type of machine presents its own particular hazards, and it is not the purpose of this standard to recommend the manner of application of the ESPE to any particular machine. The application of the ESPE should be 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, ISO/TR 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.

[SIST-TS CLC/TS 61496-3:2009](https://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18fc869e/sist-ts-clc-ts-61496-3-2009)

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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

##### *Replacement:*

This part of IEC 61496 specifies additional requirements for the design, construction and testing of non-contact electro-sensitive protective equipment (ESPE) designed specifically to detect 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 may include optional safety-related functions, the requirements for which are given both in Annex A of this part and in Annex A of IEC 61496-1.

This part 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 a detection zone specified in two dimensions wherein radiation in the near infrared range is emitted by a transmitter 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 whereby the presence of the object can be detected.

NOTE 1 Under certain circumstances, limitations of the sensor in relation to its use need to be considered. For example:

- Objects that generate mirror-like (specular) reflections may not be detected if the diffuse reflectance value is less than that specified for the "black" test piece.
- The determination of the minimal reflection factors for the detection of obstacles is based on the clothing of a person. Objects having a reflectivity lower than that considered in this part may not be detected.

Excluded from this part are AOPDDRs employing radiation of wavelength outside the range 820 nm to 946 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 part may be used as a guide. This part is relevant for AOPDDRs having a stated detection capability in the range from 30 mm to 200 mm. AOPDDRs intended for use as trip device using whole-body detection with normal approach to the detection zone and having a stated detection capability not exceeding 200 mm shall meet the requirements of Clause A.12. AOPDDRs intended for a direction of approach normal to the detection zone and having a stated detection capability in the range from 30 mm to 70 mm shall meet the requirements of Clause A.13.

NOTE 2 According to ISO 13855 (EN 999), 6.3 foreseeable angles of approach greater than 30° should be considered normal approach and foreseeable angles of approach less than 30° should be considered parallel approach.

NOTE 3 According to ISO 13855 (EN 999), 6.2 when electro-sensitive protective equipment employing active opto-electronic protective devices is used for direction of approach parallel to the detection zone the device should have a detection capability in the range from 50 mm to 117 mm.

This part may 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 may be necessary, 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 part does not deal with electromagnetic compatibility (EMC) emission requirements.

Opto-electronic devices that perform only one-dimensional spot-like distance measurements, for example, proximity switches, are not covered by this part.

## 2 Normative references

*Addition:*

IEC 60068-2-14:1984, *Basic environmental testing procedures – Part 2: Tests – Test N: Change of temperature*

Amendment 1 (1986)

IEC 60068-2-75:1997-08, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 61496-1:2004, *Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests*

IEC 62046<sup>1</sup>, *Safety of machinery – Application of protective equipment to detect the presence of persons*

ISO 13855:2002, *Safety of machinery – Positioning of protective equipment with respect to the approach speeds of parts of the human body*

EN 471:2003-09, *High-visibility warning clothing for professional use – Test methods and requirements*

## 3 Terms and definitions

*Replacement:*

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

*Addition:*

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<sup>1</sup> To be published.

**3.301****active opto-electronic protective device responsive to diffuse reflection  
AOPDDR**

device, whose sensing function is performed by opto-electronic emitting and receiving elements, that detects the diffuse reflection of optical radiations generated within the device by an object present in a detection zone specified in two dimensions

**3.302****AOPDDR detection capability**

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

NOTE A list of influences which can affect the AOPDDR detection capability is given in 4.2.12.1.

**3.303****tolerance zone**

zone outside of and adjacent to the detection zone within which the specified test piece(s) (see 4.2.13) is detected with a probability of detection lower than the required probability within the detection zone. The tolerance zone is necessary to achieve the required probability of detection of the specified test piece(s) within the detection zone

NOTE For explanation of the concept of probability of detection and the tolerance zone see Annex BB.

**4 Requirements**

This clause of part 1 is applicable except as follows:

**4.1 Functional requirements****4.1.3 Types of ESPE**

*Replacement:*

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https://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18fc869e/sist-ts-clc-ts-61496-3-2009](https://standards.iteh.ai/catalog/standards/sist/6c39d966-d61a-468f-8fb8-822b18fc869e/sist-ts-clc-ts-61496-3-2009)

In this part of IEC 61496 only a type 3 ESPE is considered. It is the responsibility of the machine supplier and/or the user to prescribe if this type is suitable for a particular application.

The type 3 ESPE shall fulfil the fault detection requirements of 4.2.2.4 of this part. In normal operation, the output circuit of each of at least two output signal switching devices (OSSDs) of the type 3 ESPE shall go to the OFF-state when the sensing device is actuated, or when the power is removed from the device.

*Additional functional requirements:*

**4.1.4 Zone(s) with limited detection capability**

A zone between the optical window and the beginning of the detection zone is referred to as a zone with limited detection capability. In order to ensure no hazard can arise in a particular application due to the presence of this zone(s) between the optical window and the detection zone, its dimensions and appropriate information for use shall be provided by the supplier.

A zone with limited detection capability shall not extend more than 50 mm from the optical window in the plane of detection.

**4.2 Design requirements****4.2.2 Fault detection requirements****4.2.2.2 Particular requirements for a type 1 ESPE**

This subclause of part 1 is not applicable.