SVENSK STANDARD

SS-EN IEC 61496-3, utg 3:2026

2026-06-10

COMMENTED VERSION

Maskinsäkerhet – Elektriskt avkännande skyddsanordningar – Del 3: Särskilda fordringar på utrustning med aktiv optoelektronik, känslig för diffus reflexion (AOPDDR)

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

En så kallad ”Commented Version” (CMV) innehåller både den fastställda IEC-standarden och en kommenterad och ändringsmarkerad standard. Alla tillägg och borttagningar sedan den tidigare utgåvan är markerade med färg. Med en CMV sparar du mycket tid när du ska identifiera och förklara aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut CMV i de fall den finns tillgänglig från IEC.

IEC 61496-3

Edition 4.0 2025-08

INTERNATIONAL STANDARD

COMMENTED VERSION

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

ICS 13.110; 31.260

ISBN 978-2-8327-0662-6

SEK Svensk Elstandard

SS-EN IEC 61496-3, utg 3:2026

IEC 61496-3:2025-08 CMV(en)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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)

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
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This commented version (CMV) of the official standard IEC 61496-3:2025 edition 4.0 allows the user to identify the changes made to the previous IEC 61496-3:2018 edition 3.0. Furthermore, comments from IEC TC 44 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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

This fourth edition cancels and replaces the third edition published in 2018. This edition constitutes a technical revision.

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

a) some requirement clauses and test procedures have been adapted or removed because they have been consolidated in IEC 61496-1:2020 (e.g. 5.4.6.2 Light sources and Clause A.9);
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c) using the AOPDDR as a trip device is described as an optional function in Clause A.13.

The text of this International Standard is based on the following documents:

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The language used for the development of this International Standard is English.

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.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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The group responsible for drafting this document was concerned that, 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 experts is recommended. If this high level of confidence cannot be established, these devices would not be suitable for use in safety related applications.

1 Scope

This document specifies additional requirements for the design, construction and testing of non-contact **1** 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~~2020.

NOTE "Non-contact" means that physical contact is not required for sensing.

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 is limited to ESPE that do not require human intervention for detection. It is limited to ESPE that detect objects entering into or being present in a detection zone(s). **2**

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~~ 1 100 nm **3**, 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~~ are 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

IEC 61496-1:~~2012~~2020, Clause 2 is applicable except as follows.

Addition:

IEC 60068-2-14:2023, *Environmental testing - Part 2-14: Tests - Test N: Change of temperature*

IEC 60068-2-75:2014, *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~~2020, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

IEC TS 62998-1:2019, *Safety of machinery - Safety-related sensors used for the protection of persons*

IEC TS 62998-3:2023, *Safety of machinery - Safety-related sensors used for the protection of persons - Part 3: Sensor technologies and algorithms*

ISO 13855:~~2010~~2024, *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*

SVENSK STANDARD

SS-EN IEC 61496-3, utg 3:2026

Fastställd	Sida	Ansvarig kommitté
2026-06-10	1 (89)	SEK TK 44

Maskinsäkerhet – Elektriskt avkännande skyddsanordningar – Del 3: Särskilda fordringar på utrustning med aktiv optoelektronik, känslig för diffus reflexion (AOPDDR)

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

Som svensk standard gäller europastandarden EN IEC 61496-3:2025. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61496-3:2025.

Nationellt förord

Europastandarden EN IEC 61496-3:2025

består av:

- **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
- **IEC 61496-3, Fourth edition, 2025 - Safety of machinery - Electro-sensitive protective equipment - Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse Reflection (AOPDDR)**

utarbetad inom International Electrotechnical Commission, IEC.

Standarden ska användas tillsammans med SS-EN IEC 61496-1, utg 4:2020 och dess separat utgivna tillägg, ändringar och rättelser.

Tidigare fastställd svensk standard SS-EN IEC 61496-3, utg 2:2019 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2028-10-31.

ICS 13.110.00; 31.260.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1042, 172 21 Sundbyberg
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: elstandard.se

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Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

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Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1042
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61496-3

October 2025

ICS 13.110; 31.260

Supersedes EN IEC 61496-3:2019

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 61496-3:2025)

Sécurité des machines - Équipements de protection électrosensibles - Partie 3: Exigences particulières pour les équipements utilisant des dispositifs protecteurs optoélectroniques actifs sensibles aux réflexions diffuses (AOPDDR)
(IEC 61496-3:2025)

Sicherheit von Maschinen - Berührungslos wirkende Schutzeinrichtungen - Teil 3: Besondere Anforderungen an aktive optoelektronische diffuse Reflexion nutzende Schutzeinrichtungen (AOPDDR)
(IEC 61496-3:2025)

This European Standard was approved by CENELEC on 2025-09-18. 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.

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

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

Ref. No. EN IEC 61496-3:2025 E

SEK Svensk Elstandard SS-EN IEC 61496-3, utg 3:2026

European foreword

The text of document 44/1061/FDIS, future edition 4 of IEC 61496-3, prepared by TC 44 "Safety of machinery - Electrotechnical aspects" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61496-3:2025.

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)	2026-10-31
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2028-10-31

This document supersedes EN IEC 61496-3:2019 and all of its amendments and corrigenda (if any).

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.

This document is read in conjunction with EN IEC 61496-1:2020.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61496-3:2025 was approved by CENELEC as a European Standard without any modification.

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

IEC 60068-2-64:2008 NOTE Approved as EN 60068-2-64:2008 (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.cencenelec.eu.

Annex ZA of EN IEC 61496-1:2020, applies, except as follows:

Add:

Publication	Year	Title	EN/HD	Year
IEC 60068-2-14	2023	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN IEC 60068-2-14	2023
IEC 60068-2-75	2014	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	2014
IEC 60825-1	2014	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	2014
-	-		+ A11	2021
-	-		+ AC	2017-06
IEC 61496-1	2020	Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests	EN IEC 61496-1	2020
IEC 62471 (mod)	2006	Photobiological safety of lamps and lamp systems	EN 62471	2008
IEC/TS 62998-1	2019	Safety of machinery - Safety-related sensors used for the protection of persons	-	-
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The group responsible for drafting this document was concerned that, 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 experts is recommended. If this high level of confidence cannot be established, these devices would not be suitable for use in safety related applications.

1 Scope

This document specifies additional requirements for the design, construction and testing of non-contact 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 61496-1:2020.

NOTE "Non-contact" means that physical contact is not required for sensing.

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 is limited to ESPE that do not require human intervention for detection. It is limited to ESPE that detect objects entering into or being present in a detection zone(s).

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 1 100 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 are 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

IEC 61496-1:2020, Clause 2 is applicable except as follows.

Addition:

IEC 60068-2-14:2023, *Environmental testing - Part 2-14: Tests - Test N: Change of temperature*

IEC 60068-2-75:2014, *Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests*

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

IEC 61496-1:2020, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

IEC TS 62998-1:2019, *Safety of machinery - Safety-related sensors used for the protection of persons*

IEC TS 62998-3:2023, *Safety of machinery - Safety-related sensors used for the protection of persons - Part 3: Sensor technologies and algorithms*

ISO 13855:2024, *Safety of machinery - Positioning of safeguards with respect to the approach of the human body*

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