IEC 62046

Edition 2.0 2026-07

# INTERNATIONAL STANDARD

**Safety of machinery - Application of protective equipment to detect the presence of persons**

ICS 13.110

ISBN 978-2-8327-1314-3

IEC 62046:2026-07(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# Safety of machinery - Application of protective equipment to detect the presence of persons

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IEC 62046 has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects. It is an International Standard.

This second edition cancels and replaces the first edition published in 2018. This edition constitutes a technical revision.

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

a) restructuring of the document to aid the user;
b) additional information on vision and radar systems;
c) muting requirements have been updated;
d) information on whole body access has been added;
e) whole body access has also been covered in more detail;
f) alignment to changes in ISO 13855.

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

| Draft | Report on voting |
|---|---|
| 44/1080/FDIS | 44/1088/RVD |

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

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

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

# INTRODUCTION

This document provides requirements and information on the application of sensitive protective equipment (SPE), which employs sensing devices to detect persons, in order to reduce or minimize a risk from hazardous parts of machinery, without providing a physical barrier.

The objective of this document is to assist standards writing committees responsible for developing machine standards (type-C Standards), machine designers, manufacturers and refurbishers, machine safety certification organizations, workplace authorities and others on the proper application of sensitive protective equipment to machinery.

Figure 1 shows the general context and the intended use of this document.

Clause 1 to Clause 5, Clause 7 and Clause 8 of this document apply to all sensitive protective equipment included in the scope, Clause 6 contains guidance for the application of specific kinds of sensitive protective equipment.

The principles of this document can be useful in the application of devices using other detection technologies but this document does not give specific requirements for those devices.

This document considers devices standardized in the IEC 61496 series and the ISO 13856 series. Unless a product-specific safety-related standard for devices using other sensing technologies is published, their suitability as the sole means of protection from machine hazards is unknown. The selection and use of devices for which there is no product-specific safety-related standard because their behaviour, particularly under fault conditions, is not known to be sufficiently predictable should be selected only after adequate research.

A SIL (safety integrity level, as described in IEC 62061 or IEC 61508) or PL (performance level, as described in ISO 13849-1) is not sufficient as an indication of a device's suitability for use as a safeguard. Suitability depends on appropriate sensing means, environmental conditions especially those that can affect the detection capability, behaviour under fault conditions, etc.

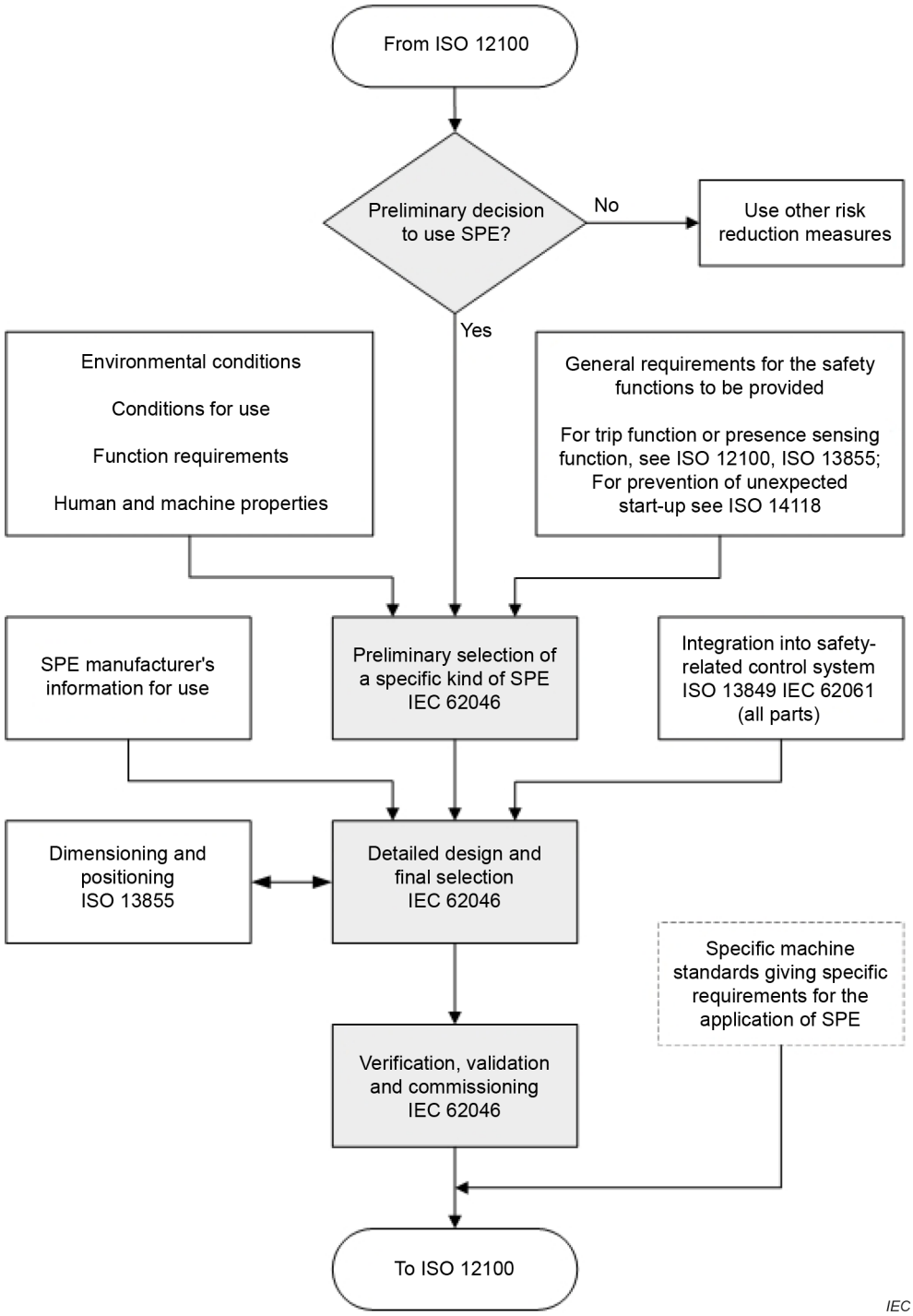


**Figure 1 – Relationship of this document to other standards**

## 1 Scope

This document specifies requirements for the selection, positioning, configuration and commissioning of sensitive protective equipment (SPE) to detect the momentary or continued presence of persons in order to protect those persons from dangerous part(s) of machinery in industrial applications. This document covers the application of electro-sensitive protective equipment (ESPE) specified in the IEC 61496 series and pressure-sensitive mats and floors specified in ISO 13856-1.

It takes into account the characteristics of the machinery, the sensitive protective equipment, the environment and human interaction by persons of 14 years and older.

This document includes informative annexes to provide guidance on the application of sensitive protective equipment to detect the presence of persons. These annexes contain examples to illustrate the principles of this document. These examples are not intended to be the only solutions to a given application and are not intended to restrict innovation or advancement of technology. The examples are provided only as representative solutions to illustrate some of the concepts of integration of sensitive protective equipment, and have been simplified for clarity, so they can be incomplete.

It is intended that this document is used in conjunction with ISO 13855.

## 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 62061:2021, *Safety of machinery - Functional safety of safety-related control systems* IEC 62061:2021/AMD1:2024

IEC TS 61496-4-2:2022, *Safety of machinery - Electro-sensitive protective equipment - Part 4-2: Particular requirements for equipment using vision based protective devices (VBPD) - Additional requirements when using reference pattern techniques (VBPDPP)*

IEC TS 61496-4-3:2022, *Safety of machinery - Electro-sensitive protective equipment - Part 4-3: Particular requirements for equipment using vision based protective devices (VBPD) - Additional requirements when using stereo vision techniques (VBPDST)*

ISO 13849-1:2023, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design*

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

# Bibliography

IEC 60050-191:1990, *International Electrotechnical Vocabulary - Part 191: Dependability and quality of service* (available at <http://www.electropedia.org/)

IEC 60947-5-3, *Low-voltage switchgear and controlgear - Part 5-3:Control circuit devices and switching elements. Requirements for proximity devices with defined behaviour under fault conditions (PDDB)*

IEC 61131-2:2017, *Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests*

IEC 61496 (all parts), *Safety of machinery - Electro-sensitive protective equipment*

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

IEC 61496-2, *Safety of machinery - Electro-sensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs)*

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

IEC TS 61496-4-2, *Safety of machinery - Electro-sensitive protective equipment - Part 4-2: Particular requirements for equipment using vision based protective devices (VBPD) - Additional requirements when using reference pattern techniques (VBPDPP)*

IEC TS 61496-4-3:2022, *Safety of machinery - Electro-sensitive protective equipment - Part 4-3: Particular requirements for equipment using vision based protective devices (VBPD) - Additional requirements when using stereo vision techniques (VBPDST)*

IEC TS 61496-5:2023, *Safety of machinery - Electro-sensitive protective equipment - Part 5: Particular requirements for radar-based protective devices*

IEC TR 62513, *Safety of machinery - Guidelines for the use of communication systems in safety-related applications*

IEC TS 62998-1, *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 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction*

ISO 13854, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body*

ISO 13856-1:2013, *Safety of machinery - Pressure-sensitive protective devices - Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors*

ISO 13857, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs*

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