



SLOVENSKI STANDARD
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**Varnost strojev - Laserski obdelovalni stroji - 1. del: Splošne varnostne zahteve
(ISO/DIS 11553-1:2016)**

Safety of machinery - Laser processing machines - Part 1: General safety requirements
(ISO/DIS 11553-1:2016)

Sicherheit von Maschinen - Laserbearbeitungsmaschinen - Teil 1: Allgemeine
Sicherheitsanforderungen (ISO/DIS 11553-1:2016)

Sécurité des machines - Machines à laser - Partie 1: Prescriptions générales de sécurité
(ISO/DIS 11553-1:2016)

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Safety of machinery — Laser processing machines —

Part 1: General safety requirements

*Sécurité des machines — Machines à laser —**Partie 1: Prescriptions générales de sécurité*

ICS: 13.110; 31.260

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

ISO 11553-2 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems* in collaboration with IEC/TC 76, *Optical radiation safety and laser equipment*.

This Draft International Standard 11553-1 is a revision of ISO 11553-1:2005 and includes the following changes:

- The terms “beam delivery systems”, “beam path components”, “beam shaping components”, “beam switching components” and “fibre optic cable” were added.
- The document has been technically revised.
- An [Annex ZA](#) was added.

ISO 11553 consists of the following parts, under the general title Safety of machinery – Laser processing machines:

- *Part 1: General safety requirements*
- *Part 2: Safety requirements for hand-held laser processing devices*
- *Part 3: Noise reduction and noise measurement methods for laser processing machines and hand-held processing devices and associated auxiliary equipment (accuracy grade 2)*

Introduction

The Machinery Safety Directive issued by the European Parliament and the Council of the EC outlines essential and mandatory requirements that must be met in order to ensure that machinery is safe. In response, CEN/CENELEC initiated a programme to produce safety standards for machines and their applications. This part of ISO 11553 is one in that series.

It has been prepared as a harmonized standard to provide a means of conforming with the essential safety requirements of the Machinery Directive and associated EFTA Regulations.

This document is a type B standard as stated in ISO 12100. The provisions of this document may be supplemented or modified by a type C standard.

For machines which are covered by the scope of a type C standard and which have been designed and built according to the provision of that standard, the provisions of that type C standard take precedence over the provisions of this type B standard.

It is applicable to machines using laser radiation to process materials. The purpose of this part of ISO 11553 is to prevent injuries to persons by

- listing potential hazards generated by machines containing lasers,
- specifying safety measures and verifications necessary for reducing the risk caused by specific hazardous conditions,
- providing references to pertinent standards, and
- specifying the information which is to be supplied to the users so that they can establish proper procedures and precautions.

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Safety of machinery — Laser processing machines —

Part 1: General safety requirements

1 Scope

This part of ISO 11553 describes hazards generated by laser processing machines, as defined in 3.2, and specifies the safety requirements relating to radiation hazards and hazards generated by materials and substances. It also specifies the information to be supplied by the manufacturers of such equipment.

Requirements dealing with noise as a hazard from laser processing machines are included in ISO 11553-3.

This part of ISO 11553 is not applicable to laser products, or equipment containing such products, which are manufactured solely and expressly for the following applications:

- photolithography;
- stereolithography;
- holography;
- medical applications (per IEC 60601-2-22);
- data storage.

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.

ISO 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 3864-2, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 3864-3, *Graphical symbols — Safety colours and safety signs — Part 3: Design principles for graphical symbols for use in safety signs*

ISO 3864-4, *Graphical symbols — Safety colours and safety signs — Part 4: Colorimetric and photometric properties of safety sign materials*

ISO 11145, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols*

ISO 11252, *Lasers and laser-related equipment — Laser device — Minimum requirements for documentation*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

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

ISO 13850, *Safety of machinery — Emergency stop function — Principles for design*

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ISO 14118, *Safety of machinery — Prevention of unexpected start-up*

ISO 14119, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

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

IEC 60825-4, *Safety of laser products — Part 4: Laser guards*

IEC 62061, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11145, ISO 12100 and IEC 60825-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>.

3.1 beam delivery systems

system comprised of all those components, including all optical beam components and potential beam paths and enclosures, which when combined, transfer laser radiation emitted from the laser radiation generator (the laser) to the workpiece and where the components may include all elements for guiding, shaping and switching the laser beams as well as the enclosure of and support for the beam path components

3.2 beam path components

those optical components which lie on a defined beam path (see 3.16 of IEC 60825-1)

EXAMPLE A beam steering mirror, a focus lens, a fibre optic cable or a fibre optic cable connector.

3.3 beam shaping components

those optical components introduced in the beam path to transform the profile or cross-section of the laser beam by means of apertures, reflective, refractive or diffractive optical components

3.4 beam switching components

those optical components or an assembly of components introduced in the beam path to direct or divert, under external control, the beam path along predetermined direction(s) and the external control allows the beam path to be switched from one predetermined direction to another

3.5 fibre optic cable

optical beam guiding components that enables the transmission of laser radiation along a transparent medium

Note 1 to entry: A fibre optic cable may have a glass or the other core that carries the laser radiation and be surrounded by cladding. The outside of the fibre is protected by cladding and may be further protected by additional layers of other materials such as polymer or a metal to protect the fibre from mechanical deformation, the ingress of water, etc. For this standard, this term also includes other form of transmission devices such as waveguides.

3.6**laser processing machine**

machine in which (an) embedded laser(s) provide(s) sufficient energy/power to melt, evaporate, or cause a phase transition in at least a part of the workpiece, and which has the functional and safety completeness to be ready-to-use

3.7**location with controlled access**

location where the hazard is inaccessible except to authorized persons who have received adequate training in laser safety and servicing of the system involved

Note 1 to entry: See [Table 1](#).

3.8**location with restricted access**

location where the hazard is inaccessible to the public but may be accessible to other observers or other untrained personnel who are kept from being exposed to the hazards of laser processing by barriers or other methods.

Note 1 to entry: See [Table 1](#).

3.9**location with unrestricted and uncontrolled access**

location where access is not limited or controlled.

Note 1 to entry: See [Table 1](#).

Table 1 — Description of locations

Location	Controlled	Restricted	Unrestricted and uncontrolled
People	Authorized and trained in laser safety	Personnel untrained in laser safety but not the public	All, including the public

3.10**machine**

assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material

[SOURCE: ISO 12100]

3.11**(preventive) maintenance**

performance of those adjustments or procedures specified in user information, which are intended to be performed by the user for the purpose of assuring the intended performance of the product

EXAMPLE Replenishment of consumables and cleaning.

3.12**manufacturer**

individual or organization that assembles the laser processing machine

Note 1 to entry: Where a laser processing machine is imported, the importer assumes the responsibilities of the manufacturer.

Note 2 to entry: An individual or organization that is responsible for modification of a machine is regarded as a manufacturer.