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Safety of machinery — Laser processing machines —

Part 1: Laser safety requirements

Sécurité des machines — Machines à laser —

Partie 1: Exigences de sécurité laser

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **2**
4 Hazards generated by laser radiation ... **5**
4.1 General ... 5
4.2 Laser radiation hazards/sources of laser radiation emission ... 6
4.3 Laser radiation hazards induced by external effects (interferences) ... 7
4.4 Characteristics of laser radiation ... 7
5 Safety requirements and measures ... **8**
5.1 General requirements ... 8
5.2 Risk assessment with regard to laser radiation hazards ... 8
5.3 Implementation of risk reduction measures ... 9
5.3.1 General ... 9
5.3.2 Safety measures against laser radiation hazards in dependence of the locations ... 9
5.3.3 Safety measures against laser radiation hazards ... 10
5.3.4 Engineering control measures ... 13
6 Verification of the safety requirements and risk reduction measures ... **14**
7 Information for use ... **15**
8 Labelling ... **16**
Annex A (informative) **Potential hazards** ... **18**
Bibliography ... **21**

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 11553-1:2005), which has been technically revised with the following main changes:

— the terms "beam delivery systems", "beam path components", "beam shaping components", "beam switching components" and "fibre optic cable" and "fibre connector" were added;

— the document was restructured;

— the Title was adapted;

— other hazards than laser radiation hazards are not considered in this document but are described in Annex A;

— operating modes (automatic mode, setting mode, manual intervention mode, service mode) and the operating mode selector switch were added;

— Clause 5 is separated in requirements regarding different locations and the different modes of operation;

— in Clause 6 the verification procedures were described in more detail;

— Annex B was deleted.

A list of all the parts of ISO 11553 can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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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 document is one in that series.

It has been prepared as a harmonized standard to provide a means of conforming to 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.

The purpose of this document is to prevent injuries to persons by

— listing potential laser radiation 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: Laser safety requirements

1 Scope

This document describes laser radiation hazards arising in laser processing machines, as defined in 3.7. It also specifies the safety requirements relating to laser radiation hazards, as well as the information to be supplied by the manufacturers of such equipment (in addition to that prescribed by IEC 60825).

Requirements dealing with noise as a hazard from laser processing machines are included in ISO 11553-3:2013.

This document is applicable to machines using laser radiation to process materials.

It 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 (all parts), *Graphical symbols — Safety colours and safety signs*

ISO 11145:2018, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

ISO 13850:2012, *Safety of machinery — Emergency stop function — Principles for design*

IEC 60204-1:2016, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

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

IEC 60825-4:2006, *Safety of laser products — Part 4: Laser guards*

IEC 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

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