SLOVENSKI STANDARD
SIST EN 12198-3:2003+A1:2008

01-november-2008

Varnost strojev - Ocenjevanje in zmanjševanje nevarnosti sevanj, ki jih oddajajo stroji - 3. del: Zmanjševanje sevanja s filtriranjem ali zaslanjanjem

Safety of machinery - Assessment and reduction of risks arising from radiation emitted by machinery - Part 3: Reduction of radiation by attenuation or screening

Sicherheit von Maschinen - Bewertung und Verminderung des Risikos der von Maschinen emittierten Strahlung - Teil 3: Verminderung der Strahlung durch Abschwächung oder Abschirmung

Sécurité des machines - Estimation et réduction des risques engendrés par les rayonnements émis par les machines - Partie 3: Réduction du rayonnement par atténuation ou par écrans

Ta slovenski standard je istoveten z: **EN 12198-3:2002+A1:2008**

ICS:

13.110	Varnost strojev	Safety of machinery
13.280	Varstvo pred sevanjem	Radiation protection

SIST EN 12198-3:2003+A1:2008 **en,fr,de**

EUROPEAN STANDARD

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EN 12198-3:2002+A1

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English Version

Safety of machinery - Assessment and reduction of risks arising from radiation emitted by machinery - Part 3: Reduction of radiation by attenuation or screening

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This European Standard was approved by CEN on 16 October 2002 and includes Amendment 1 approved by CEN on 18 July 2008.

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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 CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Contents

Foreword

This document (EN 12198-3:2002+A1:2008) has been prepared by Technical Committee CEN /TC 114 "Safety of machinery", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document supersedes EN 12198-3:2002.

This document includes Amendment 1, approved by CEN on 2008-07-18.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

⟨A1⟩ For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

This European Standard deals with the essential requirement "Radiation" (see EN 292-2:1991, annex A, paragraph 1.5.10).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Machinery supplied by electrical power or containing radiation sources may emit radiation or generate electric and/or magnetic fields. The radiation emissions will vary in frequency and magnitude.

It does not deal with other strategies concerning reduction of radiation risk by substitution with a smaller source, increasing the distance or reducing exposure time.

This document is a type B standard as stated in EN 1070.

The provisions of this document may be supplemented or modified by a type C standard.

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

1 Scope

The purpose of this European standard is to provide means to enable manufacturers of machinery concerned by a radiation hazard to design and manufacture efficient safeguards against radiations.

Specific technical details of the design of shields for the different types of radiation and machines will be provided in other standards.

This European standard applies to machinery as defined by EN 292.

Part 1 of this standard contains the general principles of risk assessment of radiation emission by machinery. Details of the measurement of the radiation emission are given in Part 2 of this standard.

This standard deals with a design strategy for reducing the radiation flux by attenuation or screening.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-1:1991, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*

EN 292-2:1991, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs.*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards.*

EN 1050:1996, *Safety of machinery — Principles for risk assessment.*

EN 1070:1998, *Safety of machinery — Terminology.*

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection.*

EN 12198-1:2000, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 1: General principles.*

EN 12198-2:2002, *Safety of machinery – Assessment and reduction of risks arising from radiation emitted by machinery – Part 2: Radiation emission measurement procedure.*

IEC 60050-111:1996, *International Electrotechnical Vocabulary — Chapter 111: Physics and chemistry.*

IEC 60050-121:1998, *International Electrotechnical Vocabulary — Part 121: Electromagnetism*.

IEC 60050-161:1990, *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility.*

IEC 60050-881:1983, *International Electrotechnical Vocabulary — Chapter 881: Radiology and radiological physics.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1070:1998 and the following apply. Additional definitions specifically needed for this standard are contained in EN 12198-1:2000.

The terms and definitions given in IEC 60050-111:1996, IEC 60050-121:1998, IEC 60050-161:1990 and IEC 60050-881:1983, are also applicable.

3.1
shield (general definition)
component designed to reduce, select or absorb radiations. The purpose of the component may be for radiation protection or in order to select particular radiations

NOTE Shields are also know as attenuators, screens or filters.

3.2
protection shield
shield used for the radiation protection of people and/or equipment

3.3
selective shield
shield used to filter the radiations, selecting their kind or their energy

3.4
shadow shield
shield arranged in such a way that the radiation source is not totally enclosed, but which prevents free passage of radiation in certain directions

4 Classification of radiation

Classification of radiation is given in clause 4 of EN 12198-1:2000.

Machinery shall be so designed and constructed that any emission of radiation is limited to the extent necessary for its operation and that the effects on exposed persons are non-existent or reduced to non-dangerous proportions (See EN 292-2:1991, annex A).

5 Procedure for reducing radiation emission levels by design

The procedure for reducing radiation by attenuation or screening shall include the following steps:

1) Specify the design target according to 7.2 of EN 12198-1:2000, by defining a radiation emission level not to be exceeded, lowest possible.

2) Characterize all the radiation sources (see clause 4 and 6.2 of EN 12198-1:2000).

3) Define intended directions, intensity of radiation fields and access to the irradiated area.

4) Review attenuating or screening materials available.

5) Assess environmental conditions and their effects on the source and shields.

6) Make design decisions.

7) Manufacture prototype.

8) Measure in accordance with EN 12198-2 and clause 6 of EN 12198-1:2000.

9) Compare with desired levels set in step 1 (see clause 7 of EN 12198-1:2000).

10) If necessary, modify design and repeat steps 6 to 10.

11) Prepare documentation for users.

These steps will be described in detail in clause 6.

6 Strategy for design of shield

6.1 Design target

The design target defined in 5.1) is set by the manufacturer according to clause 7 of EN 12198-1:2000.

6.1.1 It is essential that manufacturers take the risk from radiation into account when they design machines. This can be achieved by assigning desired maximum emission levels of functional radiation emissions and undesirable radiation emissions, according to 7.2 of EN 12198-1:2000.

6.1.2 Numerical values for maximum emission levels may be set by other bodies in documents such as national legislation or international recommendations. Where there is no legislation or recommendation then the manufacturer shall decide what safety criteria the design has to satisfy. These criteria may differ during different phases of a machine's use (see 3.11 and 5.1 of EN 292-1:1991), (see also EN 1050).

6.1.3 The manufacturer shall also consider the possible alteration of radiation emissions caused by changes in environmental operating conditions or in duty cycles of the machine.

6.2 Characterization of all the radiation sources

The following points shall be taken into consideration:

— number of sources;

— radiation characteristics: spectrum, intensity etc. (see clause 4 of EN 12198-1:2000);

— construction characteristics of each source;

  — geometry (point, linear, cylindrical, spherical...) including dimensions;

  — open or enclosed radiation sources;

  — radiation generator (removal of electrical power will terminate radiation emission);

  — physical state: (solid, liquid, gas, plasma...);

— chemical composition (s).

Special care shall be taken:

— when different types of radiation are emitted by the same source;

— when the source manufacturer has defined a functional life time or safe working life time for the source.

6.3 Radiation fields, beam geometry access and enclosure

The manufacturers shall take account of the following considerations.

6.3.1 Radiation field or beam geometry

a) The field or beams size should be as small as possible considering such factors as the area of the interaction between radiation and material and the uniformity needed across that area.

b) The distance which the intended field or beam has to traverse should be minimized. This will be after taking account of the divergence and any access required to the field.

6.3.2 Access to the irradiated area

Wherever possible the field or beam should be enclosed to prevent inadvertent access to levels of radiation above the design target level.

As part of the routine maintenance or setting of a machine, it may be necessary to measure the field or beam profiles or intensity. The position of beams may also need to be adjusted.

If there is a need for access to the field or beam then access points should be included during the design stage.

The construction of access points shall not create leakage of radiation above the level specified in the design targets.