SLOVENSKI STANDARD
SIST EN 15949:2012

01-maj-2012

Varnost strojev - Varnostne zahteve za valjarne za palice, profilirano jeklo in žico

Safety of machinery - Safety requirements for bar mills, structural steel mills and wire rod mills

Sicherheit von Maschinen - Sicherheitsanforderungen an Stab-, Formstahl- und Drahtwalzwerke

Sécurité des machines - Exigences techniques de sécurité pour machines de train à barres, train à profilés et train à fil

Ta slovenski standard je istoveten z: **EN 15949:2012**

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13.110	Varnost strojev	Safety of machinery
25.120.20	Valjalni stroji, stroji za vbrizgovanje in vlečni stroji	Rolling, extruding and drawing equipment

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Safety of machinery - Safety requirements for bar mills, structural steel mills and wire rod mills

Sécurité des machines - Exigences techniques de sécurité pour machines de train à barre, train à profilés et train à fil

Sicherheit von Maschinen - Sicherheitsanforderungen an Stab-, Formstahl- und Drahtwalzwerke

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Contents

Page

Figures

Tables

Foreword

This document (EN 15949:2012) has been prepared by Technical Committee CEN/TC 322 “Equipment for making and shaping of metals - Safety requirements”, 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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

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Introduction

This document is a type C standard as stated in EN ISO 12100:2010.

The equipment concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

Where for clarity an example of a preventative measure is given in the text, this should not be considered as the only possible solution. Any other solution leading to the same risk reduction is permissible if an equivalent level of safety is achieved.

This European Standard assumes that the equipment is operated and maintained by trained personnel.

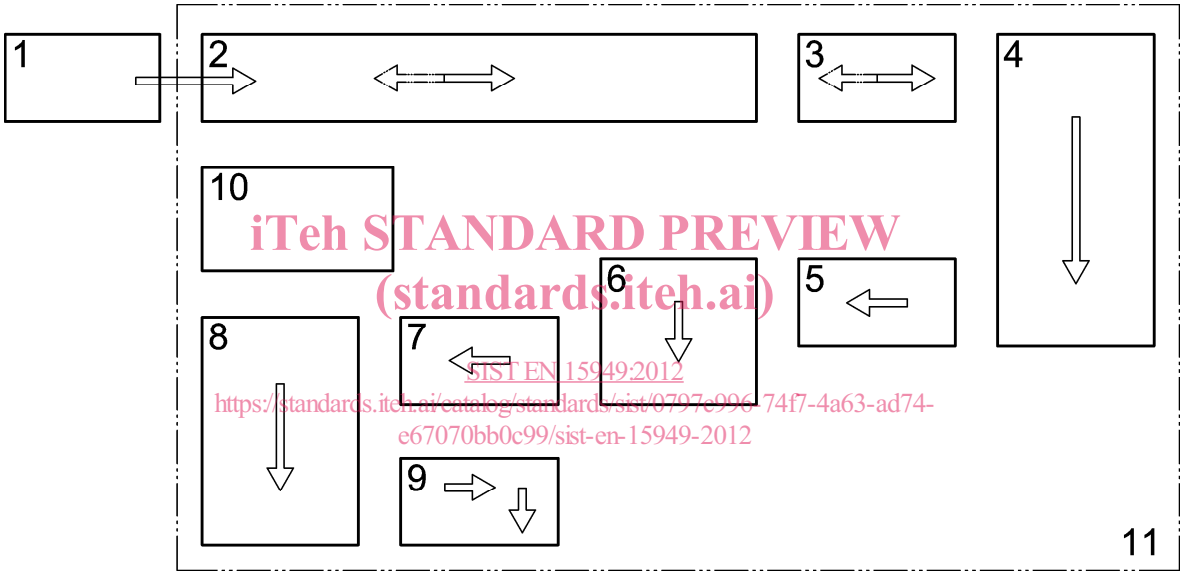
1 Scope

This European Standard defines the general safety requirements for hot rolling mills for long products as defined in 3.1.

This European Standard deals with significant hazards, hazardous situations and events relevant to hot rolling mills for long products. It deals not only with circumstances where the machinery is used as intended, but also includes other conditions foreseen by the manufacturer, such as foreseeable faults, malfunctions or misuse (see Clauses 4 and 5).

This applies also to hazards arising during various phases of the life of the machinery and equipment as described in 5.4 of EN ISO 12100:2010.

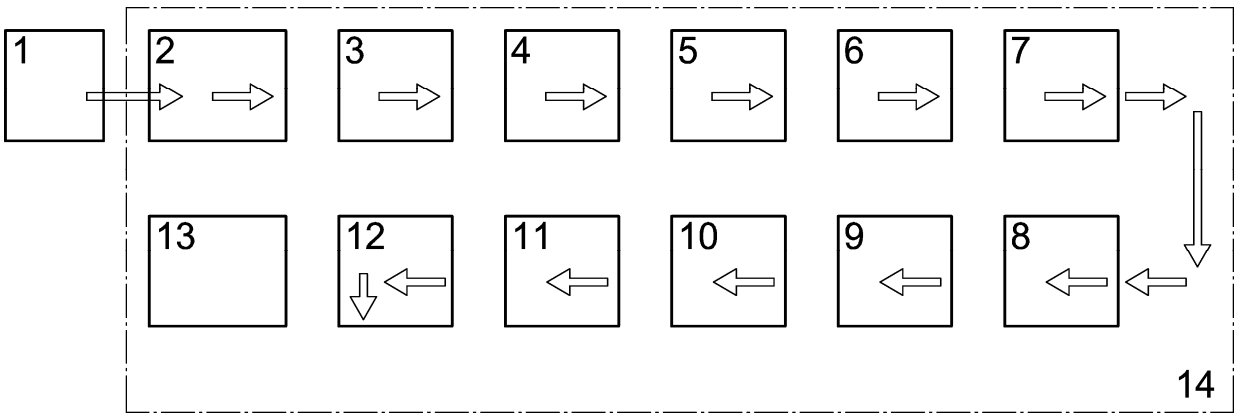
This European standard applies to: Machinery and equipment used for the manufacturing of metal rolled long products from the material supply from (1), via the rolling mill process equipment (2) to (9) including preparation area (10) (exemplary layout is given in Figure 1).



Key

1	e.g., continuous casting machine (according to EN 14753) or furnace (according EN 746-1)	7	saws, shears, abrasive cutting machines
2	mill stands	8	piling machine
3	roller tables	9	binding and loading area
4	cooling beds	10	preparation area
5	straightening machines	11	border of the rail / section rolling mill
6	collecting beds	⇨	product flow

Figure 1 — Exemplary layout of a rail / section rolling mill



Key

1	e.g., continuous casting machine (according to EN 14753) or furnace (according EN 746-1)	8	cooling line
		9	laying head
2	roughing mill area	10	loop cooling conveyor
3	intermediate mill area	11	coil station
4	cooling line	12	coil handling
5	shearing group	13	preparation area
6	wire rod block	14	border of the bar / wire rod mill
7	snap shear	⇨	product flow

Figure 2 — Exemplary layout of a bar / wire rod mill

The following equipment is excluded:

a) furnaces in accordance with the EN 746 series;

b) continuous casting machines according to EN 14753;

c) hook conveyors according to EN 619;

d) roll and guide shop equipment (e. g., machine-tool);

e) storage equipment (e.g., high-bay warehouses);

f) cranes, fork lifts, trucks and railway trucks and other vehicles.

This document is not applicable to rolling mills for long products, which are manufactured before the date of its publication as an EN document.

2 Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 626-1, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 842, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 894-1, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

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

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

EN 1032, *Mechanical vibration — Testing of mobile machinery in order to determine the vibration emission value*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1063, *Glass in building — Security glazing — Testing and classification of resistance against bullet attack*

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

EN 1299, *Mechanical vibration and shock — Vibration isolation of machines — Information for the application of source isolation*

EN 1591-1, *Flanges and their joints — Design rules for gasketed circular flange connections — Part 1: Calculation method*

EN 1837, *Safety of machinery — Integral lighting of machines*

EN 12094-1, *Fixed firefighting systems — Components for gas extinguishing systems — Part 1: Requirements and test methods for electrical automatic control and delay devices*

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

EN 12198-3, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 3: Reduction of radiation by attenuation or screening*

EN 12254, *Screens for laser working places — Safety requirements and testing*

EN 12464-1, *Light and lighting — Lighting of work places — Part 1: Indoor work places*

EN 13478, *Safety of machinery — Fire prevention and protection*

EN 13480-2, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2002, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4:2002, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13861, *Safety of machinery — Guidance for the application of ergonomics standards in the design of machinery*

EN 15004-1, *Fixed firefighting systems — Gas extinguishing systems — Part 1: Design, installation and maintenance (ISO 14520-1:2006, modified)*

EN 50171, *Central power supply systems*

EN 60204-1:2011, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 44/617/CD:2010)*

EN 60447, *Basic and safety principles for man-machine interface, marking and identification — Actuating principles*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 60825-1:2008, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide (IEC 60825-1:2007)*

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

EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking*

EN 61496-1/A1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004/A1:2007 + corrigendum Jul. 2008)*

EN ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 10218-1, *Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots (ISO 10218-1:2011)*

EN ISO 11064-1, *Ergonomic design of control centres — Part 1: Principles for the design of control centres (ISO 11064-1:2000)*

EN ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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

EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2006, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13855, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855:2010)*

EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14122-1, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders — Amendment 1 (ISO 14122- 4:2004 + Amd 1:2010)*

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

ISO 6183, *Fire protection equipment — Carbon dioxide extinguishing systems for use on premises — Design and installation*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

NOTE Definition used in EN and ISO standards referred to in this European Standard are also valid for this European Standard.

3.1
rolling mill for long products
machinery and equipment where metal is hot rolled to long products, such as bar mills, bloom and billet mills, wire rod mills, section/rail mills as well as any area inside or outside the superstructure of the building where product is being handled or stored

Note 1 to entry: Examples of machines and equipment which are covered by this standard are listed in Annex F.

3.2
product
metal to be or being hot rolled

3.3
preparation area
dedicated place to carry out the necessary maintenance activities and/or to prepare to use interchangeable equipment (e.g. roll change devices)

3.4
pulpit
enclosed room in which the control desk and monitoring facilities for a machine or equipment are located, used as a permanent work place

3.5
control stand
free standing control desk (usually situated adjacent to the machine or equipment), used as a temporarily work place

3.6
large machinery/equipment
interconnected equipment (size > 15 m) of long products rolling mills in which several components of the machinery or forming stages are linked by dedicated transport facilities (e. g., roller tables, cross-transfer systems)

3.7
cobbling
product leaving its intended path

3.8
trained personnel
persons with proven knowledge of systems, background, experience and ability to operate and/or maintain the equipment in the intended use and proper operation of the machinery/equipment

3.9
unauthorized person
person not permitted to enter certain areas of the long products rolling mills, or to perform certain actions in relation to the operation and/or maintenance of the equipment, because of not having the required specific knowledge and skill or for not being properly equipped in order to avoid the related hazards

3.10
maintenance
service, inspection and repair of machinery and equipment

3.11
inspection and adjusting under load
access of authorized personnel to danger zones under defined plant running conditions

3.12
modes of control
machinery and equipment used to roll long products (single machines or groups of interconnected parts) typically features three modes of control defined as follows:

a) manual mode

a function or sequence of functions is controlled by an operator by means of a hold-to-run control or equivalent device (see 3.28 of EN ISO 12100:2010)

b) semi-automatic mode

mode of operation of the machinery consisting of a series of automatic sequences (summary of functions) into which the whole working cycle is subdivided: at the end of each sequence, started by the operator and then controlled by a programmable electronic system (PES), the operation is automatically stopped, and a new command of the operator is needed to initiate the next sequence

c) automatic mode

process, e.g., a cycle of successive or parallel sequences, once initiated by the operator, is totally controlled by a PES; repetition of the working cycle of the machinery takes place (as long as the running conditions are met) without any operator intervention required

3.13
modes of operation
machinery and equipment used to roll long products (single machines or groups of interconnected parts) typically features different modes of operation, e.g., production, maintenance, adjusting, inspection, immobilization (see Table 1)

3.14
safety layout
description of line-related equipment with safety functions to ensure safe operation of the long product rolling mill avoiding hazards or hazardous situations for, e.g., unauthorized access or having another line-related safety function (for explanations, see 5.1.4)

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which requires action to eliminate or reduce the risk. The risk identification was determined as follows:

a) potentially hazardous situations having significant risks;

b) the safety requirements and/or measures which shall be incorporated into the machinery/equipment;

c) any special instructions which shall be communicated to the user.

The significant hazards and hazardous situations identified are listed in columns 1 and 2 of 5.2, Table 3.

In addition, the manufacturer shall carry out an individual risk assessment according Clause 4 of EN ISO 12100:2010 to identify any other significant hazard of the machine/equipment. Significant hazards identified in this individual risk assessment but not dealt with in this standard shall be reduced by applying the principles of EN ISO 12100.

In general, risks and associated hazards are production and plant-related. The main differences arise from the processing of different products and materials in different qualities and the surrounding (i.e. different combinations of machines, different boundary conditions, see Annex H). The resulting variety of "different plants" could not be covered in all details in a standard. To deal with these facts an individual risk assessment according to EN ISO 12100 for the long product rolling mill in question shall be carried out considering the safety requirements of this standard. The individual risk assessment shall also take into account the interfaces between the machinery and the environment (e.g. other machinery and/or buildings), see Annex H.

5 Safety requirements and/or measures

5.1 General requirements for design, planning and risk assessment

5.1.1 General

Long product rolling mills conforming to this standard shall comply with the safety requirements and/or measures set out in Clause 5 together with those set out in Annexes A and B and the information for use as defined in Clause 7.

This standard assumes that:

a) installations are operated and maintained by trained personnel; manual intervention for setting, inspection, adjustment and maintenance is accepted as part of the normal use of the equipment;

b) machinery is used with adequate workplace lighting conforming to EN 12464-1 or to local regulations.

Where the means of reducing the risk is by the physical arrangement or positioning of the installed machines, the manufacturer shall include in the information for use a reference to the reduction means to be provided and to any limiting value of the requirement, and, if appropriate, to the means of verification.

Where the means of reducing the risk is by a safe system of working the line, the manufacturer shall include in the information for use details of the system and of the elements of the information required by the operating personnel.