SLOVENSKI STANDARD
SIST EN 15094:2022

01-julij-2022

Nadomešča:
SIST EN 15094:2008

Varnost strojev - Varnostne zahteve za valjarne (hladno valjanje)

Safety of machinery - Safety requirements for cold flat rolling mills

Sicherheit von Maschinen - Sicherheitsanforderungen an Kaltflachwalzwerke

Sécurité des machines - Prescriptions de sécurité relatives aux laminoirs à froid pour produits plats

Ta slovenski standard je istoveten z: **EN 15094:2022**

ICS:

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

SIST EN 15094:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15094

May 2022

ICS 77.180

Supersedes EN 15094:2008

English Version

Safety of machinery - Safety requirements for cold flat rolling mills

Sécurité des machines - Prescriptions de sécurité relatives aux laminoirs à froid pour produits plats

Sicherheit von Maschinen - Sicherheitsanforderungen an Kaltflachwalzwerke

This European Standard was approved by CEN on 13 March 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (EN 15094:2022) 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 November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15094:2008.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

Introduction

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

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

Where for clarity an example of a preventative measure is given, 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.

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine and/or plant manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine and/or plant users/employers (small, medium and large enterprises);

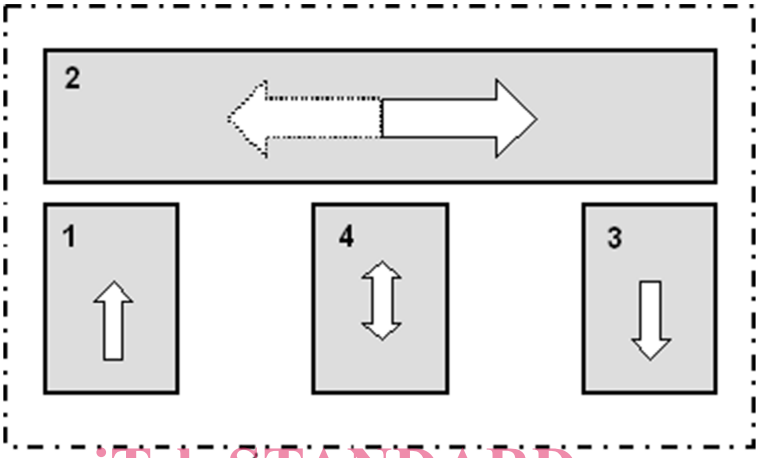
— service providers, e.g. for maintenance (small, medium and large enterprises).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

1 Scope

This document specifies the general safety requirements for cold rolling mills for flat products as defined in 3.1.

This document is applicable to: Plant (machinery, equipment, devices according Annex D) used for the manufacturing of metal cold rolled flat products from the material supply from entry (1), via the mill stand(s) (2) with roll changing devices (4), to the material removal (3) (see Figure 1).



Key

1 entry section
2 cold rolling mill
3 exit section
4 roll changing device
5 border of the cold rolling mill

Figure 1 — Exemplary layout of a cold flat rolling mill

This document does not cover:

— Design and construction of buildings including cellars and their facilities;

— Thermo process equipment, e.g. in accordance with EN 746 series;

— Strip processing lines according to EN 15061, e.g. pickling line;

— Abrasive blasting plants according to EN 1248;

— Coil transporting system before coil take-over-point at the entry section and after coil take-over-point at the exit section, e.g. hook conveyors, overhead cranes, fork lift and railway trucks and other vehicles;

— Roll shop equipment;

— Hook conveyors according to EN 619;

— Non-fixed load lifting attachments, e.g. according to EN 13155;

— Storage equipment (e.g. high-bay warehouses);

— Cranes, fork lifts, trucks and railway trucks and other vehicles;

— Process technology (e.g. systems for rolling lubricant, compressed air, treatment of water, cleaning system for exhaust air);

— Firefighting system.

NOTE 1 Special requirements for protection of persons in case of using asphyxiant gases used in firefighting system is covered by this document, see Annex C.

This document deals with foreseeable significant hazards, hazardous situations and events relevant to cold rolling mills for flat products, when used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer. It provides the requirements to be met by the manufacturer to ensure the safety of persons and property during transport, commissioning, operation and de-commissioning, as well as in the event of foreseeable failures or malfunctions that can occur in the equipment.

NOTE 2 For modernization, this document (type-C standard) can be applied for the part to be modernized.

This document is not applicable to cold rolling mills for flat products manufactured before the date of its publication.

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.

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

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 ISO 14123-1, *Safety of machinery - Reduction of risks to health resulting from hazardous substances emitted by machinery - Part 1: Principles and specifications for machinery manufacturers (ISO 14123-1)*

EN ISO 14123-2, *Safety of machinery - Reduction of risks to health resulting from hazardous substances emitted by machinery - Part 2: Methodology leading to verification procedures (ISO 14123-2)*

EN 415-8, *Safety of packaging machines - Part 8: Strapping machines*

EN 689, *Workplace exposure - Measurement of exposure by inhalation to chemical agents - Strategy for testing compliance with occupational exposure limit values*

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

EN 894-1, *Safety of machinery - Ergonomics 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 ISO 14120, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120)*

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

EN ISO 14118:2018, *Safety of machinery - Prevention of unexpected start-up (ISO 14118:2017)*

EN ISO 14119, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119)*

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

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

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

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 13480-1, *Metallic industrial piping - Part 1: General*

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

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

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

EN 13480-5, *Metallic industrial piping - Part 5: Inspection and testing*

EN 14253, *Mechanical vibration - Measurement and calculation of occupational exposure to whole-body vibration with reference to health - Practical guidance*

EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

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

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

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

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

EN 62598, *Nuclear instrumentation - Constructional requirements and classification of radiometric gauges*

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

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

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7010, *Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010)*

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

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

EN ISO 11202, *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)*

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)*

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

EN ISO 13850:2015, *Safety of machinery - Emergency stop function - Principles for design (ISO 13850:2015)*

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

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

EN ISO 14122-1, *Safety of machinery - Permanent means of access to machinery - Part 1: Choice of fixed means and general requirements of access (ISO 14122-1)*

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

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

EN ISO 14122-4, *Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders (ISO 14122-4)*

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

EN 61800-5-2:2017, *Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional*

EN 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 EN ISO 12100:2010 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
cold rolling mills for flat products
interconnected equipment for cold rolling of flat material in which several components of the machinery or forming stages are linked by dedicated transport facilities, including associated devices

Note 1 to entry: Plant and equipment which are covered by this document are listed in Annex D.

3.2
safety layout
graphic overview of the cold rolling mill with arrangement of safety-related elements and areas

3.3
hazard zone
danger zone
any space within and/or around machinery in which a person can be exposed to a hazard

[SOURCE: EN ISO 12100:2010, 3.11]

3.4
take-over-point(s)
point(s) where the cold flat rolling mill is connected to incoming/outgoing material (e.g. coils), media, electricity (e.g. power supply and communication like input/output parameters)

Note 1 to entry: For example, coil take-over-point: Point where overhead cranes or other transport systems deposit or remove coils.

3.5
main route(s)
marked traffic route

3.6
safeguard(ing)
guard or protective device

[SOURCE: EN ISO 12100:2010, 3.26]

3.7
reel (sleeve)
cylindrical hollow body used for coiling the material

3.8
trained person(nel)
skilled person with system knowledge, background knowledge, experience and/or ability to perform a specific task and are aware of the hazards related to their duties

3.9
authorized person(nel)
trained person who is instructed by the user to perform a specific task on a specific equipment

Note 1 to entry: In contrast, an unauthorized person does not have the required qualification and is not adequately equipped, e.g. PPE.

3.10
maintenance
combination of service, inspection, reconditioning and functional test of the equipment

Note 1 to entry: The purpose is to preserve the working condition or returning to this condition so that the rolling mill is able to perform the required function (including safety requirements).

3.10.1
service
measure to maintain the nominal condition

Note 1 to entry: The nominal condition can be maintained in general without dismantling/disassembling major parts of the equipment, e.g. cleaning, lubrication of the work equipment as well as addition or replacement of agents or by replacing tools or operational changing parts.

3.10.2
inspection
measure to observe and assess the current condition as well as fault finding

Note 1 to entry: Measures, e.g. measuring, testing, diagnostics including the determination of the causes of wear or damage and the derivation of the necessary consequences for the continued use.

Note 2 to entry: 3.10.2 does not cover “material inspection”, see 3.17.

3.10.3
reconditioning
foreseeable measure(s) to return to the nominal condition

Note 1 to entry: Foreseeable measures to replace worn parts or parts having expired the foreseen lifetime (could require dismantling/disassembling). These parts should meet manufacturers' specification.

3.10.4
functional test
checking the functionality of the exchanged or repaired parts

Note 1 to entry: It is maybe required to carry out adjustment work, e.g. test runs, verifying safety functions.

3.11
repair
not foreseeable measure(s) to return to the nominal condition

Note 1 to entry: Measure to replace damaged parts, requires in general dismantling/disassembling. These parts should meet manufacturers' specification.

3.12
material
metal being cold rolled as a flat product

3.13
coil
coiled material (strip)

3.14
strip
flat material

Note 1 to entry: Strip includes foil and sheet.

3.15
material supply
devices feeding material to the cold rolling mill and which are linked by control with the cold rolling mill

3.16
material removal
devices removing material from the cold rolling mill and which are linked by control with the cold rolling mill

3.17
material inspection
observe and assess the current condition of the material

3.18
cobbling
material leaving its intended path

3.19
pulpit
enclosed room in which the control desk and monitoring facilities for a machine or equipment are located, used as a permanent workstation

3.20
control stand
free standing control desk (usually situated adjacent to the machine or equipment), used as a temporary workstation

3.21
portable control device
control device which can be used in different places (e.g. control pendant, enabling button, radio control)

3.22
enabling (control) device
additional manually actuated device used in conjunction with a start control which, when continuously actuated, permits machine function

[SOURCE: EN ISO 12100:2010, 3.28.2]

3.23
hold-to-run control device
control device which initiates and maintains machine functions only as long as the control device is actuated

[SOURCE: EN ISO 12100:2010, 3.28.3]

3.24
control mode(s)
single machines or groups of interlinked machines of cold flat rolling mills can be operated by different control modes:

Note 1 to entry: This document distinguishes between control mode(s) and operating mode(s) because there is neither a common understanding nor a definition in EN ISO 12100 and EN 60204-1. The operating modes (see 3.25) corresponds to the “control mode” of EN ISO 12100:2010, 6.2.11.9.

3.24.1
manual control mode(s)
3.24.1.1
hold-to-run control
every function is controlled by an operator by means of a button or equivalent device according EN ISO 12100:2010, 3.28.3

Note 1 to entry: Release of the button/device stops the function (e.g. movement) immediately.

3.24.1.2
single function
functions are started and/or stopped by an operator

3.24.2
semi-automatic control
sequence of functions released once by an operator

Note 1 to entry: The released sequence is automatically stopped at its end. For the initiation of another sequence, a new command by the operator is required.

3.24.3
automatic control
cycles of successive or parallel sequences once initiated by the operator

Note 1 to entry: If there is no operator intervention, the repetition of the sequences takes place as long as the running conditions are met.

3.25
operating mode(s)
state of the control system allowing to operate the cold flat rolling mill under defined conditions

Note 1 to entry: Such modes are, e.g. production, safe stop, enabling, adjustment, inspection.

Note 2 to entry: The safety level of the operating mode(s) is defined as result of the risk assessment.

3.25.1
special modes
3.22.1.1
enabling mode
operation of machine functions by using an enabling device (as per 3.22)

3.22.1.2
inching (jog) mode
operation of machine functions using a hold-to-run control device (as per 3.23)

3.25.2
safe stop mode
movement of the involved equipment is prevented through the control system

Note 1 to entry: The required safety level of the safe stop is defined as result of the risk assessment.

Note 2 to entry: Safe stop is not sufficient as a safety measure to perform reconditioning or repair work because isolation of the equipment from the relevant energy sources is not realized.

Note 3 to entry: Residual risks, e.g. by stored energy must have been secured by other means.

Note 4 to entry: Safe stop mode may also include switching off additional devices, e.g. X-ray.

3.25.3
normal production mode
machine is ready to produce or producing as intended

Note 1 to entry: Production, material handling and activities supporting these processes are covered.

Note 2 to entry: Maintenance according 3.10 is not covered.

3.26
reduced speed
speed, reduced to minimize the hazardous potential without safety monitoring of speed

Note 1 to entry: In case of failure, an increase in speed can occur.

Note 2 to entry: Applies to linear or rotational speed.

Note 3 to entry: Speed reduced without an enabling device means that the movement is so slow that the operator can move away from this dangerous movement in time. Based on a risk assessment, an enabling device might therefore be required in some cases, even at a reduced speed (e.g. in narrow spaces).

Note 4 to entry: Examples of reduced speeds include speeds of less than 10 mm/s for presses, less than 250 mm/s for robots, less than 250 mm/s for all non-shearing movements and less than 33 mm/s for shearing or crushing movements.