

Safety of machinery - Safety requirements to finishing lines for metal strip

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 17449:2022 sisaldab Euroopa standardi EN 17449:2022 ingliskeelset teksti.	This Estonian standard EVS-EN 17449:2022 consists of the English text of the European standard EN 17449:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
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English Version

## Safety of machinery - Safety requirements to finishing lines for metal strip

Sécurité des machines - Prescriptions de sécurité pour les lignes de finition pour bandes métalliques

Sicherheit von Maschinen - Sicherheitsanforderungen an Adjustageanlagen für Metallband

This European Standard was approved by CEN on 26 December 2021.

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# Contents

Page

European foreword.....	5
Introduction .....	6
1 Scope.....	7
2 Normative references.....	11
3 Terms and definitions .....	13
4 Significant hazards and risk assessment.....	20
4.1 General.....	20
4.2 Interfaces to the linked/integrated equipment.....	20
5 Safety requirements and/or protective/risk-reduction measures .....	20
5.1 General.....	20
5.2 General requirements for design, planning and risk assessment.....	21
5.2.1 General.....	21
5.2.2 Planning of finishing line.....	22
5.2.3 Linked equipment.....	22
5.2.4 Structural assembly .....	22
5.2.5 Safety layout.....	22
5.2.6 Safety signs and warning devices.....	23
5.2.7 Personal protective equipment (PPE) .....	23
5.2.8 Loss of energy and failure of controls.....	23
5.2.9 Workstations and assigned modes of operation .....	24
5.2.10 Enabling control device and hold-to-run control device .....	25
5.2.11 Access to and presence in danger zones.....	26
5.2.12 Safeguarding .....	29
5.2.13 Guards .....	29
5.2.14 Sensitive protective equipment.....	29
5.2.15 Guard-rails.....	30
5.2.16 Preconditions for movements of equipment not causing significant hazards .....	30
5.2.17 Determination of required Performance Level (PLr) .....	30
5.2.18 Stored energy.....	31
5.2.19 Mechanical restraint devices .....	32
5.2.20 Electrical equipment.....	32
5.2.21 Safety-related control systems.....	32
5.2.22 Safety-related software and parameters.....	32
5.2.23 Remote access to control systems.....	33
5.2.24 Radiation and fields .....	33
5.2.25 Fluid systems (hydraulic, pneumatic, cooling, lubrication and additional media systems).....	34
5.2.26 Substances .....	35
5.2.27 Firefighting.....	35
5.2.28 Ergonomics.....	35
5.2.29 Vibrations .....	36
5.2.30 Noise reduction as a safety requirement.....	37
5.3 List of significant hazards, hazardous situations, safety requirements and/or protective/risk-reduction measures .....	39
5.3.1 Structure of Table 4.....	39

<b>6</b>	<b>Verification/validation of safety requirements/functions and/or protective/risk reduction measures .....</b>	<b>72</b>
<b>6.1</b>	<b>General .....</b>	<b>72</b>
<b>6.2</b>	<b>Required verification D .....</b>	<b>73</b>
<b>6.3</b>	<b>Required verification V, M and T .....</b>	<b>73</b>
<b>7</b>	<b>Information for use .....</b>	<b>74</b>
<b>7.1</b>	<b>General .....</b>	<b>74</b>
<b>7.2</b>	<b>Warning devices and safety signs .....</b>	<b>74</b>
<b>7.3</b>	<b>Minimum marking .....</b>	<b>74</b>
<b>7.4</b>	<b>Accompanying documents .....</b>	<b>75</b>
<b>7.4.1</b>	<b>Instructions .....</b>	<b>75</b>
<b>7.4.2</b>	<b>Instruction for transportation and assembly of the equipment .....</b>	<b>77</b>
<b>7.4.3</b>	<b>Information about disabling, disassembly and disposal of the equipment .....</b>	<b>77</b>
<b>7.5</b>	<b>Training of personnel .....</b>	<b>78</b>
<b>7.6</b>	<b>Remote access .....</b>	<b>78</b>
<b>8</b>	<b>Supplementary information regarding repair work .....</b>	<b>78</b>
<b>Annex A (normative)</b>	<b>Requirements for shut-down, emergency stop and other stop functions .....</b>	<b>80</b>
<b>A.1</b>	<b>General requirements .....</b>	<b>80</b>
<b>A.2</b>	<b>Specific requirements .....</b>	<b>80</b>
<b>A.3</b>	<b>Selection of stop functions .....</b>	<b>80</b>
<b>A.4</b>	<b>Emergency stop areas .....</b>	<b>81</b>
<b>A.5</b>	<b>Compilation of applicable shut-down, emergency stop and other stop functions .....</b>	<b>81</b>
<b>Annex B (normative)</b>	<b>Noise test code .....</b>	<b>85</b>
<b>B.1</b>	<b>Introduction .....</b>	<b>85</b>
<b>B.2</b>	<b>Determination sound power levels .....</b>	<b>85</b>
<b>B.3</b>	<b>Determination of emission sound pressure levels at permanent or temporary work stations .....</b>	<b>86</b>
<b>B.3.1</b>	<b>Determination of the emission sound pressure level at specified measuring points .....</b>	<b>86</b>
<b>B.3.2</b>	<b>Determination of emission sound pressure level at workstations .....</b>	<b>86</b>
<b>B.4</b>	<b>Measurement uncertainty .....</b>	<b>87</b>
<b>B.5</b>	<b>Operating conditions .....</b>	<b>87</b>
<b>B.6</b>	<b>Information to be recorded and reported .....</b>	<b>88</b>
<b>B.7</b>	<b>Declaration and verification of noise emission values .....</b>	<b>88</b>
<b>Annex C (normative)</b>	<b>Protection of persons in case of using asphyxiant gases used in firefighting systems .....</b>	<b>90</b>
<b>C.1</b>	<b>General .....</b>	<b>90</b>
<b>C.2</b>	<b>Warning devices .....</b>	<b>90</b>
<b>C.3</b>	<b>Restraint devices .....</b>	<b>91</b>
<b>C.4</b>	<b>Preliminary warning time .....</b>	<b>91</b>
<b>C.5</b>	<b>Interrupt device for extinguishing gas .....</b>	<b>92</b>

<b>C.6</b>	<b>Blocking devices.....</b>	<b>92</b>
<b>C.7</b>	<b>Pipes.....</b>	<b>92</b>
<b>C.8</b>	<b>Rooms and adjacent areas.....</b>	<b>93</b>
<b>C.9</b>	<b>Escape routes.....</b>	<b>93</b>
<b>C.10</b>	<b>Doors.....</b>	<b>93</b>
<b>C.11</b>	<b>Marking.....</b>	<b>93</b>
<b>C.12</b>	<b>Instruction handbook.....</b>	<b>93</b>
<b>Annex D (informative) Example for operating modes in relation to segregated areas.....</b>		<b>94</b>
<b>Annex E (informative) Example for the risk analysis due to interfaces.....</b>		<b>95</b>
<b>Bibliography.....</b>		<b>96</b>

## European foreword

This document (EN 17449:2022) has been prepared by Technical Committee CEN/TC 322 “Equipment for making and shaping of metals”, 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 September 2022, and conflicting national standards shall be withdrawn at the latest by September 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.

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.

This document is not applicable to finishing lines for metal strip (according to the scope) manufactured before the date of its publication.

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.



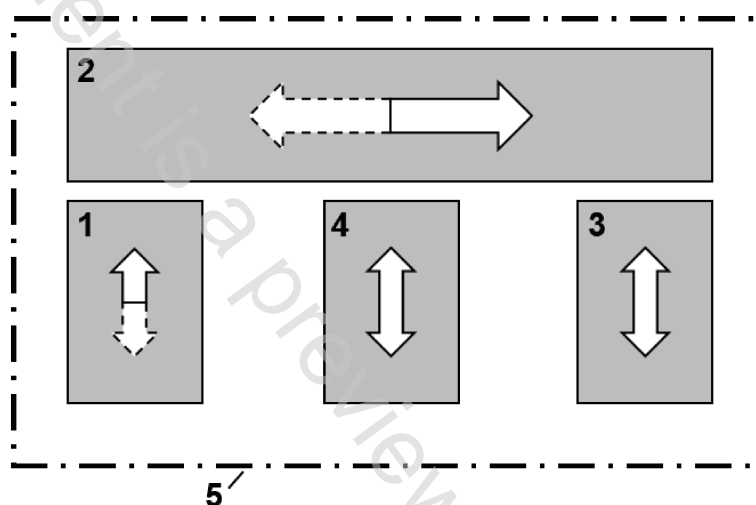
# 1 Scope

This document specifies the general safety requirements for finishing lines for metal strip, hereafter referred as finishing line(s), as defined in 3.1.

This document deals with significant hazards, hazardous situations and events relevant for finishing lines when used as intended and under conditions foreseen by the manufacturer. This document 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 (see Clauses 4 and 5).

This document is applicable to:

Plant (machinery, equipment, devices) for the customer-specific processing of metal strip/metal foil (starting material: hot rolled or cold rolled strip as coil) from the material feeding (1) via the finishing process (2) until the material removal (3) (see exemplary layout in Figure 1).



## Key

- 1 supply or removal of material (as coil) or tools (e.g. spool/sleeve)
- 2 finishing process (e.g. cutting, trimming, punching, straightening, laminating, inspecting, rewinding)
- 3 removal or supply of material (e.g. as coil, slit strip, stack) respectively pallet feed
- 4 changing devices (e.g. levelling rolls, knife shaft, cutting tools)
- 5 border of the finishing line

**Figure 1 — Exemplary layout of a finishing line for metal strip**

Examples of finishing lines and their machinery/equipment covered by the scope of this document are listed below:

- finishing lines, e.g.:
- slitting line (see Figure 2);
- cut-to-length line (see Figure 3);
- feeding line (see Figure 4);
- blanking line;

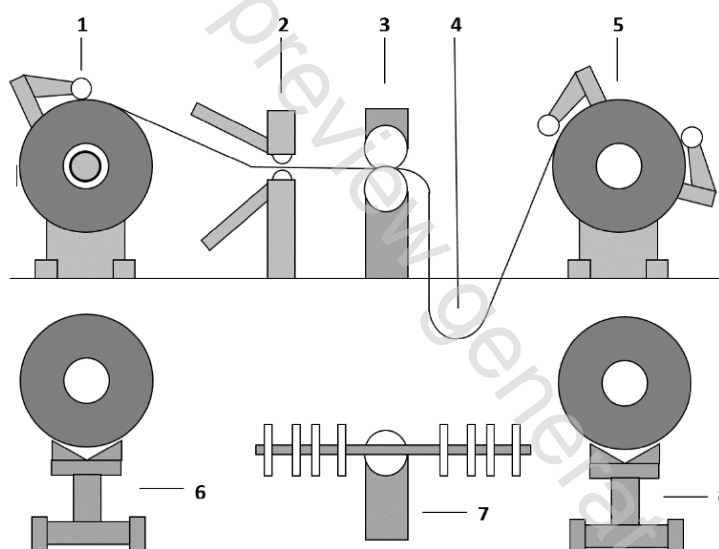
- trimming line;
- rounding machines;
- strip edge machining lines;
- inspection lines;
- rewinding lines, separator lines, doubler lines;
- strip-supply lines (e.g. for presses or roll forming lines);
- interlinked machinery/equipment which can be part of a finishing line, e.g.:
  - coil conveying (e.g. feeding in, threading, pushing-in, guiding and transporting);
  - stretching, bending, levelling machine;
  - marking machine;
  - recoiler and uncoiler;
  - shears;
  - punching machine;
  - coil and sleeve handling device;
  - welding machine;
  - oiling machine;
  - scrap chopper, scrap coiler, scrap conveyor;
  - changing device;
  - stacking device;
  - coil transport device (associated with the line);
  - measuring systems and devices;
  - fluid systems.

The following machinery may be part of or linked to a finishing line but are not covered by this document:

- packaging lines (EN 415);
- roll forming lines;
- machines for painting and laminating;
- embossing machine;
- saws;

- plate shear (plate as raw material) (EN 13985);
- equipment for applying (removing) media to (from) the material surface;
- coil transport devices outside the boundaries of the line (e.g. supply from the storage);
- presses (EN ISO 16092-1, EN ISO 16092-2 and EN ISO 16092-3);
- milling machines (EN ISO 16090-1);
- machinery using laser (EN ISO 11553) for strip processing (e.g. welding, cutting);
- punching machines (as stand-alone machine);
- cranes;
- robots (EN ISO 10218);
- separate media systems (e.g. compressed air system, exhaust system);
- storage equipment.

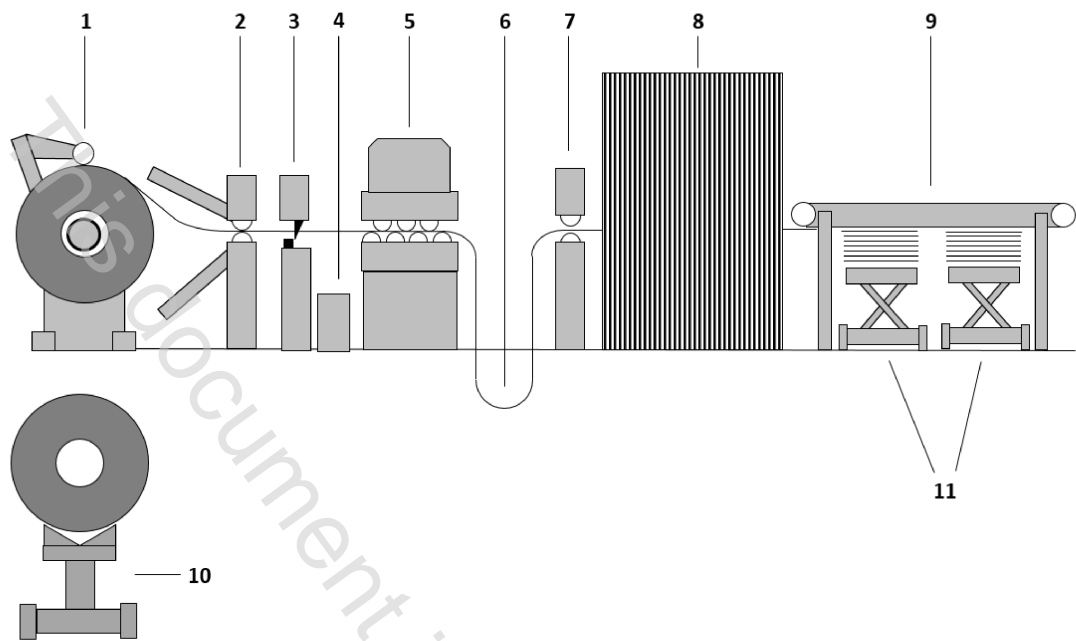
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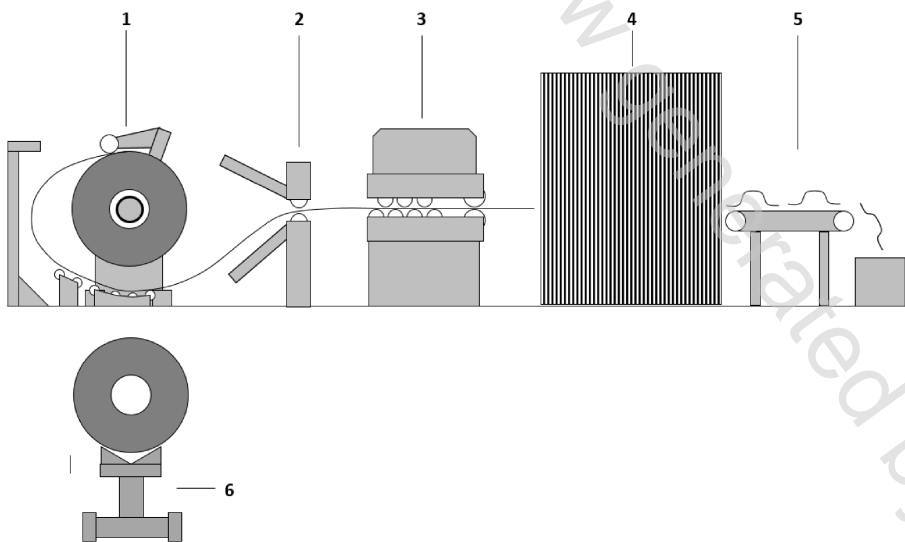
- |                         |                         |
|-------------------------|-------------------------|
| 1 uncoiler              | 5 recoiler              |
| 2 peeler                | 6 coil car              |
| 3 circular knife cutter | 7 knife changing device |
| 4 loop                  | 8 coil car              |

**Figure 2 — Exemplary layout of a slitting line**



- Key**
- |   |              |    |  |
|---|--------------|----|--|
| 1 | uncoiler     | 7  | feeder   |
| 2 | peeler       | 8  | shear (covered by the scope) or<br>press, laser (not covered by the scope) |
| 3 | shear        | 9  | stacker  |
| 4 | scrap box    | 10 | coil car   |
| 5 | straightener | 11 | stacker car  |
| 6 | loop         |    |  |

**Figure 3 — Exemplary layout of a cut-to-length line**



- Key**
- |   |              |   |  |
|---|--------------|---|--|
| 1 | uncoiler     | 4 | shear (covered by the scope) or<br>press, laser (not covered by the scope) |
| 2 | peeler       | 5 | conveyor belt  |
| 3 | straightener | 6 | coil car   |

**Figure 4 — Exemplary layout of a feeding line**

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

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

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

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 (IEC 60204-1:2016)*

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 (all parts), *Safety of machinery - Indication, marking and actuation (IEC 61310)*

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

EN ISO 361, *Basic ionizing radiation symbol (ISO 361)*

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 11064-2, *Ergonomic design of control centres - Part 2: Principles for the arrangement of control suites (ISO 11064-2)*

EN ISO 11064-3, *Ergonomic design of control centres - Part 3: Control room layout (ISO 11064-3)*

EN ISO 11064-6, *Ergonomic design of control centres - Part 6: Environmental requirements for control centres (ISO 11064-6)*

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 11553 (all parts), *Safety of machinery - Laser processing machines*

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

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

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

EN ISO 14122 (all parts), *Safety of machinery - Permanent means of access to machinery (ISO 14122)*

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)*

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*

CEN ISO/TR 22100-4:2020, *Safety of machinery - Relationship with ISO 12100 - Part 4: Guidance to machinery manufacturers for consideration of related IT-security (cyber security) aspects (ISO/TR 22100-4:2018)*

### 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 <https://www.electropedia.org/>

#### 3.1

##### **finishing line**

machinery used for the customer-specific manufacture of metal strip or metal foil by one of the following lines, their combination or, in addition, a combination with machinery which is not covered by this standard (e.g. presses, milling machines, lasers)

##### 3.1.1

##### **slitting line**

machinery to cut the strip into minimum two defined strip widths by longitudinal separation

##### 3.1.2

##### **cut-to-length line**

machinery to cut the strip into defined strip lengths by cross-sectional separation

##### 3.1.3

##### **feeding line**

machinery to prepare and/or feed the strip to subsequent processing

##### 3.1.4

##### **trimming line**

machinery to cut the strip to a defined strip width and/or to increase strip edge quality by longitudinal separation (e.g. side/edge trimming shear)