



SLOVENSKI STANDARD

SIST EN 1010-5:2005

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Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 5: Machines for the production of corrugated board and machines for the conversion of flat and corrugated board

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Sicherheit von Maschinen - Sicherheitsanforderungen an Konstruktion und Bau von Druck- und Papierverarbeitungsmaschinen, Wellpappenerzeugungs-, Flach- und Wellpappenverarbeitungsmaschinen

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Sécurité des machines - Prescriptions de sécurité pour la conception et la construction de machines d'impression et de transformation du papier - Partie 5: Machines de fabrication du carton ondulé et machines de transformation du carton plat et du carton ondulé

Ta slovenski standard je istoveten z: EN 1010-5:2005

ICS:

37.100.10	Reprodukcijska oprema	Reproduction equipment
85.100	Oprema za papirno industrijo	Equipment for the paper industry

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ICS 85.100

English version

Safety of machinery - Safety requirements for the design and construction of printing and paper converting machines - Part 5: Machines for the production of corrugated board and machines for the conversion of flat and corrugated board

Sécurité des machines - Prescriptions de sécurité pour la conceptions des machines d'impression, de transformation et définition du papier - Partie 5: Onduleuses et machines de transformation du carton plat et du carton ondulé

Sicherheit von Maschinen - Sicherheitsanforderungen an Konstruktion und Bau von Druck- und Papierverarbeitungsmaschinen - Wellpappenerzeugungs-, Flach- und Wellpappenverarbeitungsmaschinen

This European Standard was approved by CEN on 2 September 2004.

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Contents

Page

Foreword.....	4
Introduction.....	5
1 Scope.....	5
2 Normative references.....	6
3 Terms and definitions.....	6
4 List of significant hazards.....	8
5 Safety requirements and/or measures.....	13
5.1 General.....	13
5.2 Machines for the production of corrugated board.....	13
5.2.1 Entire machines.....	13
5.2.2 Unwinding stations.....	14
5.2.3 Splicers.....	17
5.2.4 Preheater.....	18
5.2.5 Single facer.....	20
5.2.6 Inclined belt conveyor.....	23
5.2.7 Bridge.....	23
5.2.8 Braking and web aligning section.....	24
5.2.9 Glue machine (Figure 11, item 1).....	24
5.2.10 Heating and pulling section.....	24
5.2.11 Rotary shears (Figure 11, item 16).....	27
5.2.12 Pulling unit (Figure 12).....	27
5.2.13 Slitter-scoring units.....	28
5.2.14 Web diverter.....	29
5.2.15 Sheeters.....	29
5.2.16 Stacker devices.....	30
5.3 Folding box gluer machines.....	32
5.3.1 Feeder.....	32
5.3.2 Folding section.....	33
5.3.3 Gluing section.....	34
5.3.4 Folding belt.....	34
5.3.5 Pressing section.....	35
5.3.6 Entire machine.....	35
5.4 Inline machines.....	36
5.4.1 Entire machine (Figure 20).....	36
5.4.2 Feeding unit (Figure 20, item 1).....	36
5.4.3 Printing unit (Figure 20, item 5).....	39
5.4.4 Slitter-scoring unit (Figure 20, item 7), rotary die cutter (Figure 20, item 8).....	39
5.4.5 Folding unit (folding box gluer) (Figure 20, item 10).....	40
5.4.6 Stitching unit (Figure 20, item 11).....	40
5.4.7 Delivery (Figure 20, item 12).....	41
5.5 Hand-fed platen machines for cutting and creasing.....	41
5.6 Automatic flatbed punching machines.....	44
5.6.1 Feeder (Figure 24, item 1).....	44
5.6.2 Punching section (Figure 24, item 2).....	45
5.6.3 Breaking section (Figure 24, item 3).....	45
5.6.4 Blank separating section, blank delivery (Figure 24, item 4).....	46
5.6.5 Trimming and delivery of gripper edge (Figure 24, item 5).....	46
5.6.6 Entire machine.....	46
5.7 Tube winding machines.....	47

6	Verification of safety requirements and/or measures.....	49
7	Information for use.....	56
7.1	Instruction handbook.....	56
7.1.1	Corrugated board machine.....	56
7.1.2	Folding box gluer machines.....	57
7.1.3	Inline machines.....	58
7.1.4	Hand-fed platen machines.....	58
7.1.5	Automatic flatbed punching machines.....	58
7.1.6	Tube winding machine.....	58
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC		59
Bibliography.....		60

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Foreword

This document (EN 1010-5:2005) has been prepared by Technical Committee CEN/TC 198 "Printing and paper machinery - Safety", 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 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

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

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 **EU Directives**.

For relationship with EU Directives, see informative Annex ZA, B, C or D which is an integral part of this document

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

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Introduction

This document is a type C standard as stated in EN ISO 12100-1:2003.

It contains additional safety requirements and/or deviations from EN 1010-1:2004. The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

For machines designed and built in compliance with this type C standard, the following rule applies: where 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.

This standard consists of the following parts:

- Part 1 Common requirements
- Part 2 Printing and varnishing machines including pre-press machinery
- Part 3 Cutting machines
- Part 4 Bookbinding, paper converting and finishing machines
- Part 5 Machines for the production of corrugated board and machines for the conversion of flat and corrugated board

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1 Scope

This standard applies to machines for the production of corrugated board and the conversion of flat and corrugated board:

- corrugated board production machines;
- folder gluer machines;
- printer slotters, rotary die cutters and combined machines (inline machines);
- hand-fed platen machines for cutting and creasing;
- automatic platen machines for cutting and creasing;
- tube winding machines.

This document shall be used together with EN 1010-1:2004. Both parts together identify all significant hazards relevant to machines for the production of corrugated board and the conversion of flat and corrugated board when they are used as intended and under the conditions foreseen by the manufacturer (see clause 4). The specific requirements in EN 1010-5 take precedence over respective requirements in EN 1010-1:2004.

This document does not deal with risks generated by noise emitted from the machines. These issues are fundamentally covered in EN 1010-1:2004. However, this document specifies requirements for noise reduction of corrugated board and flatbed punching machines.

EN 1010-5:2005 (E)

This document is not applicable to machines for the production of corrugated board and machines for the conversion of flat and corrugated board which are manufactured before the date of publication of this document by CEN.

2 Normative references

The following referenced documents are indispensable for the application 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 418:1992, *Safety of machinery — Emergency stop equipment, functional aspects — Principles for design*

EN 619:2002, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 954-1:1996, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

EN 983:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

EN 1010-1:2004, *Safety of machinery — Technical safety requirements for the design and construction of printing and paper converting machines — Part 1: Common requirements*

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

EN 1088:1996, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 13023:2003, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy categories 2 and 3*

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

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*.

3 Terms and definitions

For the purposes of this European Standard, the terms given in EN ISO 12100-1:2003 and EN 1010-1:2004 and the following terms apply.

3.1

ESPD

electro-sensitive protective device

3.2

stop safe section

specific part of a machine or equipment which can be provided with a separate safeguard against restart

3.3**stop safe actuator**

control element which, when actuated, prevents restart of that specific part of the machine. The actuator is locked in the stop safe position and can be disengaged by turning it

3.4**splicer**

device provided on unwinds with automatic reel changing for cutting off the run-down paper web supplied from the unwinding reel and fitting the cut web to the paper web from the new reel such as to ensure continuous production

3.5**single facer**

equipment where corrugations are embossed into a paper web by using two corrugating rollers and where a liner is glued onto one side

3.6**preheater**

equipment for preheating the paper web where the web is brought into contact with a steam-heated cylinder

3.7**wrap arm**

arm moving around the preheating cylinder in such a way as to vary the length of the paper web in contact with the preheating cylinder

3.8**inclined belt conveyor**

transport system for feeding the single-faced corrugated board onto the bridge

3.9**inclined belt conveyor side**

that side of a single facer where the corrugated board is delivered and fed onto the bridge by the inclined belt conveyor

3.10**bridge**

transport system positioned above the single facers, serving as storage facility. The inclined belt conveyor feeds the single-faced corrugated board to the bridge where it is deposited in loops and subsequently fed to the following machines

3.11**braking and web aligning section**

unit which is fitted on the bridge for taking up slacks in the single-faced corrugated web and guiding the web into the following machines

3.12**glue machine**

separate machine for applying an even layer of glue onto the top of the corrugations of one or more single-faced board webs

3.13**heating and pulling section**

equipment for joining one or more single-faced webs coated with glue on the corrugated side with a liner and for drying and transporting it to following machines

3.14**rotary shears**

rotary cutter for cutting the running corrugated web when changing the format and for removing imperfections (waste material)

3.15
pulling section

pair of transport rollers ensuring pulling of the web

3.16
slitter-scoring unit

equipment for slitting and creasing the corrugated web

3.17
web diverter

system of movable elements for diverting and feeding the slit webs delivered from the slitting and scoring unit into the sheeter

3.18
sheeter

cutting machine for cutting the corrugated web into specific sheet lengths. The sheeter can consist of one or more vertically mounted cut-off units

3.19
stacking device

device for stacking sheets of corrugated board (see downstacker, upstacker)

3.20
downstacker (auto-piler)

stacking device on corrugated board machines where the position of the feeding conveyor remains unchanged and the pile is created by the lowering movement of the pile carrier

3.21
upstacker

stacking device on corrugated board machines where the position of the pile carrier remains unchanged and the pile is created by the upward movement of the conveyor belt

3.22
inline machine

machine for processing board and corrugated board, consisting of a number of units such as a feeding unit, one or more printing units, slitter-scoring unit, rotary die cutter, gluing unit, folding unit, stitching unit. Depending on the type of machine, one or more of the units listed may be missing

4 List of significant hazards

4.1 This clause contains all the significant hazards (noise is fundamentally dealt with in EN 1010-1:2004), as far as they are dealt with in this standard, identified by the risk assessment significant for this type of machinery and which require action to eliminate or reduce the risk. When carrying out the risk assessment, the machine designer shall check whether the list of hazards in Table 1 is complete and applicable with respect to the particular machine.

4.2 It is of great importance that the users of this standard, i. e. the designer or manufacturer, take into account the following principal aspects in accordance with EN 1050:1996:

- the intended use of the machine including setting-up (make-ready), cleaning and maintenance, including foreseeable misuse;
- identification of all hazards existing on the machine.

Table 1 — Significant hazards, danger zones, safety measures

Hazards	Danger zone	Safety measures: reference to clauses in		
		This standard	EN ISO 12100-1: 2003	EN 1010-1: 2004
Mechanical hazards crushing shearing cutting or severing entanglement drawing-in trapping impact ejection of high-pressure fluids	Corrugated board production machines		4.2.1	
	— unwind	5.2.2.1 to 5.2.2.4		5.3.5.9 to 5.3.5.11
	— splicer	5.2.3.1 to 5.2.3.4		5.2.1.1, 5.2.10.1, 5.2.10.2, 5.2.3.3
	— splicing knives	5.2.3.5		
	— preheater	5.2.4.1 to 5.2.4.6, 5.2.4.8		5.2.1
	— single facer, corrugating rollers	5.2.5.1 to 5.2.5.2, 5.2.5.4		5.2.3.2 a) 2, 5.2.2
	— pressing belt, pressure roller, corrugating roller	5.2.5.5		
	— glue rollers	5.2.5.8 to 5.2.5.10		
	— guide rollers	5.2.5.11		
	— drive	5.2.5.15		5.2.2
	— inclined belt conveyor	5.2.6.1 to 5.2.6.3		5.2.1
	— bridge	5.2.7.1 to 5.2.7.3		5.2.1, 5.2.2
	— braking and aligning section	5.2.8		5.2.1.1
	— glue machine	5.2.9.2 to 5.2.9.4		5.2.2
	— heating and pulling section	5.2.10.1 to 5.2.10.3, 5.2.10.5 to 5.2.10.8		
	— rotary shears	5.2.11.1 to 5.2.11.7, 7.1.1.8		5.2.2
	— pulling unit	5.2.12.1 to 5.2.12.3		5.2.2
	— slitter-scorer unit	5.2.13.1 to 5.2.13.3, 5.2.13.6, 5.2.13.7		5.2.2, 5.2.3.2 a) 2
	— web diverter section	5.2.14		5.2.2
	— sheeters	5.2.15.2 to 5.2.15.5		5.2.2
	— stacking devices	5.2.16.1 to 5.2.16.7, 7.1.1.9		5.2.3.1, 5.2.12, 5.3.4, 5.2.2.2, 5.2.2
	Folding box gluer machines			
	— feeder	5.3.1.1 to 5.3.1.4		5.3.4, 5.3.4.8
— folding section	5.3.2.1 to 5.3.2.3		5.2.3.2 a) 2	
— gluing section	5.3.3.1 to 5.3.3.2		5.2.2	
— folding belt	5.3.4.1 to 5.3.4.2		5.2.2	

Table 1 (continued)

Hazards	Danger zone	Safety measures: reference to clauses in		
		This standard	EN ISO 12100-1: 2003	EN 1010-1: 2004
	— pressing section	5.3.5.1 to 5.3.5.2		5.2.2
	— power-driven shafts	5.3.6.1		
	— format setting	5.3.6.3		5.2.3.3
	Inline machines			
	— travel of individual units	5.4.1.1 to 5.4.1.4		5.2.6.1.1, 5.2.1.4
	— inrunning nips on conveying belts	5.4.1.5		
	— feeding unit	5.4.2.1 to 5.4.2.8		5.2.2, 5.3.4.8, 5.2.6.1.5, 5.3.4
	— printing unit	5.4.3.1, 5.4.3.2, 5.4.3.4, 5.4.3.5, 7.1.3.2		5.2.2, 5.2.3.2, 5.2.6.1.1
	— slitter-scorer, rotary die cutter	5.4.4.1 to 5.4.4.5		5.2.3.2, 5.2.6.1.1, 5.2.12
	— folding unit	5.4.5.1 to 5.4.5.6		5.2.2, 5.2.3.1, 5.2.3.2, 5.2.6.1.1, 5.3.6.1
	— stitching unit	5.4.6.1 to 5.4.6.3, 5.4.6.5		5.2.2, 5.2.3.1, 5.2.3.2 a) 2, 5.2.6.1.1, 5.3.6.1
	— delivery	5.4.7		5.3.4
	Hand-fed platen machine			
	— danger points created by closing movement	5.5.1 to 5.5.4, 5.5.6		5.2.10, 5.2.10.2, 5.2.6.1.1
	— impacts caused by platen	5.5.5		
	— excess of stopping time	5.5.8		
	Flatbed punching machines			
	— feeding unit	5.6.1.1 to 5.6.1.5		5.3.4, 5.3.4.8
	— punching section	5.6.2.1 to 5.6.2.3		
	— breaking section	5.6.3.1 to 5.6.3.3		5.2.3.1, 5.2.2
	— blank separating, delivery	5.6.4.1 to 5.6.4.2		5.2.3.1, 5.3.4
	— trimming of gripper edge, delivery	5.6.5		
	— gravity falling of tools	5.6.6.1		
	— hazards created by material jams	5.6.6.2		
	Tube winding machines			
	— unwind	5.7.1, 5.7.2		
	— winding belt/winding mandrel	5.7.3, 7.1.6.1		

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Table 1 (continued)

Hazards	Danger zone	Safety measures: reference to clauses in		
		This standard	EN ISO 12100-1: 2003	EN 1010-1: 2004
	— winding belt/drive drums	5.7.4		
	— glue rollers	5.7.5		5.2.1.1.b)
	— cutting and sawing units	5.7.6		
	— tube transfer	5.7.7		
Avoiding direct or pending hazardous situations	Corrugating board production machines Folding box gluer machines Inline machines Hand-fed platen machines Automatic flatbed punching machines Tube winding machines	5.2.1.3 to 5.2.1.5, 5.2.16.2, 5.2.3.9 5.3.6.4 5.4.1.2, 5.4.1.6 5.5.6, 5.5.9 5.6.6.3, 5.6.6.7, 7.1.5.1 5.7.8		5.2.7.2
Breakages during production runs	Corrugating board production machines - breakage of pressure belt	5.2.5.6	4.2.2	
Electrical hazards direct or indirect contact	Corrugating board production machines — electrical equipment	5.2.1.1	4.3	5.2.5
Thermal hazards burns due to possible contact	Corrugated board production machines — preheater — steam pipes, steam couplings — single facer — heating and pulling section	5.2.4.7 5.2.5.12, 5.2.5.13 5.2.5.14, 7.1.1.7 5.2.10.4, 5.2.10.10, 5.2.10.11	4.4	
Hazards generated by noise resulting in hearing loss (deafness)	Corrugated board production machines — single facer — sheeter Inline machines Automatic flatbed punching machines	5.2.5.16 5.2.15.6 5.4.4.6 5.6.6.6	4.5	5.2.14
Hazards from fire and explosion	Corrugated board production machines — blowers for braking systems on unwinds — vacuum belts — exhaust hoses — braking systems on unwinds Automatic flatbed punching machines — exhaust equipment	5.2.2.5 5.2.10.9 5.2.13.4 5.2.2.5 5.6.3.4	4.8	5.2.4.3.1, 5.2.4.9 5.2.4.9 5.2.4.1, 5.2.4.4.1, 5.2.4.9
Hazards from substances and material used for processing, machine operation or which are emitted during the process	Corrugated board production machines — escape of steam	5.2.5.14	4.8	

Table 1 (continued)

Hazards	Danger zone	Safety measures: reference to clauses in		
		This standard	EN ISO 12100-1: 2003	EN 1010-1: 2004
Hazards resulting from contact with or inhalation of harmful fluids, gases, fumes, dusts				
Hazards generated by neglect of ergonomic principles in machine design unhealthy body postures	Corrugated board production machines — access stairs, catwalks — access to splicers — catwalk on preheater — changing of corrugating rollers — catwalk in front of corrugating rollers — access to bridge, bridge — threading of paper web on gluing unit — waste removal on rotary shears — access to creasing unit, catwalk — access to sheeter Folding box gluer machines — access, working platform Inline machines — access stairs, working platform — mounting of stereos — changing and threading of adhesive tape — changing and threading of stitching wire Automatic flatbed punching machines — changing of tools — access stairs, working platform	 5.2.1.6 5.2.3.7, 5.2.3.8 5.2.4.8 5.2.5.3 5.2.5.7 5.2.7.4 to 5.2.7.6 5.2.9.1 5.2.11.5 5.2.13.5 5.2.15.1 5.3.6.2 5.4.1.7 5.4.3.3 5.4.5.7 5.4.6.4 5.6.2.3, 5.6.2.4 5.6.6.5	4.9	 5.2.12 5.2.12 5.2.12.2 5.2.12 5.2.12 5.2.12 5.2.12 5.2.12 5.12.12.1
Failure, malfunction of control system Faults or failures in safety circuits	Corrugated board production machines — entire machine — knife control system of splicing device — rotary shears Hand-fed platen machines — control system — laser scanners Automatic flatbed punching machines — control system, interlocking	5.2.1.2 5.2.3.6 5.2.11.2 5.5.7 5.5.4 5.6.6.4		5.2.6.1

5 Safety requirements and/or measures

5.1 General

Machinery shall comply with the safety requirements and/or measures of this clause. In addition, the machine shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant which are not dealt with by this standard (for example, sharp edges of the machine frame). The common requirements of Part 1 shall also be satisfied.

5.2 Machines for the production of corrugated board

5.2.1 Entire machines

5.2.1.1 The electrical equipment shall comply with the requirements of 5.2.5 of EN 1010-1:2004.

5.2.1.2 The control system shall comply with the requirements of 5.2.6.1 of EN 1010-1:2004.

5.2.1.3 A start-up warning device is required. The requirements of 5.2.7.2 of EN 1010-1:2004 shall be complied with.

5.2.1.4 An emergency stop device is required. The emergency stop actuators shall be provided on each main control panel and at least at a distance of 15 m and they shall act on the entire machine.

The glue rollers of the gluing unit can be excluded if the danger points on the gluing unit are safeguarded by guards.

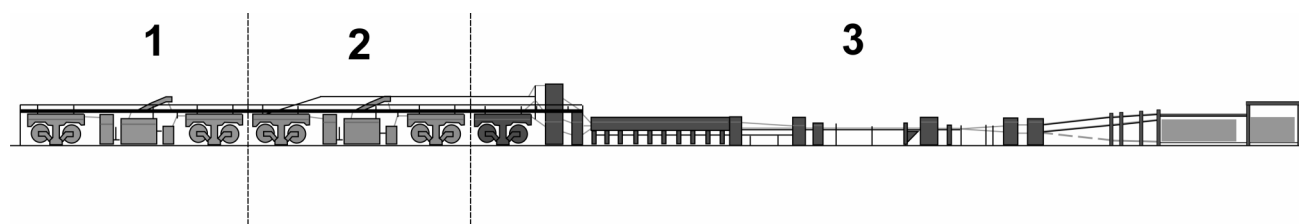
5.2.1.5 Where stop safe actuators are provided, the following requirements apply:

- stop safe actuators shall be marked such that they clearly indicate the section they apply to;
- signal processing shall comply with category 3 in accordance with 5.2.6.1.1 of EN 1010-1:2004.

Where stop safe sections are provided, they shall be identified as follows:

Section: per single-facer group (unwind of liner with preheater, single facer, unwind of corrugated web) (see Figure 1).

Section: liner unwind before heating up to stacker device (see Figure 1).



Key

- 1 Single-facer group
- 2 Single-facer group
- 3 Liner unwind up to stacker device

Figure 1 — Stop safe sections

5.2.1.6 Access stairs and catwalks shall comply with 5.2.12 of EN 1010-1:2004.