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**Stroji za predelavo gume in plastike - Navijalniki za folije (filme) in trakove -
Varnostne zahteve**

Plastics and rubber machines - Winding machines for film or sheet - Safety requirements

Kunststoff- und Gummimaschinen - Wickelmaschinen für flache Bahnen -
Sicherheitsanforderungen

Machines pour les matières plastiques et le caoutchouc - Bobineuses pour films ou
feuilles - Prescriptions de sécurité

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sécurité

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flache Bahnen - Sicherheitsanforderungen

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
Introduction	3
1 Scope	3
2 Normative references	4
3 Terms and definitions	6
4 List of significant hazards	9
4.1 Mechanical hazards	9
4.2 Hazards resulting from electrical energy	10
4.3 Hazards generated by neglecting ergonomic principles.....	11
4.4 Hazards resulting from noise	11
4.5 Hazards caused by failure of energy supply	11
4.6 Hazards resulting from failure of control systems.....	11
4.7 Hazards caused by setting up and maintenance of cutting devices.....	11
5 Safety requirements and/or protective measures	11
5.1 General safety requirements and/or protective measures	11
5.1.1 Protection of danger points/areas	11
5.1.2 Safety distances to prevent danger points/areas being reached	12
5.1.3 Minimum distances to avoid crushing of parts of the human body.....	12
5.1.4 Drive and power transmission systems.....	12
5.1.5 Area guarding.....	12
5.1.6 Electrical equipment.....	12
5.1.7 Safety-related parts of the control system.....	13
5.1.8 Pneumatic systems and their components	13
5.1.9 Hydraulic systems and their components	13
5.1.10 Precautions in view of emergency situations.....	13
5.1.11 Unexpected start-up	13
5.1.12 Electrostatic discharge	13
5.1.13 Ergonomics	14
5.1.14 Noise	14
5.2 Specific safety requirements and/or protective measures	15
5.3 Start-up and manual intervention	25
5.3.1 Start-up	25
5.3.2 Manual intervention	26
6 Verification of the safety requirements and/or protective measures	28
7 Information for use	37
7.1 Minimum marking on the machine.....	37
7.2 Instruction manual.....	38
Annex A (informative) Schematic drawings of a dancer roll and of a suspended roll.....	40
Annex B (informative) Example: Turret winder safety concept.....	42
Annex C (informative) Example of area guarding using a combination of distance guarding in conjunction with electro-sensitive protective equipment (ESPE)	46
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	47
Bibliography	48

Foreword

This document (prEN 13418:2010) has been prepared by Technical Committee CEN/TC 145 “Plastics and rubber machines”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13418:2004+A1:2008.

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 Directive(s).

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

Annexes A, B and C are informative.

Introduction

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

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

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.

1 Scope

This European Standard specifies the safety requirements for the design and construction of winding machines used for, winding, unwinding, rewinding and the slitting of film or sheet manufactured from rubber, plastics and composite materials in respect of the significant hazards listed in clause 4.

A machine used for winding or rewinding (winder or rewinder) begins at the intake of the film or sheet into the winding machine and ends at the discharge position of the reel(s).

A machine used for unwinding (unwind) begins at the take-up position of the reel(s) and ends at the film or sheet take-off point.

A machine used for unwinding, slitting and re-winding (slitter rewinder) begins at the take-up position of the reel(s) and ends at the discharge positions of the reel(s) and covers one or more integrated slitting/cutting units.

In some machines the winding, unwinding, rewinding and slitting functions may be combined.

The following functional groups are covered by this European Standard:

- fixed point roll;

prEN 13418:2010 (E)

- film or sheet tension control;
- winding zone;
- reel change device;
- reel loading and unloading devices;

and the following additional equipment integrated into the winding machine are also covered:

- spreader roll device;
- longitudinal cutting device;
- cross-cutting device;
- splitting device;
- film or sheet alignment device;
- static eliminator.

Hazards due to electro-magnetic radiation, e.g. from the use of thickness monitoring devices, are not covered by this standard.

Toxic or chemical hazards and hazards due to dusts, fumes or gases, which could occur from the materials being wound, unwound, slit or rewound are not covered by this standard.

NOTE Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC.

This standard applies to machines which are manufactured after the date of approval of the standard 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 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body.*

EN 574:1996+A1:2008, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design.*

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

EN 953:1997+A1:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards.*

EN 982:1996+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics.*

EN 983:1996+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics.*

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

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices with and without guard locking — General principles and provisions for design.*

EN 60204-1:2006+A1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997).*

EN 60529:1992, *Degrees of protection provided by enclosures (IP-Code).*

EN ISO 3743-1:2009, *Acoustics — Determination of sound power levels of noise sources - Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms.*

EN ISO 3743-2:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms.*

EN ISO 3744:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 3746:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane.*

EN ISO 3747:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method for use in situ.*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment.*

EN ISO 9614-1:1995, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points.*

EN ISO 9614-2:1997, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement by scanning.*

EN ISO 11201:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plan.*

EN ISO 11202:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ.*

EN ISO 11203:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions from the sound power level.*

EN ISO 11204:1996, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Method requiring environmental corrections.*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning.*

EN ISO 12100-1:2003+A1:2009, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*

EN ISO 12100-2:2003+A1:2009, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles.*

prEN 13418:2010 (E)

EN ISO 13849-1:2008, *Safety of Machinery — Safety related parts of control systems — Part 1: General principles for design*.

EN ISO 13850:2008, *Safety of machinery — Emergency stop equipment, functional aspects — Principles for design*.

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1070:1998 and the following apply.

3.1**working zone**

this zone includes any place where the operator of the machine stands or passes in order to carry out operations and includes catwalks, working pits and devices firmly mounted to the machine like stairs, platforms and pedestals of all kinds

3.2**winding machines**

machines to wind up film or sheet material and/or to unwind and/or rewind it. The various kinds of machines are distinguished by their drives. A distinction is made between centre winder, surface winder and combinations of both

3.2.1**centre winder**

winding machine with central drive to the winding core

3.2.2**surface winder**

winding machine whose winding or reel drive relies on friction at the driven reel surface

3.3**winding core**

element onto which film or sheet is wound or from which film or sheet is unwound. It may be a solid shaft or a hollow core, for example made of cardboard, or a combination of the two where the core is sleeved onto the shaft

3.4**winding**

the process of film or sheet being wound

3.5**reel**

film or sheet material which is wound with or without a winding core

3.6**area guarding**

one or a combination of safety measure(s) for several danger points/areas

3.7**non-driven roll**

roll for guiding film or sheet through the machine and which is driven by the film or sheet

3.8**fixed point roll**

roll or set of rolls that determine the material speed and/or the tension within the winding machine. The following are fixed point rolls: driven roll, vacuum roll, nip roll

3.8.1**driven roll**

roll that pulls the film or sheet by means of surface contact (friction)

3.8.2**vacuum roll**

driven roll against which the film or sheet is held by means of a vacuum which creates adherence

3.8.3**nip rolls**

rolls that are pressed one against the other; one at least is driven. The film or sheet is drawn through the nip by the nipping effect

3.9**film or sheet tension control**

driven or non-driven roll systems that control the film or sheet tension

3.9.1**dancer roll**

guide roll that is pivoted about a point and over which the film or sheet runs. The load of the dancer roll determines the film or sheet tension (see annex A, Figure A.1)

3.9.2**suspended roll**

guide roll that reciprocates between guides in a linear direction and over which the film or sheet runs. The load of the suspended roll determines the film or sheet tension (see annex A, Figure A.2)

3.9.3**measuring roll**

guide roll the axis of which is supported in load cell mounted bearings which measure the film or sheet tension

3.10**winding zone**

area in which the winding and/or unwinding and/or rewinding is undertaken

3.10.1**winding position**

position where film or sheet material is wound to form a reel.

3.10.2**unwind position**

position where film or sheet material is unwound from a reel

3.10.3**pivot arm**

pair of arms that support a reel and insert or discharge it in a pivoting movement

prEN 13418:2010 (E)

3.10.4**turret device**

device that changes the positions of the winding core and the reel in the winding position e. g. by rotation. The following distinction is made:

- for winding machines: the winding core is moved from the take-up position to the winding position and the reel is moved from the winding position to the discharge position,
- for unwinding machines: the reel is moved from the take-up position to the unwind position and the winding core is moved from the unwind position to the discharge position.

3.10.5**guide carriage**

device that provides linear direction to the reel or the contact/pressure roll to maintain the winding parameters

3.10.6**contact/pressure roll**

a driven or non-driven roll that is used for controlling the winding of the film or sheet

3.10.7**winding core support**

device for supporting and fixing winding cores, for example, three-point bearing, tilting bearing, spindle, trunnion bearing or expanding mandrel

3.10.8**winding core loading device**

device that feeds empty winding cores either into a magazine or directly to the winding start position

3.10.9**winding core unloading device**

device that extracts winding cores from the unwind position

3.11**reel change device**

device that ensures continuous winding, unwinding or rewinding of the film or sheet during the reel change sequence

3.11.1**lay on device**

device that lays the film or sheet against an empty winding core during reel change

3.11.2**film or sheet splicing device**

device that splices the end of the film or sheet from one reel to the start of the film or sheet of a new reel

3.11.3**cross cutting device**

device that finishes the winding cycle by cutting the film or sheet across its width

3.11.3.1**impact cutting device**

device that cuts the film or sheet by an impact movement across its width

3.11.3.2**draw-type cutting device**

device in which either a rotating or fixed knife/blade is moved to cut the film or sheet across its width

3.12**reel loading device**

device for loading reels on to the unwind station

3.13**reel unloading device**

device for unloading reels from the winding station

3.14**spreader roll**

roll that prevents the film or sheet being wound from getting narrower or from getting wrinkled and maintains the spread of multiple lanes of film or sheet

3.15**longitudinal cutting device**

device for cutting film or sheet to a certain width. It allows the film or sheet to be cut into two or more lanes or to trim the edges. There are different kinds of cutting knives, for example:

- fixed knives;
- circular knives.

3.16**splitting device**

device that slits a tubular film in a fold

3.17**film or sheet alignment device**

device for alignment of the film or sheet

3.18**static eliminator**

device for eliminating electrostatic charges built up on the film or sheet during winding or unwinding or rewinding.

4 List of significant hazards

4.1 Mechanical hazards

This clause contains the significant hazards and hazardous situations, as far as they are dealt with in this European Standard, identified by a risk assessment significant for this type of machinery and which require action to eliminate or reduce the risk.

When using this standard, it is important to carry out a risk assessment of the individual functional groups in accordance with EN ISO 14121-1 to check whether it has hazards additional to the ones covered by this standard.

The letters a to k in Table 1 indicate the hazards and are referred to in Table 2, column 3.

Table 1 — List of mechanical hazards

Danger points/areas		Hazards									
		a	b	c	d	e	f	g	h	j	k
		Drawing-in between film or sheet and moving part, e. g. roll	Drawing-in between film or sheet and reel	Drawing-in between film or sheet and winding/reel and fixed or moving machine parts or floor	Drawing-in between moving parts, e. g. roll/roll	Drawing-in between fixed and moving machine parts	Crushing and/or shearing between moving machine parts	Crushing and/or shearing between fixed and moving machine parts and floor	Crushing and/or shearing when inserting/chucking machine parts	Drawing-in or trapping by moving machine parts	Cutting by knives
4.1.1	Non-driven web roll(s)	x			x	x				x	
4.1.2	Fixed point roll(s)										
4.1.2.1	Driven roll(s)	x			x	x					
4.1.2.2	Vacuum roll(s)	x				x					
4.1.2.3	Nip roll(s)	x			x		x	x			
4.1.3	Film or sheet tension control (e.g. dancer roll, suspended roll, measuring roll)	x						x			
4.1.4	Winding zone										
4.1.4.1	Winding position		x	x							
4.1.4.2	Unwind position			x							
4.1.4.3	Pivot arm						x	x			
4.1.4.4	Turret device							x		x	
4.1.4.5	Guide carriage							x		x	
4.1.4.6	Contact/pressure roll	x			x		x	x			
4.1.4.7	Winding core support								x	x	
4.1.4.8	Winding core loading device							x			
4.1.4.9	Winding core unloading device							x			
4.1.5	Reel change device										
4.1.5.1	Lay on device			x	x		x				
4.1.5.2	Film or sheet splicing device			x			x				x
4.1.5.3	Cross cutting device										
4.1.5.3.1	Impact cutting device							x			x
4.1.5.3.2	Draw cutting device						x				x
4.1.6	Reel loading device							x			
4.1.7	Reel unloading device							x			
4.1.8	Spreader roll device			x							
4.1.9	Longitudinal cutting device				x						x
4.1.10	Slitting device										x
4.1.11	Film or sheet alignment	x						x			
4.1.12	Drive and power transmission systems				x	x	x	x		x	

4.2 Hazards resulting from electrical energy

Electric shock or burns due to direct or indirect contact with live conductive parts.

Electric shock due to electrostatic discharge.

4.3 Hazards generated by neglecting ergonomic principles

Hazards resulting from unfavourable posture or excess efforts.

4.4 Hazards resulting from noise

Hazards caused by high noise levels can lead to:

- hearing impairment;
- interference with speech communication;
- interference with the perception of acoustic signals.

4.5 Hazards caused by failure of energy supply

- unexpected movement of machine parts.

4.6 Hazards resulting from failure of control systems

- unexpected overrunning or starting of hazardous movements;
- moveable machine parts changing their position.

4.7 Hazards caused by setting up and maintenance of cutting devices

- hazard of cutting during assembly and disassembly of cutting blade(s).

5 Safety requirements and/or protective measures

Machinery shall comply with the safety requirements and/or protective 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 document (e.g. sharp edges).

5.1 General safety requirements and/or protective measures

5.1.1 Protection of danger points/areas

Access to danger points/areas in working zones shall be protected by measures in accordance with Clause 4 of EN ISO 12100-2:2003, subject to additional provisions for individual functional groups in 5.2.

No drawing-in hazard exists for arms and hands at rolls where:

- there is a minimum distance of 120 mm between two rolls,
- there is a minimum distance of 120 mm between a roll and the nearest machine parts.

Protection at material take-up points of non-driven rolls is not required, if:

- the roll can be stopped with one hand;
- and
- there are no hazards which are due to any property of the material such as adhesion, roughness, etc.

prEN 13418:2010 (E)**5.1.2 Safety distances to prevent danger points/areas being reached****5.1.2.1 Upper limbs**

The safety distances for the upper limbs shall be in accordance with EN ISO 13857:2008. For selection of tables to be used concerning "reaching over protective structures", see 5.2.

5.1.2.2 Lower limbs

The safety distances for the lower limbs shall be in accordance with EN ISO 13857:2008.

5.1.3 Minimum distances to avoid crushing of parts of the human body

The minimum distances shall be in accordance with EN 349:1993+A1:2008.

5.1.4 Drive and power transmission systems

Moving parts of drive and power transmission systems, for example shafts, clutches, chains or belts shall be protected by fixed guards in accordance with 3.2 of EN 953:1997+A1:2009.

5.1.5 Area guarding

Area guarding may be used to protect several danger points/areas.

The danger points/areas may need different categories of protective measures and safety related parts for their control systems if safeguarded individually. If this is the case, the protective measures and safety related parts selected from among those specified for the individual danger points/areas shall be those which achieve the highest level of safety.

5.1.6 Electrical equipment

The electrical equipment shall be in accordance with EN 60204-1:1997 and the following additional requirements:

5.1.6.1 Supply disconnecting (isolating) device

The supply disconnecting devices shall be in accordance with EN 60204-1:1997, 5.3.2 a) to e).

Where the supply disconnecting device is of the type a), b) or c), the requirements of EN 60204-1:1997, 5.3.3 shall apply.

5.1.6.2 Protection against direct contact

Protection against direct contact shall be in accordance with EN 60204-1:1997, 6.2 including the IP codes according to EN 60529.

5.1.6.3 Protection against indirect contact

Protection against indirect contact shall be in accordance with EN 60204-1:1997, 6.3.

5.1.6.4 Control functions – Start and Stop

The start function shall conform to EN 60204-1:1997, 9.2.1 and 9.2.5.2.

The stop shall function as a category 0 stop and in accordance with EN 60204-1:1997, 9.2.2.

If stop category 0 can result in additional hazards, e.g. due to inertia of the winding, stop category 1 shall be used. Stop category 2 may be used if it is necessary to leave the winding machine energized after stopping, e.g. to keep the film or sheet tensioned in the production line when it is stationary.

5.1.7 Safety-related parts of the control system

The safety-related parts of the control system shall be at least in accordance with EN ISO 13849-1:2008 PL_r = b, subject to other provisions for individual functional groups in 5.2.

5.1.8 Pneumatic systems and their components

The pneumatic systems and their components shall be in accordance with EN 983:1996.

5.1.9 Hydraulic systems and their components

The hydraulic systems and their components shall be in accordance with EN 982:1996.

5.1.10 Precautions in view of emergency situations

Precautions in view of emergency situations shall be in accordance with 5.5.2 of EN ISO 12100-2:2003.

Emergency stop device(s) shall be positioned to give easy access at every control point and at other suitable locations around the winder. They shall function as category 0 in accordance with EN ISO 13850:2008 unless there are additional hazards, e.g. due to inertia of the winding machine or other machinery working in combination with it, in which case category 1 shall be used (see also 7.2 b).

Operation of an emergency stop actuator shall cause the winding machine to come to rest in a safe condition and its reset shall not initiate a restart of the winding machine.

The manufacturer shall inform the user about the electrical interface concerning the emergency stop equipment in the information for use supplied with the winding machine (see 7.2 b).

The types of device(s) for emergency stop shall be in accordance with EN 60204-1:1997, 10.7.2.

5.1.11 Unexpected start-up

Hazards due to unexpected start-up of winding machines shall be prevented in accordance with the requirements of EN 1037:1995.

Devices for switching off for the prevention of unexpected start-up shall conform to 5.4 of EN 60204-1:1997.

Protective measures against hazards due to unexpected start-up from individual functional groups are described in the corresponding sub clauses of 5.2 in this standard.

5.1.12 Electrostatic discharge

5.1.12.1 General

Hazards arising from static electricity shall be prevented by bonding all conductive structural parts of the electrical equipment and the machine and connecting to earth.

Earthing points for temporary connections shall be provided where a machine assembly includes moveable metal items, which are not permanently installed.

See also 7.2 I).