BS EN 13418:2013

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 13418:2013. It supersedes BS EN 13418:2004+A1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/3/2, Rubber and plastics machine - Safety.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected

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English Version

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

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

Kunststoff- und Gummimaschinen - Wickelmaschinen für flache Bahnen - Sicherheitsanforderungen

This European Standard was approved by CEN on 11 April 2013.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 13418:2013) has been prepared by Technical Committee CEN/TC 145 “Plastics and rubber machines”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by November 2013.

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 supersedes 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.

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

List of significant technical changes since the last edition:

— partially modified requirements and/or protective measures for individual functional groups by taking into account the technological changes in the plastics and rubber industry and the development of the safety technology;

— modified requirements for the safety related parts of the machine control system by taking into account the performance levels as specified in EN ISO 13849-1;

— complete revision of the clause on start-up procedure and manual intervention;

— addition of a noise test code in form of a normative annex;

— modified informative annexes showing examples of safety concepts used at winding machines.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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 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 deals with all significant hazards, hazardous situations and events relevant to the design and construction of winding machines used for the winding and/or unwinding and/or rewinding and/or slitting of film or sheet manufactured from rubber, plastic and composite materials, when the machines are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see 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.

Hazards due to electro-magnetic radiation, e.g. from the use of thickness monitoring devices, are not covered by this European 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 European 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 European Standard is not applicable to winding machines which are manufactured before the date of its publication.

2 Normative references

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

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

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

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1760-1:1997+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors*

EN 1760-3:2004+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 3: General principles for the design and testing of pressure sensitive bumpers, plates, wires and similar devices*

EN 60204-1:2006,[1)] *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

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

EN 61496-1:2004,[2)] *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

CLC/TS 61496-3:2008, *Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for Active Opto-electronic Protective Devices responsive to Diffusive Reflection (AOPDDR) (IEC 61496-3:2008)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:2010)*

EN ISO 3747:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment (ISO 3747:2010)*

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

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

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

EN ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

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 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

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

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1) EN 60204-1:2006 is impacted by the stand-alone amendment EN 60204-1:2006/A1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*.

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

EN ISO 13849-1:2008,[3)] *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

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

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

3 Terms and definitions

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

3.1
winding machine
machine to wind up film or sheet material. and/or to unwind and/or rewind it or a combination including a slitting or splitting function

Note 1 to entry: The various kinds of this machine are distinguished by their drive. Distinction is made between centre winder, surface winder and combinations of both.

3.1.1
centre winder
winding machine with central drive to the winding core

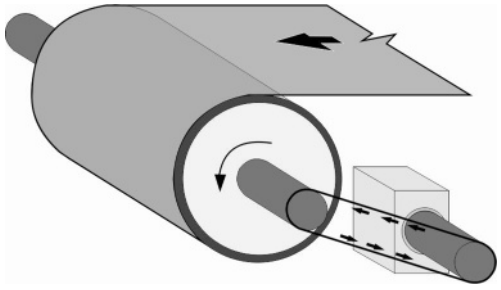


Figure 1 — Centre winder

3.1.2
surface winder
winding machine whose reel drive relies on friction at the driven reel surface

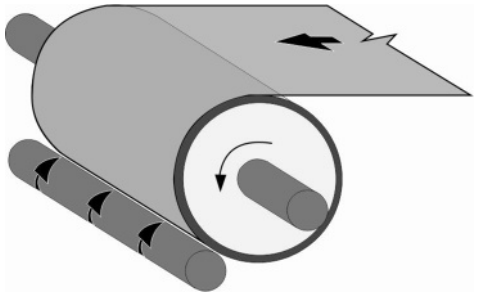


Figure 2 — Surface winder

3) EN ISO 13849-1:2008 is impacted by the corrigendum EN ISO 13849-1:2008/AC:2009.

3.2
winding core
element onto which film or sheet is wound or from which film or sheet is unwound

Note 1 to entry: 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.

3.3
winding
process of film or sheet being wound

3.4
reel
film or sheet material which is wound with or without a winding core

3.5
non-driven roll
roll for guiding film or sheet through the machine and which is driven by the film or sheet

3.6
fixed point roll
roll or set of rolls that determine the material speed and/or the tension within the winding machine

Note 1 to entry: The following are fixed point rolls: driven roll, vacuum roll, nip roll.

3.6.1
driven roll
roll that pulls the film or sheet by means of surface contact (friction)

3.6.2
vacuum roll
driven roll against which the film or sheet is held by means of a vacuum which creates adherence

3.6.3
nip rolls
rolls that are pressed one against the other, one of which at least is driven

Note 1 to entry: The film or sheet is drawn through the nip by the nipping effect.

3.7
film or sheet tension control
driven or non-driven roll systems that control the film or sheet tension

3.7.1
dancer roll
guide roll that is pivoted about a point and over which the film or sheet runs, and the load of which determines the film or sheet tension

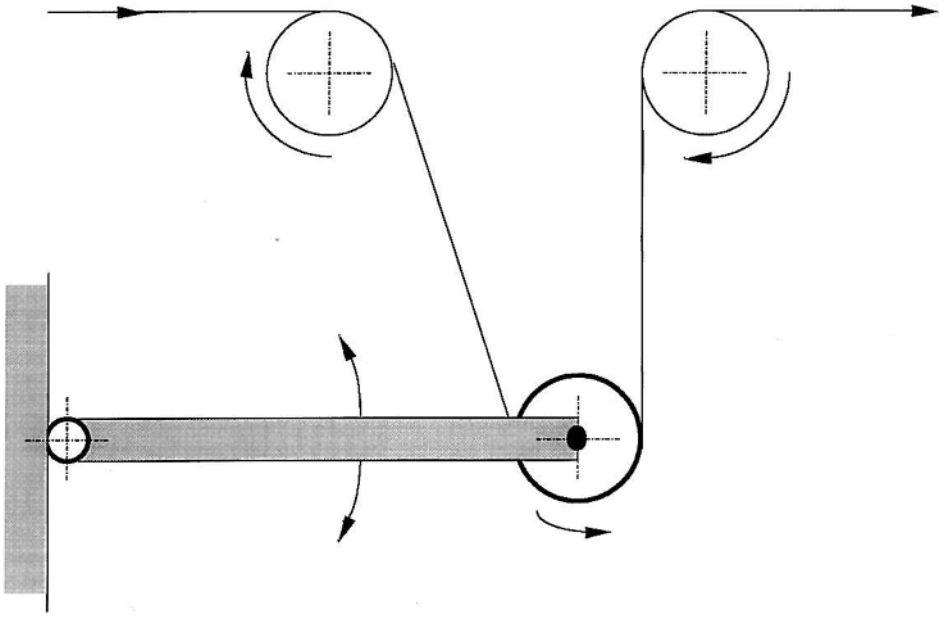


Figure 3 — Schematic drawing of a dancer roll

3.7.2
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

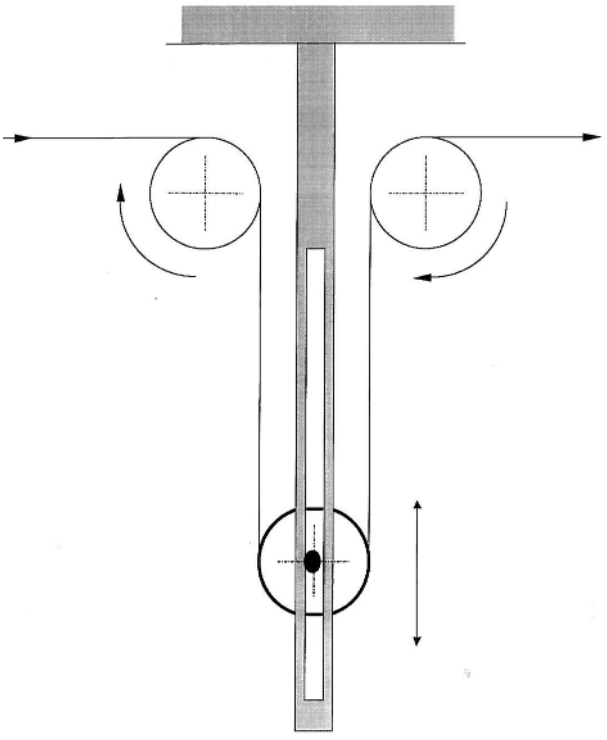


Figure 4 — Schematic drawing of a suspended roll

3.7.3
force measuring roll
guide roll the axis of which is supported in load cell mounted bearings which measure the film or sheet tension

3.8
winding zone
area in which the winding and/or unwinding and/or rewinding is undertaken

3.8.1
winding position
position where film or sheet material is wound to form a reel

3.8.2
unwind position
position where film or sheet material is unwound from a reel

3.8.3
pivot arm
pair of arms that support a reel and insert or discharge it in a pivoting movement

3.8.4
turret device
device that changes the positions of the winding core and the reel in the winding position e.g. by rotation

Note 1 to entry: 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.

3.8.5
guide carriage device
device that provides linear direction to the reel or the contact/pressure roll to maintain the winding parameters

3.8.6
contact/pressure roll
driven or non-driven roll that is used for controlling the winding of the film or sheet

3.8.7
winding core support
device for supporting and fixing winding cores, for example, three-point bearing, tilting bearing, spindle, trunnion bearing or expanding mandrel

3.8.8
winding core loading device
device that feeds empty winding cores either into a magazine or directly to the winding start position

3.8.9
winding core unloading device
device that extracts and/or removes winding cores from the unwind position

3.9
reel change device
device that ensures continuous winding, unwinding or rewinding of the film or sheet during the reel change sequence

3.10
lay on device
device that lays the film or sheet against an empty winding core or reel during reel change

3.11
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

3.12
cross cutting device
device that finishes the winding cycle by cutting the film or sheet across its width

3.12.1
impact cutting device
device that cuts the film or sheet by an impact movement across its width

3.12.2
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

3.13
reel loading device
device for loading reels on to the unwind station

3.14
reel unloading device
device for unloading reels from the winding station

3.15
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

3.16
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

Note 1 to entry: There are different kinds of cutting knives, for example: fixed knives and circular knives.

3.17
splitting device
device that slits a tubular film in a fold

3.18
film or sheet alignment device
device that controls the alignment of the film or sheet in relation to its centre or its edges

3.19
static eliminator
device for eliminating electrostatic charges built up on the film or sheet during winding or unwinding or rewinding

3.20
working zone
zone which includes any place where the operator of the machine stands or passes in order to carry out operations

Note 1 to entry: This includes catwalks, working pits and devices firmly mounted to the machine like stairs, platforms and pedestals of all kinds.

3.21
area guarding
one or a combination of safety measure(s) for several danger points/areas

4 List of significant hazards

This clause contains all 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.

Table 1 and Table 2 list the hazards on winding machines and include cross-references to the safety requirements and/or protective measures in Clause 5.

Table 1 — Mechanical hazards associated with individual functional groups

	Hazards										
Danger points/areas	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 reels and/or 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	**Cross-references to Table 3 (Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode)**
Non-driven roll(s)	x			x	x				x		5.3.1
Driven roll(s)	x			x	x						5.3.2.1
Vacuum roll(s)	x				x						5.3.2.2
Nip roll(s)	x			x		x	x				5.3.2.3
Film or sheet tension control (e.g. dancer roll, suspended roll, force measuring roll)	x						x				5.3.3
Material take-up point of a centre winder		x	x								5.3.4.1.1
Intake nip of a surface winder		x	x								5.3.4.1.2
Unwind position			x								5.3.4.2
Pivot arm						x	x				5.3.4.3
Turret device							x		x		5.3.4.4
Guide carriage device							x		x		5.3.4.5
Contact/pressure roll	x			x		x	x				5.3.4.6
Winding core support								x	x		5.3.4.7
Winding core loading device							x				5.3.4.8
Winding core unloading device							x				5.3.4.9
Lay on device			x	x		x					5.3.5.1
Film or sheet splicing device			x			x				x	5.3.5.2
Impact cutting device							x			x	5.3.5.3.1
Draw type cutting device						x				x	5.3.5.3.2
Reel loading device							x				5.3.6
Reel unloading device							x				5.3.7
Spreader roll			x								5.3.8
Longitudinal cutting device				x						x	5.3.9
Splitting device										x	5.3.10
Film or sheet alignment device	x						x				5.3.11

Table 2 — Other hazards

Possible causes	Hazards	Cross-references to 5.2 (General safety requirements and/or protective measures)
Drive and power transmission systems	Drawing-in, crushing and shearing	5.2.4
Cutting devices	Cutting during handling of cutting knives/blades (setting-up, maintenance, assembly and disassembly)	5.2.5
Electrical equipment	Electric shock or burns due to direct or indirect contact with live conductive parts.	5.2.7
Failure of control systems	Unexpected overrunning or starting of hazardous movements Unexpected movement of machine parts	5.2.8, 5.2.9, 5.2.11
Entrapment within the machine	Drawing-in, trapping and crushing between rolls and/or machine parts	5.2.10
Malfunction of hydraulic or pneumatic systems	Unexpected movement of machine parts, ejection of pressurised fluids, etc.	5.2.12, 5.2.13
Electrostatic discharge	Electric shock due to electrostatic discharge and subsequent dangerous movement (e.g. fall).	5.2.14
Neglecting ergonomic principles	Hazards resulting from unfavourable posture or excess efforts	5.2.15
Noise	Hearing impairment Interference with speech communication or with the perception of acoustic signals	5.2.16

5 Safety requirements and/or protective measures

5.1 General

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 12100:2010 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges).

5.2 General safety requirements and/or protective measures

5.2.1 Protection of danger points/areas

Access to danger points/areas in working zones shall be protected by measures in accordance with Clause 6 of EN ISO 12100:2010, subject to additional provisions for individual functional groups in 5.3.

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.

5.2.2 Safety distances to prevent danger points/areas being reached

5.2.2.1 Upper limbs

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

A hazard zone that is at a height of ≥ 2 700 mm does not need safeguarding.

For selection of tables to be used concerning "reaching over protective structures", see Table 3 in 5.3.

5.2.2.2 Lower limbs

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

5.2.3 Basic safeguard requirements

Guards shall comply with EN 953:1997+A1:2009. Interlocking guards without guard locking shall be positioned in accordance with Clause 9 of EN ISO 13855:2010.

Sensitive protective equipment shall be in accordance with 6.3.2.5 of EN ISO 12100:2010.

Light curtains shall be in accordance with EN 61496-1:2004 and positioned in accordance with EN ISO 13855:2010.

Scanners (AOPDDR) shall be in accordance with CLC/TS 61496-3:2008 and positioned in accordance with 6.1.4 of EN ISO 13855:2010.

Pressure sensitive mats or floors shall be in accordance with EN 1760-1:1997+A1:2009 and installed in accordance with Clause 7 of EN ISO 13855:2010.

Pressure sensitive bumpers shall be in accordance with EN 1760-3:2004+A1:2009.

5.2.4 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 fixed guards as defined in 3.27.1 of EN ISO 12100:2010.

5.2.5 Cutting devices

All cutting devices (impact, cross cutting, and draw type cutting device) shall be fitted with safeguarding to minimise operator contact with the cutting surface and prevent the hazard of cutting when not in use. See also 7.2.f).

5.2.6 Area guarding

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

The danger points/areas may need different types of protective measures and different performance levels (PL) for safety related parts of the control systems if safeguarded individually. If this is the case, the protective measures and safety related parts for the area guarding, selected from among those specified in Table 3 for the individual danger points/areas, shall be those which achieve the highest level of safety. If the guarded area is not entirely visible from the control panel provision(s) shall be made to prevent person(s) from being trapped (locked) inside the area guarding, such as an audible and/or visual alarm that is activated prior to machine starting and a method for trapped personnel to escape the area if for any unforeseen reason this event has occurred.

5.2.7 Electrical equipment

5.2.7.1 General

The electrical equipment shall comply with EN 60204-1:2006 and with the following additional requirements:

5.2.7.2 Supply disconnecting (isolating) device

The supply disconnecting devices shall be in accordance with 5.3.2 and 5.3.3 of EN 60204-1:2006.

The supply disconnecting (isolating) device can be used for maintenance and machine inspection, as defined in 6.3.5.4 of EN ISO 12100:2010.

5.2.7.3 Protection against direct contact

Protection against direct contact shall be as defined in 6.2 of EN 60204-1:2006, including the IP codes according to EN 60529:1991.

5.2.7.4 Protection against indirect contact

Protection against indirect contact shall be as defined in 6.3 of EN 60204-1:2006,

5.2.7.5 Control functions – Start and Stop

The start function shall conform to 9.2.1 and 9.2.5.2 of EN 60204-1:2006.

The stop shall function as a category 0 stop and in accordance with 9.2.2 of EN 60204-1:2006,

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 energised after stopping, e.g. to keep the film or sheet tensioned in the production line when it is stationary.

5.2.8 Control systems - Safe design measures

The design measures of the control system shall be chosen so that their safety-related performance provides a sufficient amount of risk reduction in accordance with 6.2.11 of EN ISO 12100:2010.

5.2.9 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 and the control system will be a minimum of PL_r=b, subject to specific provisions for individual functional groups in 5.3 and specific operations in 5.4.

5.2.10 Precautions in view of emergency situations

Emergency stop shall comply with EN ISO 13850:2008.

Emergency stop device(s) shall be positioned at each working position where the operator needs to intervene (e.g. during the start-up procedure) and at the entry and the exit point of the film or sheet. They shall function as stop category 0 in accordance EN 60204-1:2006. Where this is technically not possible, e.g. to maintain the tension and alignment, stop category 1 in accordance with EN 60204-1:2006 shall be used (see also 7.2 b)).

If there is a risk of entrapment between rolls, or between a roll and machine parts, means shall be provided to release trapped persons.

See also 7.2 p).

The types of device(s) for emergency stop shall be in accordance with 10.7.2 of EN 60204-1:2006.

5.2.11 Unexpected start-up

Hazards due to unexpected start-up of winding machines shall be prevented in accordance with the requirements of EN 1037:1995+A1:2008.

Devices for switching off for the prevention of unexpected start-up shall conform to 5.4 of EN 60204-1:2006.

Protective measures against hazards due to unexpected start-up from individual functional groups are described in the corresponding subclauses of 5.3 in this standard.

5.2.12 Pneumatic systems and their components

The pneumatic systems and their components shall be in accordance with EN ISO 4414:2010. When designing pneumatic systems for machinery, all intended operations and use of systems shall be considered.

5.2.13 Hydraulic systems and their components

The hydraulic systems and their components shall be in accordance with EN ISO 4413:2010 When designing hydraulic systems for machinery, all intended operations and use of systems shall be considered.

5.2.14 Electrostatic discharge

5.2.14.1 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 cannot be permanently earthed.

See also 7.2 k).

5.2.14.2 Additional requirements for machinery processing non-conductive film or sheet

Additional measures shall be employed to prevent hazards due to electrostatic discharge where a winding machine is used to process non-conductive film or sheet, for example by:

— reducing friction between the film or sheet and guiding system by minimising the area of contact;

— eliminating thin non-conductive layers on metallic parts upon which non-conductive film or sheet is to be wound; or

— use of suitably located static eliminators.

NOTE For guidance, see CLC/TR 50404:2003.

5.2.15 Ergonomics

The machines shall be designed in accordance with 6.2.8 of EN ISO 12100:2010, taking into account operating positions and the need for access to particular zones. See also 7.2 n).

5.2.16 Noise

5.2.16.1 Noise reduction at source by design

Main sources of noise are:

— drive motors;

— power transmission systems;

— pneumatic systems;

— ventilators;

— hydraulic systems;

— control valves;

— pipe lines.

The following measures may, for example, be taken for noise reduction:

— low-noise design;

— enclosures;

— silencers;

— low-noise machinery components e. g. pumps, ventilators, etc.;

— vibration damping;

— sound insulating elements.

When designing the machine, the available information and technical measures to reduce noise at source shall be taken into account; see, for example, EN ISO 11688-1:2009.

NOTE EN ISO 11688-2:2000 gives useful information on noise generation mechanisms in machinery.

5.2.16.2 Noise tests and information

The manufacturer shall carry out machine noise tests in accordance with the noise test code in Annex A and inform the user of the results in the instruction handbook see 7.2 g).

5.3 Specific safety requirements and/or protective measures in normal operating mode

In addition to 5.2, the safety requirements and/or protective measures in Table 3 shall be complied with.

— **Guidance for interpreting Table 3**

The arrangement of the columns does not represent any hierarchical order.

The second column contains the danger points/areas according to Table 1.

An "x" ("cross" sign) in columns "Guards" and "Protective devices" identifies the “Protective measures” which are permitted for the particular danger point/area. They are local protective measures and at least one of them shall be used for the particular danger point/area. If the column "Combination" (abbreviated to “Combi.”) is marked with an "x", then it is permissible to use the identified “Protective measures” in combination for the particular danger point/area. See example in Annex B for a combination of protective measures for area guarding.

An "&" ("and" sign) contained in any of the columns identifies an obligatory requirement that has to be fulfilled in addition to the "Protective measures".

The right-hand column contains the additional protective measures that have to be fulfilled.

The following supplements give further requirements or information in relation to particular safety requirements and/or protective measures in Table 3. In the table, the word supplement is abbreviated to “Supp.”.

— **Supplement 1**

Where used for area guarding light barriers, scanners (AOPDDR) and pressure sensitive mats or floors shall be positioned at the minimum safety distance calculated in accordance with the following formula:

$$S = (KxT / 10) + 850mm$$

$$K = 1\ 600mm / s$$

T = overall system stopping performance

For the definition of T, see 3.1.2 of EN ISO 13855:2010 and for the calculation of T, see 5.1 of EN ISO 13855:2010.

NOTE For winding machines, the formula given in EN ISO 13855:2010 is modified due to high inertia of the rolls and because the SPE are positioned to prevent unintentional access only. For the possible residual risk see 7.2 o).

For an example see Annex B.

— **Supplement 2**

If the sensitive protective equipment is actuated, any intake nip that exists shall be opened to a safety distance of 120 mm to 150 mm, and the winding shall be brought to a standstill as quickly as possible. This is not required if the safety distances of EN ISO 13857:2008, Table 2 for upper limbs are complied with and the intake nip is not accessible by reaching over or under the growing winding.

— **Supplement 3**

Prevention of unintentional movement of machine parts can be achieved, for example, by using pilot controlled check valves or cylinders with self locking piston rod or valves with closed central position or by brake motors or self locking gears.

— **Supplement 4**

When access is required more than once per shift, movable interlocking guards shall be selected.

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.1	Non-driven roll(s)		x + Supp. 4	x	x	PL_r=b	2						
5.3.2	Fixed point roll(s)												
5.3.2.1	Driven roll(s)		x + Supp. 4	x	x	PL_r=c	2						
5.3.2.2	Vacuum roll(s)		x + Supp. 4	x	x	PL_r=c	2						

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.2.3	Nip roll(s)		x + Supp. 4	x	x	PL_r=d	2		x + Supp. 1 + Supp. 2 PL_r=d	x		& + Supp. 3	Actuating the SPE shall trigger a visible and/or audible warning and the winding machine shall be brought to a standstill as quickly as possible preventing accidents due to inadvertent access. See also 7.2 o).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.3	Film or sheet tension control (e.g. dancer roll, suspended roll, force measuring roll)		x + Supp. 4	x	x	PL_r=b	2						Securing devices shall be provided to prevent gravity falling of rolls during activities other than normal operation, e.g. during maintenance (see 7.2 d).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4	Winding zone												
5.3.4.1	Winding position												
5.3.4.1.1	Material take-up point of a centre winder		x + Supp. 4		x	PL_r=d	1		x + Supp. 1 + Supp. 2 PL_r=d	x			Actuating the SPE shall trigger a visible and/or audible warning and the winding machine shall be brought to a standstill as quickly as possible preventing accidents due to inadvertent access. See also 7.2 o).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4.1.2	Intake nip of a surface winder		x + Supp. 4		x	PL_r=d	1		x + Supp.1 + Supp.2 PL_r=d	x			Actuating the SPE shall trigger a visible and/or audible warning and the winding machine shall be brought to a standstill as quickly as possible preventing accidents due to inadvertent access. See also 7.2 o).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4.2	Unwind position		x + Supp. 4		x	PL_r=d	1		x + Supp.1 + Supp.2 PL_r=d	x			Actuating the SPE shall trigger a visible and/or audible warning and the winding machine shall be brought to a standstill as quickly as possible preventing accidents due to inadvertent access. See also 7.2 o).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4.3	Pivot arm												
	automatic operation		x + Supp 4	x	x	PL_r=c	2		x + Supp.1 + Supp.2 PL_r=c	x		& +Supp. 4	Actuating the SPE shall stop the automatic pivot arm movement.
	manual operation						2	PL_r=c			&	& +Supp. 3	
5.3.4.4	Turret device												
	automatic operation		x + Supp 4	x	x	PL_r=c	2		x + Supp. 1 PL_r=c	x		& +Supp. 3	Actuating the SPE shall stop the automatic turretting process.
	manual operation						2	PL_r=c			&	& +Supp. 3	

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4.5	Guide carriage						1						
5.3.4.6	Contact/pressure roll		x + Supp. 4	x	x	PL_r=b	2		x + Supp. 2 PL_r=b	x		& +Supp. 3	

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.4.7	Winding core support												
	automatic operation		x + Supp. 4	x	x	PL_r=b	1					&	It shall be ensured that the winding core cannot be released unintentionally by the winding core support. For details of how to intentionally open the winding core, see 7.2 i).

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
	manual operation						1	x PL_r=b			&	&	It shall be ensured that the winding core cannot be released unintentionally by the winding core support. For details of how to intentionally open the winding core, see 7.2 i).
5.3.4.8	Winding core loading device		x				2		x + Supp. 1 PL_r=c	x			Actuating the SPE shall stop the loading process.
5.3.4.9	Winding core unloading device		x				2		x + Supp. 1 PL_r=c	x			Actuating the SPE shall stop the unloading process.

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.5	Reel change device												
5.3.5.1	Lay on device												
	automatic operation		x + Supp. 4	x	x	PL_r=b	2		x + Supp. 2 PL_r=b	x		& +Supp. 3	
	manual operation						2	x PL_r=b			&	& +Supp. 3	
5.3.5.2	Film or sheet splicing device												
	automatic operation		x + Supp. 4	x	x	PL_r=d	2		x + Supp. 1 + Supp. 2 PL_r=d	x			Actuating the SPE shall disable the cutting device.
	manual operation						2	x PL_r=d			&		

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.5.3	Cross cutting device												
5.3.5.3.1	Impact cutting device												
	automatic operation		x + Supp. 4	x	x	PL_r=d	2		x + Supp. 1 PL_r=d	x			Actuating the SPE shall disable the cutting device. In the idle position, the knife of the cutting device shall always be protected by a guard in accordance with 3.27 of EN ISO 12100:2010.

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
	manual operation	&	x	x	x				x PL_r=d		&		Actuating the SPE shall disable the cutting device. In each position, all movable parts of the cutting device shall be protected by a guard as defined in 3.27 of EN ISO 12100:2010 .

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.5.3.2	Draw-type cutting device												
	automatic operation		x + Supp. 4	x	x	PL_r=d	2		x + Supp. 1 PL_r=d	x			Actuating the SPE shall disable the cutting device. In the park position(s), the knife of the cutting device shall always be protected by a guard as defined in 3.27 of EN ISO 12100:2010

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
	manual operation	&	x	x	x		2		x PL_r=d		&		Actuating the SPE shall disable the cutting device. In the park position(s), the knife of the cutting device shall always be protected by a guard as defined in 3.27 of EN ISO 12100:2010.
5.3.6	Reel loading device												
	automatic operation		x + Supp. 4	x	x	PL_r=c	2		x + Supp. 1 PL_r=c	x			Actuating the SPE shall stop the loading process.
	manual operation						2	x PL_r=c			&		

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(continued)

Danger point/area		Protective measures												
		Guards						Protective devices		Combi.	Further requirements			
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.7	Reel unloading device													
	automatic operation		x + Supp. 4	x	x	PL_r=c	2		x + Supp. 1 PL_r=c	x				The device shall be designed so that the reel is held securely. Actuating the SPE shall stop the unloading process.
	manual operation						2	x PL_r=c			&			The device shall be designed so that the reel is held securely.

Table 3 — Safety requirements and/or protective measures for individual functional groups and/or machine parts in normal operating mode
(concluded)

Danger point/area		Protective measures											
		Guards						Protective devices		Combi.	Further requirements		
		Guards as defined in 3.27 of EN ISO 12100:2010	Fixed guards as defined in 3.27.1 of EN ISO 12100:2010	Interlocking guards as defined in 3.27.4 of EN ISO 12100:2010	Interlocking guards with guard locking as defined in both 3.27.5 of EN ISO 12100:2010 and according to the choice criteria of EN 1088:1995+A2:2008	Required Performance Level (PL_r) for the safety related parts of the control system in accordance with EN ISO 13849-1:2008	Table for the safety distances for the upper limbs for reaching over protective structures in accordance with EN ISO 13857:2008	Hold-to-run control device as defined in 3.28.3 of EN ISO 12100:2010 and EN ISO 13849-1:2008. The maximum speed of the movement shall not exceed 5 m/min monitored to PL_r=b	Sensitive protective equipment as defined in 3.28.5 and 3.28.6 of EN ISO 12100:2010 and in accordance with EN ISO 13849-1:2008	A combination of the devices in columns "Guards" and/or "Protective devices" where their use is indicated as permissible	The danger zone shall be visible to the operator from the actuator operating position	It shall be ensured that machine parts cannot move unintentionally as a result of stopping the machine or due to a failure of the energy supply (see EN 1037:1995+A1:2008)	Additional protective measures
5.3.8	Spreader roll device												
	driven		x + Supp. 4	x	x	PL_r=c	1						
	non driven		x + Supp. 4	x	x	PL_r=b	1						
5.3.9	Longitudinal cutting device		x	x	x		1						
5.3.10	Splitting device		x	x	x		1						
5.3.11	Film or sheet alignment device		x	x	x		2						

5.4 Start-up procedure and manual intervention

5.4.1 Start-up procedure

A winding machine shall be designed to allow the film or sheet to be threaded through the machine,

either

— when the machine is stationary

or

— with the machine running while all the safeguards are in position and functioning, using an automatic device.

If these solutions cannot be applied for technical reasons and if the winding machine can only be threaded up in motion with parts of the normal safeguarding system inoperative, then one of the following options shall be used via the use of a mode selector switch in accordance with to 6.2.11.10 of EN ISO 12100:2010 and 9.2.4 of EN 60204-1:2006 to override the normal safeguarding; the mode selector switch shall be positioned outside the protected area and fulfil the performance level for the safety related parts of the control system in accordance with EN ISO 13849-1:2008, PL_r=d; when the start-up mode is selected an audible alarm and/or visual signal shall be given and the following shall be applied:

either

a) actuating the normal start device shall start the machine with the following conditions:

   1) at the slowest peripheral speed possible for the rolls (≤ 15 m/min to be monitored to PL_r=b);

   2) with sensitive protective equipment (SPE) in accordance with 6.3.2.5 of EN ISO 12100:2010 and EN ISO 13849-1:2008, PL_r=d active; the SPE shall be specifically positioned to be actuated involuntarily by the operator if he gets too close to any hazard at a danger point/area; if the SPE is actuated, the winding machine shall be brought to a standstill as quickly as possible;

or

b) actuating a hold-to-run control device in accordance with 6.2.11.10 of EN ISO 12100:2010 and EN ISO 13849-1:2008, PL_r=d shall start the machine with the following conditions:

   1) peripheral speed of the rolls ≤ 15 m/min;

   2) speed of any linear or pivoting movement ≤ 5 m/min;

   3) reduced speeds shall be monitored to PL_r=b;

   4) two movements shall not be started at the same time;

   5) the danger point/area shall be visible to the operator from the operating position of the hold-to-run control device;

or

c) actuating the normal start device shall start the machine with the following conditions:

   1) the winding tangential force shall be ≤150 N;

2) if the machine is fitted with a cutting device, the cutting device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d; impact cutting devices shall also be automatically locked in park position;

3) if the machine is fitted with a turret device, the turret device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d;

4) if the machine is fitted with an unloading device, the unloading device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008 PL_r=d;

5) if a nip roll is fitted, the gap between the nip roll and winding reel shall be ≥ 120 mm.

For a machine fitted with a turret device, see example in Annex C.

The operating procedure shall be specified in the instruction manual (see 7.2 l)).

5.4.2 Manual intervention

5.4.2.1 General

A winding machine shall be designed to allow manual intervention in a working zone either only if:

— the machine is stationary;

or

— hazardous movements are not accessible by the operator;

or

— hazardous movements are stopped or disabled in accordance to the requirements given in Table 3.

5.4.2.2 Manual reel changeover and manual removal of wound reels

If the requirements of 5.4.2.1 cannot be applied for processing reasons, then at least one of the following measures shall be activated by a mode selector switch in accordance with 6.2.11.10 of EN ISO 12100:2010 and 9.2.4 of EN 60204-1:2006 to override the normal safeguarding; the mode selector switch shall be positioned outside the protected area and fulfil the performance level for the safety related parts of the control system in accordance with EN ISO 13849-1:2008, PL_r=d; when the manual mode is selected an audible alarm and/or visual signal shall be given and:

either

a) sensitive protective equipment as defined in 3.28.5 of EN ISO 12100:2010 and/or active opto-electronic protective device(s) as defined in 3.28.6 of EN ISO 12100:2010 and fulfilling the performance level for the safety related parts of the control system in accordance with EN ISO 13849-1:2008, PL_r=d shall be specifically positioned to be activated involuntarily by the operator if he gets too near to any hazard at a danger point/area; if the sensitive protective equipment is activated, the winding machine shall be brought to a standstill as quickly as possible;

or

b) the following shall be applied:

1) the winding tangential force at the winding position being prepared shall be ≤150 N;

2) if the machine is fitted with a cutting device, the cutting device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d; impact cutting devices shall also be automatically locked in park position;

3) if the machine is fitted with a turret device, the device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d;

4) if the machine is fitted with an unloading device, the unloading device shall be disabled ; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d;

5) to allow access to the winding position at winding machines fitted with a turret device, the existing protective device has to be disabled. The protective device may be temporarily by-passed by a dedicated hold-to-run control device in accordance with EN ISO 13849-1:2008, PL_r=d. For an example see Annex C;

6) if the machine is not fitted with a turret device, sensitive protective equipment in accordance with 6.3.2.5 of EN ISO 12100:2010 shall be installed at the winding position; if the sensitive protective equipment is activated, the winding machine shall be brought to a standstill as quickly as possible. The performance level for the safety related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d.

5.4.2.3 Taking material samples, checking winding quality, winding core alignment

Material samples shall be taken with the machine stationary.

Checking winding quality shall be carried out visually from a safe position.

Winding core alignment shall be carried out away from the machine.

Where this is not possible for processing reasons the following protective measures shall be activated by a mode selector switch in accordance with 6.2.11.10 of EN ISO 12100:2010 and 9.2.4 of EN 60204-1:2006, positioned outside the protected area and fulfilling the performance level for the safety related parts of the control system in accordance with EN ISO 13849-1:2008, PL_r=d, to allow the normal safeguarding to be overridden:

— an audible or visual alarm shall be activated;

— if the machine is fitted with a cutting device, the device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d; impact cutting devices shall also be automatically locked in park position;

— if the machine is fitted with a turret device, the device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d;

— if the machine is fitted with an unloading device, the device shall be disabled; the safety-related parts of the control system shall be in accordance with EN ISO 13849-1:2008, PL_r=d;

— to allow access to the winding position, the peripheral speed possible for the rolls shall be reduced ($\leq$ 90 m/min to be monitored to PL_r=b) and the existing protective device may be temporarily bypassed (maximum time 120 s) by a dedicated hold-to-run control device in accordance with EN ISO 13849-1:2008, PL_r=d. If the maximum time is exceeded, or the hold-to-run control device is released the winding machine shall be brought to a standstill as quickly as possible;

— returning to normal mode shall be possible only after the original protective device has been reactivated by a reset device; this shall be achieved prior to releasing the hold-to-run control device;

— the intervention area shall be visible from the operating position of the hold-to-run control device and from the position of the reset device.

Informative Annex C gives an example of a possible solution.

The operating procedure for taking samples and/or checking winding quality and/or winding core alignment shall be specified by the manufacturer in the instruction manual (see 7.2 m)).

6 Verification of the safety requirements and/or protective measures

Verification of conformity with the safety requirements and/or protective measures shall be done in accordance with Table 4 "Verification methods".

Table 4 — Verification methods

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances etc.)
5.2.1 Protection of danger points/areas	x	x	x	x	
5.2.2.1 Safety distances to prevent danger points/areas being reached – upper limbs		x			
5.2.2.2 Safety distances to prevent danger points/areas being reached – lower limbs		x			
5.2.4 Drive and power transmission systems	x	x			
5.2.5 Cutting devices	x		x		
5.2.6 Area guarding	x	x	x	x	x
5.2.7 Electrical equipment	x	x	x	x	
5.2.8 Control systems – Safe design	x		x	x	
5.2.9 Safety-related parts of control system	x		x	x	x
5.2.10 Precautions in view of emergency situations	x	x	x	x	
5.2.11 Unexpected start-up			x	x	
5.2.12 Pneumatic systems and their	x	x	x	x	
5.2.13 Hydraulic systems and their	x	x	x	x	
5.2.14 Electrostatic discharge	x	x			
5.2.15 Ergonomics	x	x			
5.2.16 Noise	x			x	
5.3.1 Non-driven roll(s)					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Safety distances		x			x
5.3.2.1 Driven roll(s)					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Safety distances		x			x

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.2.2 Vacuum roll(s)					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Safety distances		x			x
5.3.2.3 Nip roll(s)					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.3 Film or sheet tension control					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Safety distances		x			x
Securing device	x		x	x	
5.3.4.1.1 Material take-up point of a centre winder					
Fixed guard	x	x			
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
5.3.4.1.2 Intake nip of a surface winder					
Fixed guard	x	x			
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.4.2 Unwind position					
Fixed guard	x	x			
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
5.3.4.3 Pivot arm					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
- **manual operation**					
Hold-to-run control device	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.4.4 Turret device					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
- **manual operation**					
Hold-to-run control device	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.4.5 Guide carriage					
Safety distances		x			x
5.3.4.6 Contact/pressure roll					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.4.7 Winding core support					
- automatic operation					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
- manual operation					
Hold-to-run control device	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.4.8 Winding core loading device					
Fixed guard	x	x			
Safety distances		x			x
Sensitive protective equipment	x	x	x	x	x
5.3.4.9 Winding core unloading device					
Fixed guard	x	x			
Safety distances		x			x
Sensitive protective equipment	x	x	x	x	x

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.5.1 Lay on device					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
- **manual operation**					
Hold-to-run control device	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.5.2 Film or sheet splicing device					
- automatic operation					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Safety distances		x			x
- manual operation					
Hold-to-run control device	x	x	x	x	x
Safety distances		x			x
5.3.5.3.1 Impact cutting device					
- automatic operation					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
- manual operation					
Guard	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.5.3.2 Draw type cutting device					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
- **manual operation**					
Guard	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
5.3.6 Reel loading device					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
- **manual operation**					
Hold-to-run control device	x	x	x	x	x
Safety distances		x			x
5.3.7 Reel unloading device					
- **automatic operation**					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Sensitive protective equipment	x	x	x	x	x
Safety distances		x			x
- **manual operation**					
Hold-to-run control device	x	x	x	x	x
Safety distances		x			x
Fixed guard	x	x			

Table 4 — Verification methods *(continued)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.3.8 Spreader roll device					
Fixed guard	x	x			
Interlocking guard	x	x	x	x	x
Interlocking guard with guard locking	x	x	x	x	x
Prevention of unintentional movement			x	x	
Safety distances		x			x
5.3.9 Longitudinal cutting device					
Guard	x	x	x	x	x
Safety distances		x			x
5.3.10 Slitting device					
Guard	x	x	x	x	x
Safety distances		x			x
5.3.11 Film or sheet alignment device					
Guard	x	x	x	x	x
Safety distances		x			x
5.4.1 Start-up	x		x		
Machine stationary	x		x		
Machine running and safeguards in place	x		x	x	
Mode selector switch	x		x	x	x
Audible and/or visual signal	x		x	x	
Sensitive protective equipment + slow speed	x	x	x	x	x
Hold-to-run control device + slow speed	x	x	x	x	x
Low winding tangential force		x	x	x	
Cutting device disabled and locked	x		x	x	x
Turret device disabled and locked	x		x	x	x
Unloading device disabled and locked	x		x	x	x
Gap between nip roll and reel		x	x	x	
5.4.2.1 Manual intervention					
Machine stationary	x		x		
Hazardous movements not accessible	x	x			
Hazardous movements stopped or disabled	x		x	x	

Table 4 — Verification methods *(concluded)*

Clause	Visual inspection to determine whether the system is available	Use of a measuring device, e.g. for shape, dimension, safety distance, temperature, pressure, current, etc.	Functional test of the safety system	Examination of safety related plans and circuit diagrams (electrical, pneumatic, hydraulic)	Calculation (PL, safety distances, etc.)
5.4.2.2 Manual reel changeover and manual removal of wound reels	x		x		
Mode selector switch	x	x	x	x	
Audible alarm / visual signal	x		x		
Sensitive protective equipment and/or active opto-electronic device	x	x	x	x	x
Low winding tangential force		x	x	x	
Cutting device disabled and locked	x		x	x	x
Unloading device disabled and locked	x		x	x	x
Turret device disabled and locked	x		x	x	x
Existing protective device temporarily bypassed by a dedicated hold-to-run control device for machines fitted with a turret device	x		x	x	x
Sensitive protective equipment for machines not fitted with a turret device	x	x	x	x	x
5.4.2.3 Taking material samples, checking winding quality, winding core alignment					
Machine stationary	x		x		
Visual checking from a safe distance	x				
Winding core alignment away from the machine	x		x		
Mode selector switch	x		x	x	x
Audible alarm / visual signal	x		x	x	
Cutting device disabled and locked	x		x	x	x
Turret device disabled and locked	x		x	x	x
Unloading device disabled and locked	x		x	x	x
Speed reduction		x	x	x	x
Existing protective device temporarily bypassed by a dedicated hold-to-run control device	x	x	x	x	x
Reset device	x		x	x	x
Good visibility of the area	x				
Annex A, Noise test code		x			x

7 Information for use

7.1 Minimum marking on the machine

The machine shall be marked at least with:

— the business name and full address of the manufacturer and, where applicable, his authorised representative;

— the designation of the machinery;

— mandatory marking[4)];

— designation of series or type;

— serial number, if any;

— rating information;

— year of construction, that is the year in which the manufacturing process is completed;

If required, additional information about start-up, operation, maintenance, cleaning and the requirement to wear personal protective equipment shall be included.

See also 6.4.4 of EN ISO 12100:2010.

7.2 Instruction manual

Instruction manuals shall be prepared in accordance with 6.4.5 of EN ISO 12100:2010.

In addition, the following shall be included:

a) instructions about the intended use;

b) information about the interfaces with machines/installations mounted upstream and downstream of the winding machine and also about external energy supply. For example, the effect of the emergency stop device and the entire control system have to be considered;

c) instructions about safe feeding/threading of the film or sheet at start-up and following film or sheet breaks. This should include, where applicable, information that feeding shall be done with the guards/protective devices operational. If any residual risk exists due to the feeding method used, this shall be stated with a method of how the residual risk is dealt with;

d) instructions on how to use the securing devices provided to prevent a fall due to gravity of the film or sheet tension control rolls during activities other than normal operation, for example, maintenance;

e) information that cleaning and maintenance operations shall be carried out only when the machine is stationary. If this is not possible for technical reasons, information shall be given about residual risks with a method of how the residual risk is dealt with;

f) information on how to avoid cutting hazards during the change, transport or disposal of cutting devices and information about the use of personnel protective equipment to be worn during assembly and

4) For machines and their related products intended to be put on the market in the EEA, CE marking as defined in the applicable European Directive(s), e. g. Machinery, Low voltage, Explosive Atmosphere, Gas appliances.

disassembly of cutting device(s). The manufacturer shall describe safe working practices for sharpening and replacing cutting knives/blades) and for adjustments;

g) information on noise:

   1) the determined noise emission values of the machinery and their uncertainties according to Annex A, A.7;

   2) if applicable, information on possible noise enclosures, screens or silencers fitted to the machinery;

   3) if applicable, recommendations to use cabins provided for the operator and/or operating and maintenance modes with reduced noise emission, and specifications about installation and assembly for reducing noise, for example, vibration dampers;

   4) if a manufacturer knows that, in spite of all measures implemented at the design stage for reducing noise, noise emission is still too high, then he shall recommend in the instructions for use that personal hearing protection is worn;

h) information on any residual risks that cannot be excluded despite the safety measures provided, including information on any special training for the operators and the wearing of personal protective equipment that is required;

i) information about the risk of injury when opening any winding core support, for example, from winding cores falling;

j) information about the effect of the safety related parts of the control system on the function of the winding machine. All operational modes shall be considered;

k) instructions for earthing (including the provision of special earthing connections) to prevent hazards due to electrostatic discharge;

l) information about the operating procedure for start-up and manual intervention;

m) where it has been found to be necessary to enter the machine area by one operator with the machine running specific instructions shall be included highlighting the risks, and the correct use of any dedicated hold-to-run control device which is used to temporarily bypass the protective equipment that is in place;

n) where necessary, information about the need to use aids for lifting and handling, e.g. of winding cores or reels;

o) where sensitive protective equipment positioned as specified in 5.3, Supplement 1 is used, the manufacturer shall inform the user of the possible risk due to e.g. a winding and/or unwinding roll still rotating after a person has tripped the SPE (this is only the case on large diameter high inertia rolls running at high speed);

p) information about the electrical interface concerning the emergency stop equipment.

Annex A
(normative)

Noise test code

A.1 Introduction

This noise test code specifies all the information necessary to carry out efficiently and under standardised conditions the determination, declaration and verification of the airborne noise emission values of winding machines. It specifies noise measurement methods and operating and mounting conditions that shall be used for the test.

Noise emission quantities include emission sound pressure levels at workstations and the sound power level. The determination of these quantities is necessary for:

— Manufacturers to declare the noise emitted within the manual and technical sales document(s).

— Recording and comparing the noise emitted by winding machines.

— Assessing noise control at source at the design stage.

The use of this noise test code ensures the reproducibility of the noise emission values within specified limits determined by the grade of accuracy of the basic airborne noise measurement method used. Noise emission measurement methods allowed by this standard are engineering methods (grade 2) and survey methods (grade 3).

A.2 Determination of the A-weighted emission sound pressure level at the workstation

A.2.1 Basic standards

The determination of the A-weighted emission sound pressure level shall be carried out in accordance with either EN ISO 11201:2010 with grade 2 of accuracy or EN ISO 11202:2010 or EN ISO 11204:2010.

Measurements shall be carried out at each microphone position during several (at least 3) test cycles of the machine (see A.4.3). At each measurement position, the energy average value shall be determined and retained as the measured value.

The microphone shall be located at all operator positions designated by the manufacturer in the instructions manual. The A-weighted emission sound pressure level at each of these operator positions shall be recorded, reported and declared.

If no workstations are designated by the manufacturer, measurements shall be carried out on each side of the machine at 1 m from the surface of the machine and at a height of 1,60 m from the floor. The highest A-weighted emission sound pressure level determined and its location relative to the machine shall be recorded, reported and declared.

NOTE Grade 2 of accuracy can be reached only with class 1 measuring instruments. Class 2 instruments are allowed when using EN ISO 11202:2010 but Grade 3 of accuracy results are obtained with, consequently, a higher uncertainty.

A.2.2 Measurement uncertainty

If a Grade 2 (engineering) method is used, the standard-deviation of reproducibility for A-weighted levels is:

σ_{RA} = 1.5 dB.

The standard-deviation of reproducibility may be much larger if a Grade 3 (survey) method is used.

NOTE Detailed information about uncertainty is given in EN ISO 11201:2010, Clause 11, EN ISO 11202:2010, Clause 12 and EN ISO 11204:2010, Clause 11. See also EN ISO 4871:2009.

A.3 Determination of the A-weighted sound power level

A.3.1 Basic standards

If the A-weighted emission sound pressure level at any of the measurement positions defined in A.2 exceeds 80 dB, the determination of the A-weighted sound power level shall be carried out using either EN ISO 3744:2010 or EN ISO 3746:2010 or EN ISO 3747:2010 or EN ISO 9614-2:1996. Preferred methods are those providing results with grade 2 of accuracy. If a grade 3 method has been used, reasons for not using a Grade 2 method shall be recorded and reported.

When either EN ISO 3744:2010 or EN ISO 3746:2010 is used, the measurement surface shall be a parallelepiped and the measurement distance shall be taken equal to 1 m.

The measurement shall be carried out at each microphone position during several (at least 3) test cycles of the machine (see A.4.3).

Winding machines with a web width ≥ 2 m and/or a height ≥ 1,8 m above floor level are considered as very large machines for which instead of the A-weighted sound power level, the A-weighted emission sound pressure levels at specific positions around the machinery may be measured, recorded and declared.

NOTE 1 EN ISO 9614-2:1996 allows higher background noise levels than the other basic standards.

NOTE 2 EN ISO 3744:2010 and EN ISO 3747:2010 require the use of a class 1 measuring instrument. EN ISO 3746:2010 allows a class 2 instrument to be used but it provides Grade 3 of accuracy results with, consequently, a higher uncertainty.

A.3.2 Measurement uncertainty

If a Grade 2 (engineering) method is used, the standard-deviation of reproducibility for A-weighted levels is:

σ_{RA} = 1,5 dB.

The standard-deviation of reproducibility may be much larger if a Grade 3 (survey) method is used.

NOTE Detailed information about uncertainty is given in EN ISO 3744:2010, Clause 9, EN ISO 3746:2010, Clause 9 and EN ISO 3747:2010, Clause 9. See also EN ISO 4871:2009.

A.4 Mounting and operating conditions

A.4.1 General

The mounting and operating conditions shall be identical for the determination of both the emission sound pressure level and the sound power level.

A.4.2 Mounting conditions

During the noise test the winding machine shall be mounted as specified / recommended by the manufacturer in the instruction manual.

A.4.3 Operating conditions

The test shall include all the normal functions of the machine cycle operated to the limits of the machine specifications for the intended use.

The operating conditions for which noise emission determination shall be carried out shall be as indicated in a) or b) or c):

a) For winding machines that never operate at the manufacturer's premises either with no load or under load with a material, noise emission shall be determined by the manufacturer once the machine is installed at the user's premises in collaboration with the user. The test shall be carried out with no load (no material).

NOTE Because the machine is normally part of a line from which it cannot be technically separated, the line usually has a higher noise emission than the winding machine, and it is not possible to discriminate the noise emitted by the winding machine from the noise emitted by the complete line. When the winding machine is a stand-alone machine, it can be at the end of a line or be installed in the same hall as several other machines and it is not possible to discriminate the noise emitted by the winding machine under test from the noise emitted by the line or other machines.

The manufacturer shall provide the result of the test (noise declaration, see A.6) to the user as part of the instruction manual.

b) For winding machines that operate at the manufacturer's place only with no load, noise emission shall be determined by the manufacturer:

   1) at his own premises with the machine operating at idle. The result of the test shall be recorded, reported and declared in the instructions manual

   2) for stand-alone machines, where possible, once the machine is installed at the user's premises in collaboration with the user. The test shall be carried out under load with the material currently used by the user. The circumstances of the measurements and the nature of the material used shall be recorded and reported. The manufacturer shall provide the result of the test (noise declaration) to the user as part of the instructions manual.

c) For winding machines that operate at the manufacturer's premises under load (with material), e.g. slitter rewinding machines with a sheet width ≤ 2 m, noise emission shall be determined by the manufacturer at his own premises with the machine operating with the material currently used by the manufacturer. The result of the test and details of the material used shall be recorded, reported, and declared in the instruction manual.

A.5 Information to be recorded and reported

The information to be recorded and reported is that required by the basic standards used. In particular, it shall include:

a) Precise identification of the machine under test.

b) Description of work cycle and material used, when relevant.

c) Description of the test arrangement and the acoustic environment.

d) Instrumentation used.

e) Presence and position(s) of operator(s) if any.

f) Deviations to this noise test code if any.

g) The noise emission levels determined and the associated measurement uncertainty.

A.6 Declaration and verification of noise emission values

The noise declaration shall be a dual-number declaration as defined in EN ISO 4871:2009 i.e. the measured value and the associated measurement uncertainty shall be indicated separately. It shall include the following:

— the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB; where this level does not exceed 70 dB, this fact shall be indicated; and

— the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB.

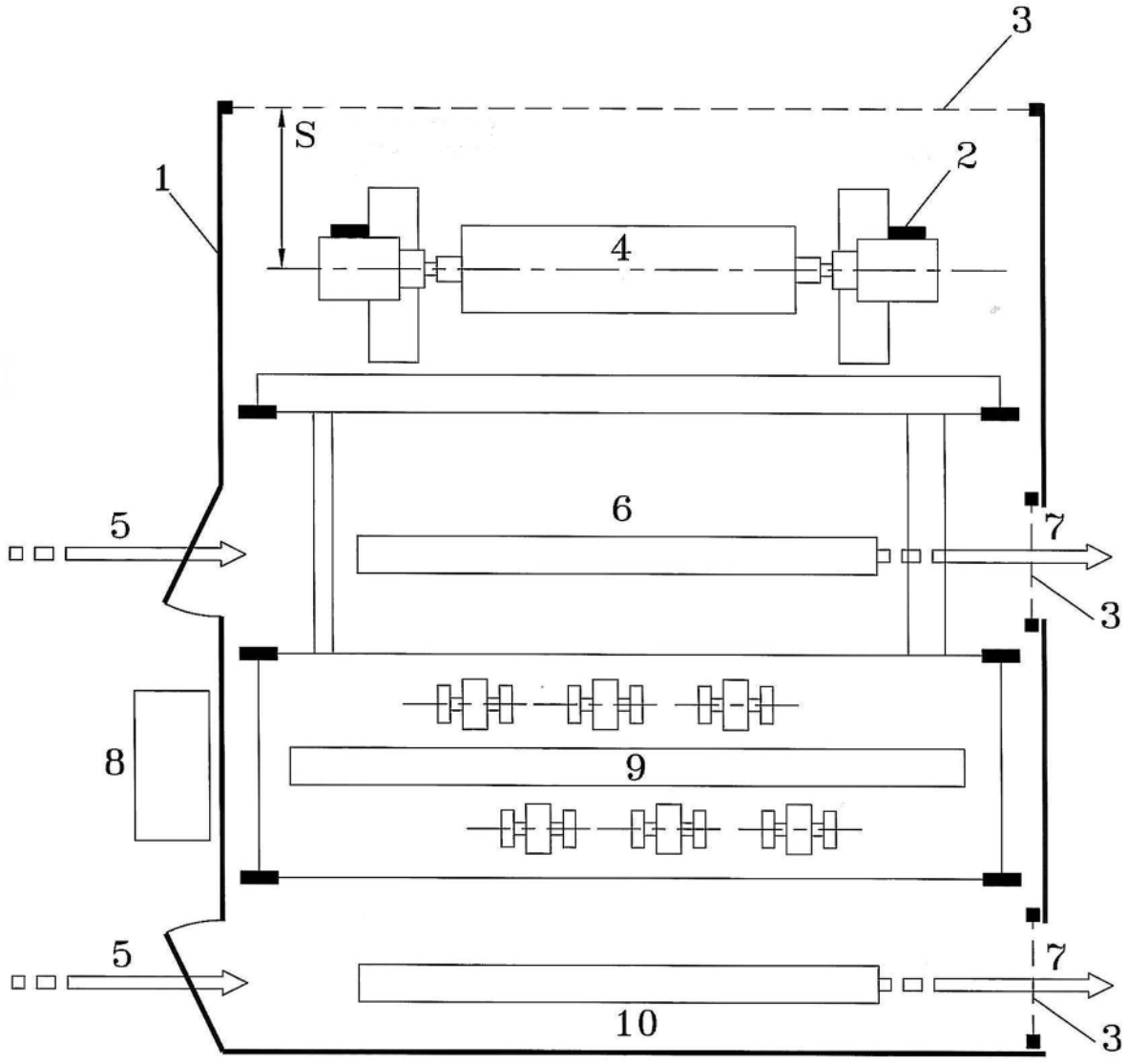
The noise declaration shall mention explicitly that noise emission values have been obtained according to this noise test code. It shall indicate which basic measurement standards have been used and give details of the mounting and operating conditions of the machine during the determination of its noise emission. The noise declaration shall clearly indicate deviation(s) from this noise test code and/or from the basic standards used if any.

When the measurement has been carried out with no load (no material), the manufacturer shall state that the noise emission level with material may be higher.

NOTE EN ISO 4871:2009 gives a methodology for declaring and verifying noise emission values. No technical data on noise emission are presently available to estimate the standard deviation of reproducibility for winding machines. Therefore the values of the standard deviation of reproducibility stated in the basic noise emission standards are used in this noise test code (see A.2.2 and A.3.2) as interim upper boundaries for the determination of the uncertainty when preparing the noise declaration. Joint investigations by manufacturers could lead to the determination of a possible lower value of the standard deviation of reproducibility which will result in a lower value of the uncertainty. Results of such investigations will be reflected in a future version of this standard.

Annex B
(informative)

Example of area guarding using a combination of distance guarding in conjunction with sensitive protective equipment (SPE)



Key

1 safety fence (fixed guard)
2 local control stations
3 multiple light beam (ESPE)
4 winding zone (unwinding)
5 operator access
6 internal trolley
7 trolley exit
8 main control panel
9 machine winding position (rewinding) with slitting area
10 external trolley
S as defined in 5.3, Supplement 1

Figure B.1 — Example of area guarding using a combination of distance guarding in conjunction with electro-sensitive protective equipment (ESPE)

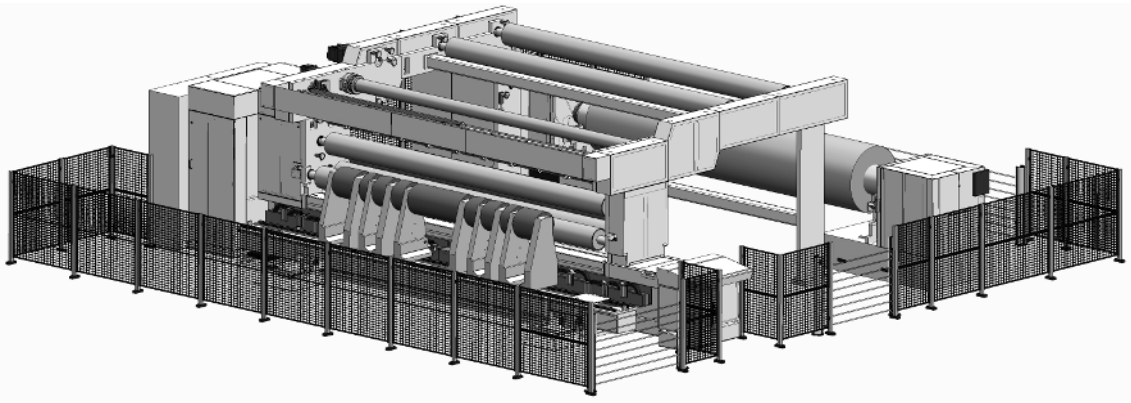


Figure B.2 — 3D example of area guarding around a slitter rewinder using a combination of distance guarding in conjunction with electro-sensitive protective equipment (ESPE)

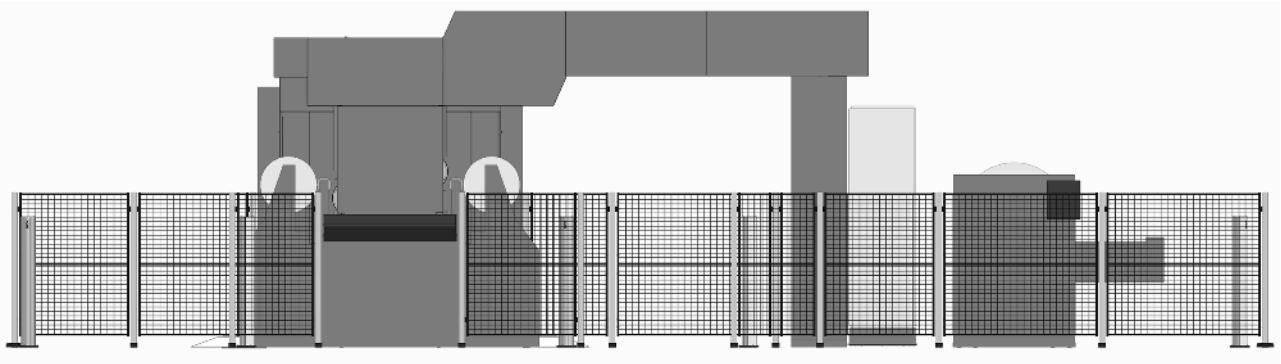


Figure B.3 — Side view of Figure B.2

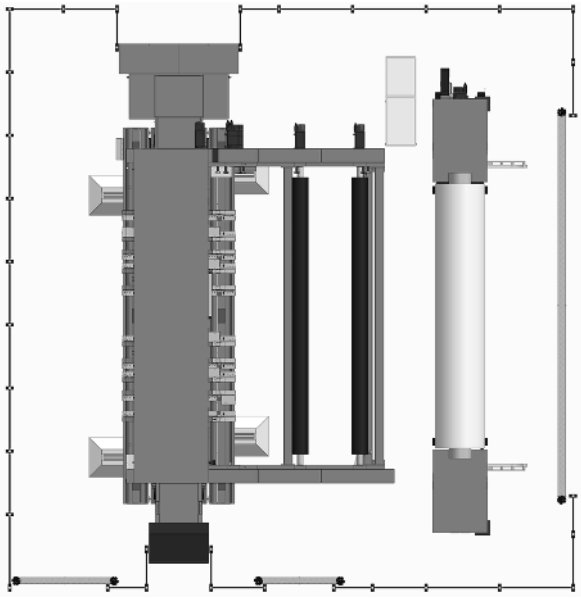
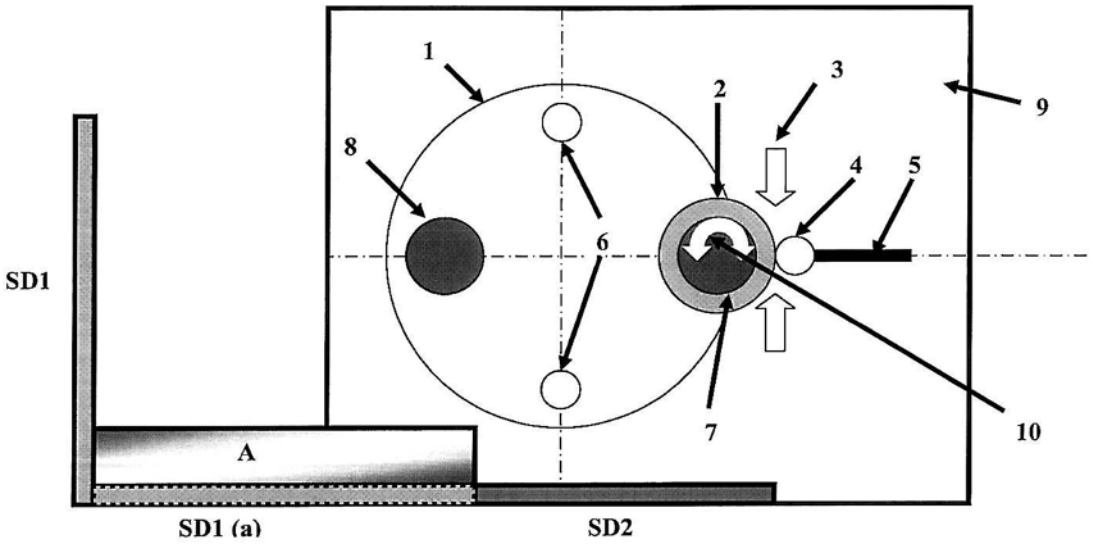


Figure B.4 — Plan view of Figure B.2

Annex C
(informative)

Example of a safety concept and procedures for a centre turret winder



Key

1	turret device
2	winding reel
3	ingoing nip point (depending on winding direction)
4	nip roll
5	guide
6	deflection roll
7	winding location 1 (In winding position)
8	winding location 2 (In discharge position)
9	side frame
10	direction of rotation
A	working zone
SD1	1st safeguard
SD1 (a)	1st safeguard alternative position
SD2	2nd safeguard

Figure C.1 — Turret winder safety concept

Table C.1 — Start-up

Mode selector switch set to:	Protective measures	Function of protective measure		
		SD1	SD2	Action
"Start-up"		Disabled	Disabled	Activates an audible or visual alarm
	A restricted tangential force available at winding location 1 ≤ 150 N.			
	The cutting device disabled The impact cutting device also automatically locked in park position.			
	The turret device disabled.			
	The unloading device (if any) disabled.			
	The gap between the nip roll and winding reel is ≥120 mm.			

Table C.2 — Manual intervention for reel changeover and removal of wound reels at winding location 2

Mode selector switch set to:	Protective measures	Function of protective measure		
		SD1	SD2	Action
"Manual"				Activates an audible or visual alarm
	A restricted tangential force available at winding location 2 ≤ 150 N.			
	The cutting device disabled The impact cutting device also automatically locked in park position.			
	The turret device disabled			
	The unloading device (if any) disabled			
		Disabled	Enabled	SD2 initiates a stop function bringing the winding machine to standstill as quickly as possible

Table C.3 — Manual intervention for taking material samples, checking winding quality, winding core alignment

Mode selector switch set to:	Protective measures	Function of protective measure		
		SD1	SD2	Action
"Hold-to-run mode"				Activates an audible or visual alarm
	The cutting device disabled. The impact cutting device also automatically locked in park position.			
	The turret device disabled			
	The unloading device (if any) disabled			
	Peripheral speed reduced to ≤ 90m/min			
		Disabled	Enabled	SD2 initiates a stop function bringing the winding machine to standstill as quickly as possible
	Dedicated hold-to-run control device activated		Disabled (by-passed by dedicated hold-to-run control device) for a maximum time of 120 s	
	Dedicated hold-to-run control device released or maximum time exceeded			Initiates a stop function bringing the winding machine to standstill as quickly as possible

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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[1] EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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