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Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines

Part 27: Roll handling systems

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National foreword

This British Standard is the UK implementation of EN 1034-27:2012.

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Foreword

This document (EN 1034-27:2012) has been prepared by Technical Committee CEN/TC 198 “Printing and Paper machinery - Safety”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

EN 1034, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines* consists of the following parts:

— *Part 1: Common requirements*

— *Part2: Barking drums*

— *Part 3: Rereelers and winders*

— *Part 4: Pulpers and their loading facilities*

— *Part 5: Sheeters*

— *Part 6: Calender*

— *Part 7: Chests*

— *Part 8: Refining plants*

— *Part 13: Machines for de-wiring bales and units*

— *Part 14: Reel splitter*

— *Part 16: Paper and board making machines*

— *Part 17: Tissue making machines*

— *Part 21: Coating machines*

— *Part 22: Wood grinders*

— *Part 26: Roll packaging machines*

— *Part 27: Roll handling systems* (the present document)

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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. For machines that have been designed and built according to the provisions of this C standard, the following stipulation applies: where provisions of this type C standard are different from those which are stated in type A or B standards, or from provisions made in EN 1034-1:2000+A1:2010, the provisions of this type C standard take precedence over the provisions of the other standards.

1 Scope

This European Standard applies to roll handling systems for use in paper finishing and applies together with EN 1034-1:2000+A1:2010. It deals with all significant hazards, hazardous situations and hazardous events relevant to roll handling systems, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard does not apply to:

— machine reel handling systems;

— stacker trucks, industrial trucks and driverless industrial trucks;

— separate storage systems with cranes and high bay storage systems;

— portable devices for moving rolls.

This European Standard is not applicable to roll handling systems which are manufactured before the date of publication of this document by CEN.

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 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

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

EN 614-2:2000+A1:2008, *Safety of machinery — Ergonomic design principles — Part 2: Interaction between the design of machinery and work tasks*

EN 619:2002+A1:2010, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 894-1:1997+A1:2008, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2:1997+A1:2008, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 2: Displays*

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

EN 1034-1:2000+A1:2010, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 1: Common requirements*

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 1525:1997, *Safety of industrial trucks — Driverless trucks and their systems*

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 1760-2:2001+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

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 1837:1999+A1:2009, *Safety of machinery — Integral lighting of machines*

EN 13023:2003+A1:2010, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy grades 2 and 3*

EN 13478:2001+A1:2008, *Safety of machinery — Fire prevention and protection*

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

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*

EN 61496-1:2004, *Safety of machinery — Electrosensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, mod)*

EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

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

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

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

EN ISO 13849-2:2008, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2003)*

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)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1034-1:2000+A1:2010, EN ISO 12100:2010 and the following apply:

3.1
roll
paper roll, made in the wind up section of a winder, by winding up the paper webs onto cores or onto a winding shaft or by winding up the paper web in the wind up section of a rereeler onto a reel spool

3.2
roll handling system
system for handling rolls which consists of one or more devices intended to transport and/or turn and tilt rolls for further processing, and which is controlled by a joint control system

Note 1 to entry: Devices can include the following: conveyor, roll kicker, roll stopper, lowering and lifting cradle, transfer carriage, horizontal transfer device, vertical transfer device, vertical conveyor, upender, handling device for narrow rolls, rotating device.

Note 2 to entry: The transporting might involve for example rolls being taken from winders to sheeters, roll packaging machines, intermediate storage or dispatching.

3.2.1
conveyor
equipment provided with movable carrying elements for transporting the rolls on the carrying elements such as slat, belt, carousel cart or roller conveyors

3.2.2
carrying element
movable parts of the conveyor carrying the roll

3.2.3
roll kicker
device for pushing the rolls to make them roll

3.2.4
roll stopper
device for stopping rolling rolls

3.2.5
lowering and lifting cradle
device for rolling-in the roll, stopping it and subsequently releasing it for further rolling

Note 1 to entry: The lowering and lifting cradle can be integrated as part of a plane surface or an inclined surface.

3.2.6
rolling roll
roll rolling on a plane, kicked off by a roll kicker or moved by gravity

3.2.7
rolling distance
distance a paper roll is rolling freely from a sending device (e.g. roll kicker) to a receiving device (e.g. a roll stopper)

3.2.8
area of rolling
area where rolls roll, either by being pushed or by gravity

Note 1 to entry: The area of rolling rolls can comprise one or more rolling distances.

3.2.9
transfer carriage
device with integrated conveying element(s) for transferring rolls from one intersection point to another

3.2.10
horizontal transfer device
device with integrated conveying element for transferring rolls horizontally from one conveyor to another changing the conveying direction

EXAMPLE Turntable or turning conveyor.

3.2.11
vertical transfer device
lifting table with integrated conveying element(s) for transferring rolls onto a different conveying level with a maximum lifting height of 1,50 m

EXAMPLE Scissor lifting table.

3.2.12
vertical conveyor
device with integrated conveying elements and a lifting/lowering device for transferring rolls onto a different conveying level

3.2.13
upender
device with integrated conveying element(s) and upending device for tipping rolls up to 90° changing the conveying level not more than 1,50 m

3.2.14
downender
device with integrated conveying element(s) and downending device for tipping rolls up to 90° changing the conveying level more than 1,50 m

3.2.15
rotating device
device with two carrying rolls for rotating paper rolls around their own axis into predetermined positions

Note 1 to entry: For example, a rotating device might be used for reading labels or attaching the paper web.

3.2.16
handling device for narrow rolls
device handling short rolls

3.3
delivering machine
machine which delivers rolls to the roll handling system

EXAMPLE Winders, coating machines, storage systems.

3.4
receiving machine
the machine which receives the rolls

EXAMPLE Sheeters, roll packaging machines, palletizers, labelling robots, strapping machines, automatic cranes.

3.5
transfer point
area in or at a roll handling system where rolls are
— transferred from a delivering machine to a conveying system,

— transferred from a conveying system to a receiving machine,

— transferred from one conveying unit to another conveying unit,

— introduced into the system by means of an industrial truck or a lifting device,

— taken over from the system by means of an industrial truck or a lifting device,

— are kicked out of the system or roll out,

— rolled into the system manually or by means of portable devices

4 List of significant hazards

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

Table 1 — List of significant hazards

No	Hazard		subclause of this standard	EN 1034-1:2000+A1:2010
	Origin (source)	**Potential consequences**		
	Mechanical hazards			
1	Inadequate design of workplaces, means of access, walkways, passageways	Slipping, tripping, falling off and falling, fractures of arms and legs, injury of head by impact	5.1; 5.3.7; 5.7.1	5.5; 5.5.9
2	Drawing-in points on conveyors, rotating rolls and rollers Wrapping points on transmissions elements	Drawing-in or trapping, crushing, amputation	5.3.1; 5.3.2; 5.8.1; 5.8.2; 5.11	5.1; 5.4; 5.7
3	Linear movements of machinery or machinery parts	Crushing, shearing, impact injuries, contusion	5.2.1; 5.2.4; 5.4.2; 5.4.3; 5.6.1; 5.6.2; 5.7.4; 5.11	5.1; 5.3; 5.7
4	Swivelling machinery parts	Shearing, crushing injuries	5.2.4; 5.9.1; 5.11	5.1; 5.7
5	Sharp edges of machinery frame	Cutting injuries		5.1; 5.11; 5.12
6	Movement of rolls	Crushing, impact injuries	5.2.2; 5.2.3; 5.2.4; 5.3.3; 5.3.4; 5.3.5; 5.3.6; 5.4.1; 5.4.2; 5.6.1; 5.11	5.1
7	Hydraulic and pneumatic equipment	Injuries by ejection of high-pressure fluids		5.24; 5.25
8	Ejection and falling of rolls	Crushing, impact of injuries	5.3.8; 5.3.9; 5.3.10; 5.7.2; 5.7.3; 5.9.2; 5.9.3	5.2
	Electrical Hazards			
9	Electrical equipment	Electric shock, death, fire, burning and blinding by electric arc	5.1	5.23
10	Electrical equipment	Outside effects on electrical equipment	5.1	5.23

Table 1 *(continued)*

	Thermal hazards			
11	Hot surfaces of machinery parts	Burning by contact of persons	5.1	5.17
	Noise hazards			
12	Hydraulic aggregate	Hearing loss, stress, interference with speech communication and acoustic signals	5.13	5.15
	Hazards generated by material and substances			
13	Paper, leakage of hydraulic and lubrication oil, material of electrical equipment	Fire	5.1	5.19; 5.23
	Hazards generated by neglecting ergonomic principles			
14	Neglect of ergonomic principles	Discomfort, fatigue, stress, overload	5.9.3	5.22
15	Inadequate lighting of the workplace	Blinding, falling, stress		5.18
	Hazards caused by failure of energy supply, control system and other functional disorders			
16	Unexpected start-up	Crushing, shearing, impact	5.2.4; 5.3.2; 5.3.4; 5.3.5; 5.3.6; 5.3.8; 5.3.9; 5.4.1; 5.6.1; 5.6.2; 5.7.2; 5.7.4; 5.8.2; 5.9; 5.11.4; 5.12.2	5.6; 5.8
17	Malfunction in the control system	Crushing, shearing, impact	5.2.4; 5.3.2; 5.3.4; 5.3.5; 5.3.6; 5.3.8; 5.3.9; 5.4.1; 5.6.1; 5.6.2; 5.7.2; 5.7.4; 5.8.2; 5.9; 5.11.4; 5.12.2	5.14
	Combination of hazards			
18	Combination of hazards	Drawing-in, crushing, shearing, impact	5.10.1; 5.10.2; 5.12	5.7
19	Fire hazards	Spread of fire	5.5	

5 Safety requirements and/or measures

5.1 General

The machine shall comply with the safety requirements and/or protective measures of Clause 5 and EN 1034-1:2000+A1:2010, Table 2. For guidance in connection with risk reduction, see EN ISO 12100:2010, 6.2 and for safeguarding measures see EN ISO 12100-2:2010, 6.3. In addition, the machine shall be designed in accordance with 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 of the machine frame).

Table 2 — Requirements from EN 1034-1:2000+A1:2010 and related B standards

Requirements and/or measures from Clause 5 of EN 1034-1:2000+A1:2010		**Related B standards**
Working platforms, means of access, walkways	5.5	EN ISO 14122-2:2001 EN ISO 14122-3:2001

Table 2 *(continued)*

Requirements for guards and protective structures	5.1	EN 953:1997+A1:2009 EN ISO 13857:2008 EN 1088:1995+A2:2008 EN 61496-1:2004 EN 1760-1:1997+A1:2009 EN 1760-2:2001+A1:2009 EN 1760-3:2004+A1:2009
Energy isolation and dissipation, protection against unexpected start-up	5.8	EN 1037:1995+A1:2008 EN 60204-1:2006
Integrated lighting	5.18	EN 1837:1999+A1:2009
Electrical equipment	5.23	EN 60204-1:2006 EN 61000-6-2:2005
Hydraulic equipment	5.24	EN ISO 4413:2010
Pneumatic equipment	5.24	EN ISO 4414:2010
Power transmission elements	5.2	EN 953:1997+A1:2009 Table 4 of EN ISO 13857:2008
Ergonomic principles	5.22	EN 614-1:2006+A1:2009 EN 614-2:2000+A1:2008 EN 894-1:1997+A1:2008 EN 894-2:1997+A1:2008
Hot surfaces	5.17	EN ISO 13732-1:2008
Control systems	5.14	EN 60204-1:2006 EN ISO 13849-1:2008 EN ISO 13849-2:2008 EN 62061:2005
Emergency stop device	5.7	EN ISO 13850:2008
Fire hazard	5.19	EN 13478:2001+A1:2008

Table 3 lists the requirements for safety related control systems which are specified in this standard.

Table 3 — List of safety functions, Performance Level und Safety Integrity Level

Safety function	Clause of this standard	Performance Level, minimum	Safety Integrity Level, minimum
Interlocking and stop function of safety device for systems with rolling rolls, roll kickers, lowering and lifting cradle and roll stopper	5.2.4	PL b	SIL 1
Stop function of safety device for drawing-in points on conveyor	5.3.2	PL b	SIL 1
Stop function of safety device for crushing and shearing points between rolls and surrounding parts	5.3.4	PL b	SIL 1
Stop function of safety device for crushing and shearing points between rolls and conveyor	5.3.5	PL b	SIL 1
Protection against collision of rolls on conveyor	5.3.6	PL b	SIL 1
Protection against falling down of rolls at the transfer points of conveyor and transfer carriage, horizontal and vertical transfer and upenders	5.3.8	PL b	SIL 1
Stop function of above-floor conveyors, to prevent falling down of the rolls	5.3.9	Pl b	SIL 1
Protection against impact of persons by paper rolls	5.4.1	PL b	SIL 1
Protection against crushing or shearing points between the rolls or their carrying elements and parts of the passage way	5.4.2	PL c	SIL 1
Interlocking and stop function of safety devices for crushing and shearing points for transfer carriages, upenders, horizontal transfer devices, vertical transfer devices, transfer devices for narrow rolls	5.6.1	PL c	SIL 1
Interlocking and stop function of safety devices in order to avoid or reduce the risk of collision with transfer carriages	5.6.2	PL b	SIL 1
Interlocking against falling down of rolls on vertical conveyors	5.7.2	PL c	SIL 2
Stop function of safety devices for crushing and shearing points on vertical conveyors	5.7.4	PL c	SIL 2
Stop function of safety devices on drawing-in points on rollers	5.8.2	PL c	SIL 1
Protection against automatic start-up of the conveyor at the transfer points for industrial trucks	5.9.1	PL b	SIL 1
Emergency stop function	5.11.4	PL c	SIL 1
Hold-to-run control devices used for make-ready and maintenance and repair	5.12.2	PL b	SIL 1

5.2 Handling systems with rolling rolls, roll kicker, lowering and lifting cradle, roll stopper

5.2.1 Crushing hazards existing between roll kickers, lowering and lifting cradles and roll stoppers and the floor and machine frame shall be avoided either by

— gaps according to EN 349:1993+A1:2008,

— filling/covering the openings between moveable machinery parts and machine frame or floor,

or they shall be safeguarded in accordance with 5.2.4.

5.2.2 Roll stoppers shall maintain their position in the event of power loss and/or emergency stopping.

5.2.3 On operator-controlled systems where rolls are pushed by roll kickers, roll out of a lowering and lifting cradle or roll under gravity, safeguarding shall be provided by

— measures according to 5.2.4, or by

1) locating the actuator for releasing the pushing of the rolls in such a way that the danger zone is well within the operator's view; and

2) limiting the rolling distance up to the nearest roll stopper to 5 m maximum: and

3) providing perimeter fencing with a height of 1,40 m minimum on the sides of the rolling area extending as far as possible; and

4) marking the area as danger zone.

5.2.4 On automated roll handling systems where rolls are pushed by roll kickers, roll out of lowering and lifting cradles or roll under gravity, safeguarding shall be provided by one of the following safety devices and measures or a combination thereof:

— protective structures in accordance with EN ISO 13857:2008, Tables 1 and 4;

— fixed guards in accordance with EN 953:1997+A1:2009 and in accordance with EN ISO 13857:2008, Tables 1 and 4;

— fencing with a height of 1,40 m minimum and in accordance with EN 1034-1:2000+A1:2010, 5.1.3 taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009, EN 1760-2:2001+A1:2009 and EN 1760-3:2004+A1:2009;

— electro-sensitive protective equipment type 2 in accordance with EN 61496-1:2004 at the entrance and outlet areas where these areas can be accessed to reach the danger zone. Also see EN 619:2002+A1:2010, Annex F;

— an interlocked moveable guard e.g. roll gate arrangement at the entrance and outlet points;

— locating the in-feeding or out-feeding conveyor(s) at a height of at least 1,00 m above level of access.

EN ISO 13855:2010 shall be complied with. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

When designing the safety system, special consideration shall be given to the fact that electro-sensitive protective equipment and pressure-sensitive devices will prevent the automatic start-up of rolls but that roll rolling will continue up to the next roll stopper.

5.3 Conveyors

5.3.1 Drawing-in and wrapping points on moving elements of the conveyor shall be avoided by design or be safeguarded in accordance with EN 619:2002+A1:2010, 5.1.3.2 and 5.1.3.9.

5.3.2 Drawing-in points on the transfer points of conveyors shall be safeguarded by one or a combination of the following safety devices:

— fixed plates for covering the inrunning nips mounted in such a way that the gap between the plate and the moving elements is not more than 8 mm;

— fixed guards in accordance with EN 953:1997+A1:2009 taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009;

— electro-sensitive protective equipment type 2 in accordance with EN 61496-1:2004.

The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.3 Crushing points which can occur during conveying between the rolls moving up and stationary rolls shall either be avoided or safeguarded by:

— control measures ensuring that the distance between the rolls is 500 mm minimum where there is a risk of whole-body access; or

— safety devices and measures in accordance with 5.3.4.

5.3.4 Crushing and shearing points occurring between the rolls on the conveyor and parts of the building, pillars, gates, fences etc. shall be avoided and/or, where this is not possible, be safeguarded by one or a combination of the following safety devices and measures:

— minimum distances in accordance with EN 349:1993+A1:2008 and safety distances in accordance with EN ISO 13857:2008, Table 1;

— protective structures taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— fixed guards in accordance with EN 953:1997+A1:2009 taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4 ;

— pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009, EN 1760-2:2001+A1:2009 or/and EN 1760-3:2004+A1:2009;

— electro-sensitive protective equipment type 2 if access is possible to the danger area or electro-sensitive protective equipment type 4 if access is necessary in accordance with EN 61496-1:2004;

— a moveable guard, e.g. roll gate arrangement, at the entrance and outlet points.

EN ISO 13855:2010 shall be complied with. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.5 Crushing and shearing points occurring between the paper rolls on the conveyor and the cylinders/rollers of roller conveyors or the cross members of drag chain conveyors shall be safeguarded by one or a combination of the following safety devices and measures:

— filler pieces, for example see EN 619:2002+A1:2010, Figure D.14;

— protective structures, taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— fixed guards in accordance with EN 953:1997+A1:2009, taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009, EN 1760-2:2001+A1:2009 or/and EN 1760-3:2004+A1:2009;

— electro-sensitive protective equipment type 2 in accordance with EN 61496-1:2004;

— a moveable guard, e.g. roll gate arrangement, at the entrance and outlet points.

EN ISO 13855:2010 shall be complied with. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.6 In order to prevent or reduce hazards from collision of conveyed rolls and persons, one of the following measures or safety devices shall be applied:

— limiting the conveying speed of conveyors which can be accessed to 0,60 m/s and limiting the start-up-acceleration of conveyors which can be accessed to 0,4 $m/s^{2.}$ The conveyor floor area beside the conveyor shall be provided with clearly visible and indelible markings with the width of the maximum roll radius plus 500 mm on both sides;

— reducing the possibilities of access by fencing; the height of fencing shall be at least 1,40 m;

— fixed guards in accordance with EN 953:1997+A1:2009 and/or protective structures taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— a moveable guard, e.g. roll gate arrangement, at the entrance and outlet points.

The control system of the interlocking device shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.7 To prevent hazards for persons stepping on conveyors inadvertently or tripping and falling, conveyors with carrying elements that are arranged at a height of up to 0,30 m above access level and which can be accessed easily, shall be provided with clearly noticeable marking, for example marking on the floor or on the frame.

5.3.8 At the points where rolls are handed over from conveyors onto transfer carriages, to horizontal and vertical transfer devices, devices shall be provided which prevent falling of the rolls and allow transfer only if the transfer device is in correct position. The control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.9 At the end of above-floor conveyors, measures shall be provided to prevent falling down of the rolls, e.g. mechanical limit stops or moveable limit stops or sensors for stopping the conveyor movement. The control system of the interlocking device shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.3.10 Conveyors and their carrying elements shall be so designed that the rolls cannot roll down to the sides or tip over. Measure taken to comply with this requirement include:

— conveying rolls on trough-type carrying elements,

— use of trough-type pallets for horizontal transport of rolls,

— control measures, and

— using handling devices for narrow rolls which allow the rolls to be upended so that they are positioned and transported on their abutting face.

5.4 Crossing of passage ways and conveyors

5.4.1 Where passage ways of persons cross conveyors with automatic start-up, one or a combination of the following devices shall be provided:

— maximum conveyor-speed 0,4 m/s and maximum start-up-acceleration 0,4 m/s^2;

— foot bridges;

— interlocking guards with an interlocking device in accordance with EN 1088:1995+A2:2008;

— interlocking guards with guard locking;

— interlocking doors with guard locking;

— barriers;

— safety device with approach reaction;

— actuators for stopping the conveyor;

— signal lights.

The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1. EN ISO 13855:2010 shall be complied with.

5.4.2 If crushing or shearing hazards between the rolls or their carrying elements and parts of the passage way, e.g. steps, are not avoided by design, one of the following devices shall be provided:

— interlocking guards;

— an interlocking device in accordance with EN 1088:1995+A2:2008;

— interlocking doors;

— safety device with approach reaction.

The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 1. EN ISO 13855:2010 shall be complied with.

5.4.3 Where passage ways of industrial trucks cross accessible conveyors with automatic start-up, one or a combination of the following devices shall be provided:

— interlocking doors;

— barriers;

— induction loops for industrial trucks;

— safety devices with approach reaction;

— actuators for stopping the conveyor;

— traffic lights.

5.5 Conveyors passing through fire resistant doors

Where conveyors pass through fire resistant doors, it shall be prevented that rolls stop under the fire doors in normal drive mode.

5.6 Transfer carriages, upenders, horizontal transfer devices, vertical transfer devices, handling devices for narrow rolls

5.6.1 Crushing and shearing points created by the moving elements of

- transfer carriages,
- upenders,
- horizontal transfer devices,
- vertical transfer devices,
- handling devices for narrow rolls,
- and/or rolls handled by these devices

shall be safeguarded by one or a combination of the following safety devices and measures:

- designing out crushing and shearing risks;
- minimum distances in accordance with EN 349:1993+A1:2008 and safety distances in accordance with EN ISO 13857:2008, Table 1;
- protective structures taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4;
- fixed guards and interlocking guards in accordance with EN 953:1997+A1:2009 and the safety distances of EN ISO 13857:2008, Tables 1 and 4; fencing shall have a minimum height of 1,40 m and comply with EN 1034-1:2000+A1:2010, 5.1.3;
- pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009, EN 1760-2:2001+A1:2009 and EN 1760-3:2004+A1:2009;
- electro-sensitive protective equipment type 4 in accordance with EN 61496-1:2004, where frequent access is required;
- electro-sensitive protective equipment type 2 in accordance with EN 61496-1:2004 at the entrance and outlet areas where these areas can be accessed to reach the danger zone. Where on automated systems the stopping function is muted for ingoing and outgoing rolls, provisions shall be made to detect persons present at the side of the roll (for examples, see Annex B and EN 619:2002+A1:2010, Annex F);
- a moveable guard, e.g. roll gate arrangement, at the entrance and outlet points;
- locating the in- or out-feeding conveyor(s) at a height of at least 1,00 m above level of access.

EN ISO 13855:2010 shall be complied with. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 1.

It is recommended to refer to CLC /TS 62046:2008 for further information on Application of protective equipment to detect the presence of persons.

Depending on the configuration of the specific system, it is possible to safeguard various danger zones and devices by the same safety devices.

5.6.2 In order to avoid or reduce the risk of transfer carriages colliding with persons, access to the area where transfer carriages are moving or ready to start moving shall be prevented by providing at least one of the following devices:

— Protective structures taking into account the safety distances of EN ISO 13857:2008, Tables 1 and 4.

— Fixed guards complying with EN 953:1997+A1:2009 and the safety distances of EN ISO 13857:2008, Tables 1 and 4; fencing shall have a minimum height of 1,40 m.

— Electro-sensitive protective equipment type 2 or type 4 in accordance with EN 61496-1:2004. EN ISO 13855:2010 shall be complied with. The related control system shall satisfy the requirements of at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

— Pressure-sensitive devices such as pressure-sensitive mats shall comply with EN 1760-1:1997+A1:2009. The requirements of EN ISO 13855:2010 shall be satisfied. The related control system shall satisfy the requirements of at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

Where this requirement cannot be fulfilled and access to the area where the transfer carriage is moving or ready to start moving is possible, the following measures shall be provided:

a) Provide scanning devices on the transfer carriage allowing non-contact detection of the presence of persons in the danger zone and stopping of the transfer carriage drive so that the transfer carriage will come to a stop before the collision occurs. The related control system shall satisfy the requirements of at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

b) As an alternative to a): on transfer carriages with speeds below 0,5 m/s, it is permitted to provide pressure-sensitive devices such as bumpers in accordance with EN 1760-3:2004+A1:2009 or trip devices in accordance with EN 1760-2:2001+A1:2009. The related control system shall satisfy the requirements of at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

c) The sides of the transfer carriage shall be smooth and without gaps or protruding parts in order to prevent entanglement of parts of the body.

d) The castors of transfer carriages shall be covered, (also see EN 619:2002+A1:2010).

It is recommended to refer to Annex D and Annex E of CLC /TS 62046:2008 for further information on Application of protective equipment to detect the presence of persons.

5.7 Vertical conveyor

5.7.1 On the upper transfer points where rolls are handed over from conveyors to vertical conveyors, special precautions are required to prevent falling of persons, for example:

— locating the conveyor at a height of at least 1,00 m above level of access,

— fall-off protection with a height of 1,10 m minimum,

— access barriers in accordance with EN 619:2002+A1:2010, Annex F,

— roll gate,

— danger warning "falling hazard“ where access to the danger point is prevented by guards but where such guards are not located directly on the point of risk of falling.

5.7.2 On the upper transfer points where rolls are handed over from horizontal conveyors to vertical conveyors, an interlocking device shall be provided which prevents rolls falling down from the vertical conveyor. Interlocking devices shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 2.

5.7.3 The operating coefficient of conveyor chains and supporting ropes of vertical conveyors shall be at least five.

5.7.4 Crushing and shearing points created by vertical conveyors shall be safeguarded by one or a combination of the following safety devices and measures:

— minimum distances according to EN 349:1993+A1:2008 and safety distances according to EN ISO 13857:2008, Table 1;

— protective structures taking account of the safety distances of EN ISO 13857:2008, Tables 1 and 4;

— fixed guards in accordance with EN 953:1997+A1:2009 and the safety distances of EN ISO 13857:2008; Tables 1 and 4; fencing shall have a minimum height of 1,40 m and comply with EN 1034-1:2000+A1:2010, 5.1.3;

— pressure-sensitive safety devices in accordance with EN 1760-1:1997+A1:2009, EN 1760-2:2001+A1:2009 and EN 1760-3:2004+A1:2009;

— electro-sensitive protective equipment type 4 in accordance with EN 61496-1:2004 at the roll-in and roll-out areas where these areas can be accessed to reach the danger zone (for examples of muting systems see Annex B and EN 619:2002+A1:2010, Annex F);

— interlocking movable guard;

— locating the in-feeding or out-feeding conveyor(s) at a height of at least 1,00 m above level of access and complying with the safety distances EN 349:1993+A1:2008 and safety distances according to EN ISO 13857:2008, Table 1 and Table 4.

EN ISO 13855:2010 shall be complied with. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 2.

5.8 Rotating device with carrying rolls

5.8.1 On rotating devices with carrying rolls, the inrunning nips between the carrying rolls and the machine frame shall be avoided by designing the gap as small as possible and with a maximum of 8 mm.

5.8.2 Drawing-in points between paper rolls and the carrying rolls shall be safeguarded by safety devices in accordance with EN 1034-1:2000+A1:2010, 5.1 and 5.4, for example pressure-sensitive devices according to EN 1760-1:1997+A1:2009. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 1. EN ISO 13855:2010 shall be complied with.

5.9 Transfer points for industrial trucks

5.9.1 On sites where industrial trucks are used to take rolls from a conveying system, for example a conveyor, or to put them on the conveyor, provisions shall be made to inhibit automatic start-up of the conveying system while the roll is being transferred. Appropriate measures are for example induction loops provided in the floor or photoelectric curtains which prevent the conveyor from starting if the presence of an industrial truck is detected. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or EN 62061:2005, Safety Integrity Level SIL 1.

5.9.2 Driverless trucks used for handling rolls shall comply with EN 1525:1997. In the area where rolls are transferred to driverless trucks, measures and devices are required in accordance with EN 1525:1997, 5.9.5.6.

5.9.3 The conveyor on the transfer-points for trucks shall not be higher than 1,5 m.

5.10 Interfaces/transfer points to adjacent conveying systems, the delivering machine and the receiving machine

5.10.1 Where roll handling systems are split up into sections operating under a joint safety device, and where an individual section needs to be accessed with the guard open while the adjacent area is active, provisions shall be made to ensure that the safety system for the active area is maintained, for example by a temporarily active trip device on the interface/transfer point.

5.10.2 On the interfaces/transfer points between the roll handling system and the delivering machine or the receiving machine, rolls shall be prevented from causing the safety system of the delivering or receiving machine to be defeated.

NOTE This may require manufacturers of roll handling systems and the manufacturers of delivering and receiving machines to work together, for example for finding a common definition of the interface, installation of muting systems. General information on muting systems is given in Annex B.

5.11 Emergency stop device

5.11.1 Roll handling systems shall be provided with an emergency stop device in accordance with EN 1034-1:2000+A1:2010, 5.7 and EN ISO 13850:2008.

5.11.2 Emergency stopping shall act on the entire interlinked roll transport system, including the conveyor of the delivering machine and the feeding conveyor of the receiving machine.

5.11.3 The control system shall contain interfaces to ensure that the delivery conveyor of the delivering unit is included in the emergency stop circuit of the delivering unit and the feeding conveyor of the receiving unit in the emergency stop circuit of the receiving unit.

NOTE This may require manufacturers of roll handling systems and manufacturers of the delivering or receiving units respectively to work together.

5.11.4 The control system relating to the emergency stop function shall comply with at least EN ISO 13849-1:2008, Performance Level PL c or EN 62061:2005, Safety Integrity Level SIL 1.

5.11.5 Where interlinked roll handling systems extend over two or more floor levels or rooms of the building, risk assessment may reveal that more than one emergency stop device is required and, in deviation from 5.11.2, a particular emergency stop device may not need to stop all the machinery..

5.12 Devices for make-ready and maintenance

5.12.1 Devices for isolation, energy dissipation and the prevention of unexpected start-up shall be provided in accordance with EN 1034-1:2000+A1:2010, 5.8 and EN 1037:1995+A1:2008. The risk of confusion of such devices, which exists especially on complex systems, shall be taken into account and reduced to a minimum. Unambiguous marking is required in order to identify such devices in relation to the respective parts of the machine unless the allocation of functions is obvious from the way the devices are arranged and located in proximity to the machine.

5.12.2 Where, for make-ready and maintenance, hazardous movements of parts of the roll handling system are required while the related guard is open or the related safety device is not active, hold-to-run controls need to be provided. Actuators shall be located in such a way that the danger zone is within view. The related control system shall comply with at least EN ISO 13849-1:2008, Performance Level PL b or with EN 62061:2005, Safety Integrity Level SIL 1.

5.12.3 Where interventions for make-ready and maintenance cannot be done from floor level, working platforms and their means of access are required in accordance with EN 1034 1:2000+A1:2009, 5.5.

5.12.4 Where individual sections of the roll handling system require maintenance while adjacent parts of the roll handling system remain in operation, devices shall be provided to prevent access to active areas or ensure active

areas to be switched off in case of access, for example guards or ESPDs which can be put into action or activated temporarily.

5.12.5 Vertical conveyors, downenders, vertical transfer devices and handling devices for narrow rolls shall be designed in such a way that maintenance operations are not required while the lifting equipment is in the lifted position. Where this is not possible, provisions are required to positively prevent falling of the lifting equipment, for example mechanical supports or bolts locking the lifting equipment in its position.

5.12.6 Roll kickers and roll stoppers shall be so designed that maintenance operations are not required while in raised position. Where this is not possible, provisions are required to positively prevent lowering by gravity, for example mechanical supports or bolts locking the raised part in its position.

5.13 Noise

5.13.1 The requirements of EN 1034-1:2000+A1:2010, 5.15 shall be satisfied.

5.13.2 Examples of noise reduction measures and points to be considered are:

— low–noise gear boxes and drives;,

— noise of the hydraulic aggregate;

— lubrication of conveyors.

5.13.3 The emission sound pressure level shall be measured in accordance with EN 13023:2003+A1:2010, 6.2.

NOTE Roll handling systems are generally considered to be large machines with automatic operation. Therefore only emission sound pressure levels at different positions are measured.

6 Verification of compliance with safety requirements and/or measures

The following table describes the methods used to verify if the safety requirements and/or measures described in Clause 5 are complied with. A stands for visual inspection; B for functional test; C for measurement; D for verification on the basis of drawings and calculations.

Table 4 — Verification of compliance with safety requirements and/or measures

No.	Safety requirements and/or measures	A	B	C	D
1	Safety distances	x		x	
2	Guards	x		x	x
3	Interlocking guards	x	x	x	x
4	Trip devices		x	x	x
5	Emergency stop device	x	x	x	
6	Working platforms	x		x	x
7	Energy isolation	x	x		
8	Control systems		x		x
9	Noise			x	
10	Lighting		x	x	
11	Electrical equipment	x	x	x	

7 Information for use

7.1 General

The requirements of EN 1034-1:2000+A1:2010, Clause 7 shall be satisfied.

7.2 Instruction handbook

The instruction handbook shall contain the following information as a minimum:

a) description of the roll handling system;

b) instructions for start-up and stopping of the system;

c) function and use of devices for energy isolation, energy dissipation;

d) function, use and testing of emergency stop device;

e) information about make-ready and maintenance, including mounting and dismantling of safety devices for inspection and maintenance;

f) emission sound pressure level measured in accordance with EN 13023:2003+A1:2010, 6.2;

g) description of safe checking of safety devices;

h) requirements for use of personal protective equipment, for example protective shoes, where necessary;

i) function and proof-tests of the safety-related control systems; the Performance Level according to EN ISO 13849-1:2008 and/or the Safety Integrity Level according to EN 62061:2005 for each safety control function;

j) use of the devices, as specified in 5.12.4.

7.3 Marking

The machinery shall be marked visibly, legibly and indelibly with the following minimum particulars:

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

— designation of the machinery,

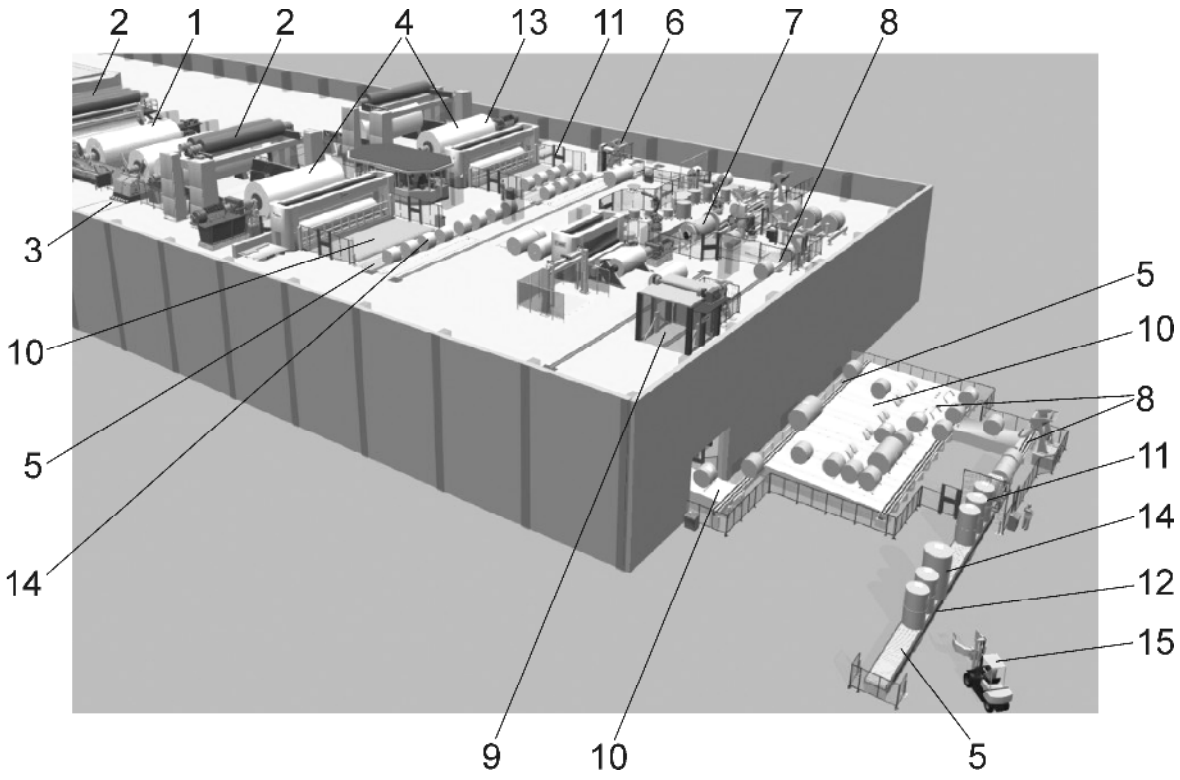
— designation of the series or type,

— serial number, if any,

— the year of construction, that is the year in which the manufacturing was completed.

Annex A
(informative)

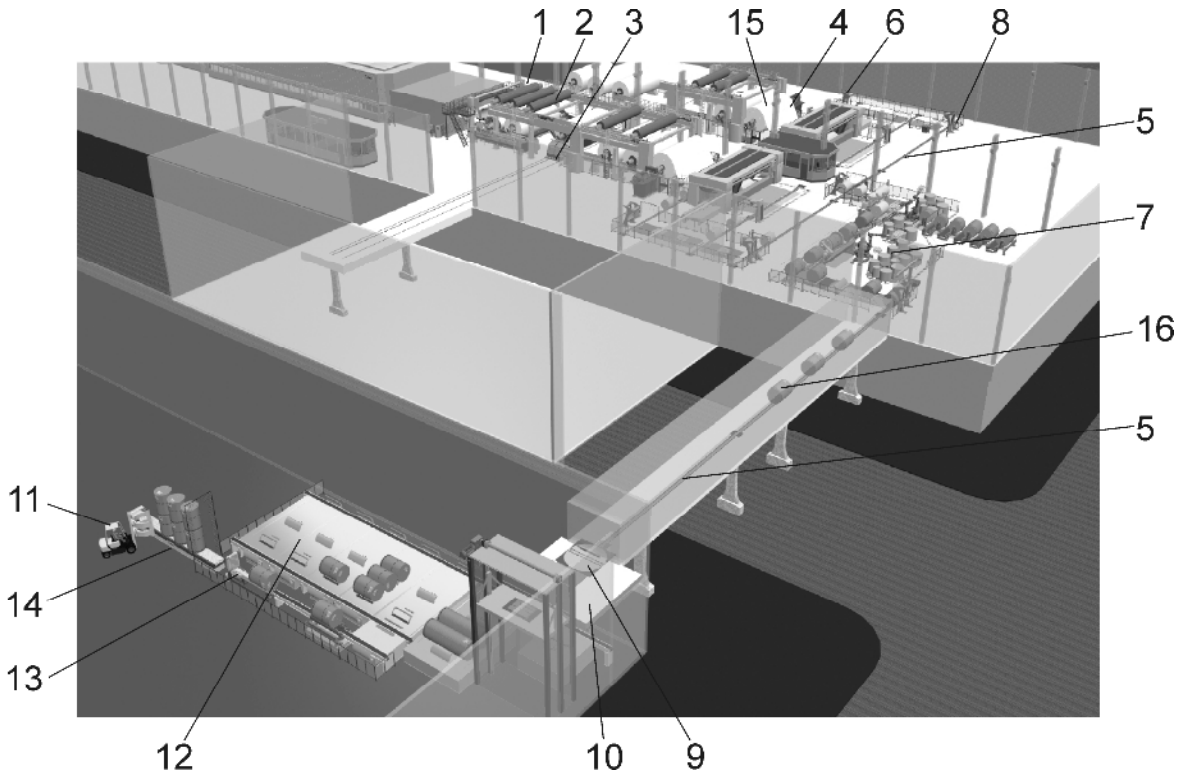
Figures



Key

1 paper machine reel up section	2 reel spool magazine	3 reel transport carriage	4 slitter unwind	5 conveyor
6 roll kicker	7 roll packaging machine	8 roll stopper	9 vertical conveyor	10 area of rolling
11 upender	12 point of transfer to industrial trucks	13 machine reel	14 roll	15 industrial truck

Figure A.1 — Example of a reel and roll handling system



Key

1 paper machine reel up section	2 reel spool magazine	3 reel transport carriage	4 slitter unwind	5 conveyor
6 roll kicker	7 roll packaging machine	8 roll stopper	9 turntable	10 vertical conveyor
11 industrial truck	12 area of rolling	13 upender	14 point of transfer to industrial trucks	15 machine reel
16 roll				

Figure A.2 — Example of a reel and roll handling system

Annex B
(informative)

Application of electro-sensitive protective equipment (ESPE) on roll loading (entry) and unloading (exit) areas of paper finishing machines and roll handling systems

B.1 Muting

B.1.1 Operating principle and general requirements

The signals from electro-sensitive protective equipment (ESPE) may have to be ignored or “muted” to allow rolls or pallets to enter or exit the machine. Muting is a feature of the control system that disables the safety function of an ESPE during the time a roll or a pallet is passing the ESPE.

The muting function shall be initiated and terminated automatically. This may be achieved by the use of appropriately selected and placed sensors or, in some cases, by signals from the safety-related control system. Incorrect signals, sequence, or timing of the muting sensors or signals shall not allow a mute condition.

NOTE CLC /TS 62046:2008, 5.5 can be referred to for further information.

B.1.2 Muting and control requirements

The muting function shall comply with EN ISO 13849-1:2008, 5.9 and the following requirements:

a) Muting of ESPE is allowed only in that phase of the operating cycle where safety is ensured by other means, for example where access to the danger zone is prevented by a paper roll or a loaded pallet.

b) The safety related parts of the control system (SRP/CS) which perform the muting function shall have an appropriate safety-related performance (PL or SIL, see EN ISO 13849-1:2008 or EN 62061:2005). This safety-related performance shall not adversely affect the performance of the protective function.

c) It shall not be possible to initiate the muting function when the ESPE outputs (OSSD’s) are in the OFF-state.

d) It shall not be possible to initiate the muting function when the ESPE is in the lock-out condition (e.g. after a fault detection in the ESPE).

e) It shall not be possible to initiate the muting function after a fault detection in the SRP/CS which perform the muting function.

f) Interruption and/or restoration of the power supply to the SRP/CS which performs the muting function, the ESPE and/or the muting sensors shall not initiate muting or allow a muted condition to continue.

g) Any fault in the SRP/CS which performs the muting function shall not allow a muted condition to occur.

h) Muting shall only be initiated and maintained by at least two signals; they shall be independent, of different origin and wired separately.

i) The initiation and maintaining of muting shall not rely entirely on logic derived or deduced software signals.

j) Muting signals that occur in an incorrect sequence shall either not allow a muted condition or lead to a protective stop.

k) Muting shall be automatically de-activated immediately following the passage of the recognized product through the detection field of the ESPE.

l) It shall not be possible for muting to be initiated by an earth fault or open-circuit of the signal lines or the power supply to the muting sensors.

m) Selection of the mode in which the muting function can be initiated shall require the use of a key, keyword, or tool.

n) Manual adjustment of the position or timing at which muting occurs shall require the use of a key, keyword, or tool.

o) If the roll stops while passing the ESPE, it shall not be possible to access the hazardous area; otherwise the control system shall initiate a protective stop.

B.1.3 Application considerations

When considering the application of the muting function, the following points shall be taken into account:

— initiation and termination of the muting function only at the appropriate times in the operating cycle, for example by provision of a muting enable function (e.g. conveyor operating);

— use of timing and/or sequence control of the muting sensors to ensure correct muting operation;

— provision of measures to prevent circumvention of the protective equipment;

— protection against mechanical damage and/or misalignment;

— protection against foreseeable misuse including manipulation;

— elimination of trapping and crushing hazards from the material being transported.

B.1.4 Muting indicator

If required by the risk assessment, an indicator shall show when the muting function is active. This indicator shows that the normal protective function is suspended. The muting indicator should have sufficient brightness and be installed so as to be readily visible from any foreseeable position where a person can attempt to access the hazard zone.

B.1.5 Mute dependent override

A manually operated, mute dependent override function can be necessary to allow blockages to be removed from the detection zone of the protective equipment. When a mute dependent override function is active, access to the hazardous zone can be possible without actuating the trip function and therefore the application of the mute dependent override function shall be done very carefully.

NOTE 1 CLC/TS 62046:2008, 5.5.4 can be referred to for further information.

The mute dependent override function is used to clear the muting area before the ESPE can be reset. Restart of the machine operation shall only be possible by means of a deliberate action once safe operating conditions have been re-established.

The activation of the mute dependent override function shall be possible only when the output of the ESPE is in the OFF-state and/or at least one muting sensor is actuated. When a fault is detected in the ESPE or the safety related parts of the control system (SRP/CS) which perform the muting function, the activation of the override function shall not be possible.

The mute dependent override shall only be activated either

— by the use of a spring return hold-to-run device located so that it is not possible to enter the hazardous zone whilst maintaining the action on the hold-to-run device, and so that the hazardous zone is visible while actuating the device

or

— by the use of a hold-to-run key operated switch or equally secure momentary action pushbutton when:

  — the override function is automatically terminated after a correct muting signal sequence is identified; and

  — no access to the hazardous zone is possible during the override sequence;

  — an emergency stop can be initiated from the same position.

NOTE 2 The same button can be used to enable the mute dependent override function and to perform an ESPE reset function when the muting area is clear.

The mute dependent override shall automatically terminate (deactivate)

— when all the muting sensors are de-actuated,

— after a pre-determined time limit has expired.

The mute dependent override shall only enable those movements that are necessary to permit blockages to be removed from the detection zone of the protective equipment. The activation of the mute dependent override function shall not initiate any movement of the transport system or hazardous machine function. Such movements or machine functions shall only be initiated by a separate actuation of a hold-to-run control device.

Measures shall be provided to prevent activation of the mute dependent override function due to a fault or inadvertent operation of the initiating device.

B.2 Partial blanking - Automatic selection of active detection fields

B.2.1 Operating principle

When large apertures of machines are designed to allow the passage of rolls or packages with different shapes, the risk of persons gaining access to the hazardous areas either directly or over this goods or packages can be prevented using ESPE with variable detection fields instead of muting the complete protective device. Some types of ESPE (AOPD / Light Curtains and AOPDDR / Laser Scanners) allow the activation of preprogrammed protective detection fields depending on external signals.

When these external signals correspond to the maximum shapes of the passing goods or loads, the proper (vertical) protective field of the ESPE shall be activated, thus preventing the undetected access.

B.2.2 Requirements

The following requirements apply to the automatic change of protective fields:

a) a "maximum" protective field shall be programmed in such a way that undetected access is impossible when no rolls or packages are present in the machine aperture;

b) the safety-related parts of the control system (SRP/CS) which perform the switching function shall have an appropriate safety-related performance (PL or SIL, see EN ISO 13849-1:2008 or EN 62061:2005). This safety-related performance shall not adversely affect the performance of the protective function;

c) it shall not be possible to change the active protective field when the ESPE outputs (OSSD's) are in the OFF-state;

d) it shall not be possible to change the active protective field when the ESPE is in the lock-out condition (e.g. after a fault detection in the ESPE);

e) after a fault detection in the SRP/CS which perform the automatic selecting function, the maximum protective field shall be activated automatically or a protective stop command shall be given;

f) interruption and/or restoration of the power supply to the SRP/CS which performs the automatic selecting function, the ESPE and/or the material detecting sensors shall not lead to the selection of an inadequate protective field;

g) any single fault in the SRP/CS which performs the muting function shall not lead to the selection of an inadequate protective field;

h) the selection of the protective field shall only be initiated and maintained by at least two signals. They shall be independent, of different origin and wired separately;

i) at least one of the signals shall be occasioned by the detection of the material or good passing the ESPE;

j) the initiation and maintaining of a protective field shall not rely entirely on logically derived or deduced software signals;

k) the maximum protective field shall be automatically activated immediately following the passage of the recognized product through the detection field of the ESPE;

l) the automatic selection of a protective field shall not be initiated by an earth fault or open-circuit of the signal lines or the power supply to the material detecting sensors;

m) selection of the mode in which the automatic selecting function can be initiated shall require the use of a key, keyword, or tool;

n) manual adjustment of the position or timing at which the automatic selection occurs shall require the use of a key, keyword, or tool;

o) if the product stops while passing the ESPE, it shall not be possible to access undetected the hazardous area or otherwise the control system shall initiate a protective stop;

p) the dimensions of the protective fields shall prevent the undetected access. When the minimum distance between the protective field (vertical plane) and the nearest hazardous zone is ≥ 900 mm the zone without detection shall not exceed a 500 mm x 500 mm square or shall not exceed 400 mm height in the case of a slot.

Annex C
(informative)

Trilingual index of terms

German	English	French
Rollentransportanlage	Roll handling system	Installation de manutention des bobines
Tambourtransportanlage	Machine reel handling system	Installation de manutention de la bobine mère
Rolle	Roll	Bobine
ablaufende Rolle	Rolling roll	Charge roulante
Ausstoßer	Kicker	Pousse-bobine
Rollenstopper	Roll stopper	Butoir
Ablaufbereich	Area of rolling rolls	Zone de charges roulantes
Kippmulde	Cradle	Berceau
Förderer	Conveyor	Convoyeur
Gurtförderer	Belt conveyor	Convoyeur à bande
Plattenbandförderer	Slat conveyor	Convoyeurs à lattes
Tragkettenförderer	Drag chain conveyor	Convoyeur à maillons porteurs
Kreisförderer	Carousel cart conveyor	Convoyeur type carrousel
Rollenbahn	Roller conveyor	Convoyeur à rouleaux
Horizontal-Umsetzeinrichtung	Horizontal transfer device	Dispositif de transfert horizontal
Schwenkband	Turning conveyor	Convoyeur tournant
Verfahrwagen	Transfer carriage	Chariot de transfert
Drehscheibe	Turn table	Plaque tournante
Aufstellvorrichtung	Upender	Redresseur
Senk-Kippstuhl	Downender	Culbuteur
Hubtisch	Vertical transfer device	Dispositif de transfert vertical
Senkrechtförderer	Vertical conveyor	Transporteur vertical
Dreheinrichtung	Rotating device	Dispositif de pivotement
Schmalrollenhandlingsystem	Handling device for narrow rolls	Dispositif de manutention des bobines filles
Flurförderzeug	Industrial truck	Chariot de manutention
Klammerstapler	Clamp truck	Chariot automoteur
Fahrerloses Flurförderzeug FTS	Driverless truck AGV (automatic guided vehicle)	Chariot sans conducteur AGV (véhicule à guidage automatique)

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 Machinery 2006/42/EC.

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.

Bibliography

[1] CLC /TS 62046:2008, *Safety of machinery — Application of protective equipment to detect the presence of persons (IEC/TS 62046:2008)*

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