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Plastics and rubber machines — Film converting machines for bags and sacks — Safety requirements

ICS 83.200

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British Standards

National foreword

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Foreword

This document (EN 15067:2007) 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

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This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

For relationship with EU Directives, see informative Annexes ZA and ZB, which are an integral part of this document.

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

Introduction

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

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

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard specifies the safety requirements applicable to the design and construction of film converting machines for making bags and sacks, for the significant and specific hazards listed in Clause 4.

This type of machine is based on the welding process.

A film converting machine for bags and sacks starts at the film unwinding unit or at the film inlet when this machine is directly fed by an upstream process and ends at the product collection or delivery unit.

The bag making line may include:

1) unwind units
2) slit-welding units
3) gussetting units
4) lane deviation units
5) perforating and welding or cutting and welding units
6) blocking units
7) pick-up and transfer units
8) stacking units
9) punching units
10) folding units
11) winding units
12) labelling or taping units
13) handle and closure units
14) draw tape insertion units
15) generators of electrostatic charge
16) electrostatic discharge equipment.

Printing units, high frequency welding machines and the design and construction of electrostatic generators are not covered by this standard.

Ultrasonic radiation hazards resulting from ultrasonic welding devices, e.g. integrated in handle and closure units, are not covered by this standard.

Film converting machines for bags and sacks generally do not create explosive atmospheres. In principle they therefore correspond with line F of Table 2 of the ATEX Guideline and consequently do not fall within the scope of Directive 94/9/EC.

This document is not applicable to machines which are manufactured before the date of its publication as EN.

2 Normative references

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

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

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

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

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

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

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

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

EN 1760-1:1997, *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 60204-1:2006, *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*, Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*

EN ISO 3747:2000, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method for use in situ (ISO 3747:2000)*

EN ISO 4871:1996, *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 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995)*

EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995)*

EN ISO 11204:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Method requiring environmental corrections (ISO 11204:1995)*

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

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

EN ISO 13732-1:2006, *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 13850:2006, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

EN ISO 14122-1:2001*, Safety of machinery - Permanent means of access to machinery - Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

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)*

EN ISO 14122-4:2004, *Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders (ISO 14122-4:2004)*

CENELEC Report R044-001:1999*, Safety of machinery - Guidance and recommendations for the avoidance of hazards due to static electricity*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1
unwind unit
device for unwinding film. The different types are distinguished by their drives. A distinction is made between centre and surface unwind units

3.1.1
centre unwind unit
unwinding device with a central drive to the winding core

3.1.2
surface unwind unit
unwinding device whose drive relies on peripheral friction on the reel surface

3.2
slit-welding unit
device with a hot element for longitudinal cutting and welding of the film

3.3
gussetting unit
device for creating longitudinal folds in a tube of film

3.4
lane deviation unit
device for diverging or converging the film lanes

3.5
perforating and welding or cutting and welding unit
device that perforates and seals or cuts and seals the film transversely

3.6
blocking unit
device for placing bags one upon another and which may also stick them together

3.7
pick-up and transfer unit
device for picking up, transferring and conveying bags

3.8
stacking unit
device for stacking bags

3.9
wicket arm
device for stacking bags on pins via rotating transfer arms

3.10
punching unit
device to create a shaped cut in film or bags

3.11
folding unit
device for the longitudinal and/or transverse folding of the bags

3.12
winding unit
device to wind-up bags in a roll

3.13
labelling or taping unit
device for applying a label or a tape on or around a roll

3.14
handles and closure unit
device for attaching or creating handles or placing a closing system in the bag

3.15
draw tape insertion unit
device for the insertion of an additional strip of film into the top hem of the bag

3.16
non-driven roll
roll for guiding film or sheet through the machine and which is driven by the film

3.17
driven roll
powered roll that pulls the film by means of surface contact (friction)

3.18
nip rolls
rolls that are pressed one against the other; one at least is driven. The film is drawn through the nip by the nipping effect

3.19
dancing roll
guide roll that is pivoted on a point and over which the film runs (see figure 1). The load of the dancing roll determines the tension of the film

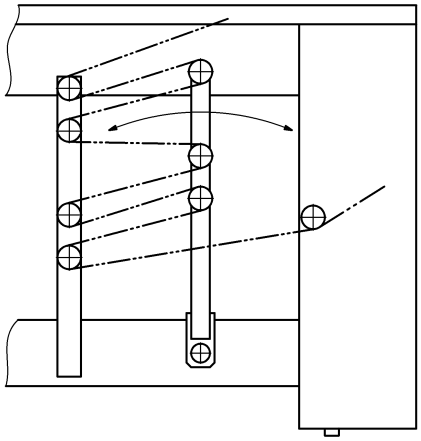

Figure 1 — Dancing roll

3.20
suspended roll
guide roll that reciprocates between guides in a linear direction and over which the film runs (see Figure 2). The load of the suspended roll determines the film tension

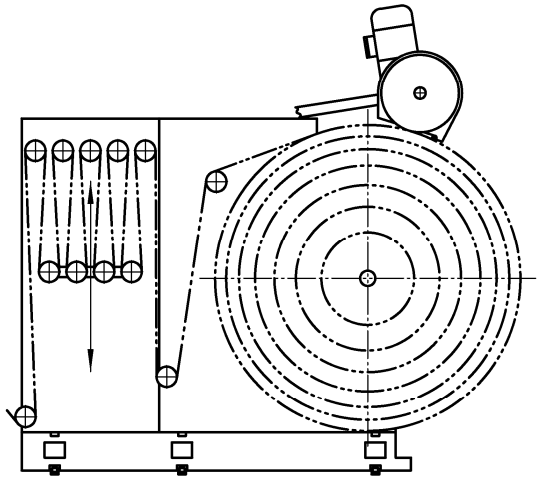

Figure 2 — Suspended roll

3.21
reel lifting arms
pair of arms for loading, supporting and unloading reels

4 List of significant hazards

4.1 General

This clause contains all the hazards, identified by risk assessment as significant for this type of machinery, which require action to eliminate or reduce risk.

The relationship between the hazards in this clause and the safety requirements and/or protective measures dealt with in Clause 5 is shown in informative Annex B.

4.2 General hazards

4.2.1 Mechanical hazards

4.2.1.1 Entanglement, drawing-in and crushing hazard due to belts, pulleys and mechanical transmission units that drive the machine units.

4.2.1.2 Hazards due to a possible whiplash caused by the tearing of hydraulic flexible hoses or their fittings.

4.2.1.3 Drawing-in and crushing hazards due to rolls which must be adjusted during machine operation.

4.2.2 Electrical hazards

4.2.2.1 Electrical hazard due to unintentional contact with live parts accessible from areas outside the machine through openings protected by interlocking guards.

4.2.2.2 Hazards due to a possible fault or failure of safety-related parts of control systems.

4.2.2.3 Electrical hazard due to the possible build-up of electrostatic charges in some areas of the machine or the processed material.

4.2.3 Slipping, tripping and falling hazards

Hazard due to slipping, tripping or falling on or from working platforms, steps and walkways.

4.2.4 Hazards due to noise

Noise can result in deafness, physiological disorders, accidents due to interference with auditory signals and speech communication.

4.2.5 Thermal hazards

Thermal hazards due to unintentional contact with hot parts of the machine.

4.2.6 Fire hazards

Fire hazards due to contact of the film with hot parts of the machine when production is stopped.

4.2.7 Hazards during start-up and setting operations

Hazards during start-up and setting operations of the machine in areas where guards are overridden and moving machine parts are accessible. Start-up and setting operations include: reel changing, film threading, machine adjustment and fault finding and correction.

4.3 Unwind unit

4.3.1 Entanglement and drawing-in hazards at the in-running nip zone between the friction wheels and the reel surface in the case of a surface unwind unit.

4.3.2 Entanglement, shearing and crushing hazards at accessible sides of the vertical frame where the piston which lifts the surface unwind drive is located.

4.3.3 Entanglement, shearing and crushing hazards at accessible sides of the vertical frame where the supporting mechanisms of the suspended rolls are located.

4.3.4 Crushing and shearing hazards in the zone of the reel lifting arms due to unexpected movement during reel changing.

4.3.5 Crushing and shearing hazards in the zone under the reel where a reel falls unexpectedly due to a pressure drop in the lifting piston(s).

4.3.6 Crushing and shearing hazards in the zone under the motorised drive group of the reel at a surface unwind unit where the motorised drive group falls unexpectedly due to a pressure drop in the lifting piston(s).

4.3.7 Impact and shearing hazards due to an unexpected break of the film and drawing-in hazard at the zone of the dancing and suspended rolls.

4.3.8 Crushing, entanglement and shearing hazards in the zone of the reel core supports at centre unwind units.

4.3.9 Ejection of reels from the unwind unit.

4.4 Slit-welding unit

4.4.1 Thermal hazard in the zone of the cutting/welding blades during a change of production.

4.4.2 Fume emission hazard in the case of particular film processing.

4.5 Gussetting unit

4.5.1 Entanglement and crushing hazards in the area of the nip rolls.

4.5.2 Entanglement hazard in the area of chains, pinions and dancing rolls.

4.6 Lane deviation unit

Entanglement, crushing and drawing-in hazards in the zone of nip and dancing rolls where there is a motorised unit.

4.7 Perforating and welding or cutting and welding units

4.7.1 Entanglement and crushing hazards in the accessible zones of the continuous and/or intermittent pulling nip rolls.

4.7.2 Crushing, cutting and thermal hazards in the zone of the sealing knives and bars.

4.7.3 Fume emission hazard in the case of particular film processing.

4.8 Blocking unit

4.8.1 Perforating and cutting hazards by pins or sharp edges.

4.8.2 Crushing and perforating hazards by moving parts.

4.8.3 Thermal hazards from hot parts.

4.8.4 Fume emission in the case of particular film processing.

4.9 Pick-up and transfer units

Entanglement, crushing, drawing-in and impact hazards from moving parts.

4.10 Stacking unit

Entanglement, crushing, drawing-in, impact, puncture hazards from moving parts and thermal hazards if heated parts are present.

4.11 Punching unit

Crushing, cutting and thermal hazards if heated parts are present.

4.12 Folding unit

Entanglement, drawing-in and crushing hazards in the zone of driven nip rolls and/or powered elements which perform folding actions.

4.13 Winding unit

Entanglement and crushing hazards in the zone of moving parts.

4.14 Labelling or taping unit

Entanglement, crushing and drawing-in hazards at nip rolls (if present) and cutting hazards in the zone of the cutting edge.

4.15 Handle and closure units

Cutting, drawing-in and crushing hazards in the zone of moving parts and thermal hazards.

4.16 Draw tape insertion unit

Crushing and entanglement hazards in the zone of moving parts, cutting hazards in the zone of cutting edges and thermal hazards if heated parts are present.

4.17 Generators of electrostatic charge

Electric shock if the machine is equipped with generators of electrostatic charge.

4.18 Electrostatic discharge equipment

Electrical shock due to electrostatic discharge.

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 12100-2 for relevant but not significant hazards which are not dealt with by this document.

5.2 General requirements

5.2.1 Mechanical hazards

5.2.1.1 The zones of the machine where belts and/or other moving transmission parts are positioned shall be protected by fixed guards in accordance with EN 953:1997, 3.2 or by interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 which are interlocked with the relevant dangerous movements. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.2.1.2 Flexible hydraulic hoses, where installed, shall be adequately fastened to the machine frame at several points so as to prevent whiplash in case of tearing.

5.2.1.3 Rolls which must be adjusted during machine operation and which create a crushing or drawing-in hazard shall be adjustable from outside the guards.

5.2.2 Electrical hazards

5.2.2.1 The electrical equipment shall be in accordance with EN 60204-1:2006 and the following specific requirements:

5.2.2.1.1 The supply disconnecting devices shall be in accordance with EN 60204-1:2006, 5.3.2 a) to e).

Where the supply disconnecting device is of the type a) to d) the requirements of EN 60204-1:2006, 5.3.3 shall apply.

5.2.2.1.2 Protection against direct contact with live conductive parts shall be in accordance with EN 60204-1:2006, 6.2 including the IP codes according to EN 60529:1991.

5.2.2.1.3 Protection against indirect contact with live conductive parts shall be in accordance with EN 60204-1:2006, 6.3.

5.2.2.1.4 The emergency stop shall function as a category 0 or category 1 stop in accordance with EN 60204-1:2006, 9.2.2.

5.2.2.1.5 One or more emergency stop actuators shall be provided. The number of actuators depends on the size of the machine. Actuators shall be so positioned that they are easily accessible. One or more actuator(s) shall be positioned close to each operating position and at other suitable locations around the machine.

Actuators for the emergency stop equipment shall be in accordance with EN ISO 13850:2006. The type of device(s) for emergency stop shall be in accordance with EN 60204-1:2006, 10.7.2.

5.2.2.1.6 Hazards due to unexpected start-up shall be prevented in accordance with EN 1037:1995.

See also 5.4 of EN 60204-1:2006.

5.2.2.1.7 If the machine is to be used with flammable substances, e. g. solvents, information shall be given in the instruction manual.

See 7.2.3.

5.2.2.2 The safety-related parts of the control system shall be at least in accordance with category 1 of EN 954-1:1996 subject to other provisions for individual units in 5.2 to 5.17.

5.2.2.3 The areas of the machine where an unwanted build-up of electrostatic charge is foreseeable shall be equipped with protective anti-static equipment. For guidance see CENELEC R044-001.

See 5.17.

5.2.3 Slipping, tripping and falling hazards

The machine manufacturer shall provide safe working platforms, steps and walkways in accordance with EN ISO 14122-1:2001, EN ISO 14122-2:2001, EN ISO 14122-3:2001 and EN ISO 14122-4:2004 to prevent the risk of slipping, tripping or falling.

In addition the manufacturer shall provide extraction and/or collection systems to prevent film trim and scraps falling onto working platforms, steps and walkways around the machine.

See 7.2.11.

5.2.4 Hazards due to noise

5.2.4.1 Noise reduction at source by design

Noise emissions of the machine shall be reduced through suitable design and construction. Account shall be taken of the available information and technology for reducing noise at source, see for example EN ISO 11688-1:1998.

Hazards caused by high noise levels can be generated by some of the film converting units, e. g. punching units, sealing knives or bars, perforating unit, rotating knives, air blow devices and vacuum devices for the recovery of plastic film waste etc.

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

Current measures to reduce noise at source may be:

— choice of low-noise machine components (motors, transmission systems);

— use of vibration damping material for vibrating surfaces;

— use of elastic transmission to prevent structure-borne noise from propagating from vibrating elements to other machine parts.

5.2.4.2 Noise reduction by protective measures

Amongst the measures that may be taken to reduce noise emission are:

— enclosures/screening of noise creating parts;

— fitting acoustic enclosures around machine parts.

5.2.4.3 Information connected with noise hazards

See 7.2.8 and Annex A.

5.2.5 Thermal hazards

If for process reasons cutting electrical power to the hot parts must be avoided, a maximum time of 5 minutes, starting from the opening of the guards, is allowed before the power is cut, provided that a permanent audible and visible warning signal is given.

5.2.6 Fire hazards

When the machine stops or there is a failure of the electric and/or pneumatic system or in the case of an emergency stop the design of the machine shall be such as to prevent the unintended contact between hot parts and the film being processed.

5.2.7 Hazards during start-up and setting operations

The start-up and the setting of the machine shall be made with all safeguards activated. If this is impossible for technical reasons a setting mode shall be provided which allows the machine to be operated with certain safeguards deactivated. For this purpose the machine shall be equipped with a key mode selector to:

— deactivate the relevant safeguards;

— deactivate the automatic control mode;

— prevent any other dangerous movement in the unprotected zone; and

— allow setting movements only by means of two-hand control devices in accordance with EN 574:1996, type III B.

In the setting mode the two-hand control devices shall:

— control a single machine actuator at a time in the unprotected machine area; and

— be disabled by the activation of any safeguard in another zone of the machine if the two-hand control device also controls hazardous movement in that other zone.

See 7.2.2.

5.3 Unwind unit

5.3.1 Access shall be prevented by a combination of fixed guards in accordance with EN 953:1997, 3.2 and interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 enclosing the unwind unit. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

See 7.1 b) and 7.2.10.

5.3.2 Fixed guards in accordance with EN 953:1997, 3.2 shall be provided on both sides of the machine in the zone of the reel lifting arms. The movement of the reel lifting arms shall be effected by a hold-to-run control device in accordance with EN ISO 12100-1:2003, 3.26.3. The safety-related parts of the control system shall be in accordance with category 1 of EN 954:1996. The speed of the reel lifting arms shall not exceed 2m/min.

The danger zone shall be visible to the operator from the operating position of the hold-to-run control device.

The unwind unit shall be so designed that when the reel is out of its lowest position it shall not be unintentionally released.

5.3.3 The piston(s) for lifting reels or motorised drive groups shall be provided with a speed limiting device such as a throttle valve or blocking device e.g. check valve.

5.3.4 Reels shall be securely fixed in the unwind unit.

5.4 Slit-welding unit

5.4.1 Electro-sensitive protective equipment in accordance with EN 61496-1:2004 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of the slit-welding unit. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The guards shall be designed to permit quick and easy access to the welding bar e.g. to allow for the removal of any material stuck to the welding bar. The guards shall not restrict the operators view of the welding bar.

5.4.2 A warning label shall be positioned on or near the hot surfaces in the zone of the cutting/welding blades in order to indicate the thermal hazard.

See 7.2.6.

5.4.3 The machine shall be so designed that a local exhaust ventilation system can be connected for the extraction of fume in the case of particular film processing.

See 7.2.4.

5.5 Gussetting unit

5.5.1 Fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of the nip rolls. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

5.5.2 Fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of chains, pinions and dancing rolls. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

5.6 Lane deviation unit

Fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of nip and dancing rolls where there is a motorised unit. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

5.7 Perforating and welding or cutting and welding units

5.7.1 Electro-sensitive protective equipment in accordance with EN 61496-1:2004 or fixed guards in accordance with EN 953:1997, 3.2 and/or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the accessible zones of the continuous and/or intermittent pulling nip rolls. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3. The guards shall be designed to permit quick and easy access to the unit e.g. to allow for the removal of any material stuck inside the unit. The guards shall not restrict the operators view into the unit.

5.7.2 Sharp-edged knives shall be placed in, or retracted to, a safe position when the guards are open in the zone of the sealing knives and bars. A warning label shall be provided inside the unit in order to give information about the thermal hazard.

See 7.2.6.

5.7.3 The machine shall be so designed that a local exhaust ventilation system can be connected for the extraction of fume in the case of particular film processing.

See 7.2.4.

5.8 Blocking unit

5.8.1 Pins or sharp edges shall be placed in, or retracted to, a safe position when the guards are open.

5.8.2 Fixed guards in accordance with EN 953:1997, 3.2 and/or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of moving parts. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.8.3 A fixed guard in accordance with EN 953:1997, 3.2 and/or interlocking guard in accordance with EN 953:1997, 3.5 or 3.6 shall be provided and a warning label shall be positioned on it in order to provide information about the thermal hazard from the hot parts.

See 7.2.6.

5.8.4 The machine shall be so designed that a local exhaust ventilation system can be connected for the extraction of fume in the case of particular film processing.

See 7.2.4.

5.9 Pick-up and transfer units

5.9.1 All sides from where moving parts are accessible shall be protected by design or by guards. All safety distances shall be in accordance with EN 294:1992, Table 2, 3 and 4. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.9.2 Interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 or electro-sensitive protective equipment in accordance with EN 61496-1:2004, type 2 shall be provided to prevent access to the rotating wicket arms. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.10 Stacking unit

5.10.1 Fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided on both sides. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied.

If for production reasons it is necessary to have access to the dangerous area electro-sensitive protective equipment in accordance with EN 61496-1:2004, type 2 shall be provided.

The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.10.2 Where conveyor belts composed of parallel strips are provided access to the in-running nip between the belts and the end roller at the delivery side of the conveyor shall be prevented by a fixed plate in accordance with EN 294:1992 and EN 349:1993.

5.10.3 The feed side of this unit shall be protected by design or by guards. All safety distances shall be in accordance with EN 294:1992, Table 2, 3 and 4. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.10.4 If there are pins, they shall be designed so as to minimise the risk of puncture and impact hazards. Access to the operator side of the bags and sacks take-off area shall be protected by electro-sensitive protective equipment in accordance with EN 61496-1:2004, type 2 or a pressure sensitive mat in accordance with EN 1760-1:1997, interlocked with the drive of the conveyor. The actuation of the electro-sensitive protective equipment or pressure sensitive mat shall stop the translation of the chain. All other accessible sides of the take-off area shall be protected by fixed guards in accordance with EN 953:1997, 3.2.

If puncture risks exist from falling onto dangerous pins and the pins cannot be so designed that the risk is minimised, then fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided.

5.10.5 Warning labels shall be positioned on the guards in order to provide information about the thermal hazards if heated parts are fitted.

See 7.2.6.

5.10.6 The chain return of the transport pulley shall be protected against drawing-in hazards by for example a trip bar or electro-sensitive protective equipment interlocked with the drive of the conveyor.

5.11 Punching unit

5.11.1 Fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.11.2 Warning labels shall be positioned on the guards in order to provide information about the cutting hazard and thermal hazards if heated parts are fitted.

See 7.2.6.

5.12 Folding unit

Driven nip rolls and/or powered elements which perform folding actions shall be protected by fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.13 Winding unit

Fixed guards in accordance with EN 953:1997, 3.2 and interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 shall be provided in the zone of moving parts. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.14 Labelling or taping unit

5.14.1 Access to nip rolls, if present, shall be prevented by fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

5.14.2 The cutting edge, if present, shall be protected by design or by fixed guard in accordance with EN 953:1997, 3.2.

5.15 Handle and closure units

5.15.1 Access to movable parts shall be prevented by fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 3.

5.15.2 Warning labels shall be positioned on the guards in order to provide information about the cutting hazard and thermal hazards if heated parts are fitted.

See 7.2.6.

5.16 Draw tape insertion unit

5.16.1 Access to moving parts shall be prevented by fixed guards in accordance with EN 953:1997, 3.2 or interlocking guards in accordance with EN 953:1997, 3.5 or 3.6. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

5.16.2 Warning labels shall be positioned on the guards in order to provide information about the cutting hazard and thermal hazards if heated parts are fitted.

See 7.2.6.

5.16.3 The cutting edges shall be protected by design or by fixed guards in accordance with EN 953:1997, 3.2.

5.17 Generators of electrostatic charge

If the machine is equipped with generators of electrostatic charge the bars shall be protected against unintended contact by fixed guards in accordance with EN 953:1997, 3.2 or by interlocking guards in accordance with EN 953:1997, 3.5 or 3.6. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1. If the guards are opened the bars shall discharge.

5.18 Electrostatic discharge equipment

Electrostatic discharge equipment shall be designed to be shock-proof and tested by a third party. If not it shall be protected by fixed guards in accordance with EN 953:1997, 3.2 or by interlocking guards in accordance with EN 953:1997, 3.5 or 3.6 so as to avoid contact. For interlocking guards the selection criteria of EN 1088:1995, Clause 7 shall be applied. The safety-related parts of the control system shall be in accordance with EN 954-1:1996, category 1.

See 7.2.5.

6 Verification of the safety requirements and/or protective measures

Type tests shall be used to verify the safety requirements and/or protective measures in accordance with Table 1.

Meaning of the Roman numbers in Table 1:

I) Visual inspection to check whether the system is present.

II) Functional test of the safety system on the basis of descriptions given in the information for use, safety-related plans and circuit diagrams and the requirements given in Clause 5 of this standard or the other quoted standards.

III) Measurement: use of measuring equipment for example to verify shape, dimensions, safety distance, temperature, pressure, noise, electric current etc.

IV) Design validation: checking of the relevant design documentation and circuit diagrams against the safety specifications of this standard.

Table 1 — Verification methods

Subclause	I	II	III	IV
5.2.1.1	X	X	X	X
5.2.1.2	X			X
5.2.1.3	X	X		X
5.2.2.1	X	X	X	X
5.2.2.2		X		X
5.2.2.3	X			X
5.2.3	X	X	X	X
5.2.4	X		X	X
Subclause	**I**	**II**	**III**	**IV**
5.2.5		X	X	X
5.2.6	X	X		X
5.2.7	X	X		X
5.3.1	X	X	X	X
5.3.2	X	X	X	X
5.3.3	X	X		X
5.3.4	X			X
5.4.1	X	X	X	X
5.4.2	X			
5.4.3	X			X
5.5.1	X	X	X	X
5.5.2	X	X	X	X

5.6	X	X	X	X
5.7.1	X	X	X	X
5.7.2	X	X		X
5.7.3	X			X
5.8.1	X	X		X
5.8.2	X	X	X	X
5.8.3	X	X	X	X
5.8.4	X			X
5.9.1	X	X	X	X
5.9.2	X	X	X	X
Subclause	**I**	**II**	**III**	**IV**
5.10.1	X	X	X	X
5.10.2	X		X	X
5.10.3	X	X	X	X
5.10.4	X	X	X	X
5.10.5	X			
5.10.6	X	X		X
5.11.1	X	X	X	X
5.11.2	X			
5.12	X	X	X	X
5.13	X	X	X	X
5.14.1	X	X	X	X
5.14.2	X		X	X

5.15.1	X	X	X	X
5.15.2	X			
5.16.1	X	X	X	X
5.16.2	X			
5.16.3	X		X	X
5.17	X	X	X	X
5.18	X	X	X	X

7 Information for use

7.1 Minimum marking on the machine

Machines shall be provided with markings in accordance with EN ISO 12100-2:2003, 6.4.

The machine shall be marked at least with:

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

— mandatory marking [1];

— year of manufacture;

— designation of the machinery: series or type; and

— serial or identification number.

In addition the following markings shall be placed on the machine:

a) warning labels in areas where there are cutting hazards and/or thermal hazards (where surfaces exceed the permissible limit values in EN ISO 13732-1:2006);

b) warning labels to advise of the residual risk resulting from an unexpected break of the film in the unwind unit.

7.2 Instruction manual

7.2.1 The instruction manual shall be drafted in accordance with EN ISO 12100-2:2003, 6.5.

7.2.2 Instructions shall be provided about the working procedures for start-up and/or setting of the machine where it must be done with the guards open.

7.2.3 Instructions shall be provided about the risks from processing flammable substances.

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

7.2.4 Instructions shall be provided about the locations on the machine where local exhaust ventilation systems should be connected in order to prevent fumes which are hazardous to health from being released into the working environment.

7.2.5 Instructions shall be provided about electrical energy which may be present due to electrostatic or electrical phenomena generated during unwinding and winding and caused by the electrostatic charging and/or discharging of some materials.

7.2.6 Instructions shall be provided about safety measures which have to be taken to avoid accidental contact with hot parts where surface temperatures exceed the permissible limits indicated in EN ISO 13732-1:2006, e.g. the use of personal protective equipment.

7.2.7 Instructions shall be provided about the requirements and use of personal protection equipment, for example wearing safety gloves to avoid cutting hazards.

7.2.8 Instructions shall be provided about the requirements for, and use of, hearing protection.

7.2.9 The instruction manual shall include a noise emission declaration according to A.6.

NOTE Information on noise emission should also be provided in the sales literature.

7.2.10 Instructions shall be provided about the safe loading and unloading of the reel including instructions about the maximum permissible weight and diameter of the reel and the use of appropriate lifting devices for lifting film rolls in order to eliminate stressful positions or excessive strain on the human body.

7.2.11 Instructions shall be provided about the use of the collection systems for film trim and scraps.

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 film converting machines for bags and sacks.

The determination of these quantities is necessary for:

— manufacturers to declare the noise emitted,

— comparing the noise emitted by machines in the family concerned,

— purposes of noise control at the source at the design stage.

It specifies the noise measurement methods and operating and mounting conditions for the test.

The use of this noise test code ensures the reproducibility of the measurements and the comparability of the airborne noise emission values within specified limits determined by the grade of accuracy of the basic measurement method used. Noise measurement methods allowed by this noise test code are engineering (grade 2) methods. If this is technically not possible survey (grade 3) methods may be used stating the justification for the use of such a method.

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

For all film converting machines for bags and sacks microphone positions shall be located at 1 m from the contour of the machine and at a height of 1,60 m, using one of the standards EN ISO 11201:1995, EN ISO 11202:1995 or EN ISO 11204:1995, and recording the highest value measured. There shall be at least 4 microphone positions, one on each side of the machine. For guidance see EN ISO 11200:1995.

For film converting machines for bags and sacks which are manually loaded and unloaded by an operator the determination of the A-weighted emission sound pressure level shall be carried out at all designated operators' positions defined by the manufacturer in the instruction handbook using one of the standards EN ISO 11201:1995 or EN ISO 11204:1995 with grade 2.

If it is not possible to use an engineering method (grade 2 of accuracy) a survey method (e.g. EN ISO 11202:1995) may be used stating the justification for the use of such a method.

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

The determination of the A-weighted sound power level shall be carried out using one of the standards EN ISO 3744:1995, EN ISO 3747:2000 with grade 2 or EN ISO 9614-2:1996 with grade 2.

If it is not possible to use an engineering method (grade 2 of accuracy) a survey method (e.g. EN ISO 3746:1995 or EN ISO 3747:2000 with grade 3) may be used stating the justification for the use of such a method.

When EN ISO 3744:1995 or EN ISO 3746:1995 is used the measurement surface shall be a parallelepiped and the measurement distance shall be 1 m. For guidance see EN ISO 3740:2000.

A.4 Mounting and operating conditions

The machine shall be mounted as specified/recommended by the manufacturer in the instruction manual. The following operating conditions shall be indicated:

— no material in the machine;

— maximum speed in cycles/min; and

— list of units included in the machine.

All units of the machine shall be in operation during noise measurement.

NOTE The operating conditions are specified to allow a direct comparison of the noise levels generated by different machines. In normal production conditions the noise levels generated by the machine will either be the same or be lower because the number of cycles/min will be lower.

A.5 Information to be recorded and reported

A.5.1 General

The information to be recorded and reported shall include all the data required by the basic standards used i.e. precise identification of the machine under test, acoustic environment, instrumentation, presence and position(s) of the operator(s) if any and as a minimum the data in accordance with A.5.1 to A.5.5. If there is any deviation to the test code this shall be recorded in the documentation.

The operating conditions of the machine during measurement and the methods that have been used for the measurement shall be indicated.

At least the data specified in A.5.2 to A.5.5 shall be recorded and reported.

A.5.2 General data

— type, serial number if any, year of manufacture of the machine;

— date of test, location, person in charge; and

— ambient temperature.

A.5.3 Mounting and operating conditions

— no material in the machine;

— maximum speed in cycles/min; and

— list of units included in the machine.

A.5.4 Standards

Measurement standard used.

A.5.5 Noise data

— locations of measurement positions; and

— noise emission values obtained.

A.6 Declaration and verification of noise emission values

The noise declaration shall be a dual-number declaration as defined in EN ISO 4871:1996 i.e. the measured value and the measurement uncertainty shall be indicated separately. It shall include the following:

— the value of the measured A-weighted emission sound pressure level at the operator's position where this exceeds 70 dB; where this level does not exceed 70 dB this fact shall be indicated; and

— the value of the A-weighted sound power level but only where the measured value of the A-weighted emission sound pressure level at the operator's position 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.

If undertaken the verification of declared values shall be conducted according to EN ISO 4871:1996, 6.2 by using the same mounting and operating conditions as those used for the initial determination of noise emission values.

NOTE EN ISO 4871:1996 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 film converting machines for making bags and sacks. Therefore the values of the standard deviation of reproducibility stated in the basic noise emission standards may be regarded as interim upper boundaries and used for the determination of the uncertainty K when preparing the noise declaration. Investigations requiring a joint effort of manufacturers are necessary to determine a possible lower value of the standard deviation of reproducibility which will result in a lower value of the uncertainty K. Results of such investigations will be reflected in a future version of this standard.

Annex B
(informative)

Relationship between the hazards and the safety requirements and/or protective measures

This annex shows the relationship between the hazards in Clause 4 of this document and the relevant safety requirements and/or protective measures in Clause 5 of this document.

Table B.1 — Relationship between hazards and safety requirements and/or protective measures

Hazard listed in Clause 4	Relevant safety requirements and/or protective measures dealt with in Clause 5
4.2.1.1	5.2.1.1
4.2.1.2	5.2.1.2
4.2.1.3	5.2.1.3
4.2.2.1	5.2.2.1
4.2.2.2	5.2.2.2
4.2.2.3	5.2.2.3
4.2.3	5.2.3
4.2.4	5.2.4
4.2.5	5.2.5
4.2.6	5.2.6
4.2.7	5.2.7
4.3.1	5.3.1
4.3.2	5.3.1
4.3.3	5.3.1
4.3.4	5.3.2
4.3.5	5.3.3
4.3.6	5.3.3
4.3.7	5.3.1
4.3.8	5.3.1

Hazard listed in Clause 4	Relevant safety requirements and/or protective measures dealt with in Clause 5
4.3.9	5.3.4
4.4.1	5.4.1; 5.4.2
4.4.2	5.4.3
4.5.1	5.5.1
4.5.2	5.5.2
4.6	5.6
4.7.1	5.7.1
4.7.2	5.7.2
4.7.3	5.7.3
4.8.1	5.8.1
4.8.2	5.8.2
4.8.3	5.8.3
4.8.4	5.8.4
4.9	5.9.1; 5.9.2
4.10	5.10.1; 5.10.2; 5.10.3; 5.10.4; 5.10.5; 5.10.6
4.11	5.11.1; 5.11.2
4.12	5.12
4.13	5.13
4.14	5.14.1; 5.14.2
4.15	5.15.1; 5.15.2
4.16	5.16.1; 5.16.2; 5.16.3
4.17	5.17
4.18	5.18

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/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 Machinery Directive 98/37/EC amended by Directive 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities 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, except 1.5.8 and 1.7.4 f) for what regards ultrasonic noise emission, 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.

Annex ZB
(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 one 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 Communities 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, except 1.5.8 and 1.7.4.2 u) for what regards ultrasonic noise emission, 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] EN ISO 11688-1:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

[2] EN ISO 3740:2000, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards (ISO 3740:2000)*

[3] EN ISO 11200:1995, *Acoustics - Noise emitted by machinery and equipment - Guidelines for the use of basic standards for the determination of emission sound pressure levels at a work station and other specified positions (ISO 11200:1995)*

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