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Safety of packaging machines - Part 10: General Requirements

Sicherheit von Verpackungsmaschinen - Teil 10: Allgemeine Anforderungen

Sécurité des machines d'emballage - Partie 10: Exigences générales

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Safety of packaging machines - Part 10: General Requirements

Sécurité des machines d'emballage - Partie 10: Prescriptions générales

Sicherheit von Verpackungsmaschinen - Teil 10: Allgemeine Anforderungen

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 415-10:2014) has been prepared by Technical Committee CEN/TC 146 “Packaging machines - Safety”, 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of an identical text or by endorsement, at the latest by July 2014, and conflicting national standards shall be withdrawn at the latest by July 2014.

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.

This standard is part of a series of standards comprising the following parts:

— EN 415-1, *Packaging machines safety — Part 1: Terminology and classification of packaging machines and associated equipment*;

— EN 415-2, *Packaging machines safety — Part 2: Pre-formed rigid container packaging machines*;

— EN 415-3, *Safety of packaging machines — Part 3: Form, fill and seal machines*;

— EN 415-4, *Safety of packaging machines — Part 4: Palletizers and depalletizers*;

— EN 415-5, *Safety of packaging machines — Part 5: Wrapping machines*;

— EN 415-6, *Safety of packaging machines — Part 6: Pallet wrapping machines*;

— EN 415-7, *Safety of packaging machines — Part 7: Group and secondary packaging machines*;

— EN 415-8, *Safety of packaging machines — Part 8: Strapping machines*;

— EN 415-9, *Safety of packaging machines — Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3*;

— EN 415-10, *Safety of packaging machines — Part 10: General requirements* (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

Packaging machines are used extensively in Europe in an increasingly wide range of industries. They contain several significant hazards that have the potential to cause serious injury.

This document is a Type C standard as defined in the Introduction of EN ISO 12100:2010.

The requirements of the machine specific parts of EN 415 take precedence over the requirements of EN 415-10. The requirements of the machine specific parts of EN 415 may supplement or modify the corresponding clauses of EN 415-10.

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

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.

1 Scope

This European Standard gives general requirements for packaging machines which are defined in the scope of EN 415-1 or are in the scope of another relevant machine specific part of EN 415. When used together with a relevant machine specific part of EN 415, it gives the requirements for that specific type of machine.

This document deals with safety requirements and their verification for design, construction, installation, commissioning, operation, adjustment, maintenance and cleaning of packaging machines when used as intended and under the conditions of misuse foreseeable by a manufacturer.

The extent to which hazards, hazardous situations and events are covered is indicated in Clause 4.

The hazards on a specific machine can vary depending on its working principle; the type, size and mass of the product; the packaging material; auxiliary equipment attached to the machine and the environment in which the machine is used. If the machine presents hazards that are not dealt with in this standard, the manufacturer should assess these hazards by using the principles detailed in EN ISO 12100:2010. Such deviations or additions are outside the scope of this standard.

Exclusions

This European Standard is not applicable to the following:

— machines that were manufactured before the date of publication of this document by CEN.

This standard does not consider the following:

— the risk resulting from the use of machines in public accessed areas.

NOTE For machines used in public accessed areas different or additional requirements can apply. It is the responsibility of the manufacturer to identify such additional risks, which are outside the scope of this standard or such deviating risks which arise from this specific use, and provide suitable protective measures in accordance with EN ISO 12100.

— the use of packaging machines in potentially explosive atmospheres;

— specific health, safety or hygiene hazards associated with the products that may be handled by the machines, but does include general advice on this subject;

— hazards that may be associated with decommissioning packaging machines.

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, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body*

EN 415-1, *Packaging machines safety - Part 1: Terminology and classification of packaging machines and associated equipment*

EN 415-9, *Safety of packaging machines - Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3*

EN 614-1, *Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles*

EN 614-2, *Safety of machinery - Ergonomic design principles - Part 2: Interactions between the design of machinery and work tasks*

EN 618, *Continuous handling equipment and systems - Safety and EMC requirements for equipment for mechanical handling of bulk materials except fixed belt conveyors*

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

EN 626-1:1994+A1:2008, *Safety of machinery - Reduction of risks to health from hazardous substances emitted by machinery - Part 1: Principles and specifications for machinery manufacturers*

EN 626-2, *Safety of machinery - Reduction of risk to health from hazardous substances emitted by machinery - Part 2: Methodology leading to verification procedures*

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

EN 1005-2, *Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery*

EN 1005-3, *Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation*

EN 1005-4, *Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery*

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

EN 1672-2:2005+A1:2009, *Food processing machinery - Basic concepts - Part 2: Hygiene requirements*

EN 1837, *Safety of machinery - Integral lighting of machines*

EN 12198-1, *Safety of machinery - Assessment and reduction of risks arising from radiation emitted by machinery - Part 1: General principles*

EN 12198-2, *Safety of machinery - Assessment and reduction of risks arising from radiation emitted by machinery - Part 2: Radiation emission measurement procedure*

EN 12198-3, *Safety of machinery - Assessment and reduction of risks arising from radiation emitted by machinery − Part 3: Reduction of radiation by attenuation or screening*

EN 13478, *Safety of machinery - Fire prevention and protection*

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

EN 60529:1991,[2)] *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60825-1:2007, *Safety of laser products - Part 1: Equipment classification and requirements (IEC 60825-1:2007)*

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1) This standard is impacted by the stand-alone amendment EN 60204-1:2006/A1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (EN 60204-1:2005/A1:2008)*

2) This standard is impacted by the stand-alone amendment EN 60529:1991/A1:2000, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989/A1:1999)* and EN 60529:1991/A2:2013, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989/A2:2013)*.

EN 60947-5-5, *Low voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function (IEC 60947-5-5)*

EN 61310-3, *Safety of machinery - Indication, marking and actuation - Part 3: Requirements for the location and operation of actuators (IEC 61310-3:2007)*

EN 61496-1:2004+A1:2008, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:2004, mod.)*

EN 61800-5-2:2007, *Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional (IEC 61800-5-2:2007)*

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 7010, *Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010)*

EN ISO 11553-1:2008, *Safety of machinery - Laser processing machines - Part 1: General safety requirements (ISO 11553-1:2005)*

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 13732-3:2008, *Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 3: Cold surfaces (ISO 13732-3:2005)*

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 13850, *Safety of machinery - Emergency stop - Principles for design (ISO 13850)*

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 13856-1, *Safety of machinery – Pressure-sensitive protective devices – Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO 13856-1)*

EN ISO 13856-2, *Safety of machinery – Pressure-sensitive protective devices – Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars (ISO 13856-2)*

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 14119:2013, *Safety of machinery – Interlocking devices associated with guards – Principles for design and selection (ISO 14119:2013)*

EN ISO 14122-1:2001,[3] *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, *Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways (ISO 14122-2)*

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

CLC/TS 61496-2, *Safety of machinery - Electro-sensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC/TS 61496-2)*

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

ISO 3864-1, *Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings*

ISO 3864-2, *Graphical symbols - Safety colours and safety signs - Part 2: Design principles for product safety labels*

ISO 3864-3, *Graphical symbols - Safety colours and safety signs - Part 3: Design principles for graphical symbols for use in safety signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 60204-1:2006, EN 415-1 and the following apply.

3.1
change parts
machine parts designed to handle a specific product, packaging material or pack size that are changed when the machine is set up to handle a different product, packaging material or pack size

3.2
film compensator
device which maintains a constant film tension

3.3
film reel mandrel
device which may be fixed to the machine or which is loose and which supports a reel of film

3.4
hot melt adhesive
adhesive that is solid at room temperature and which can be applied at elevated temperature

3.5
minimum distance
calculated distance between the safeguard and the hazard zone necessary to prevent a person or part of a person reaching the hazard zone before the termination of the hazardous machine function

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3) This standard is impacted by the stand-alone amendment EN ISO 14122-1:2001/A1:2010, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels — Amendment 1 (ISO 14122-1:2001/Amd 1:2010)*.

Note 1 to entry: Different minimum distances may be calculated for different conditions or approaches, but the greatest of these minimum distances is used for selecting the position of the safeguard.

3.6
modified atmosphere
atmosphere where the normal atmosphere within a package is completely or partially replaced by one or more selected gases

Note 1 to entry: Usually the objective is to extend shelf or storage life of the packaged products.

3.7
packaging material
material used to make a package

EXAMPLE Corrugated board, carton board, stretch film, paper, polypropylene.

3.8
product
substance, article, pack or group of packages with or without pallet that are handled in the packaging machine

3.9
safety distance
Safe separation distance
S_r
minimum distance that a protective structure is required to be placed from a hazard zone

3.10
safety related parts of control systems
SRP/CS
part of a control system that responds to safety-related input signals and generates safety-related output signals

Note 1 to entry: The combined safety-related parts of a control system start at the point where the safety-related input signals are initiated (including, for example, the actuating cam and the roller of the position switch) and end at the output of the power control elements (including, for example, the main contacts of a contactor).

Note 2 to entry: If monitoring systems are used for diagnostics, they are also considered as SRP/CS.

[SOURCE: EN ISO 13849-1:2008, 3.1.1]

3.11
strap
band of material, usually made from mild steel, polypropylene or polyester, which is passed around a group of products, tensioned and then sealed to hold the products together

3.12
teleservice
machine control mode where faults can be diagnosed, parameters changed and machine functions can be initiated from a remote location

Note 1 to entry: Collecting data or monitoring machine parameters is not considered as teleservice.

4 List of significant hazards

4.1 General

This clause lists all the significant hazards, hazardous situations and events that can be found on most packaging machines.

Before using this document, the manufacturer shall establish that the hazards on his machine correspond to the hazards described in this document.

4.2 Mechanical hazards

4.2.1 Moving parts

Packaging machines may incorporate moving parts which present a variety of mechanical hazards including crushing, shearing, cutting, entanglement, friction, impact, drawing-in and trapping. Some of these hazards may persist after the power supply has been cut off due to stored energy or gravity.

4.2.2 Slip, trip and fall hazards

Slip accidents can occur if liquids or solids from the machine, e.g. lubricants, packaging materials or the product, spill onto traffic routes, work stations or means of access around the machine.

Trip accidents may occur if parts of the machine protrude beyond the machine frame at low level, or if cables and pipes associated with the machine are installed without proper consideration of tripping hazards.

Falls may occur if people climb or stand on parts of the machine above floor level, e.g. for magazine loading, size changing, maintenance or cleaning.

4.2.3 Loss of stability

If packaging machines become unstable and move unexpectedly or fall over, they can cause crushing and impact injuries. Loss of stability can occur in the following circumstances:

a) while the machine is in operation, for example:

   1) if components are unbalanced;

   2) if the machine footings are unstable;

   3) if the centre of gravity of the machine is high or close to the boundary of the base area;

   4) if someone stands on the machine;

   5) when the machine is positioned on a slope;

b) while the machine is being moved, for example:

   1) if suitable lifting instructions are not provided;

   2) when the volume and shape of the machine could suggest a position of the centre of gravity different from the actual centre of gravity;

   3) on machines fitted with wheels when the machine is being moved on a slope or uneven surface.

4.2.4 Hazards from guards

Guards may present crushing, shearing and impact hazards when they open or close or are handled if they have a high mass or move under gravity or power.

4.3 Pneumatic and hydraulic equipment

Pneumatic and hydraulic equipment present crushing, shearing, ejection of parts and injection of fluids hazards. Stored energy in pneumatic or hydraulic systems may cause mechanisms to move unexpectedly

even when power supplies are disconnected. In addition, hydraulic oil and pneumatic lubricating oil may present a potential fire hazard and can contaminate products. Failure of a hose assembly can constitute a whiplash hazard.

4.4 Hazards from electrical equipment

Electrical equipment on the machine can generate a potential electric shock and burn hazard and in the presence of combustible materials, a potential fire hazard. Electrical systems can act as an ignition source in the presence of flammable substances or products which are capable of creating an explosive atmosphere.

If liquids, e.g. product spillage or cleaning agents like water, come into contact with the electrical conductors, there is a risk of electric shock.

4.5 Hazards from electrostatic phenomena

Electric shock hazards can arise if parts of the machine or materials are electrostatically charged, e.g. a plastic guide rail that is rubbed by passing products or plastic film unwinding from a reel. Electrostatic discharge can be a source of ignition in the presence of flammable substances or explosive atmospheres.

Electrostatic discharge can cause hazards for persons with inactive or active implantable medical devices.

4.6 Thermal hazards

4.6.1 Hot Surfaces

Parts of the machine, e.g. sealing mechanisms and drive motors, which have a high surface temperature, may cause burning hazards.

The burning hazard will usually continue to exist for a period of time after power has been disconnected.

4.6.2 Cold surfaces

Parts of the machine or products, e.g. on packaging machines for frozen product, which have a very low surface temperature, may cause burning hazards.

The frostbite hazard will usually continue to exist for a period of time after power has been disconnected.

4.7 Noise

Noise generated by packaging machines can result in:

— permanent hearing loss;

— tinnitus;

— fatigue, stress, etc.;

— other effects such as loss of balance, loss of awareness;

— interference with speech communication;

— inability to hear acoustic warning signals.

4.8 Radiation

Some packaging machines incorporate sources of radiation that may give rise to hazards. For example: