SLOVENSKI STANDARD
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Pakirne naprave - Varnost pakirnih naprav - 2. del: Pakirni stroji za vlaganje v pripravljeno predoblikovano embalažo

Packaging machines safety - Part 2: Pre-formed rigid container packaging machines

Sicherheit von Verpackungsmaschinen - Teil 2: Verpackungsmaschinen für vorgefertigte formstabile Packmittel

Sécurité des machines d'emballages - Partie 2: Machines d'emballage pour contenants rigides préformés

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EUROPEAN STANDARD
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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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FOREWORD

This European Standard 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of an identical text or by endorsement, at the latest by June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

This European Standard 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 standard.

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

0. INTRODUCTION

This European Standard is a type 'C' standard as stated in EN1070: 1998. The machinery concerned and the extent to which hazards are covered are indicated in the scope of this standard.

It is the intention of this standard to allow innovative safety systems which can provide the equivalent or a greater degree of protection.

This standard is one of a series of 'C' standards relating to the safety of packaging machines. These standards include:

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

EN 415-3: Packaging machines safety - Form, fill and seal machines

EN 415-4: Packaging machines safety - Palletisers and depalletisers

1. SCOPE

This standard specifies the safety requirements for the design and manufacture of pre-formed rigid container packaging machinery and the information that should be made available to the user of these machines.

All the significant hazards (see clause 4) arising from the machines included in this part of the standard are covered except for hazards associated with ancillary equipment for evacuating gases, cooling/refrigeration equipment associated with packaging machines, steam services supplying packaging machines, substances being filled (see annex C for guidance), hygiene principles (see annex D for guidance) and substances for cleaning/sterilising (see annex E for guidance).

The following machines are included:

- Filling machines (other than cask, keg and barrel filling machines)
- Capping, closing and sealing/seaming machines
- Container cleaning machines (other than cask, keg and barrel cleaning machines)
- In-line and rotary rinsing and air cleaning machines
- Labelling, decorating, coding and marking machines
- Decapping/unscrewing machines
- Inspection and ejection machines
- Machines that apply wiring to secure stoppers in bottles
- Machines which rinse, inspect, fill, seal and label containers
- Keg and cask turning, pushing, cleaning and filling machines (but not multi-lane plants)
- Packing, unpacking and unscrambling machines
- Unpressurised pasteurisers and back-cooling machines
- Vertical and horizontal sterilising machines

For information, schematic drawings showing typical combinations of rigid container packaging machines for beverages are included (see Figures 1, 2 and 3).

The following machines are not included:

- Aerosol Filling and Sealing
- Multi-lane Kegging plants
- Conveyor systems which link packaging machines (they are dealt with by prEN 617, prEN 618, prEN 619, prEN 620 and prEN 741)

Before this standard is used a hazard identification and risk assessment shall be carried out to check that the hazards for the machine to be designed are the same as those identified in this standard.

This standard applies to machines which are manufactured after the date of issue of this standard.

2. NORMATIVE REFERENCES

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1: 1991	Safety of machinery Basic concepts, general principles for design Part 1: Basic terminology, methodology
EN 292-2: 1991	Safety of machinery Basic concepts, general principles for design Part 2: Technical principles and specifications
EN 294: 1992	Safety of machinery Safety distances 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 415-1: 1999	Packaging machines safety Part 1: Terminology and classification of packaging machines and associated equipment
EN 418: 1992	Safety of machinery Emergency stop equipment; functional aspects - Principles for design
EN 457: 1992	Safety of machinery Auditory danger signals - General requirements, design and testing
EN 563: 1994	Safety of machinery Temperature of touchable surfaces - Ergonomic data to establish temperature limit values for hot surfaces
EN 574: 1996	Safety of machinery Two hand control devices – Functional aspects – Principles for design
EN 614-1: 1995	Safety of machinery Ergonomic design principles. Part 1: Terminology and general principles.
EN 626-1: 1994	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: 1996	Safety of machinery Reduction of risks to health from hazardous substances emitted by machinery - Part 2: Methodology leading to verification procedures
EN 811: 1996	Safety of machinery Safety distances to prevent danger zones being reached by the lower limbs
EN 842: 1996	Safety of machinery Visual danger signals - General requirements, design and testing

EN 894-1: 1997	Safety of machinery Ergonomics 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	Safety of machinery Ergonomics requirements for the design of displays and control actuators Part 2: Displays
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 982: 1996	Safety of machinery Safety requirements for fluid power systems and their components Hydraulics
EN 983: 1996	Safety of machinery Safety requirements for fluid power systems and their components Pneumatics
EN 999: 1998	Safety of machinery – The positioning of protective equipment in respect of approach speed of parts of the human body
prEN 1005-1:1993	Safety of machinery Human physical performance Part 1: Terms and definitions
prEN 1005-2:1993	Safety of machinery Human physical performance Part 2: Manual handling of machinery and component parts of machinery
EN 1037: 1995	Safety of machinery Prevention of unexpected start-up
EN 1050: 1996	Safety of machinery Principles for risk assessment
EN 1070:1998	Safety of machinery Terminology
EN 1088: 1995	Safety of machinery Interlocking devices associated with guards - Principles for design and selection
EN 1093-1:1998	Safety of machinery Evaluation of the emission of airborne hazardous substances Part 1: Selection of test methods
EN 1127-1: 1997	Explosive atmospheres – Explosion prevention and protection Part 1: Basic concepts and methodology
EN 1672-2: 1997	Food processing machinery Basic concepts Part 2: Hygiene requirements

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

prEN 1760-2:1996 Safety of machinery
Pressure sensitive protective devices
Part 2: General principles for the design and testing of pressure sensing edges and pressure sensitive bars

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

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

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 level at the work station and at other specified positions (ISO 11200:1995)

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

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)

ISO EN 11689: 1996 Acoustics
Procedure for the comparison of noise emisssion data for machinery and equipment (ISO 11689: 1996)

ISO EN 11690-1: 1996 Acoustics
Recommended practice for the design of low noise workplaces containing machinery
Part 1: Noise control strategies (ISO 11690-1: 1996)

ISO EN 11690-2: 1996 Acoustics
Recommended practice for the design of low noise workplaces containing machinery
Part 2: Noise control measures (ISO 11690-2: 1996)

prEN 12198-1: 1995 Safety of machinery
Assessment and reduction of risks arising from radiation emitted by machinery
Part 1: General principles

prEN 12437-1: 1996 Safety of machinery
Safety by means of permanent means of access to machines and industrial plant
Part 1: Choice of a fixed means of access between two levels

prEN 12437-2: 1996	Safety of machinery Safety by means of permanent means of access to machines and industrial plant Part 2: Fixed ladders with or without safety cages and means of barring access to such
prEN 12437-3: 1996	Safety of machinery Safety by means of permanent means of access to machines and industrial plant Part 3: Stairways, stepladders and guard rails
prEN 12437-4: 1996	Safety of machinery Safety by means of permanent means of access to machines and industrial plant Part 4: Working platforms and gangways
EN 50014: 1998	Electrical apparatus for potentially explosive atmospheres General requirements
EN 61310-1: 1995	Safety of machinery Indication, marking and actuation Part 1: Requirements for visual, auditory and tactile signals
EN 61310-2: 1995	Safety of machinery Indication, marking and actuation Part 2: Requirements for marking
EN 60079-10: 1996	Electrical apparatus for explosive gas atmospheres: Part 10: Classification for hazardous areas
EN 60204-1: 1992	Safety of machinery – Electrical equipment of machines – Specification for general requirements
EN 60529:1992	Specification for degrees of protection provided by enclosures (IP code)
EN 60825-1: 1994	Safety of laser products Part 1: Equipment classification, requirements and user's guide
EN 61496-1:1996	Safety of machinery Electro-sensitive protective equipment Part 1: General requirements and test
prEN 61496-2:1996	Safety of machinery Electro-sensitive protection equipment Part 2: Opto-electronic devices

3. DEFINITIONS

For the purpose of this standard the following definitions apply, in addition to those given in EN 1070 and clause 6 of EN 415-1:

3.1 pre-formed rigid containers: Pre-formed rigid containers in this standard include bottles, cans, cups, jars, pots, ampoules, vials, kegs, casks and barrels. The containers may be made of glass, metal, plastics, fibreboard, wood, ceramic material or composite materials. The containers are not usually manufactured by the machine itself, but may be, and can be sealed by a seamed end, cap, cork, foil lid or similar, or a combination of these.

3.2 pre-formed rigid container packaging machines: Machines which pack liquid, cream, paste, powder, free flowing solid or thixotropic substances in pre-formed rigid containers and machines which sort, invert , clean, inspect, pasteurise, sterilise and label these containers. These include machines which clean, sort, load and unload filled or empty containers into cases or crates.

3.3 carousel: Rotating machine element which locates and transports containers through one or more processes in a packaging machine (e.g. see Figure 10)

3.4 counterpressure filling: Container filling where the container is presented to a filling nozzle and first filled with gas (usually carbon dioxide or nitrogen) under pressure. The gas is then displaced by the product being filled.

3.5 walking beam: Moving machine element for indexing containers through one or more processes in a packaging machine (e.g. see Figure 9)

3.6 lifting pedestal: Plate or base on which a container temporarily stands during its passage through the processing stations of some types of packaging machine. The lifting pedestal is attached and activated by a lifting cylinder (e.g. see Figure 9)

3.7 lifting cylinder: Mechanically, pneumatically or hydraulically operated cylinder for lifting a container, which stands on the lifting pedestal, up to the processing head of a packaging machine (e.g. see Figure 9)

3.8 linear labeller: Machine on a conveying system so that containers are labelled as they are transported along a packaging line

3.9 rotary labeller: Machine which places labels onto containers as they are positioned by a carousel.

3.10 oscillating label magazine: Label magazine which oscillates back and forward about a fixed point or pivot.

3.11 roll through labeller: Machine in which the container is rolled across a flat surface by a moving belt picking up the label as it rotates.

4. LIST OF SIGNIFICANT HAZARDS

There are a wide range of packaging machines and the types of the containers they handle. The hazards on a particular machine can vary depending on the product being packed, the pack size, the packaging materials being used, the use of modified packing atmospheres, the use of sterilising agents, the environment in which the machine is sited, etc. Consequently, not all of the hazards associated with a particular pre-formed rigid container packaging machine may be covered by this standard (see scope). It is therefore necessary that the results of the designer's risk assessment are checked against the hazards listed in this clause.

Hazards which are common to more than one type of machine included in this standard are dealt with in 4.1. Hazards which are machine specific are additionally covered in 4.2.

4.1 Common Hazards

4.1.1 Mechanical hazards

The machines covered by this standard exhibit a wide range of mechanical hazards (see examples below), many of which occur in combination because of essential functional design.

4.1.1.1 **Crushing hazards** may exist at container transferring mechanisms,

e.g.
- between the scroll and the container
- between the container and fixed guides (e.g. see Figure 4)
- on gripping heads of packing/unpacking machines

4.1.1.2 **Shearing hazards** may exist where fixed and moving machine parts run close together,

e.g.
- cam tracks on filling machines (e.g. see Figure 5)
- between lifting devices and machine columns

4.1.1.3 **Cutting and severing hazards** may exist at moving parts with sharp edges,

e.g. - cutting tools on labelling and decorating machines

4.1.1.4 **Entanglement hazards** may exist at rotating machine elements

e.g. - rotary carousels of filling and labelling machines
- starwheels
- machine drive shafts
- infeed guides and transferring scrolls

4.1.1.5 **Drawing in or trapping hazards** may exist on machines where at least one part is movable, creating a situation which can lead to the drawing in of human extremities or parts of clothes,

e.g. - rotating machine elements on filling machines (see Figures 4 & 5)
- between transferring heads of packing/unpacking machines and fixed machine parts

4.1.1.6 **Impact hazards** may exist where machine parts or containers transferred by the machine come into dangerous contact with the human body,

e.g. - ejection devices of inspection machines
- moving machine elements such as container transferring bars
- machine transferred containers

4.1.1.7 **Stabbing or puncture** hazards may exist at filling and cleaning stations where the nozzle enters a container,

e.g. - at the filling nozzle and the cleaning nozzle

4.1.1.8 **Friction or abrasion hazards** may exist wherever a drive belt or a belt conveyor is used, e.g. at a roll through labeller

4.1.1.9 **High pressure fluid ejection hazards** may exist where liquids, e.g. cleaning agents, are used.

e.g. on - the inspection points of cleaning machines
- the high pressure nozzles of some filling machines
- Cleaning-in-place (CIP) and/or Sanitizing-in-place (SIP) plants