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Varnost pakirnih strojev - 4. del: Stroji za nakladanje in razkladanje palet ter pripadajoča oprema

Safety of packaging machines - Part 4: Palletizers and depalletizers and associated equipment

Sicherheit von Verpackungsmaschinen - Teil 4: Palettierer und Depalettierer und zugehörige Ausrüstungen

Sécurité des machines d'emballage - Partie 4 : Palettiseurs et dépalettiseurs et équipement associé

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ICS:

55.200 Pakirni stroji Packaging machinery

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Safety of packaging machines - Part 4: Palletizers and depalletizers and associated equipment

Sécurité des machines d'emballage - Partie 4 :
Palettiseurs et dépalettiseurs et équipement associé

Sicherheit von Verpackungsmaschinen - Teil 4:
Palettierer und Depalettierer und zugehörige
Ausrüstungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 146.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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prEN 415-4:2021 (E)**European foreword**

This document (prEN 415-4:2021) has been prepared by Technical Committee CEN/TC 146 “Packaging machines - Safety”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 415-4:1997.

The main changes compared to the previous edition are listed below:

- palletizers and depalletizers that incorporates industrial robots and multi-stations palletizing systems have been added to the scope;
- safety requirements have been rewritten so they are in line with EN 415-10:2014;
- normative references have been changed to reflect the current B1 and B2 standards;
- the performance level required PLr (defined by EN ISO 13849-1:2015) is specified for the safety related parts of control system.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2006/42/EC.

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

This document is part of the series EN 415, *Safety of packaging machines*, which consists of the following parts:

- *Part 1: Terminology and classification of packaging machines and associated equipment;*
- *Part 2: Pre-formed rigid container packaging machines;*
- *Part 3: Form, fill and seal machines; fill and seal machines;*
- *Part 5: Wrapping machines;*
- *Part 6: Pallet wrapping machines;*
- *Part 7: Group and secondary packaging machines¹;*
- *Part 8: Strapping machines;*
- *Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3;*
- *Part 10: General requirements.*

¹ EN 415-7:2006+A1:2008 is currently being revised with a new title: “Cartooning and Case-packing machines”.

Introduction

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the abovementioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);

The above-mentioned stakeholder groups have been given the possibility to participate in the process of drafting this document.

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

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

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

The full set of requirements for machines in the scope of this document are those given in this document EN 415-4 applicable to that type, together with the relevant requirements from EN 415-10:2014.

As far as possible in EN 415-4 safety requirements are referenced to the relevant clauses of EN 415-10:2014 to avoid repetition and reduce their length.

EN 415-10:2014 applies when this document does not provide requirements.

Therefore, this document EN 415-4 is intended to be used in conjunction with EN 415-10:2014.

When a requirement of EN 415-4 differs from a requirement of EN 415-10:2014, the requirement of EN 415-4 will prevail.

When a machine covered by EN 415-4 incorporates functions described by other standards of the EN 415 series, those functions are expected to comply with those standards.

EXAMPLE 1 In the case of a palletizer which incorporates cartoning mechanisms, the palletizing mechanisms are expected to comply with EN 415-4 and the cartoning mechanisms are expected to comply with EN 415-7:2006+A1:2008.

EXAMPLE 2 In the case of a palletizer which incorporates a pallet wrapping mechanism, the palletizing mechanisms are expected to comply with EN 415-4 and the pallet wrapping mechanisms are expected to comply with EN 415-6.

Annex ZA of this document will not list the EHSR of Annex I of the Machinery Directive which are completely covered by EN 415-10:2014.

Annex ZA of this document will not list the EHSR which are not relevant for this kind of machines or are not covered for any other reason.

prEN 415-4:2021 (E)**1 Scope**

This document applies to the following groups of machines, auxiliary equipment and their combinations:

- palletizers;
- depalletizers;
- auxiliary equipment incorporated in or linked to the operations of palletizers and depalletizers;
- conveying systems which are part of palletizers or depalletizers;
- palletizers combined with functions of machines which are covered by other parts of EN 415, but detailed requirements are only provided for palletizing functions.

The individual machines are described in 3.2. Auxiliary equipment is described in 3.3.

This document deals with safety requirements for machine design, transport, installation, commissioning, operation, adjustment, maintenance and cleaning of palletizers, depalletizers, auxiliary equipment and conveying systems which are part of palletizer or depalletizer. The extent to which hazards, hazardous situations and events are covered is indicated in Annex B.

Exclusions:

This document is not applicable to the following machines:

- machines that were manufactured before the date of publication of this document by CEN;
- conveyors that connect palletizers and depalletizers with machines that are not in the scope of this document.

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Conveyors in the scope of this document also fall in the scope of EN 619:2002+A1:2010, however, this document describes the additional or specific hazards for conveyors fitted into palletizers and depalletizers and so the requirements of this document take precedence over the requirements of EN 619:2002+A1:2010.

This document does not consider the following hazards:

- the use of palletizers and depalletizers in a potentially explosive atmosphere;
- the health, safety or hygiene hazards associated with the products that are contained in the unit load handled by palletizers and depalletizers except for the spillage of hazardous substances caused by the malfunction of as machine.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 415-1:2014, *Safety of packaging machines - Part 1: Terminology and classification of packaging machines and associated equipment*

EN 415-7:2006+A1:2008, *Safety of packaging machines - Part 7: Group and secondary packaging machines*

EN 415-9:2009, *Safety of packaging machines - Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3*

EN 415-10:2014, *Safety of packaging machines - Part 10: General Requirements*

EN 795:2012, *Personal fall protection equipment - Anchor devices*

EN 1005-3:2002+A1:2008, *Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation*

EN 13155:2020, *Crane - Safety - Non-fixed load lifting attachments*

EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

EN 61496-1:2013, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests*

EN 61496-2:2013, *Safety of machinery - Electro-sensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs)*

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 7010:2020, *Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010:2019, Corrected version 2020-06)*

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EN ISO 10218-1:2011, *Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots (ISO 10218-1:2011)*

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EN ISO 10218-2:2011, *Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration (ISO 10218-2:2011)*

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

EN ISO 13849-1:2015, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13850:2015, *Safety of machinery - Emergency stop function - Principles for design (ISO 13850:2015)*

EN ISO 13851:2019, *Safety of machinery - Two-hand control devices - Principles for design and selection (ISO 13851:2019)*

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 13856-2:2013, *Safety of machinery - Pressure-sensitive protective devices - Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars (ISO 13856-2:2013)*

EN ISO 13857:2019, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

EN ISO 14122-2:2016, *Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways (ISO 14122-2:2016)*

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EN ISO 14122-3:2016, *Safety of machinery - Permanent means of access to machinery - Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 415-1:2014, EN 415-10:2014, Clause 3, EN ISO 12100:2010, Clause 3 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 Definitions**3.1.1****palletize**

place one or more products on a pallet, a similar support or on the floor

3.1.2**depalletize**

separate a palletized load into individual products

3.1.3**layer**

arrangement of products in a horizontal plane

3.1.4**layer pad****layer sheet****intermediate layer**

sheet of material used to stabilize a pallet load

[SOURCE: EN 415-1:2014, 3.15.39]

3.1.5**layer pattern**

disposition of the products in a layer

3.1.6**pallet**

rigid horizontal platform designed to be handled by pallet trucks, fork-lift trucks or other appropriate handling equipment, and used as a base for assembling, loading, storing, handling, stacking, transporting, or displaying goods and loads

Note 1 to entry: The pallet may be constructed with, or fitted with, a superstructure.

3.1.7**pallet load**

arrangement of products placed on a pallet or slip sheet

3.1.8**porous vacuum plate**

plate made of porous material which holds a product by means of a vacuum

3.1.9**row**

horizontal line of products

3.1.10**slip sheet**

thin flat piece of material used to support a pallet load

3.1.11**stack**

vertical column of products or pallets

3.1.12**integrator**

entity who designs, provides, manufactures or assembles an integrated manufacturing system and is in charge of the safety strategy, including the protective measures, control interfaces and interconnections of the control system

Note 1 to entry: The integrator may be a manufacturer, engineering company or the user.

3.1.13**integrated palletizing system**

assembly of machines designed to palletize or depalletize pallet loads

3.1.14**ESPE****electro-sensitive protective equipment**

assembly of devices and/or components working together for protective tripping or presence-sensing purposes and comprising as a minimum:

- a sensing device
- controlling/monitoring device
- output signal switching device and/or a safety-related data interface

3.1.15**AOPD****active opto-electronic protective device**

device whose sensing function is performed by opto-electronic emitting and receiving elements detecting the interruption of optical radiation generated, within device, by an opaque object present in the specified detection zone for a light beam device, on the axis of the light beam

3.1.16**AOPDDR****active opto-electronic protective device responsive to diffuse radiation**

device, whose sensing function is performed by optoelectronic emitting and receiving elements, that detect the diffuse reflection of optical radiation generated within the device by an object present in a detection zone specified in two dimensions

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prEN 415-4:2021 (E)**3.2 Definitions of palletizers and depalletizers****3.2.1 General**

This clause describes the working principles of typical configurations of palletizers and depalletizers. Variations of these typical assemblies also exist.

3.2.2**semi-automatic stripper plate palletizer**

palletizer in which an operator forms the products into the layer pattern on a stripper plate manually and then presses a start button

3.2.3**automatic low-level stripper plate palletizer or depalletizer**

palletizer in which layers of products are formed at low or high level, is then transferred onto a stripper plate which raises or lowers to the appropriate level and transfers the layers onto the pallet

3.2.4**automatic high-level palletizer or depalletizer**

palletizer in which layers of packages are formed at one level usually a high level and transferred onto the pallet which is raised and then lowered as the pallet load forms

Note 1 to entry: A depalletizer operates in reverse.

3.2.5**pick and place palletizer or depalletizer (gantry type)**

palletizer in which products are gripped, lifted, transferred to the loading position and then lowered onto the pallet load with linear movements and a rotation of the end effector

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3.2.6**pick and place palletizer or depalletizer (column type)**

pick-and-place palletizer in which the product lifting device is supported on a column and can move up and down the column or rotate around the column

Note 1 to entry: A rotation of the end effector may also exist.

Note 2 to entry: Column palletizers can pick up products one at a time, or in groups. Products are typically conveyed to the machine at low level but sometimes at high level.

3.2.7**stack palletizer**

palletizer which creates stacks of packages, e.g. crates which are then transferred to the pallet as a group

3.2.8**robot palletizer and depalletizer**

palletizer or depalletizer which uses an industrial robot to perform some or all sequential operations for palletizing or depalletizing products

Note 1 to entry: Robot palletizers can pick up products one at a time, or in groups. In some installations the robot also positions the pallet or the layer pads.

3.2.9**case-packer-palletizer**

machine which combines the operations of case-packing and palletizing in one machine

3.2.10**linear multi-station palletizing system**

palletizer in which two or more pallet or pallet loads are positioned in a row on the ground for palletizing or depalletizing and pallets and pallets loads are delivered to and removed from the machine using an industrial truck

Note 1 to entry: The industrial truck can be a conventional fork-lift truck, a manually operated pallet truck or remote-controlled self-propelled work equipment.

3.3 Definition of auxiliary equipment**3.3.1 General**

This clause describes the working principle of typical types of auxiliary equipment used in palletizers and depalletizers.

3.3.2**mechanical gripping head**

assembly of mechanical components which hold products, a set of products, an empty pallet or layer pads using one of the following methods:

- a) positive support, e.g. the product is supported by a plate or hooks
- b) friction between fingers or plates and the load
- c) friction between the products that make up the load
- d) friction or positive support by inflatable elements

3.3.3**vacuum gripping head**

gripping head which uses vacuum to hold products or layer pads

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Note 1 to entry: The mechanism will typically comprise several suction cups or a porous vacuum plate.

3.3.4**magnetic gripping head**

gripping head which uses electromagnetic force to lift products made from magnetic material, e.g. tin-plated mild steel cans

3.3.5**gripping head with roller curtain**

mechanism comprising a set of free running rollers supported by two chains which receives and supports a layer of products; the mechanism is then lifted and moved over a pallet where the roller curtain is retracted leaving the products on the pallet

3.3.6**pallet stacker/ unstacker**

machine which dispenses empty pallets from a stack or accepts single empty pallets and places them in a stack

3.3.7**pallet changer**

machine which removes a pallet load from a pallet so that it can be placed on another pallet