

Safety of packaging machines

Part 4. Palletizers and depalletizers

The European Standard EN 415-4 : 1997 has the status of a British Standard

ICS 55.200

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- Association of the British Pharmaceutical Industry
- Brewers and Licensed Retail Association
- British Robot Association
- British Soft Drinks Association Limited
- Dairy Industry Federation
- Food and Drink Federation
- Health and Safety Executive
- Liquid Food Carton Manufacturers' Association
- Processing and Packaging Machinery Association
- Scotch Whisky Association
- Trades Union Congress

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National foreword

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Cross-references

Publication referred to	Corresponding British Standard
	BS EN 292 <i>Safety of machinery — Basic concepts, general principles for design</i>
EN 292-1 : 1991	Part 1 : 1991 <i>Basic terminology, methodology</i>
EN 292-2 : 1991	Part 2 : 1991 <i>Technical principles and specifications</i>
EN 294 : 1992	BS EN 294 : 1992 <i>Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs</i>
EN 349 : 1992	BS EN 349 : 1993 <i>Safety of machinery — Minimum gaps to avoid crushing of parts of the human body</i>
EN 418 : 1992	BS EN 418 : 1992 <i>Safety of machinery — Emergency stop equipment, functional aspects — Principles for design</i>
	BS EN 614 <i>Safety of machinery — Ergonomic design principles</i>
EN 614 : 1995	Part 1 : 1995 <i>Terminology and general principles</i>
EN 774 : 1996	BS EN 774 : 1996 <i>Garden equipment — Hand held, integrally powered hedge trimmers — Safety</i>
EN 982 : 1996	BS EN 982 : 1996 <i>Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics</i>
EN 983 : 1996	BS EN 983 : 1996 <i>Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics</i>
EN 1037 : 1995	BS EN 1037 : 1996 <i>Safety of machinery — Prevention of unexpected start-up</i>
EN 1050 : 1996	BS EN 1050 : 1997 <i>Safety of machinery — Principles for risk assessment</i>
ENV 1070 : 1993	DD ENV 1070 : 1993 <i>Safety of machinery — Terminology</i>
EN 1088 : 1995	BS EN 1088 : 1996 <i>Safety of machinery — Interlocking devices associated with guards — Principles for design and selection</i>
	BS EN 60204 <i>Safety of machinery — Electrical equipment of machines</i>
EN 60204-1 : 1992	Part 1 : 1993 <i>Specification for general requirements</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 28, an inside back cover and a back cover.

ICS 55.200

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English version

Safety of packaging machines — Part 4: Palletizers and depalletizers

Sécurité des machines d'emballage —
Partie 4: Palettiseurs et dépalettiseurs

Sicherheit von Verpackungsmaschinen —
Teil 4: Palettierer und Depalettierer

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European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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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 September 1997, and conflicting national standards shall be withdrawn at the latest by September 1997.
EN 415 consists of the following Parts under the general title *Safety of packaging machines*.

- Part 1 *Terminology and classification of packaging machines and associated equipment*
- Part 2 *Preformed rigid container packaging machines*
- Part 3 *Form, fill and seal machines*
- Part 4 *Palletizers and depalletizers*

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).
The annex A is normative.
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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

1 Scope

This standard specifies the safety requirements for the design, manufacture and information for safe use of palletizers, depalletizers, and stackers/unstackers of empty pallets integrated or not into a (de)palletizer as defined in 3.1. In many respects palletizers and depalletizers present the same risks. In this text they are referred to together as (de)palletizers.

For manipulating industrial robots used in (de)palletizer applications this standard and EN 775 apply.

These safety requirements apply to automatic and semi-automatic (de)palletizers. They take into account the hazards which may occur during setting, commissioning and decommissioning, adjustment, use according to the information given by the manufacturer, maintenance (both preventive and repair) and cleaning.

This standard does not cover the following hazards which can occur on (de)palletizers in certain circumstances:

- heat;
- noise;
- radiation;
- fumes, gas, dust;
- vibration;
- ergonomics (see EN 614-1 : 1995).

Furthermore this standard does not cover hazards arising from contents of the load (e.g. toxic or flammable materials).

Linked equipment, before and after the (de)palletizer, which is not an integral part of (de)palletizing machinery, (for example pallet load securing) is not covered by this standard. This standard applies primarily to the machines which are manufactured after the date of issue of the 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	<i>Safety of machinery — Basic concepts, general principles for design</i> <i>Part 1: Basic terminology, methodology</i>
EN 292-2 : 1991	<i>Safety of machinery — Basic concepts, general principles for design</i> <i>Part 2: Technical principles and specifications</i>
EN 294 : 1992	<i>Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs</i>
EN 349	<i>Safety of machinery — Minimum gaps to avoid crushing of parts of the human body</i>
EN 418	<i>Safety of machinery — Emergency stop equipment, functional aspects — Principles for design</i>
EN 614-1 : 1995	<i>Safety of machinery — Ergonomic design principles —</i> <i>Part 1: Terminology and general principles</i>
prEN 619 : 1991	<i>Continuous handling equipment and systems — Equipment for mechanical handling of unit loads only — Special safety requirements for design, manufacturing, erections and commissioning stages</i>
EN 775 : 1992	<i>Manipulating industrial robots — Safety (ISO 10218 : 1992, modified)</i>
prEN 953 : 1992	<i>Safety of machinery — General requirements for the design and construction of guards (fixed, movable)</i>
prEN 954-1 : 1992	<i>Safety of machinery — Safety related parts of control systems —</i> <i>Part 1: General principles for design</i>
prEN 982 : 1996	<i>Safety requirements for fluid power systems and components — Hydraulics</i>
prEN 983 : 1996	<i>Safety requirements for fluid power systems and components — Pneumatics</i>
prEN 999 : 1993	<i>Safety of machinery — Hand/arm speed — Approach speed of parts of the body for the positioning of safety devices</i>
EN 1037	<i>Safety of machinery — Prevention of unexpected start-up</i>
EN 1050 : 1993	<i>Safety of machinery — Risk assessment</i>
ENV 1070	<i>Safety of machinery — Terminology</i>
EN 1088 : 1995	<i>Safety of machinery — Interlocking devices associated with guards — Principles for design and selection</i>

prEN 50100-1 : 1994	<i>Safety of machinery — Electrosensitive protective equipment — Part 1: General requirements and tests</i>
EN 60204-1 : 1992	<i>Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 204-1 : 1992, modified)</i>

3 Definitions and functional grouping of (de)palletizers

3.1 Definitions

For the purposes of this standard, the following definitions apply in conjunction with those terms defined in EN 292 and ENV 1070.

3.1.1 normal operation

Automatic or semi-automatic operation of the machine, including routine adjustment and refilling (e.g. layer sheet dispensers, glue reservoirs), but excluding maintenance.

3.1.2 Types of load

3.1.2.1 unit load

Smallest indivisible unit in the palletizing or depalletizing operation (for example: box, bottle, crate sack)

3.1.2.2 pallet load

The whole of the layers or stacks destined to be placed on the pallet or other support.

NOTE.1. If the load is not placed on a pallet or other support, for the purposes of this standard, the load is considered as a pallet load.

NOTE.2. The pallet load can include some binding elements (spacers - gluing of unit loads, etc.) which are part of the pallet load.

3.1.2.3 palletized load

Assembly of the pallet load, and of the pallet or other support.

NOTE. If there is no pallet or other support, it is the pallet load and its possible means for binding which are equivalent to the palletized load.

3.1.2.4 layer layout

Simple or overlapped disposition of the unit loads in one layer.

3.1.2.5 simple layer

Layer consisting of unit loads disposed in the same direction.

3.1.2.6 overlapped layer

Layer consisting of unit loads disposed in part longitudinally, in part laterally.

3.1.2.7 crossed layers; bonded layers

Pallet load consisting of layers of different layer layouts to reinforce the binding effect (for example, the same palletizing layouts turned through 90° or 180° relative to each other).

3.1.2.8 pallet

A rigid horizontal platform of minimum height compatible with handling by pallet trucks, and/or fork lift trucks and other appropriate handling equipment, used as a base for assembling, stacking, storing, handling and transporting goods and loads. It may be constructed with, or fitted with, a superstructure.

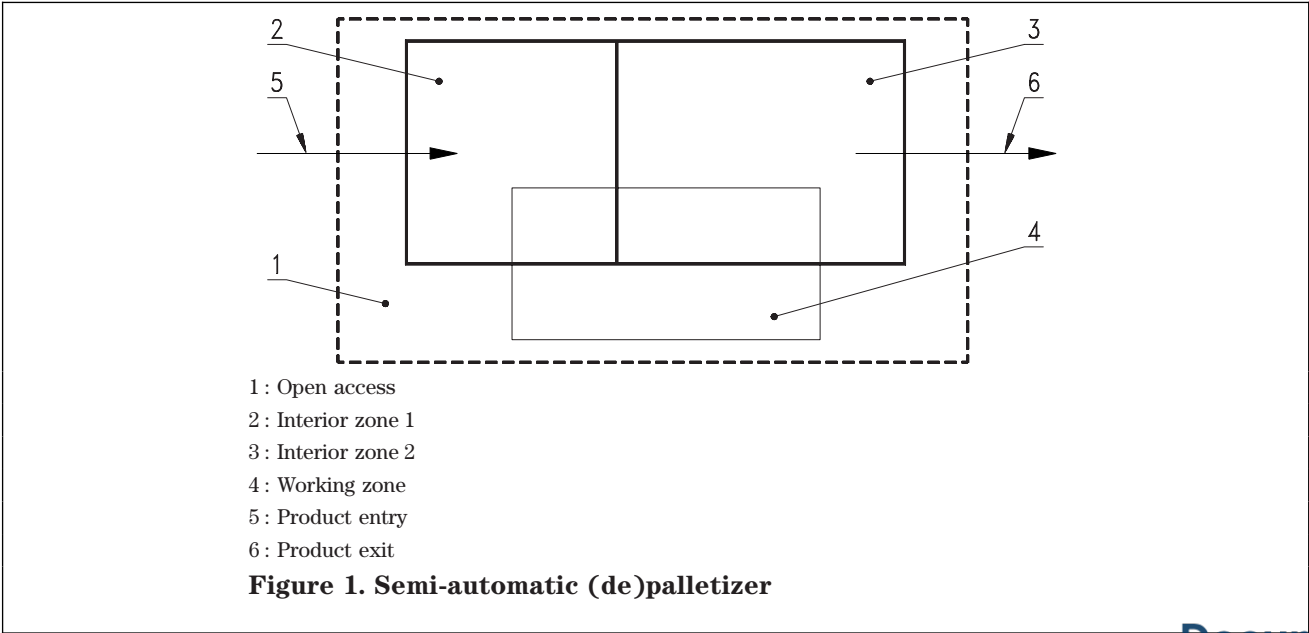
[ISO/DIS 445 : 1994]

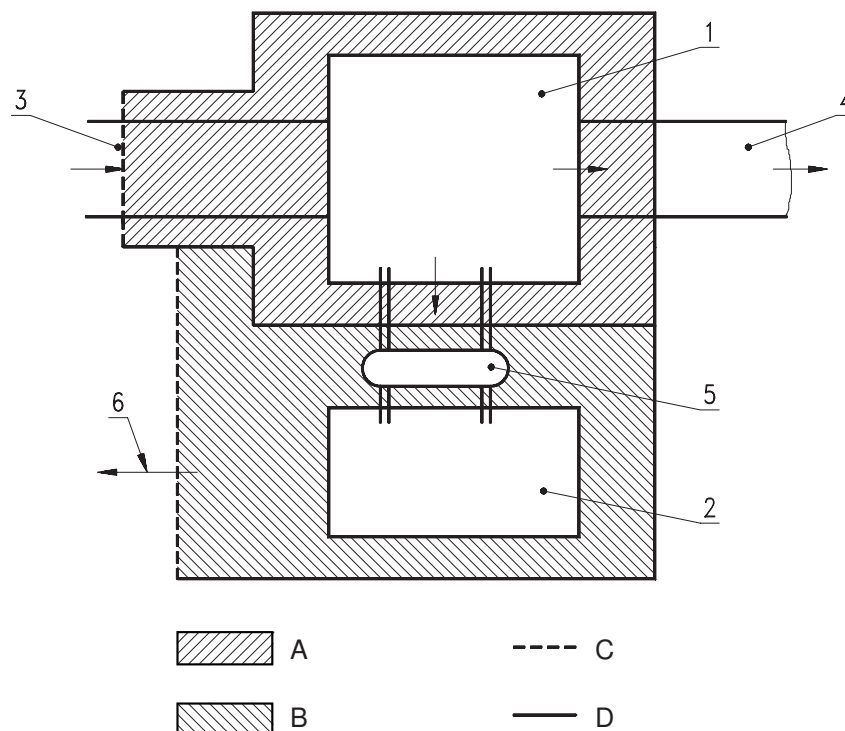
3.1.3 Zones

3.1.3.1 interior zone

Zone defined by the boundaries of the machine safeguards and, if applicable, the machine structure (see figures 1 and 2).

NOTE. The concept is addressed in 5.2.





- 1: Depalletizer
- 2: Empty pallet stacker
- 3: Pallet loads conveyor
- 4: Unit load conveyors
- 5: Transfer conveyor for empty pallets
- 6: Stacks of empty pallets
- A: Interior zone 1
- B: Interior zone 2
- C: Electrosensitive protective device
- D: Guarding

Figure 2. Automatic depalletizer

3.1.3.2 working zone

Area occupied by the personnel employed to work at the machine during normal operation (see figure 1). This area may include part of the interior zone at a specific period of the machine cycle.

NOTE. The different zones of a (de)palletizer are shown schematically in figure 1. See figure 2 for an example of automatic depalletizer.

3.1.4 Types of machine

3.1.4.1 palletizer

Machine intended for the grouping or stacking of unit loads on pallets.

3.1.4.2 depalletizer

Machine intended for separation of palletized loads.

3.1.4.3 semi automatic (de)palletizer

Machine in which part of the operations are carried out manually or under manual control and the other part is carried out automatically.

NOTE. The concept is addressed in 5.4.

3.1.4.4 automatic (de)palletizer

Machine in which all the operations on the palletized load are carried out automatically by the machine.

3.1.4.5 single position palletizer

Palletizer having a feed and a stacking system designed such that a palletized load cannot begin to be formed until the preceding palletized load has been removed.

3.1.4.6 multiposition palletizer

Palletizer having a feed and a stacking system designed such that several palletized loads can be formed at the same time.

3.1.4.7 single position depalletizer

Depalletizer having a separating system and a system for removing unit loads such that the unloading of a palletized load cannot begin to be carried out until after the complete separation of the preceding palletized load.

3.1.4.8 multiposition depalletizer

Depalletizer having a separating system and a system for removing unit loads such that the separation of several palletized loads can be carried out at the same time.

3.1.4.9 palletizer-depalletizer

Machine in which the palletization and depalletization functions are physically combined.

3.1.4.10 unstacker of empty pallets

Machine or element forming part of a palletizer designed to remove individual pallets from a stack of empty pallets.

3.1.4.11 stacker of empty pallets

Machine or element forming part of a depalletizer designed to stack individual empty pallets.

NOTE. Unstacker and stacker can be combined into a single machine.

3.1.4.12 manipulating industrial robot

An automatically controlled, reprogrammable, multi-purpose, manipulative machine with several degrees of freedom, which may be either fixed in place or mobile for use in industrial automation applications. [EN 775 : 1992]

3.1.4.13 palletizing programme

Schedule of information which allows the palletizer to dispose the unit loads in such a way as to obtain a pallet load conforming to the desired palletizing layouts.

3.2 Functional grouping of (de)palletizers

3.2.1 Functional grouping of palletizers' types

There are many variations on the way to group unit loads to form a pallet load. They can be classified depending on the transfer unit which can be one (or several) unit load (see 3.2.1.1.1), a row (see 3.2.1.1.2), a stack (see 3.2.1.1.3), a multiple stack (see 3.2.1.1.4) or a layer (see 3.2.1.1.5); or on the number of pallet loads that can be processed simultaneously: single position (see 3.2.1.2.1) or multiposition (see 3.2.1.2.2)

3.2.1.1 Functional grouping depending on the means of transferring unit loads

3.2.1.1.1 Unit load transfer, when the machine transfers by one unit load at a time.

The principle is shown in figure 3 and an example is shown in figure 4.

3.2.1.1.2 Row transfer, when the machine transfers a horizontal linear grouping of unit loads.

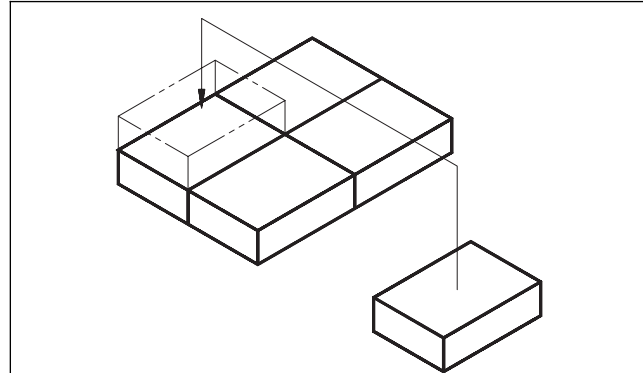


Figure 3. Principle of unit load transfer

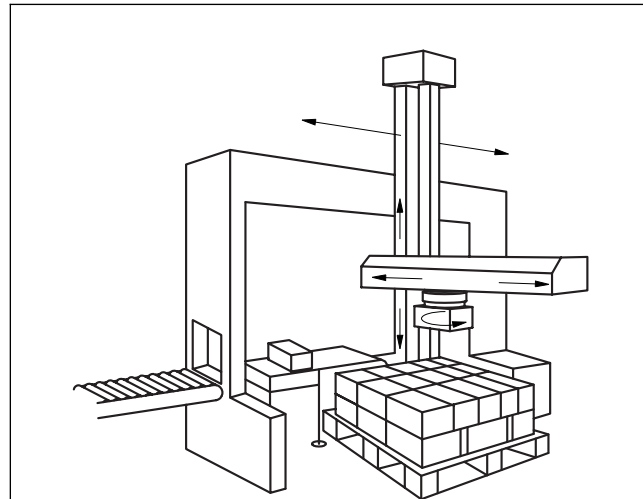


Figure 4. Example of unit load transfer

The principle is shown in figure 5 and an example is shown in figure 6.

3.2.1.1.3 Stack transfer, when the machine transfers a vertical linear grouping of unit loads.

The principle is shown in figure 7 and an example of stack preparation is shown in figure 8.

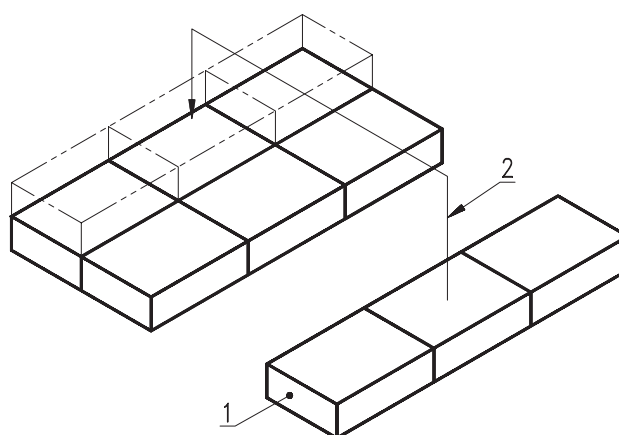


Figure 5. Principle of row load transfer

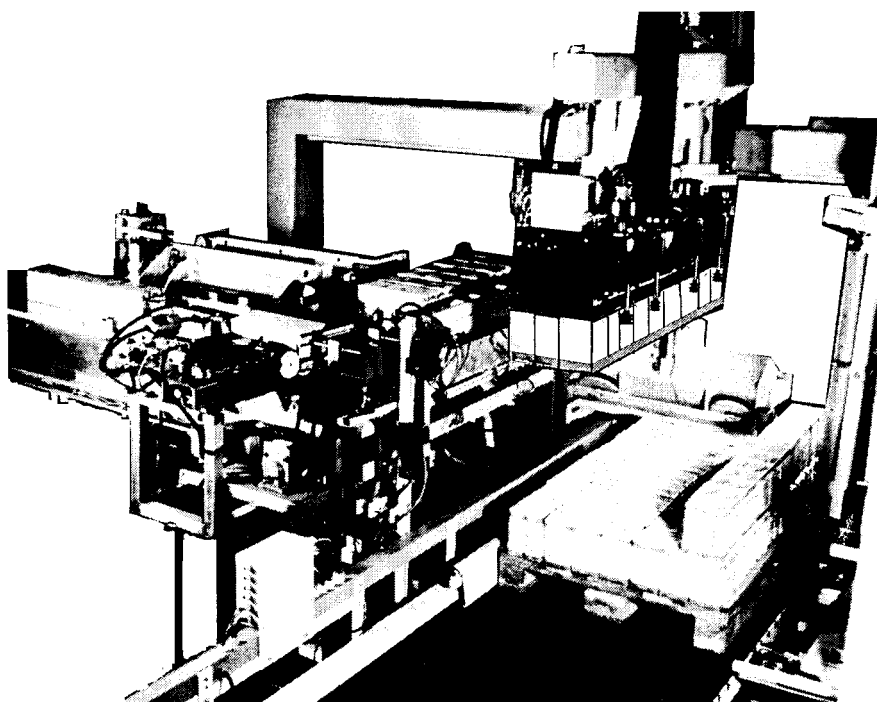


Figure 6. Example of low load transfer