



SLOVENSKI STANDARD
SIST EN 415-4:1999

01-december-1999

Pakirne naprave - Varnost pakirnih strojev - 4. del: Stroji za nakladanje in razkladanje palet

Safety of packaging machines - Part 4: Palletisers and depalletisers

Sicherheit von Verpackungsmaschinen - Teil 4: Palettierer und Depalettierer

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

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Ta slovenski standard je istoveten z: EN 415-4:1997

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ICS:

55.200

Pakirni stroji

Packaging machinery

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en

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EUROPEAN STANDARD

EN 415-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 1997

ICS 55.200

Descriptors: safety of machinery, dangerous machine, packing, pallet loaders, pallet unloaders, accident prevention, design, hazards, hazardous areas, protection against mechanical hazards, safety measures, inspection, information, technical notices, marking

English version

Safety of packaging machines - Part 4: Palletisers and depalletisers

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

Sicherheit von Verpackungsmaschinen - Teil 4:
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

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of an identical text or by endorsement, at the latest by September 1997, and conflicting national standards shall be withdrawn at the latest by September 1997.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 Palletisers and depalletisers

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.

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 palletisers, depalletisers, and stackers/unstackers of empty pallets integrated or not into a (de)palletiser as defined in 3.1. In many respects palletisers and depalletisers present the same risks. In this text they are referred to together as (de)palletisers.

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

These safety requirements apply to automatic and semi-automatic (de)palletisers. 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)palletisers 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)palletiser, which is not an integral part of (de)palletising 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	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	Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
EN 418	Safety of machinery - Emergency stop equipment, functional aspects - Principles for design SIST EN 415-4:1999
EN 614-1:1995	Safety of machinery - Ergonomic design principles - Part 1 : Terminology and general principles https://standards.iteh.ai/catalog/standards/sist/8a5898f6-2c9ff1be598d/sist-en-415-4-1999
prEN 619:1991	Continuous handling equipment and systems - Equipment for mechanical handling of unit loads only - Special safety requirements for design, manufacturing, erections and commissioning stages
EN 775:1992	Manipulating industrial robots - Safety (ISO 10218:1992, modified)
prEN 953:1992	Safety of machinery - General requirements for the design and construction of guards (fixed, movable)
prEN 954-1:1992	Safety of machinery - Safety related parts of control systems - Part 1 : General principles for design
EN 982:1996	Safety requirements for fluid power systems and components - hydraulics
EN 983:1996	Safety requirements for fluid power systems and components - pneumatics
prEN 999:1993	Safety of machinery - Hand/arm speed - Approach speed of parts of the body for the positioning of safety devices
EN 1037	Safety of machinery - Prevention of unexpected start-up
EN 1050:1996	Safety of machinery - Risk assessment
ENV 1070	Safety of machinery - Terminology
EN 1088:1995	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
prEN 50100-1:1994	Safety of machinery - Electrosensitive protective equipment - Part 1 : General requirements and tests
EN 60204-1:1992	Safety of machinery - Electrical equipment of machines - Part 1 : General requirements (IEC 204-1:1992, modified)

3 Definitions and functional grouping of (de)palletisers

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 palletising or depalletising 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 palletised 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 palletised 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 palletising 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]

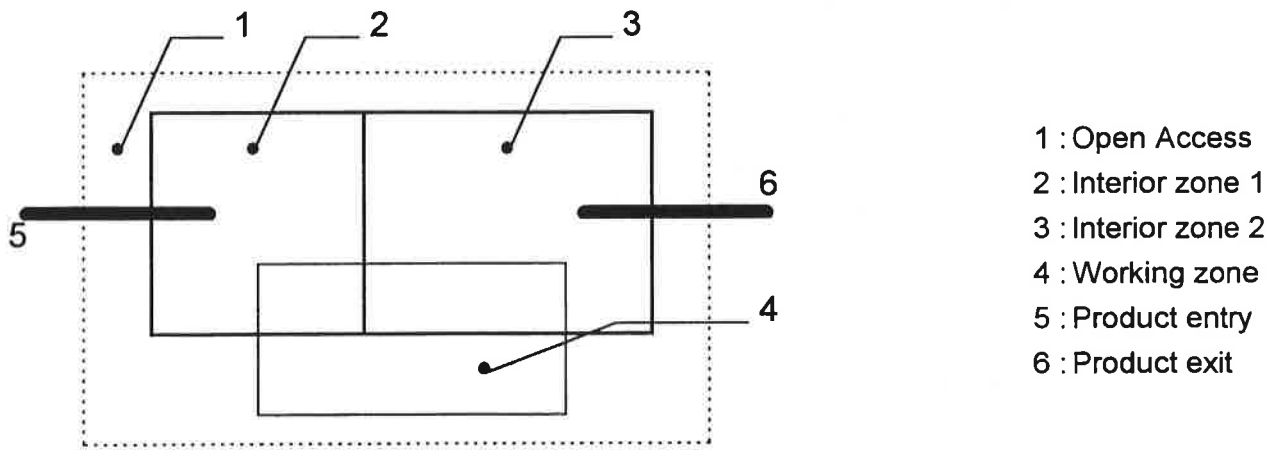
3.1.3 zones

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.

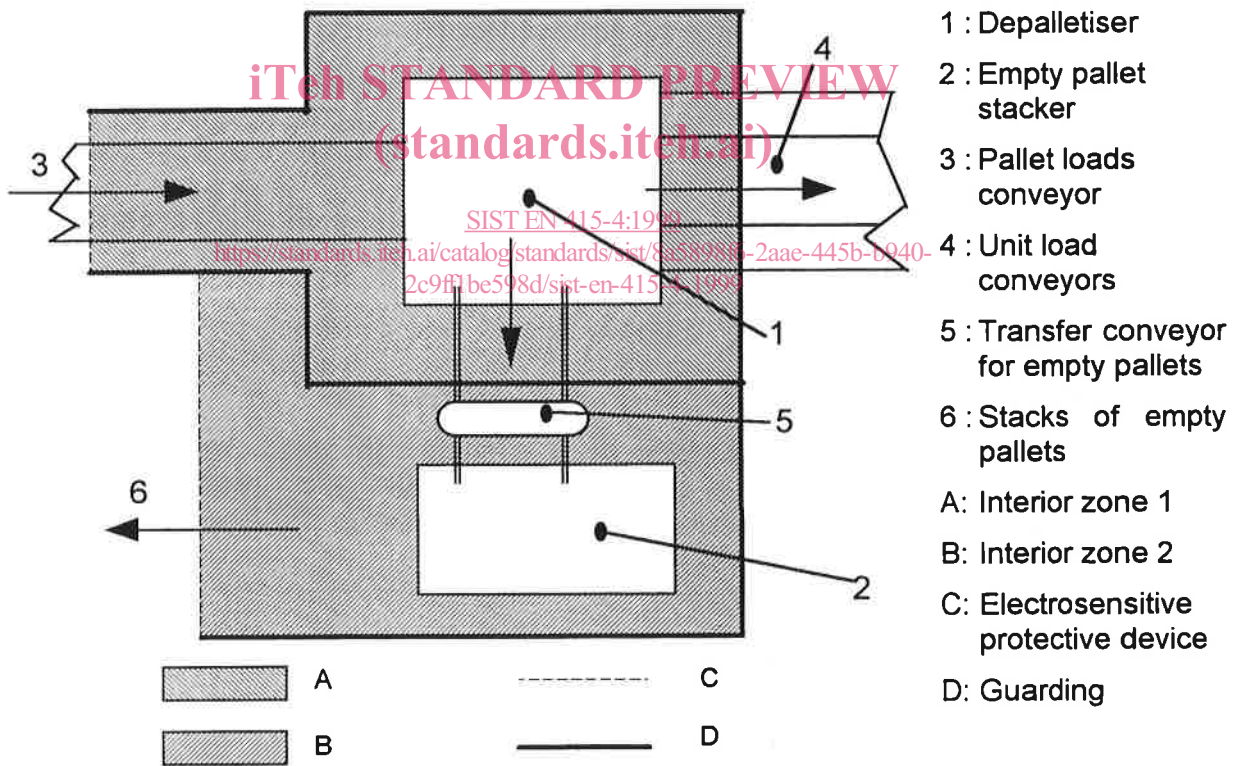
3.1.3.2 working zone : Area occupied by the personnel employed to work at the machine during normal operation (see figure 1). This area may include part of the interior zone at a specific period of the machine cycle.

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



- 1 : Open Access
- 2 : Interior zone 1
- 3 : Interior zone 2
- 4 : Working zone
- 5 : Product entry
- 6 : Product exit

Figure 1 : Semi-automatic (de)palletiser



- 1 : Depalletiser
- 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 depalletiser

3.1.4 types of machine

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

3.1.4.2 depalletiser : Machine intended for separation of palletised loads.

3.1.4.3 semi automatic (de)palletiser : 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)palletiser : Machine in which all the operations on the palletised load are carried out automatically by the machine.

3.1.4.5 single position palletiser : Palletiser having a feed and a stacking system designed such that a palletised load cannot begin to be formed until the preceding palletised load has been removed.

3.1.4.6 multiposition palletiser : Palletiser having a feed and a stacking system designed such that several palletised loads can be formed at the same time.

3.1.4.7 single position depalletiser : Depalletiser having a separating system and a system for removing unit loads such that the unloading of a palletised load cannot begin to be carried out until after the complete separation of the preceding palletised load.

3.1.4.8 multiposition depalletiser : Depalletiser having a separating system and a system for removing unit loads such that the separation of several palletised loads can be carried out at the same time.

3.1.4.9 palletiser-depalletiser : Machine in which the palletisation and dépalettisation functions are physically combined.

3.1.4.10 unstacker of empty pallets : Machine or element forming part of a palletiser 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 depalletiser 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 palletising programme : Schedule of information which allows the palletiser to dispose the unit loads in such a way as to obtain a pallet load conforming to the desired palletising layouts.

3.2 Functional grouping of (de)palletisers

3.2.1 Functional grouping of palletisers' 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.

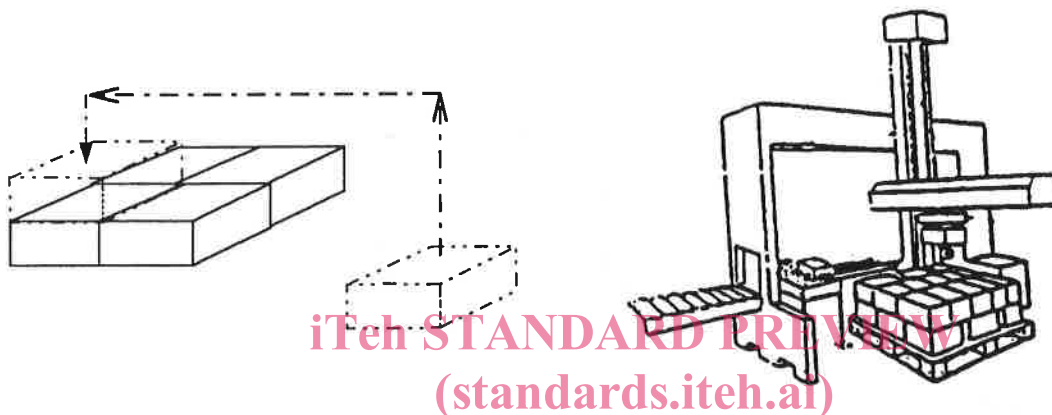


Figure 3 : Principle of unit load transfer **Figure 4 : Example of unit load transfer**

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3.2.1.1.2 Row transfer, when the machine transfers a horizontal linear grouping of unit loads
 The principle is shown in figure 5 and an example is shown in figure 6.

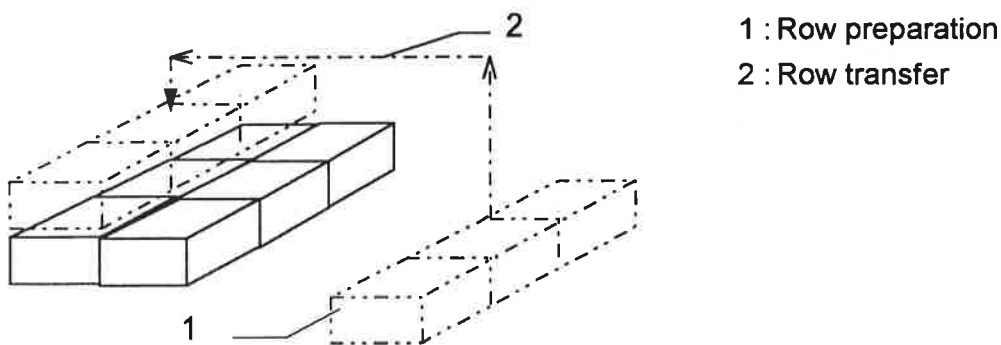


Figure 5 : Principle of row load transfer

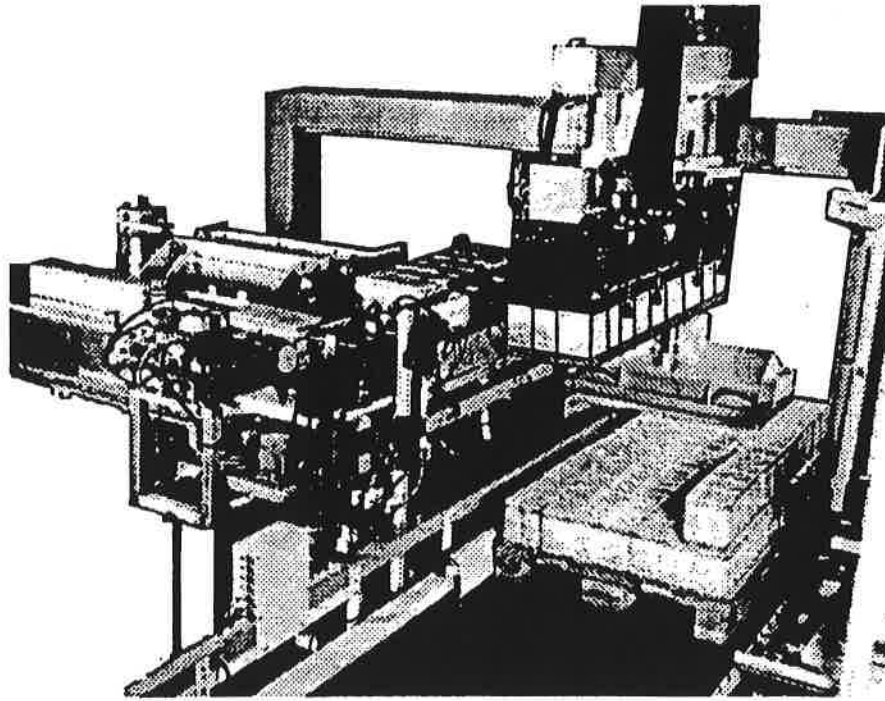


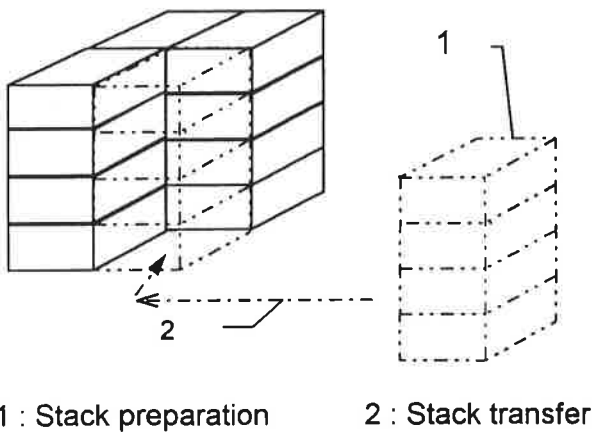
Figure 6 : Example of row load transfer

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.

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1 : Stack preparation

2 : Stack transfer

Figure 7 : Principle of stack transfer

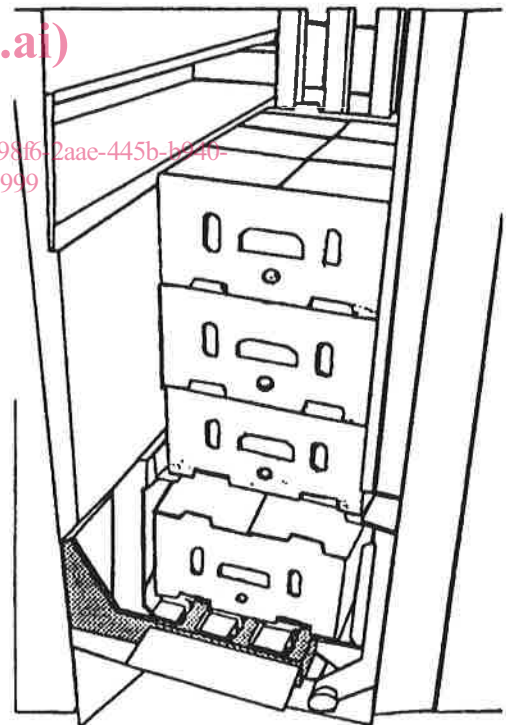
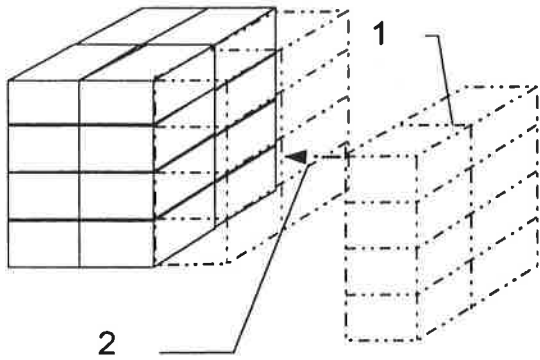


Figure 8 : Example of stack preparation

3.2.1.1.4 Multiple stack transfer, when the machine transfers a vertical grouping of several stacks

The principle is shown in figure 9 and an example is shown in figure 10.



1 : Multiple stack preparation 2 : Multiple stack transfer

Figure 9 : Principle of multiple stack transfer

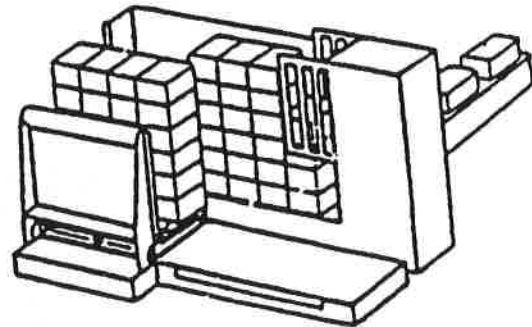


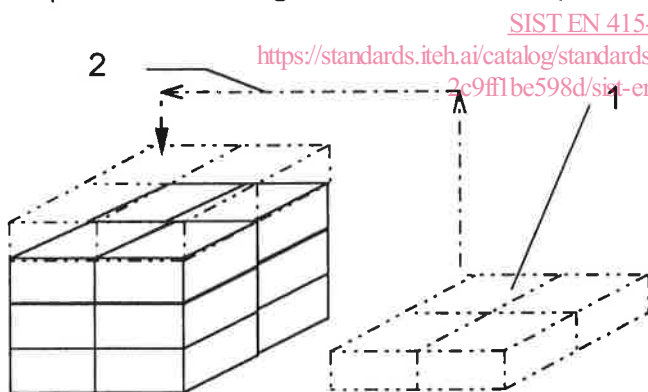
Figure 10 : Example of multiple stack transfer palletiser

3.2.1.1.5 Layer transfer, when the machine transfers a horizontal grouping of several rows.

This can be done in different ways :

3.2.1.1.5.1 High level palletiser where transfer is done from above, after assembly at low level

The principle is shown in figure 11 and an example is shown in figure 12.



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1 : Assembly of the layer at low level
2 : Stacking of the new layer from above

Figure 11 : Principle of high level palletiser with layer assembly at low level

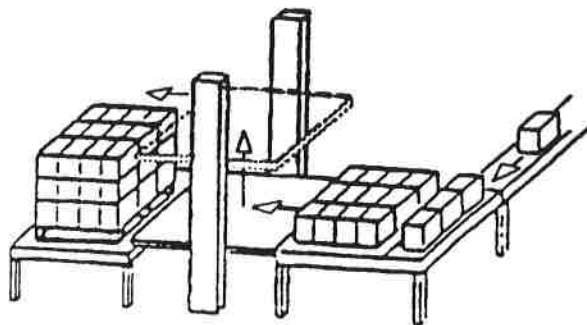


Figure 12 : Example of high level palletiser with layer assembly at low level