

SLOVENSKI STANDARD

SIST EN 415-3:2001+A1:2010

01-februar-2010

Pakirne naprave - Varnost pakirnih naprav - 3. del: Oblikovalne, polnilne in zapiralne naprave

Safety of packaging machines - Part 3: Form, fill and seal machines

Sicherheit von Verpackungsmaschinen - Teil 3: Form-, Füll- und Verschleißmaschinen

Sécurité des machines d'emballage - Partie 3: Machines d'emballage à former, remplir et sceller

Ta slovenski standard je istoveten z: EN 415-3:1999+A1:2009

SIST EN 415-3:2001+A1:2010
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ICS:

55.200

Pakirni stroji

Packaging machinery

SIST EN 415-3:2001+A1:2010

en,fr

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 415-3:1999+A1

October 2009

ICS 55.200

Supersedes EN 415-3:1999

English Version

Safety of packaging machines - Part 3: Form, fill and seal machines

Sécurité des machines d'emballage - Partie 3: Machines d'emballage à former, remplir et sceller

Sicherheit von Verpackungsmaschinen - Teil 3: Form-, Füll- und Verschleißmaschinen

This European Standard was approved by CEN on 26 December 1998 and includes Amendment 1 approved by CEN on 7 September 2009.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN 415-3:1999+A1:2009 (E)**Foreword**

This document (EN 415-3:1999+A1:2009) 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of an identical text or by endorsement, at the latest by April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.

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 supersedes EN 415-3:1999.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

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).

A1 For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. **A1**

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Other parts of this standard include:

EN 415 Safety of packaging machines;

Part 1: Terminology and classification of packaging machines and associated equipment;

Part 2: Pre-formed rigid container packaging machines;

Part 4: Palletisers and depalletisers;

A1 Part 5: Wrapping machines;

Part 6: Pallet wrapping machines;

Part 7: Group and secondary packaging machines;

Part 8: Strapping machines;

Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3. **A1**

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Form, fill and seal machines are used extensively in Europe, in an increasingly wide range of industries. They contain many hazards and have the potential to cause serious injury.

The extent to which hazards are covered is indicated in the scope and clause 4 of this standard. In addition, machines should comply as appropriate with EN 292-1 and EN 292-2 for hazards which are not covered by this standard.

A1 This document is a type C standard as stated in EN ISO 12100. The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

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 over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard. **A1**

1 Scope

This European Standard establishes safety requirements for form, fill and seal packaging machines and the filling machines which are particularly associated with them. This group of machines is defined in detail in clause 3 of this standard, with diagrams illustrating examples of the principle of operation of each machine type. However briefly, this standard covers the following broad groups of machines:

- horizontal form, fill and seal machines;
- vertical form, fill and seal machines;
- pre-made bag erect fill and seal machines;
- mandrel flexible package or carton form, fill and seal machines;
- carton erect, fill and close machines;
- thermoform, fill and seal machines.

Filling machines commonly fitted to form, fill and seal machines including:

- auger fillers;
- volumetric cup fillers;
- volumetric piston fillers;
- counters;
- gravimetric fillers (weighers).

This standard covers the safety requirements for machine design, construction, installation, commissioning, operation, adjustment, maintenance and cleaning.

This part of EN 415 applies primarily to machines manufactured after the date of issue of this standard.

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This standard does not cover in detail the safety or hygiene hazards associated with the products which may be handled on form, fill and seal machines, but does include general advice.

This standard does not cover thermoforming machines. These machines are covered in prEN 12409.

This standard does not cover blow mould, fill and seal machines. The main hazards and safety requirements for these machines are described in EN 422.

[A1] This document is not applicable to form, fill and seal machines which are manufactured before the date of its publication as EN 415-3:1999 as amended. **[A1]**

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 prevent crushing of parts of the human body*

EN 415-1:1999, *Safety of packaging machines – 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 422:1995, *Rubber and plastics machines – Safety - Blow moulding machines intended for the production of hollow articles – Requirements for the design and construction*

EN 457:1992, *Safety of machinery - Auditory danger signals - General requirements design*

EN 563:1994, *Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces*

EN 614-1:1995, *Safety of machinery - Ergonomic design principles – Part 1: Terminology and general principles*

prEN 614-2, *Safety of machinery - Ergonomic design principles – Part 2 : Interaction between the design of machinery and work tasks*

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 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 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 components – Hydraulics*
- EN 983:1996, *Safety of machinery - Safety requirements for fluid power systems and components - Pneumatics*
- 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 1672-2:1997, *Food processing machinery - Basic concepts – Part 2: Hygiene requirements*
- prEN 1760-2, *Safety of machinery - Pressure sensitive protective devices – Part 2: General principles for the design and testing of pressure sensing edges and pressure sensitive bars*
- prEN 12409, *Rubber and plastics machines - Thermoforming machines - Safety requirements*
- EN 60204-1:1992, *Safety of machinery - Electrical equipment of machines – Part 1: Specification for general requirements*
- EN 60204-3-1:1992, *Machines – Part 3: Particular safety requirements for sewing machines units and systems.*
- EN 60529:1992, *Specification for degrees of protection provided by enclosures (IP Code)*
- 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 61496-1:1997, *Safety of machinery - Electrosensitive protective equipment – Part 1: General requirements and test*
- prEN 61496-2, *Safety of machinery - Electrosensitive protection equipment – Part 2: Photo-electric devices*
- prEN 61496-3, *Electrosensitive protection devices – Part 3: Proximity sensing devices*
- ISO/CD 14159, *Safety of machinery; Hygiene design requirements for machines.*
- 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)*

3 Definitions

In addition to those terms defined in EN292-1, EN 1070 and EN 415-1, the following definitions apply, for the purposes of this standard.

EN 415-3:1999+A1:2009 (E)

3.1 Definition of terms

3.1.1

bag

flat or gusseted flexible container longitudinally seamed and closed at one or both ends made from paper, plastic film, foil, laminate etc. Bags produced on form, fill and seal machines will typically have a seal at both ends and a longitudinal seal running down the centre of the rear face of the bag

3.1.2

bag-in-box

package comprising a carton containing a bag which closely fits the carton and contains the product

3.1.3

block bottom bag

flexible package with a tucked and sealed base which allows the filled and sealed pack to stand on its base

3.1.4

carton

container which is made from carton board, generally between 250 µm and 1000 µm in thickness, and is usually delivered to the user in the form of a carton blank or folded and side seam glued

3.1.5

carton blank

individual carton in the flat after cutting and creasing and with the strippings removed

3.1.6

carton tray

rectangular open carton with sides and ends made from carton board generally between 250 µm and 1000 µm in thickness and usually delivered to the user in the form of a carton blank

3.1.7

cartonboard

paper board used for folding cartons generally between 250 µm and 1000 µm thick and bendable enough so that it can be folded along score lines without cracking

3.1.8

deformable material

material which can be formed by the application of pressure only

3.1.9

film reel

continuous sheet of paper, carton board, plastics film, metal foil or flexible laminate wound on a cylindrical core

3.1.10

film web

continuous sheet of paper, plastics film, metal foil or laminate

3.1.11

flexible packaging film

continuous sheet of paper, plastics film, metal foil or laminate

3.1.12

lay flat tubular film

continuous tube of plastic film usually supplied wound on a core

3.1.13

paper laminate

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paper that has been coated or bonded to one or a number of other materials e.g. polyethylene or aluminium foil

3.1.14

pre-made bag

pre-formed flat or gusseted flexible container longitudinally seamed and closed at one end made from paper, plastic film, foil, laminate a woven material etc

3.1.15

pre-made sack

pre-formed flat or gusseted sack longitudinally seamed and closed at one or both ends made from paper, plastic film, laminate a woven material etc

3.1.16

sachet

flat package which when formed from two webs of flexible material is sealed on four sides and when formed from one web is sealed on three or four sides

3.1.17

side seam seal

longitudinal seal which is made by stitching, heatsealing or applying adhesive, when a carton blank is formed into a flat carton

3.1.18

thermoformable material

material which when heated can be formed by pressure and/or vacuum

3.1.19

top load carton

one piece carton, with length and width greater than its height, which is erected by first interlocking or gluing the side members to the body part and having a lid with side flaps which can either be tucked or glued to the carton body to close the carton

3.1.20

longitudinal seal

seal made on a package in line with the direction of material travel in the machine

3.1.21

magazine

mechanical assembly designed to hold stacks of cartons, carton blanks, leaflets, labels, lids or stackable containers

3.1.22

mandrel

mechanical assembly around which a bag or carton is formed

3.1.23

packaging material transport mechanism

mechanical assembly which transports packaging material through the Packaging Machine

3.1.24

transverse seal

seal made on a package at right angles to the direction of material travel in the machine

3.2 Description of form, fill and seal machines

3.2.1

bag form, fill and seal machines

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the six form, fill and seal machines described in 3.2.1.1 - 3.2.1.6 produce bag shaped or block bottom bag shaped packs

3.2.1.1

flowwrapping machine

horizontally operating form, fill and seal machine with film reel mounted above the operating level, the product loaded horizontally and a longitudinal seal formed below the pack (see figure 1). The characteristic features are:

- a horizontal product infeed mechanism;
- a film unwind mechanism;
- a film folding box;
- a longitudinal seal mechanism;
- a transverse seal mechanism;
- a transverse cutting mechanism and;
- a discharge conveyor.

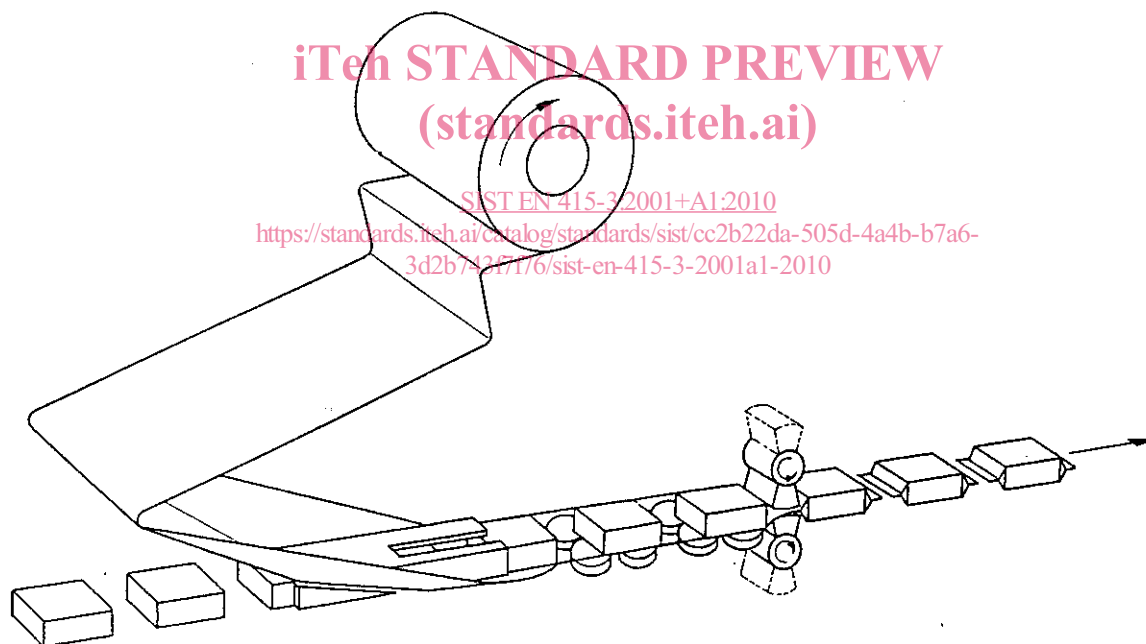


Figure 1 — Flowwrapping machine

3.2.1.2

lower reel flowwrapping machine

horizontally operating form, fill and seal machine, with film reel mounted below the operating level, product placed on to the film web and a longitudinal seal formed above the pack (see figure 2). The characteristic features are:

- a film unwind mechanism positioned below a horizontal product infeed mechanism;

- a film folding box;
- a longitudinal seal mechanism positioned over the operating level;
- a transverse seal mechanism;
- a transverse cutting mechanism and;
- a discharge conveyor.

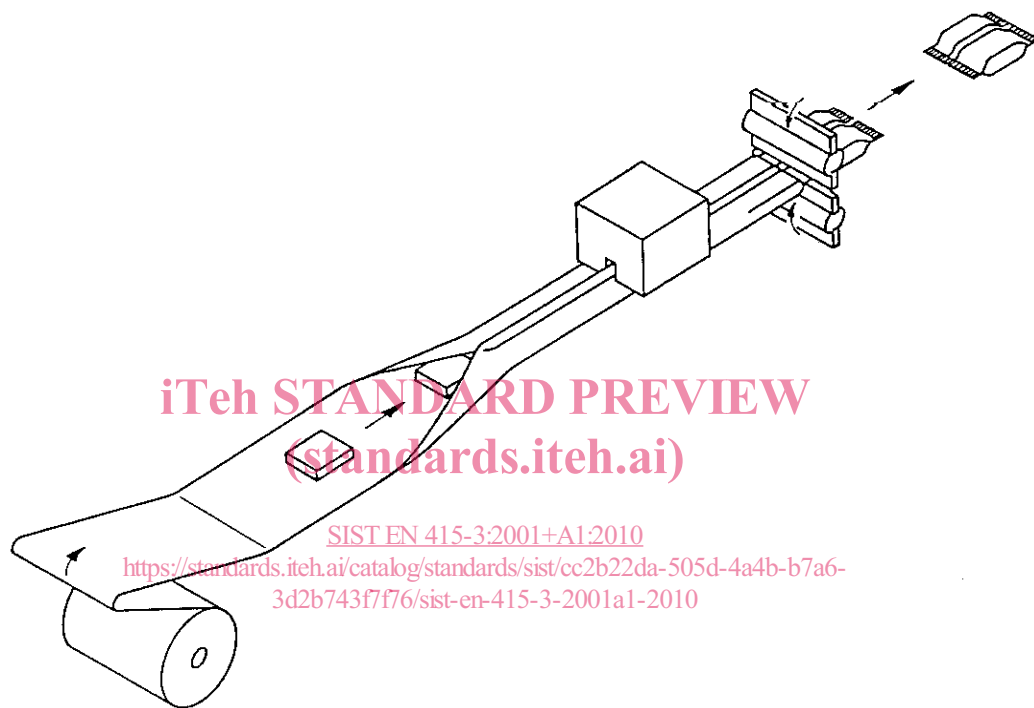


Figure 2 — Lower reel flowwrapping machine

3.2.1.3

vertical form, fill and seal machine

a packaging machine which uses flexible packaging film to form a tube, which is then filled vertically with product and sealed in a sequence of operations whilst the film is transported vertically downwards (see figure 3). The characteristic features are:

- a film unwind mechanism;
- a film forming tube;
- an automatic filling device (some machines are fed manually);
- a film transport mechanism;
- a longitudinal seal mechanism;
- a transverse seal mechanism and;
- a transverse cutting mechanism.

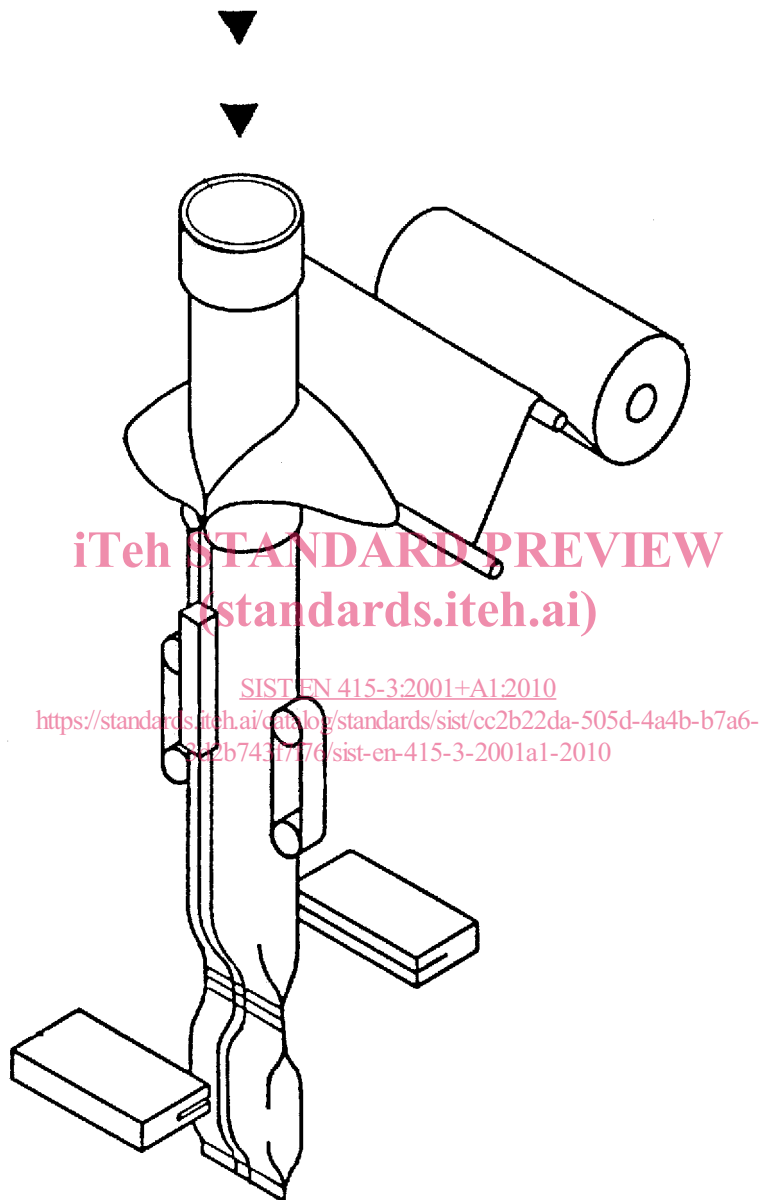


Figure 3 — Vertical form, fill and seal machine

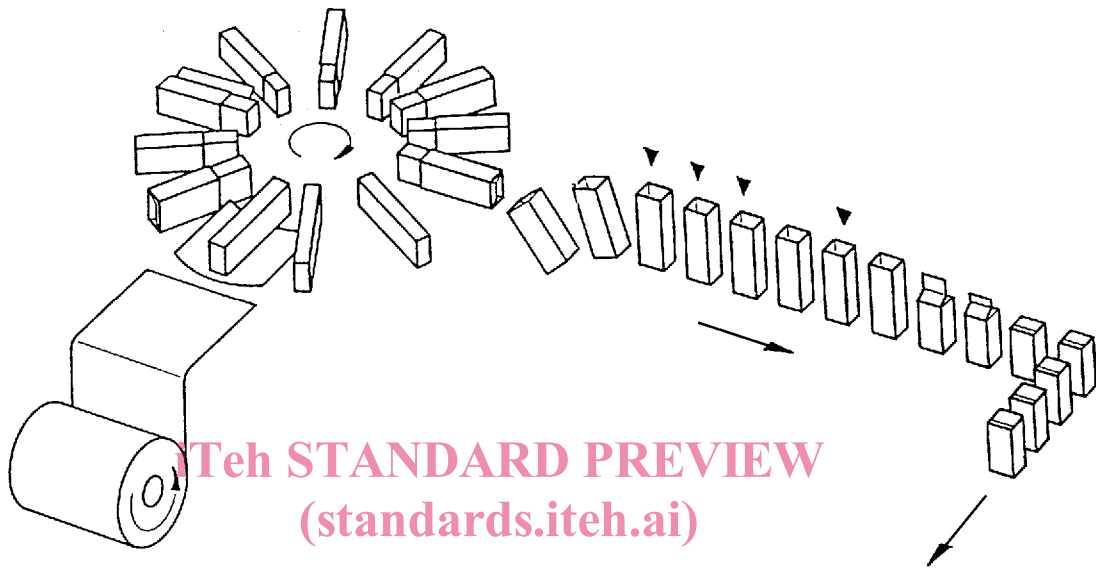
3.2.1.4

mandrel flexible package form, fill and seal machine

a packaging machine which forms packs from a reel of flexible material before filling the packs with product and sealing the top of the packs (see figure 4). The characteristic features are:

- a film unwind mechanism;
- a transverse cutting mechanism;

- a mandrel bag forming mechanism;
- bag folding and sealing mechanisms;
- a bag transport mechanism;
- an automatic filling device and;
- a bag sealing mechanism.



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Figure 4 — Mandrel flexible package form, fill and seal machine

3.2.1.5

tubular bag form, fill and seal machine

a packaging machine which forms a bag from a reel of lay flat tubular flexible packaging film. The bag is then filled with product and sealed within the machine (see figure 5). The characteristic features are:

- a film unwind mechanism;
- a transverse sealing and cutting mechanism;
- a bag transport mechanism;
- an automatic filling device, and;
- a bag sealing mechanism.