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

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

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

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ICS:

55.200

Pakirni stroji

Packaging machinery

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en

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English version

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

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

This European Standard was approved by CEN on 26 December 1998.

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of an identical text or by endorsement, at the latest by June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.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

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.

0 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.

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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 prEN 415 applies primarily to machines manufactured after the date of issue of this standard.

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.

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)

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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.

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 μ m and 1000 μ m 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 μ m and 1000 μ m 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 μ m and 1000 μ m 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: 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. <https://standards.iteh.ai/catalog/standards/sist/d58901a5-c8d7-405a-a18e-421677d4a145/en-415-3:1999>

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: 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 flowrapping 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.

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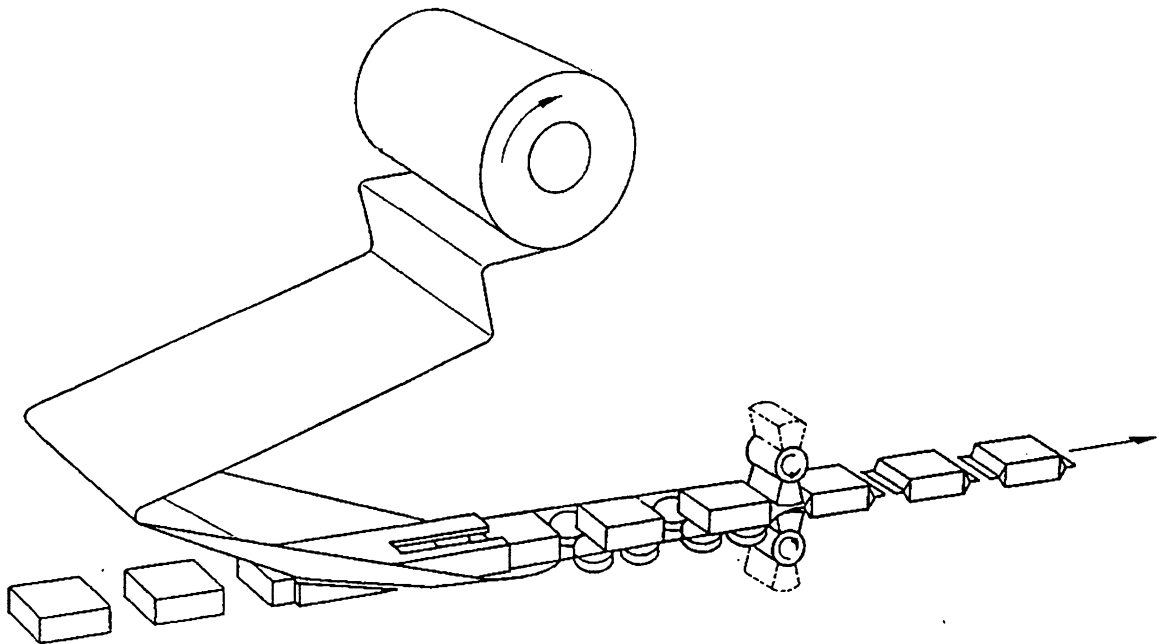


Figure 1: Flowwrapping machine

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.

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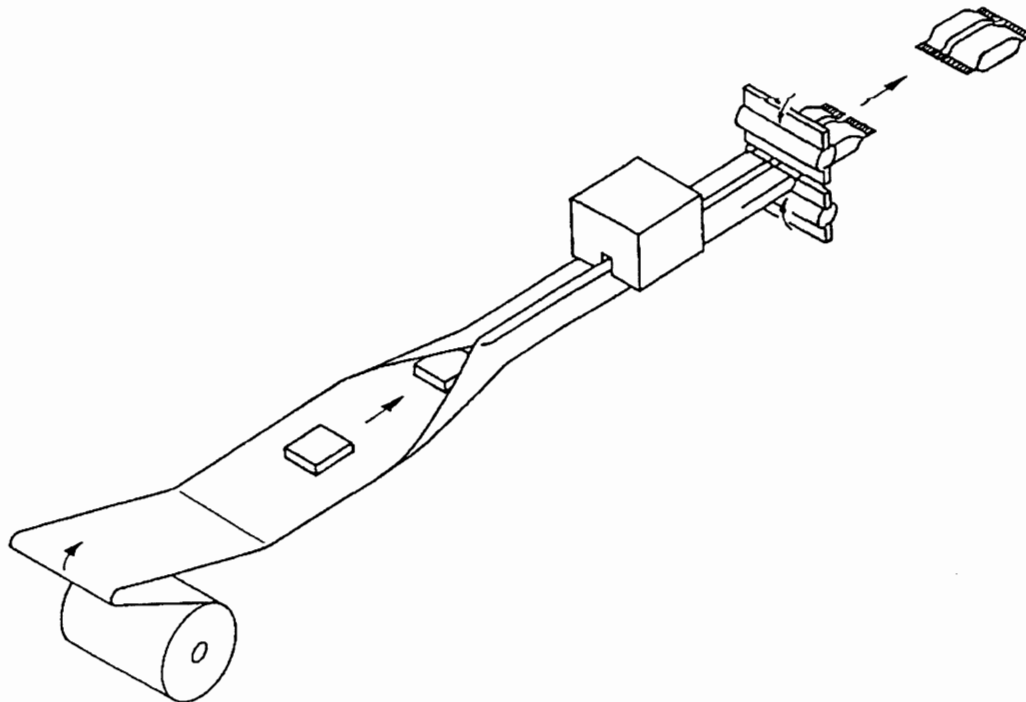


Figure 2: Lower reel flowwrapping machine

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.

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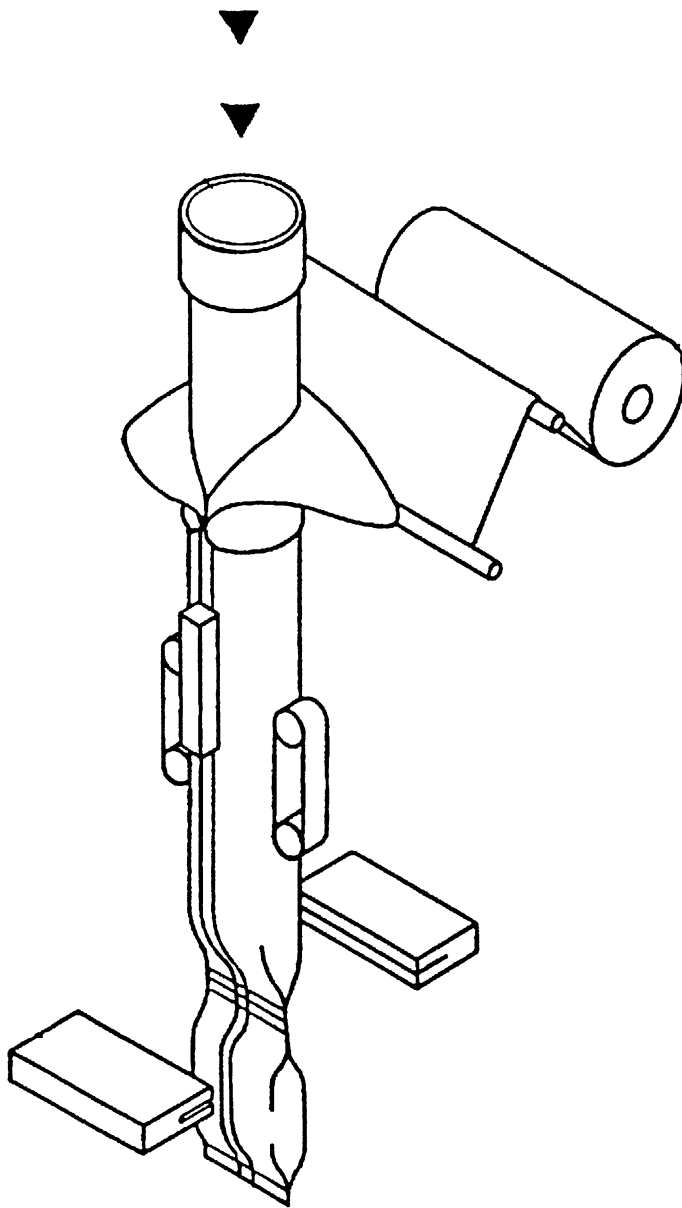


Figure 3: Vertical form, fill and seal machine
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3.2.1.4 mandrel flexible package form, fill and seal machine: A packaging machine which forms packs from a reel of flexible material before filling the packs with product and sealing the top of the packs (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.

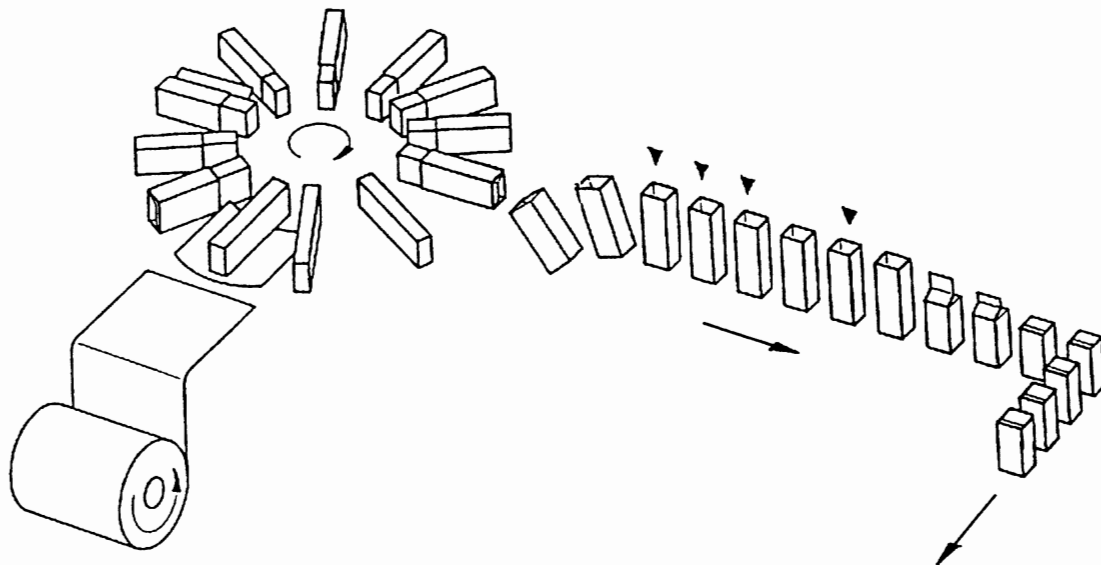


Figure 4: Mandrel flexible package form, fill and seal machine

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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.

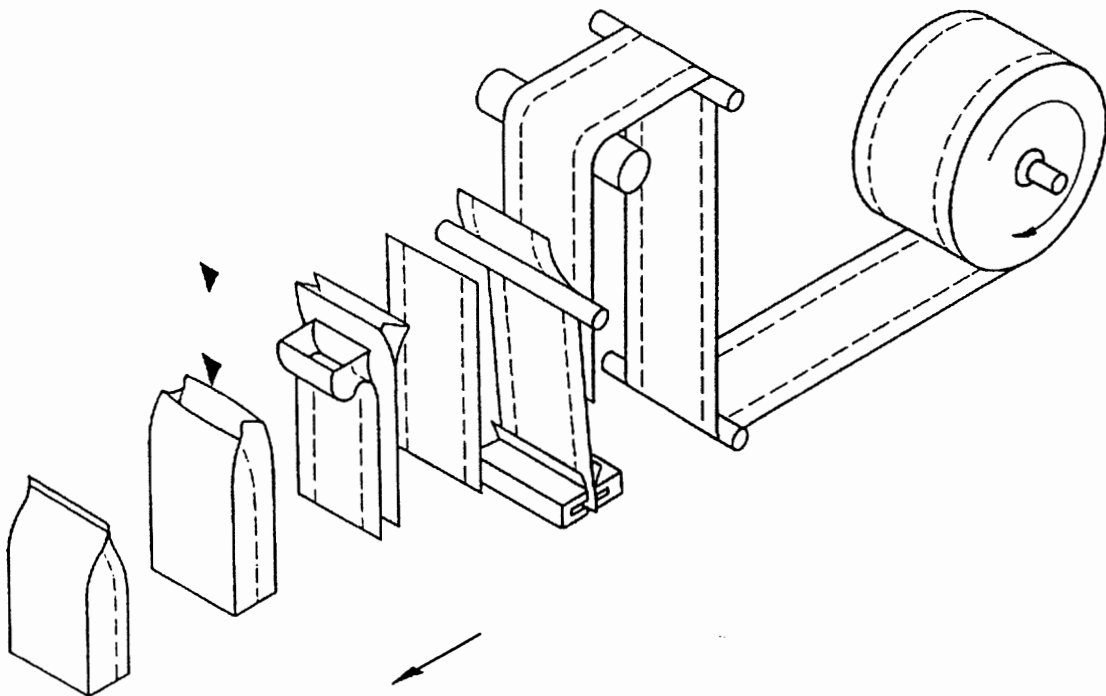


Figure 5: Tubular bag form, fill and seal machine

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