

# **SLOVENSKI STANDARD**

## **SIST EN 1034-16:2012**

**01-maj-2012**

---

**Varnost strojev - Varnostne zahteve za načrtovanje in konstrukcijo strojev in opreme za izdelavo papirja - 16. del: Stroji za izdelavo papirja in kartona**

Safety of machinery - Safety requirements for the design and construction of paper making and finishing machines - Part 16: Paper and board making machines

Sicherheit von Maschinen - Sicherheitsanforderungen an Konstruktion und Bau von Maschinen der Papierherstellung und Ausrüstung - Teil 16: Papier- und Kartonmaschinen

Sécurité des machines - Prescriptions de sécurité pour la conception et la construction de machines de fabrication et de finition du papier - Partie 16: Machines à papier et carton

**Ta slovenski standard je istoveten z: EN 1034-16:2012**

---

**ICS:**

13.110	Varnost strojev	Safety of machinery
21.020	Značilnosti in načrtovanje strojev, aparatov, opreme	Characteristics and design of machines, apparatus, equipment
85.100	Oprema za papirno industrijo	Equipment for the paper industry

**SIST EN 1034-16:2012**

**en,fr**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 1034-16:2012

<https://standards.iteh.ai/catalog/standards/sist/eddd29fc-9776-416f-bab6-2674d32a6adf/sist-en-1034-16-2012>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 1034-16**

March 2012

ICS 85.100

English Version

**Safety of machinery - Safety requirements for the design and  
construction of paper making and finishing machines - Part 16:  
Paper and board making machines**

Sécurité des machines - Prescriptions de sécurité pour la  
conception et la construction de machines de fabrication et  
de finition du papier - Partie 16: Machines à papier et  
carton

Sicherheit von Maschinen -  
Sicherheitstechnische Anforderungen an Konstruktion und  
Bau von Maschinen der Papierherstellung und Ausrüstung -  
Teil 16: Papier- und Kartonmaschinen

This European Standard was approved by CEN on 8 January 2012.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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, Turkey and United Kingdom.



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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

# Contents

Page

Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	8
4 List of significant hazards .....	14
5 Safety requirements and/or measures .....	16
5.1 General.....	16
5.2 Workplaces, means of access, walkways, passageways.....	16
5.3 Start-up warning device .....	17
5.4 Emergency stop device and braking system.....	18
5.5 Isolation and energy dissipation, prevention of unexpected start-up .....	19
5.6 Electric drive system and power transmission elements.....	19
5.7 Control system and actuators .....	19
5.8 Electrical equipment.....	22
5.9 Hydraulic equipment .....	22
5.10 Pneumatic equipment .....	22
5.11 Equipment and measures for make-ready, maintenance and lubrication .....	22
5.12 Equipment and measures for cleaning and removal of broke .....	23
5.13 Noise .....	24
5.14 Hot surfaces .....	24
5.15 Integrated lighting .....	25
5.16 Ergonomic principles .....	25
5.17 Chemical substances .....	25
5.18 Fire .....	25
5.19 Rolls, outer rolls.....	26
5.20 Water jet knives, tail cutters, severing knives, rotary knives .....	27
5.21 Machine-specific tools .....	27
5.22 Drying cylinders, steam and condensate systems .....	28
5.23 Whole body access to confined spaces.....	28
5.24 Tail and web threading equipment.....	28
5.25 Felts and wires, clothing, fabrics .....	30
5.26 Head box, wire section, former .....	30
5.27 Press section.....	32
5.28 Drying section .....	32
5.29 Film size presses, size presses, coating units .....	34
5.30 Flotation dryers.....	35
5.31 Infrared dryers.....	36
5.32 Calenders (in-line calenders).....	37
5.33 Measuring unit .....	38
5.34 Reel up section .....	38
5.35 Roll handling equipment in the reel up section.....	42
5.36 Pulpers and their loading facilities .....	42
5.37 Integrated sheeter.....	42
6 Verification of safety requirements and/or measures.....	43
7 Information for use .....	43
7.1 General information.....	43
7.2 Instruction handbook .....	43
7.3 Marking .....	45

<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC .....</b>	<b>46</b>
<b>Bibliography .....</b>	<b>47</b>

## Figures

<b>Figure 1 — Example for paper and board making machines (safety devices are not shown) .....</b>	<b>9</b>
<b>Figure 2 — Example for a wire section (safety devices are not shown) .....</b>	<b>10</b>
<b>Figure 3 — Example for a press section (safety devices are not shown) .....</b>	<b>11</b>
<b>Figure 4 — Example for a drying section (safety devices are not shown) .....</b>	<b>12</b>
<b>Figure 5 — Example for a reel up section (safety devices are not shown) .....</b>	<b>13</b>
<b>Figure 6 — Safety distance <math>\geq 2,70</math> m on drum reeler .....</b>	<b>39</b>
<b>Figure 7 — Safety distance <math>\geq 500</math> mm to prevent crushing by reels behind the drum reeler .....</b>	<b>41</b>

## Tables

<b>Table 1 — List of significant hazards .....</b>	<b>14</b>
<b>Table 1 (continued) .....</b>	<b>15</b>
<b>Table 1 (continued) .....</b>	<b>16</b>
<b>Table 2 — List of safety functions, Performance Level and Safety Integrity Level specified in this European Standard .....</b>	<b>21</b>
<b>Table 3 — Methods used to verify safety requirements and/or measures .....</b>	<b>43</b>

iTeh STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 1034-16:2012

<https://standards.iteh.ai/catalog/standards/sist/eddd29fc-9776-416f-bab6-2674d32a6adf/sist-en-1034-16-2012>

**EN 1034-16:2012 (E)****Foreword**

This document (EN 1034-16:2012) has been prepared by Technical Committee CEN/TC 198 "Printing and paper machinery - Safety", the secretariat of which is held by DIN.

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 2012, and conflicting national standards shall be withdrawn at the latest by September 2012.

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 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 document.

EN 1034 *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines* consists of the following parts:

*Part 1: Common requirements;*

*Part 2: Barking drums;*

*Part 3: Winders and slitters, plying machines;*

*Part 4: Pulpers and their loading facilities;*

*Part 5: Sheeters;*

*Part 6: Calender;*

*Part 7: Chests;*

*Part 8: Refining plants;*

*Part 13: Machines for de-wiring bales and units;*

*Part 14: Reel splitter;*

*Part 16: Paper and board making machines;*

*Part 17: Tissue making machines;*

*Part 21: Coating machines;*

*Part 22: Wood grinders;*

*Part 26: Roll packaging machines;*

*Part 27: Roll handling systems.*

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, Croatia, 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, Turkey and the United Kingdom.

## Introduction

This document is a type C standard as stated in EN ISO 12100:2010. The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document. For machines that have been designed and built according to the provisions of this C standard, the following stipulation applies: Where provisions of this type C standard are different from those which are stated in type A or B standards or from provisions made in EN 1034-1:2000+A1:2010, the provisions of this type C standard take precedence over the provisions of the other standards.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 1034-16:2012

<https://standards.iteh.ai/catalog/standards/sist/eddd29fc-9776-416f-bab6-2674d32a6adf/sist-en-1034-16-2012>

## EN 1034-16:2012 (E)

## 1 Scope

This European Standard applies to machines for the production of paper and board, including head box, wire section (former), press section, drying section, film size press, coating unit, flotation and infrared dryer, smoothing unit, integrated calender, measuring device, reel-up, integrated sheeter, drives and control system (paper and board making machines) and applies together with EN 1034-1:2000+A1:2010. It deals with all significant hazards, hazardous situations and hazard events relevant to machines for the production of paper and board, when used as intended and under the conditions foreseen by the manufacturer (see Clause 4).

This document does not deal with pressure hazards in steam-heated drying cylinders.

NOTE Directive 97/23/EC gives essential safety requirements for equipment under pressure.

This document does not apply to:

- tissue making machines,
- cardboard making machines,
- coating machines,
- machines for the production of corrugated board,
- integrated conveyors and cranes designed for transporting reels/shells (reel spools) and for machine maintenance, and
- integrated fire extinguishing equipment.

This European Standard is not applicable to paper and board making machines which are manufactured before the date of publication of this European Standard by CEN.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 547-1:1996+A1:2008, *Safety of machinery — Human body measurements — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2:2000+A1:2008, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 626-1:1994+A1:2008, *Safety of machinery — Reduction of risk to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 746-1:1997+A1:2009, *Industrial thermoprocessing equipment — Part 1: Common safety requirements for industrial thermoprocessing equipment*

EN 746-2:2010, *Industrial thermoprocessing equipment — Part 2: Safety requirements for combustion and fuel handling systems*



EN 894-1:1997+A1:2008, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2:1997+A1:2008, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 2: Displays*

EN 953:1997+A1:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1034-1:2000+A1:2010, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 1: Common requirements*

EN 1034-4:2005+A1:2009, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 4: Pulpers and their loading facilities*

EN 1034-5:2005+A1:2009, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 5: Sheeteters*

EN 1034-6:2005+A1:2009, *Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 6: Calender*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1088:1996+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 13478:2001+A1:2008, *Safety of machinery — Fire prevention and protection* EN 1760-1:1997+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors*

EN 1760-2:2001+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

EN 1837:1999+A1:2009, *Safety of machinery — Integral lighting of machines*

EN 12198-1:2000+A1:2008, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 1: General principles*

EN 12453:2000, *Industrial, commercial and garage doors and gates — Safety in use of power operated doors — Requirements*

EN 13023:2003+A1:2010, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy grades 2 and 3*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60204-11:2000, *Safety of machinery — Electrical equipment of machines — Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1500 V d.c. and not exceeding 36 kV (IEC 60204-11:2000)*

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environment (IEC 61000-6-2:2005)*

EN 61496-1:2004, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

EN 61511-1:2004, *Functional safety — Safety instrumented systems for the process industry sector — Part 1: Framework, definitions, system, hardware and software requirements (IEC 61511-1:2003 + Corrigendum 2004)*

**EN 1034-16:2012 (E)**

EN 61511-2:2004, *Functional safety — Safety instrumented systems for the process industry sector — Part 2: Guidelines for the application of IEC 61511-1 (IEC 61511-2:2003)*

EN 61800-3:2004, *Adjustable speed electrical power drive systems — Part 3: EMC requirements and specific test methods (IEC 61800-3:2004)*

EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

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

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (EN ISO 13732-1:2006)*

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13849-2:2008, *Safety of machinery — Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2003)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

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 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13850:2008)*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4:2004, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

### **3 Terms and definitions**

For the purpose of this document, the terms and definitions given in EN 1034-1:2000+A1:2010, EN ISO 12100:2010 and the following apply.

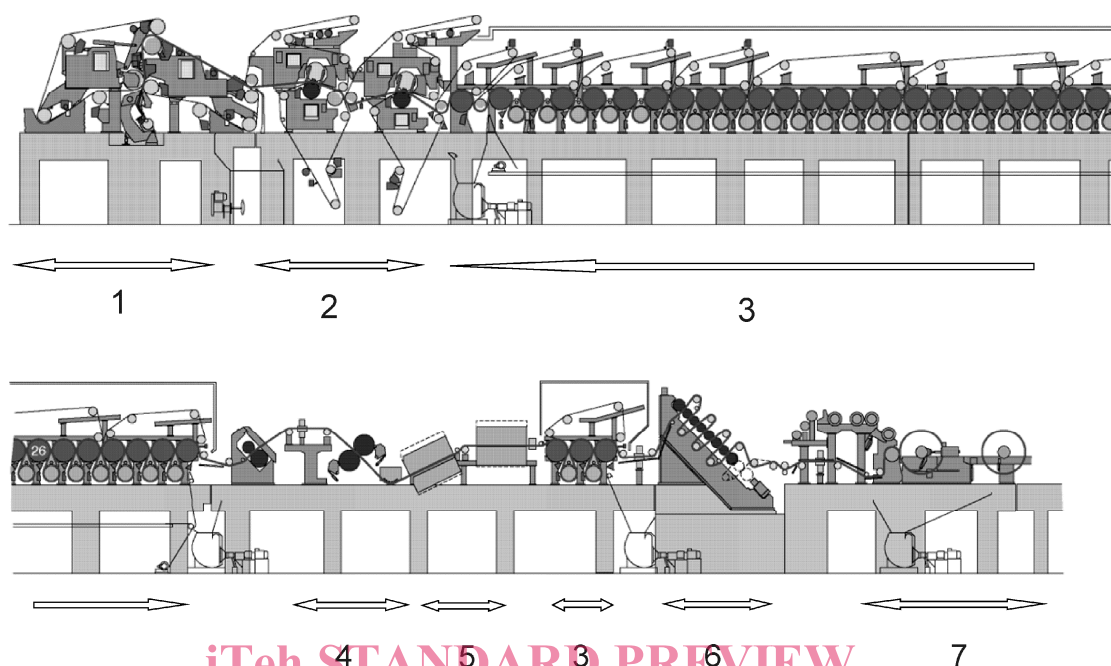
#### **3.1**

##### **paper and board making machines**

the basic principle is, that fibre suspended in water is spread onto a wire screen or belt, pressed and dried to form an endless web

Note 1 to entry: The machine is an assembly of sections with drive and control systems extending from the short circulation pump system to the head box, to the reel up and reel stand and including a wire section (former), press section, dryer section,

size press, calender, coating unit and measuring unit. Board machines are largely designed as for paper, except that the wire section consists of several formers to produce the ply, both longitudinal and round, the dryer section often incorporates a calender and the board sheet may not be reeled up, but fed directly to a sheeter. In Figure 1, an example for paper and board making machines is shown schematically.



iTeh STANDARD PREVIEW  
(standards.iteh.ai)

#### Key

- |   |                           |   |                 |
|---|---------------------------|---|-----------------|
| 1 | wire section              | 5 | flotation dryer |
| 2 | press section             | 6 | calender        |
| 3 | drying section            | 7 | reel up section |
| 4 | coating unit and air turn |   |                 |

**Figure 1 — Example for paper and board making machines (safety devices are not shown)**

### 3.2

#### head box

unit that keeps the fibres dispersed and delivers the stock uniformly onto the wire

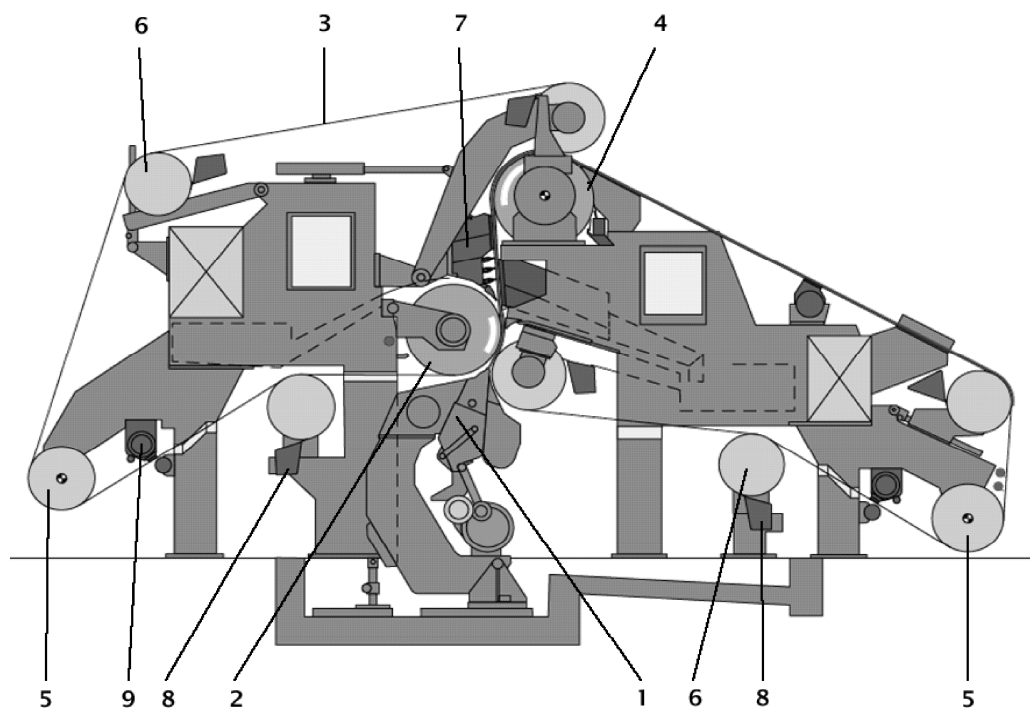
Note 1 to entry: There are many types including an open flow box (commonly known as a breast box), hydraulic flow box, pressurised flow box and vacuum flow box.

### 3.3

#### wire section

moving wire, where water drains away into a pit below (known as a hog or couch pit) leaving the fibres to form a sheet on the surface

Note 1 to entry: Machines may be single or twin wire. Synthetic wires (woven plastic) are commonly used. Water is also removed by the use of hydrofoils, suction units and a couch or wire suction roll. Equipment, such as guides and tension rollers and spraying pipes are also included in this section. A Dandy roll, which is a hollow roll with a variety of coverings, may be used to compact the fibres and apply a watermark or wove. Round wires may also be used, to form a web. In Figure 2, an example for a wire section is shown schematically.

**Key**

- 1 head box
- 2 breast roll
- 3 wire

- 4 suction roll
- 5 wire drive roll
- 6 wire guide roll

- 7 foil
- 8 doctor
- 9 spray bar

iTeh STANDARD PREVIEW

(standards.iteh.ai)

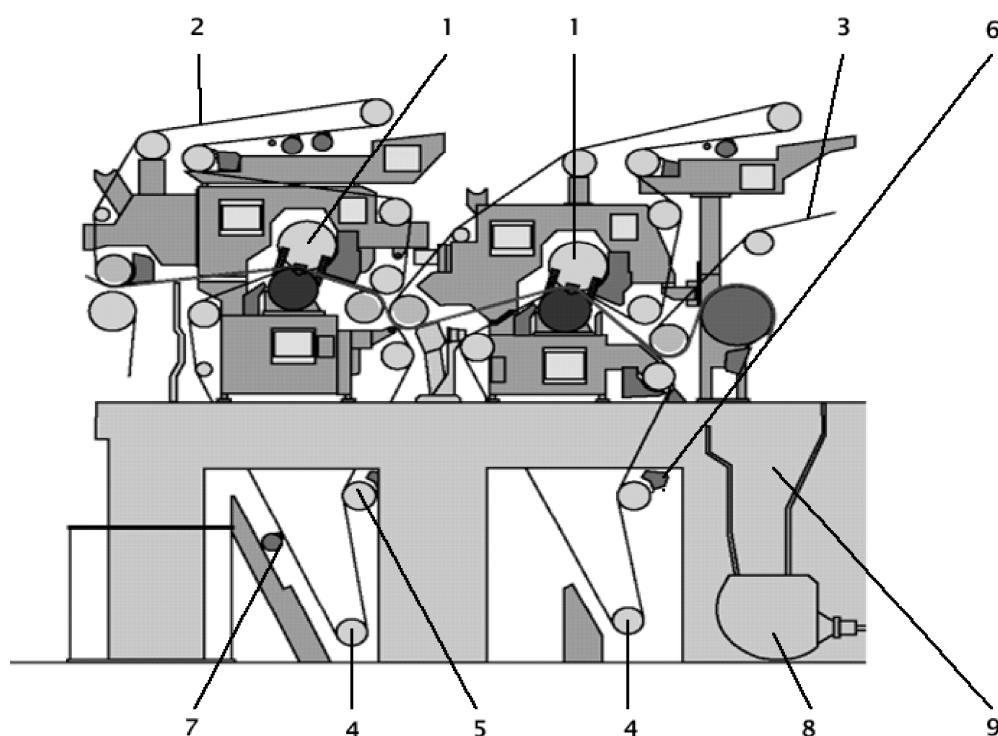
SIST EN 1034-16:2012

<https://standards.iteh.ai/catalog/standards/sist/eddd29fc-9776-416f-bab6-2674d52a0ad1/sist-en-1034-16-2012>  
**Figure 2 — Example for a wire section (safety devices are not shown)**

**3.4****press section**

consists of a number of heavy rollers and a felt and acts like a mangle. Moisture in the sheet is squeezed out and drawn out by suction; the section extends from the sheet pick up to the first dryer section and includes the pick up cylinder, pressure rolls, shoe press, lead rolls, spraying pipes, high pressure needle shower, suction boxes and roll stretch equipment

Note 1 to entry: In Figure 3 an example for a press section is shown schematically.



iTeh STANDARD PREVIEW

(standards.iteh.ai)

**Key**

1 shoe press	3 wire	5 outer roll	7 wheel box	9 hopper
2 felt	4 tension roll	6 doctor	8 pulper	

SIST EN 1034-16:2012

Figure 3 — Example for a press section (safety devices are not shown)

<https://standards.iteh.ai/catalog/standards/sist/edd129fc-9776-416f-bab6-2674d32a6ad1/sist-en-1034-16-2012>

**3.5****drying section**

textends from the first drying cylinder to the reel up. The web passes through a number of steam-heated cylinders, which are pressure vessels, that gradually rise in temperature or suction rolls; the web is supported through this section by synthetic dryer fabrics, until the sheet is completely dry. Flotation dryers, infra-red dryers and MG cylinders are includes in this European Standard

Note 1 to entry: In Figure 4 an example for a drying section is shown schematically.