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Stroji za predelavo gume in plastike - Kalandri - Varnostne zahteve

Plastics and rubber machines - Calenders - Safety requirements

Kunststoff- und Gummimaschinen - Kalander - Sicherheitsanforderungen

Machines pour le caoutchouc et les matières plastiques - Calandres - Prescriptions de sécurité

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Plastics and rubber machines - Calenders - Safety requirements

Machines pour le caoutchouc et les matières plastiques
- Calandres - Prescriptions de sécurité

Kunststoff- und Gummimaschinen - Kalanders -
Sicherheitsanforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 145.

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

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European foreword

This document (prEN 12301:2015) has been prepared by Technical Committee CEN/TC 145 “Plastics and rubber machines”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12301:2000+A1:2008.

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.

The main changes with respect to the previous edition (EN 12301:2000+A1:2008) are as follows:

- the Scope is extended to cover also two-roll calenders forming an integral unit with an extruder (roller head) and two or three-roll polishing, laminating or embossing units installed downstream of extruders in film processing lines;
- the structure is modified;
- the list of significant hazards are moved into an informative annex;
- technical developments in safeguards are taken into account;
- requirements for braking system and roll separation are updated;
- revised type-A and type-B standards are taken into account;
- the performance levels of safety related parts of control systems are specified in accordance with EN ISO 13849-1:2008.

Introduction

This European standard is a type C standard as described in EN ISO 12100:2010.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN ISO 12100:2010 for hazards which are not covered by this standard.

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SIST EN 12301:2020

<https://standards.iteh.ai/catalog/standards/sist/70a7b451-5966-4807-8a94-c6c62281c5de/sist-en-12301-2020>

1 Scope

This draft European standard specifies safety requirements relating to the design and construction of calenders intended for the processing of rubber or plastics.

This draft European standard concerns the calender alone, including all components fixed to its frame.

Annex C shows examples of various types of calenders and Annex D shows examples of calendaring processes.

This draft European standard deals with all significant hazards, hazardous situations or hazardous events relevant to the design and construction of calenders, when the machines are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex B).

This draft European standard does not deal with:

- hazards generated by the processing of explosive materials, or materials which give rise to an explosive atmosphere;
- hazards due to laser or ionizing radiation;
- hazards generated if the calender is installed in an explosive atmosphere.

Two roll mills are covered by EN 1417.

This draft European standard applies to machinery manufactured after its date of approval 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 574:1996+A1:2008, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design*

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

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

EN 1037, *Safety of machinery — Prevention of unexpected start-up*

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

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

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

EN 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4)*

EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1)*

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

CLC/TS 61496-3, *Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for Active Opto-electronic Protective Devices responsive to Diffuse Reflection (AOPDDR) (IEC 61496-3)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:2010)*

EN ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413)*

EN ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731)*

EN ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

EN ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1)*

EN ISO 11688-2, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design (ISO/TR 11688-2)*

prEN 12301:2015 (E)

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

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

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 13850, *Safety of machinery — Emergency stop — Principles for design (ISO 13850)*

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 13856-1:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO 13856-1:2013)*

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

EN ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection (ISO 14119:2013)*

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

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and the definitions given in EN ISO 12100:2010 and the following apply.

3.1

calender

machine for processing rubber, plastics, solutions or dispersions by continuous drawing between two or more rolls, which are supported at both ends by a frame

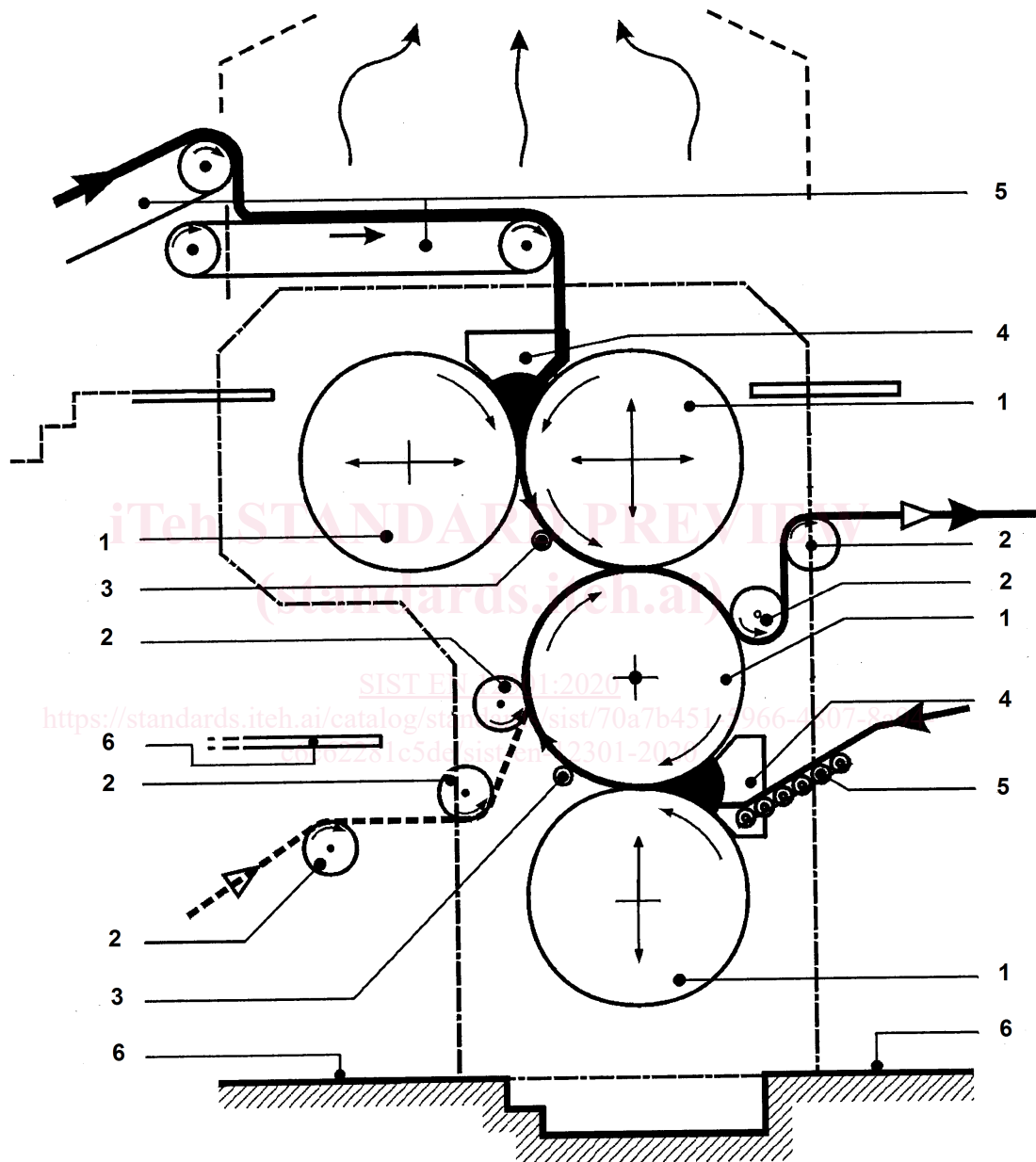
Note 1 to entry: The processing operations may be, for example:

- continuous calendaring of sheets or profiles of rubber or plastics;
- application of one or more sheet(s) or layer(s) onto a support material;
- laminating of two or more sheets of rubber or plastics under pressure or by using heat or adhesive;
- embossing or polishing of plastics (for example smoothing roll stack).

Note 2 to entry: Figure 1 shows a typical calendaring sequence and the positions of most of the components and zones defined hereafter.

Note 3 to entry: Annex C shows examples of various types of calenders.

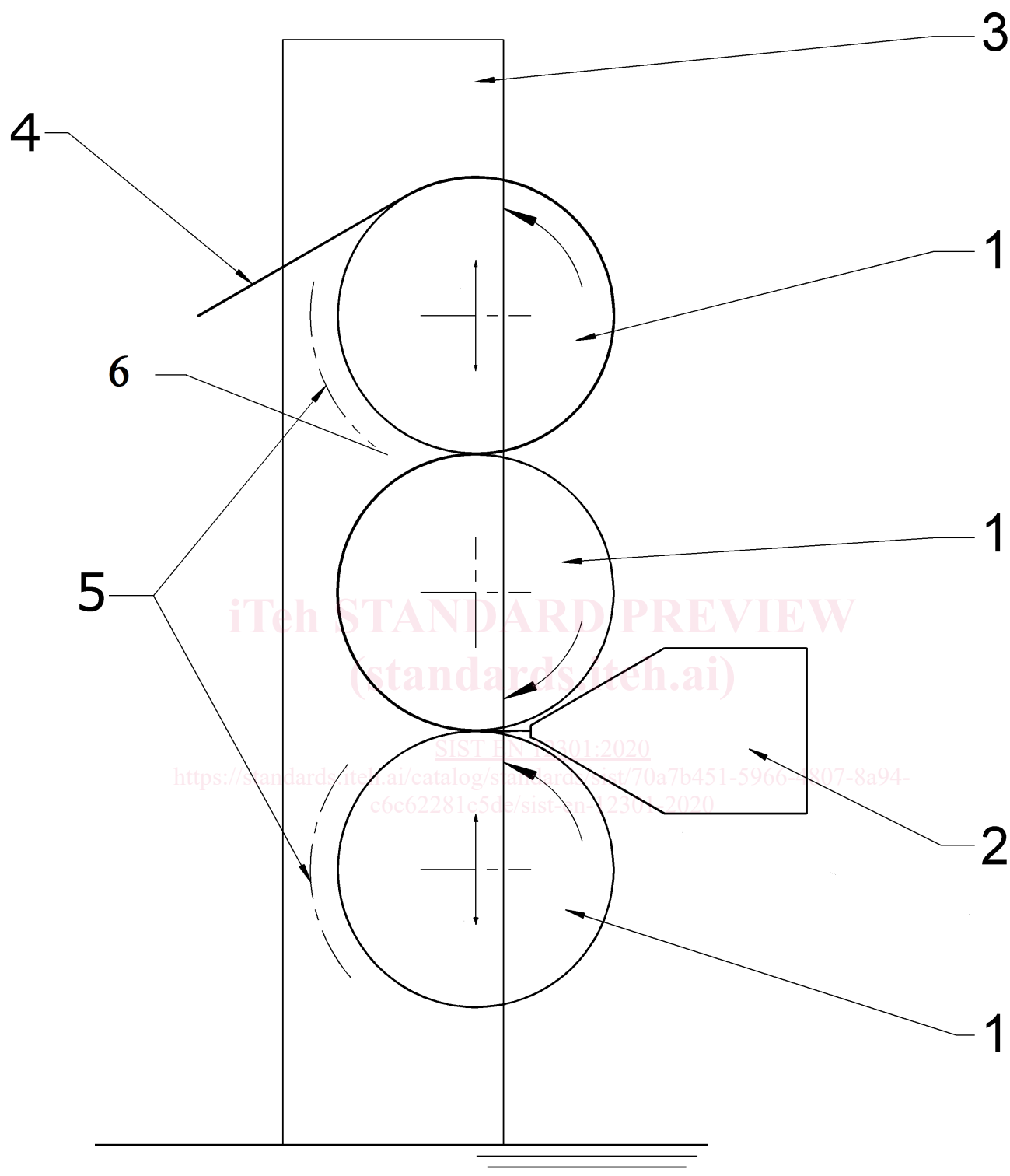
Note 4 to entry: Annex D shows examples of various calendaring processes.



Key

- | | |
|---------------------|-------------------|
| 1 calender rolls | 4 stock guides |
| 2 secondary rollers | 5 feeding devices |
| 3 cutting devices | 6 working zones |

Figure 1 — Example of a 4-roll calender showing the materials circuit for bilateral coating of (textile or metallic) fabric or cords

**Key**

- | | |
|-----------------|---------------------------|
| 1 calender roll | 4 film |
| 2 extruder head | 5 working zone (cleaning) |
| 3 frame | 6 crushing zone |

Figure 2 — Example of a 3-roll stack supplied by an extruder

3.2**calender roll**

roll which is positioned in relation to other calender rolls in order to process the material

Note 1 to entry: The roll may be counterbored or drilled to enable its temperature to be controlled by fluid circulation.

3.3**secondary roller**

roller, which is used to support the calendering process

Note 1 to entry: It may be driven and temperature regulated.

Note 2 to entry: Examples of secondary rollers are: pressure rollers, embossing rollers, filament guide rollers, tension rollers, stripper rollers, crease removing rollers, take-off rollers.

3.4**cutting equipment**

equipment for trimming the edges of the sheet to one or more specified widths

EXAMPLE Fixed knives (wires or blades), rotating knives (cutting discs).

3.5**stock guides**

devices located on either side of the feed zone which determine the width of the sheet to be calendered and retain the stock thus preventing it from extending beyond the normal working area

3.6**feeding device**

equipment for feeding and distributing the stock in the feed zone

EXAMPLE Table, grid, chute, conveyor, reciprocating feed conveyor.

3.7**stopping angle**

angle through which the calender rolls rotate from the stop signal triggered by a protective device until the calender rolls have come to rest

3.8**feed zone**

zone in which stock (rubber or plastic etc.) and/or material (cords, web, fabric etc.) is fed into the calender

3.9**working zone**

area of the calender where the operators carry out their normal duties

3.10**crushing zone**

zone existing between two calender rolls close to each other rotating in opposite directions towards the nip

Note 1 to entry: See Figure 3.

prEN 12301:2015 (E)**3.11****danger zone**

zone existing on a calender when access to the crushing zone defined in 3.10 is not prevented by a protective structure placed in the immediate vicinity of the crushing zone

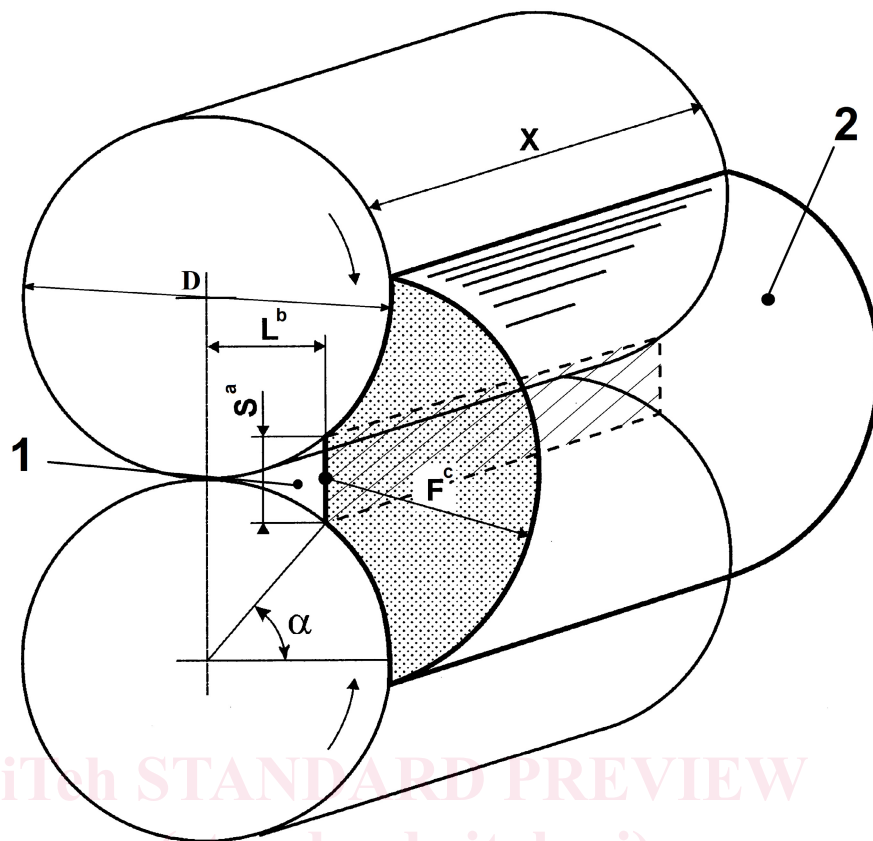
Note 1 to entry: The danger zone is the volume at the inrunning side of the rolls circumscribed by the length X of the rolls and the shaded cross-section. This section is delimited by:

- the line dimensioned S at the entrance to the crushing zone (see 3.10);
- the two arcs of circle on the calender rolls corresponding with the specified stopping angle α (see 3.7);
- the arc of a circle whose centre is the middle of the line dimensioned S and whose radius F is equivalent to the length of the arcs of circle on the calender rolls corresponding with the specified stopping angle α .

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Key

1 crushing zone

2 danger zone [://standards.iteh.ai/catalog/standards/sist/70a7b451-5966-4807-8a94-66e62381e51a/sist-en-12301-2020](http://standards.iteh.ai/catalog/standards/sist/70a7b451-5966-4807-8a94-66e62381e51a/sist-en-12301-2020)

S line dimensioned at the entrance to the crushing zone (see 3.10)

X length of calender roll

L depth of the crushing zone

D diameter of the calender rolls

α stopping angle

F radius equivalent to the length of the arcs of circle on the calender rolls corresponding with the specified stopping angle

^a S needs to be taken as 12 mm when the rolls are theoretically in contact, irrespective of the roll diameter.

^b $L = \sqrt{6D}$; where the roll diameters are different D shall be taken as the larger diameter

^c $F = \frac{D}{2} \alpha$

NOTE An example for the calculation of L is given in Annex E; L remains constant irrespective of the nip between the rolls.

Figure 3 — Crushing and danger zones at the calender rolls

3.12

setting

preparing the machine for production, including cleaning, machine set-up, etc.