BRITISH STANDARD

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Tannery machines — Roller coating machines — Safety requirements

The European Standard EN 13113:2002 has the status of a British Standard

ICS 59.140.40

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13113:2002.

The UK participation in its preparation was entrusted to Technical Committee MCE/3/11, Tannery machines — Safety, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

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Contents

Foreword

This document EN 13113:2002 has been prepared by Technical Committee CEN/TC 200 "Tannery machines and plant - 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of an identical text or by endorsement, at the latest by October 2002, and conflicting national standards shall be withdrawn at the latest by October 2002.

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 EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this document.

Annex A is normative.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard is a type C standard as stated in EN 1070.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard.

1 Scope

This European Standard deals with the following roller coating machines (see Figures 2 to 4 and normative annex A for description):

a) single and multi-roller contra-rotating machines (see Figure 2);

b) single and multi-roller synchronised machines (see Figure 3);

c) single and multi roller- contra-rotating /synchronised machines, so-called combined machines (see Figure 4).

The machines are not intended to be used during transportation.

This standard specifies safety requirements for design, construction and operation.

It takes account of intended use, foreseeable misuse, component and systems failure.

This standard takes account of material feeding and handling devices which, when attached to the machine, become an integral part.

This European Standard applies to the machines manufactured after its date of issue.

This standard does not establish any requirements for electromagnetic disturbances.

NOTE Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard does not necessarily comply with Directive 94/9/EC. Additional safety requirements in a future revision of this standard can be necessary to satisfy Directive 94/9/EC.

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 (including amendments).

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

EN 292-2:1991/A1:1995, *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 avoid crushing of parts of the human body.*

EN 418:1992, *Safety of machinery - Emergency stop equipment, functional aspects - Principles for design.*

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

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 999:1998, *Safety of machinery - The positioning of protective equipment in respect of approach speeds of parts of the human body.*

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

EN 1070, *Safety of machinery – Terminology.*

EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection.*

prEN 1760-2:1996, *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 ISO 3743-1, *Acoustics - Determination of sound power levels of noise sources – Engineering methods for small, movable sources in reverberant fields – Part 1: Comparison method for hard-walled test rooms (ISO 3743-1:1994).*

EN ISO 3743-2, *Acoustics - Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields – Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994).*

EN ISO 3744, *Acoustics - Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 3746, *Acoustics - Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995).*

EN ISO 3747, *Acoustics - Determination of sound power levels of noise sources using sound pressure – Comparison method for use in situ (ISO 3747:2000).*

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

EN ISO 9614-1, *Acoustics - Determination of sound power levels of noise sources using sound – Part 1: Measurement at discrete points (ISO 9614-1:1993).*

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

prEN ISO 9614-3, *Acoustics - Determination of sound power levels of noise sources using sound – Part 3: Precision method for measurement by scanning (ISO/DIS 9614-3:2000).*

EN ISO 11201, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995).*

EN ISO 11202, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Survey method in situ (ISO 11202:1995).*

EN ISO 11203, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995).*

EN ISO 11204, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Method requiring environmental corrections (ISO 11204:1995).*

EN ISO 11688-1, *Acoustics-Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1:1995).*

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 11688-2:1998).*

EN 61496-1:1997, *Safety of machinery - Electro-sensitive protective equipment - General requirements and tests (IEC 61496-1:1997).*

prEN 61496-2:1997, *Safety of machinery - Electro-sensitive protective equipment - Particular requirement for equipment using active optoelectronic protective devices*.

EN 60204-1:1997*, Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997).*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 292-1 and EN 1070 together with the following apply.

Definition and descriptions of each machine type are given in normative annex A.

3.1
roller coating machines (see Figure 1)
machines which are used to apply liquid coated substances on hides or skins. The substances are applied from a reservoir formed by the coating roller and a doctor blade. The hides or skins are fed to the coating roller either directly or by means of a transport belt

3.2
accessible zone
any danger zone except the working zone

3.3
belt washing system with brush roller and scraper rubber blade
system used to clean the transport belt from substances, not applied to hides or skins, that would otherwise cause contamination

3.4
coating roller
roller that applies the substances contained in the colour space, onto the hides or skins

3.5
colour space
zone which collects the material to be coated. It is formed by the contact between the doctor blade and the coating roller

3.6
doctor blade
blade that uniformly distributes the substances on the coating roller

3.7
drive roller
roller that moves the transport belt

3.8
feeding-in table
table that allows hides or skins to be introduced into the working area

3.9
rubberised counter pressure roller
roller used to adjust the pressure hand gap in which the skin is processed

3.10
spreading belt
belt used to spread the skin before it is passed between the working rollers

3.11
transport belt
belt that feeds-in the hides or skins into the working area

3.12
transmission parts
parts in motion acting singly or in combination which transmit motion to the working parts

3.13
turning device with coating roller
device that carries non working rollers and whose rotation executes roller change

3.14
working parts
parts carrying out the process for which this machine was designed

3.15
working zone
zone around a power driven working part in which the work process takes place for the treatment and processing or manufacturing of products

3.16
feed-in zone
part of the working zone, which has particular hazards and needs appropriate safety devices, in which the operators place the material to be split

4 List of hazards

Before using this standard it is important to carry out a risk assessment.

This clause contains all the significant hazards, as far as they are dealt with in this standard, identified by risk assessment significant for this type of machinery and which require action to eliminate or reduce the risk.

Danger Zone	Source of hazard	Hazard	Zone	Figure	Safety requirements
4.1 Mechanical hazards					
4.1.1 Single roller contra-rotating machine					
The feed-in zone	Coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping	A	2a	5.2.1.2 and 5.3.1.1
Colour space	Doctor blade	Cutting Trapping	F	2a	5.2.1.2 and 5.3.1.2
Drive roller	Drive roller rotation	Crushing Entanglement Trapping	D	2a	5.2.1.2
4.1.2 Single roller contra-rotating machine with spreading belts					
The feed-in zone	Spreading belts movements	Crushing Entanglement Trapping Friction/Abrasion	B	2b	5.2.1.2 and 5.3.2.1
For zones D, F see 4.1.1 of this standard					
4.1.3 Single roller synchronised machine					
The feed-in zone	Coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping	A	3a	5.2.1.2 and 5.3.3.1
Colour space	Doctor blade	Cutting Trapping	F	3a	5.2.1.2 and 5.3.3.2
Drive roller	Drive roller rotation	Crushing Entanglement Trapping	D	3a	5.2.1.2

Danger Zone	Source of hazard	Hazard	Zone	Figure	Safety requirements
4.1.4 Single roller synchronised machine with spreading belts					
The feed-in zone	coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping Friction/Abrasion	B	3b	5.2.1.2 and 5.3.4.1
For zones D, F see 4.1.3 of this standard					
4.1.5 Single roller synchronised machine with rubberised roller					
The feed-in zone	coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping Friction/Abrasion	A	3c	5.2.1.2 and 5.3.4.1
For zones A, F see 4.1.3 of this standard					
4.1.6 Single roller contra-rotating / synchronised machine (combined machine) -– Contra-rotating working configuration					
The feed-in zone	Coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping	A	4a	5.2.1.2 and 5.3.6.1
Colour space	Doctor blade	Cutting Trapping	F	4a	5.2.1.2 and 5.3.6.2
Drive roller	Drive roller rotation	Crushing Entanglement Trapping	D	4a	5.2.1.2
4.1.7 Single roller contra-rotating / synchronised machine (combined machine) – Synchronised working configuration					
The feed-in zone	Coating roller and rubberised counter pressure roller rotation	Crushing Entanglement Trapping	A	4b	5.2.1.2 and 5.3.7.1
Colour space	Doctor blade	Cutting Trapping	F	4b	5.2.1.2 and 5.3.7.2
Drive roller	drive roller rotation	Crushing Entanglement Trapping	D	4b	5.2.1.2

Danger Zone and source of hazard	Hazard	Zone	Figure	Safety requirements
4.2 High pressure fluid ejection				
High pressure fluid ejection or ejection of a burst component part by failure of hydraulic unit (broken hoses, fittings and tubes)	Burn and impact from hot oil or machinery parts under pressure			5.2.2
4.3 Electrical hazard				
Electrical contact, direct or indirect caused by: - component failure - insulation failure incorrect design, installation or component specification of the electrical equipment	Electric shock, burns			5.2.3
4.4 Slip trip and fall hazard				
Spilling and overflowing of substances during processing.	Slip			5.2.4
4.5 Noise				
Noise generated by: - action of the roller on the material - hydraulic unit	Hearing loss Interference with communication and acoustic signals			5.2.5

Danger Zone and source of hazard	Hazard	Zone	Figure	Safety requirements
4.6 Thermal hazard				
Accidental contact with heated roller surface	Burns and scalds	E	2 3 4	5.2.9
4.7 Roller changing				
The contact with moving turning device with coating roller	Impact	G	2 3 4	5.2. 10
4.8 Disassembly				
Instability from disassembly for maintenance	-	-	-	5.2. 11
4.9 Belt washing system				
Arm introduction in the zone between the rubberised counter pressure roller and belt washing system	Entanglement Trapping Friction/abrasion	H	2 3 4	5.2. 12
4.10 Sides access				
The contact with all the previous systems from machine sides	Crushing Cutting Entanglement Trapping Friction/Abrasion	A, B, C, D, E. F, G	2 3 4	5.2.13

5 Safety requirements and/or measures

NOTE For hazards not covered by this European Standard which are to be reduced by the application of a B-standard such as EN 292, EN 294, EN 418, EN 953, EN 60204-1 etc., a risk assessment is necessary to establish the requirements of the B-standard to be applied. This specific risk assessment is part of the general risk assessment of the machine

Machinery shall comply with the safety requirements and/or measures of this clause.

In addition, the machine shall be designed according to the principles of EN 292 for hazards relevant but not significant which are not dealt with by this standard.

5.1 General

See 1.1.2 of annex A of EN 292-2:1991/A1:1995.

5.2 Common requirements concerning Roller coating machines

5.2.1 Mechanical equipment

5.2.1.1 Safeguarding against the hazards generated by moving transmission parts (such as pulleys, belts, gears, rack, etc.) shall be ensured by:

- fixed enclosing guards in accordance with EN 953 and 4.2.2.2 of EN 292-2:1991/A1:1995.

or

- movable interlocking guards in accordance with EN 953, EN 1088, and 4.2.2.3 of EN 292-2:1991/A1:1995.

5.2.1.2 Hazardous motions of moving machinery parts, feed systems, tools and workpieces shall be safeguarded by:

- fixed enclosing guards or covers which satisfy EN 953 and 4.2.2.2 of EN 292-2:1991/A1:1995;

or

- fixed distance guards which satisfy EN 953 and 4.2.2.1 of EN 292-2:1991/A1:1995 and the distances given in appropriate Tables (1, 3 or 4) of EN 294:1992.

5.2.1.3 All the guards mentioned in 5.2 and 5.3 shall be in accordance with clause 5 of EN 953:1997 (design and construction) and shall be designed and manufactured in such a way as to keep all their functions during a force application of 800 N to the central zone of the guard between two supports, distributed over an area of approximately 0,01 m^2.

On release of the force no detectable distortion of the guard shall remain.

5.2.1.4 Where the above measures cannot be applied, devices shall be provided which will effect a shutdown of the hazardous motion before reaching the danger point.

Suitable protection devices are:

— movable interlocking guards which satisfy EN 953, EN 1088 and 4.2.2.3 of EN 292-2:1991/A1:1995;

— trip devices, such as

  — electrosensitive protective devices in compliance with EN 61496-1:1997, prEN 61496-2:1997 and EN 999,

  — pressure sensitive protective devices in compliance with prEN 1760-2 type 3.1 and 3.2.

5.2.2 High pressure fluid ejection

If a machine is fitted with hydraulic/pneumatic equipment a loss of fluid under high pressure may arise and result in a hazard of impact either directly or by impelled objects.

The risk of injury caused by escaping spurts/jets of fluid or impelled objects shall be reduced to the lowest practical level by the provision of fixed enclosing guards or solid screens.

Equipment of hydraulic and pneumatic system shall satisfy 3.8 of EN 292-2:1991/A1:1995, EN 982, EN 983 and 7.2.b of this standard.

5.2.3 Electrical equipment (for all machines)

5.2.3.1 Electrical systems and equipment shall be in accordance with EN 60204-1:1997.

Control and safety devices shall be protected to IP54 level. Specific levels of protection are defined in EN 60529:1991.

5.2.3.2 All operating controls requiring adjustment for changing the working process shall be located on the outside of the electrical cabinet.

NOTE Controls for routine electrical adjustment are for example temperature, speed and thickness variation

5.2.4 Slip, trip and fall hazard

Hazards, slipping especially, may arise by substances spilling and overflowing during processing material. The manufacturer shall include in the “instructions for use” information on water and grease, if discharged from the machine, and advice on the need to provide, at machine installation, safeguards such as footboards, non-slip floors etc., shall be noted in the instruction handbook (see 7.1.2 j of this standard).

5.2.5 Noise

5.2.5.1 Noise reduction at source and by protective measures at the design stage: noise reduction shall be achieved as an integral part of the design by:

— taking account of the measures to control noise at source given in EN ISO 11688-1,

— incorporating one or more of the measures indicated below as examples.

a) reduction of vibration through the static and dynamic balancing of the rotating parts;

b) reduction of vibration within the machine by reducing both the mass of the moving parts and their acceleration;

c) reduction of impactive over clearance of rotational bearings by application of positive reloading;

d) proper choice and design of the energy transfer-components to eliminate bouncing;

e) proper choice and design of the transmission components (gears, pulleys, belts, bearings and so on);

f) proper design of the machine structures by taking care of vibrations damping and by avoiding structural resonance. Antivibration feet shall be mounted to reduce vibration transmission by the floor;

g) sound deadening of pneumatic discharges, vibrations damping of hydraulic circuits.

h) when practical, screens fitted to the machine, partial or total enclosure of noisy elements.

This list of technical measures for noise reduction at the source gives only examples and is not meant to be complete.

These measures are recommended but not compulsory.

Alternative measures with identical or higher efficacy can be used.

NOTE EN ISO 11688-2 is, for machine designers, a useful source of information on noise generation mechanisms.

5.2.5.2 Noise reduction by information: if it is known that, after taking possible measures to control noise at the design stage, further protection of the operators is necessary, the instruction handbook shall give additional information (see 7.1.1).

5.2.6 Control system

5.2.6.1 Electrical control system shall be in compliance with EN 60204-1:1997. Pneumatic control system shall be in compliance with EN 983. Hydraulic control system shall be in compliance with EN 982.

5.2.6.2 Devices shall be fitted, in accordance with EN 1037, to prevent uncontrolled dangerous movements caused by irregularities, failure or unexpected reconnection of the power supply.

The stipulation for preventing uncontrolled dangerous movements caused by unexpected reconnection of the power supply is met by means of a further device to start the machine, for example a reset device.

5.2.6.3 Unless demanded by 5.2.6.4 or 5.3, safety related parts of the machine control system

— shall have at least the same level as the safeguarding used

or, where not otherwise specified

— shall be at least in compliance with category 1 of EN 954-1

5.2.6.4 The use of programmable electronic systems (PES) shall not reduce any level of safety laid down in this standard. When a machine is fitted with programmable electronic systems, safety related function shall not rely solely on it. This requirement is met, if using

— additional hardwired control system or

— duplicated solid state channel.

5.2.7 Emergency stop equipment

5.2.7.1 The emergency stop equipment function shall be independent from the normal control systems of the machines and shall comply with EN 418. The stop achieved with the emergency stop equipment shall be a category 1 stop (see 4.1.5 of EN 418:1992).

For specific requirements for electrical equipment see 9.2.2, 9.2.5.4 and 10.7 of EN 60204-1:1997.

5.2.7.2 At least one emergency stop actuator shall be provided and it shall be positioned so as to be easily accessible to the operator at the operator position and actuable by the head or knees of a person whose hands are trapped at the operating position.

The emergency stop actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop the oscillating motion of the doctor blade;

— not drive away the doctor blade from the coating roller;

— lead to an automatic divergence of the coating roller and the rubberised counter pressure roller to 30 mm minimum.

5.2.8 Maintenance and cleaning

Roller coating machines maintenance and cleaning shall take place using a key-operated switch with an appropriate selector (see 3.7.10 of EN 292-2:1991) with two different positions as specified in 5.2.8.1 and 5.2.8.2.

5.2.8.1 Maintenance

5.2.8.1.1 Maintenance for machine at rest

During maintenance of machine at rest some interventions are executed. For example the following:

— belt centring, in case fixed guards are removed;

— belt changing;

— doctor blade changing (appropriate gloves and other personal protective equipment shall be recommended in the instruction handbook, see 7.1.4.i).

In this position of mode selection device, no machine start shall be possible.

5.2.8.1.2 Maintenance for machine in movement

During maintenance of machine in movement some interventions are executed. For example the following:

— scraping blade adjustment;

— covering material of Roller and counter pressure belt grinding;

— doctor blade grinding;

— belt centring, in case fixed guards are not removed.

In this position of mode selection device:

— the conveying belt shall stop;

— the rubberised counter pressure roller may continue to rotate at a reduced speed which shall not be greater that 5 m/min;

— all the safety devices shall operate.

5.2.8.2 Cleaning

5.2.8.2.1 Cleaning for machine at rest

During cleaning of machine at rest some interventions are executed. For example the following:

— cleaning of belt washing system.

This position of mode selection device is the same of the one in 5.2.8.1.1.

5.2.8.2.2 Cleaning machine in movement

During cleaning of machine in movement some interventions are executed. For example the following:

— doctor blade cleaning;

— coating roller cleaning.

This position of mode selection device is the same of the one in 5.2.8.1.2.

5.2.9 Hot surfaces

No accessible surface shall have a temperature exceeding the “no-burn” values indicated in EN 563. Where the normal operation of the machine or for its setting makes this not possible to achieve warning signs shall be fixed to the machine and suitable personal protective equipment shall be recommended in the “Information for use”. Any insulating materials used shall not include asbestos or other dangerous materials.

5.2.10 Coating roller changing

In case when the machine is equipped with a roller changing device, the impact hazard referring to danger zone G (see Figures 2, 3, 4) shall be safeguarded by:

— a balancing device which shall assure that the turning device with coating roller is balanced;

— a geared motor and a brake system that shall drive turning device with coating roller rotation.

In cases when the machine is not equipped with such a device, the manufacturer shall provide information about centre of gravity, sling points etc. in the “Instruction for use” (see 7.1.3).

5.2.11 Disassembly

Hazards arising from instability may result from disassembly of a machine for transportation or maintenance. The manufacturer shall identify in the “instruction for use” the circumstances leading to the instability and include advice on how the risks can be reduced. Where the manufacturer recommends the use of special supports, details shall be given in the “Instruction for use”, or offered for supply with the machine.

5.2.12 Belt washing system

The gap between the belt washing system with brush roller and rubber scraping blade and rubberised counter pressure roller, in all machines, shall be protected by fixed cover in compliance with EN 349.

Solvent shall not be used for cleaning unless suitable arrestment plant is fitted.

5.2.13 Sides access

Machine sides shall be protected by (a + b):

a) fixed enclosing guards in accordance with EN 953 and 4.2.2.2 of EN 292-2:1991

   or

   movable interlocking guards in accordance with EN 953, EN 1088 and 4.2.2.2 of EN 292-2:1991;

b) fixed distance guard according to EN 294:1992 (Table 1, 3 or 4), EN 349 and EN 953.

5.3 Requirements concerning hazards in the working zone

5.3.1 Single roller- contra-rotating machine with feeding table (see Figure 2a)

5.3.1.1 Crushing, entanglement and trapping hazards referring to danger zone A, feed-in area, (see Figure 2a) shall be protected by:

5.3.1.1.1 A pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2 and category 3 of EN 954-1, along the full machine width, shall be installed in the feed-in zone to prevent the contact between the operator hands and coating roller.

The trip device actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop doctor blade oscillating movement;

— not drive away the doctor blade from coating roller;

— open automatically the coating roller and rubber-covered back pressure roller to 30 mm minimum.

5.3.1.1.2 The feed-in table height from the floor or working platform shall be equal to 1 000 mm ± 30 mm.

5.3.1.2 During cleaning, maintenance and adjustment, the doctor blade shall be moved out from the coating roller. Cutting and trapping hazards referring to danger zone F (see Figure 2a) shall be reduced using warning labels, appropriate personal protective equipment and information in the instruction handbook. A closing movement of a distance in excess of EN 294:1992 Table 4 shall not be permitted without constant operator control, for example push button which, when released, stops movement, or a manual wheel.

5.3.2 Single roller- contra-rotating machine with spreading belt (see Figure 2b)

5.3.2.1 Crushing, entanglement, trapping and friction/abrasion hazards referring to danger zone B (see Figure 2b) shall be protected by a pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2 and category 3 of EN 954-1, along the full spreading belt width, shall be installed in the feed-in zone to prevent the contact between the operator hands and spreading belts.

The trip device actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop the oscillating motion of the doctor blade;

— not drive away the doctor blade from the coating roller;

— lead to an automatic divergence of the coating roller and the rubberised counter pressure roller to 30 mm minimum.

5.3.2.2 Cutting and trapping hazards referring to all other danger zones shall be protected by the requirements indicated in 5.3.1.2.

5.3.3 Single roller synchronised machine with feeding table (see Figure 3a)

5.3.3.1 Crushing, entanglement and trapping hazards referring to danger zone A, feed-in area, (see Figure 3a) shall be protected by:

5.3.3.1.1 A pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2 and category 3 of EN 954-1, along the full machine width, shall be installed in the feed-in zone to prevent the contact between the operator hands and coating roller.

The trip device actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop the oscillating motion of the doctor blade;

— not drive away the doctor blade from the coating roller;

— lead to an automatic divergence of the coating roller and the rubberised counter pressure roller to 30 mm minimum.

5.3.3.1.2 The feed-in table height from the floor or working platform shall be equal to 1 000 mm ± 30 mm

5.3.3.2 During cleaning, maintenance and adjustment, the doctor blade shall be moved out from coating roller. Cutting and trapping hazards referring to danger zone F (see Figure 3a) shall be reduced using warning labels, appropriate personal protective equipment and reminders in the instruction handbook. A closing movement of a distance in excess of EN 294:1992, Table 4 shall not be permitted without constant operator control, for example push button which, when released, stops movement, or a manual wheel.

5.3.4 Single roller synchronised machine with spreading belts (see Figure 3b)

5.3.4.1 Crushing, entanglement, trapping and friction/abrasion hazards referring to danger zone B (see Figure 3b) shall be protected by a pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2and category 3 of EN 954-1, along the full machine width, shall be installed in the feed-in zone to prevent the contact between the operator arms and coating roller.

The trip device actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop the oscillating motion of the doctor blade;

— not drive away the doctor blade from the coating roller;

— lead to an automatic divergence of the coating roller and the rubberised counter pressure roller to 30 mm minimum.

5.3.4.2 Cutting and trapping hazards referring to danger zone F (Figure 3b) shall be protected by the requirements indicated in 5.3.3.2 of this standard.

5.3.5 Single roller synchronised machine with rubberised roller (see Figure 3c)

For mechanical hazards referring to danger zones A and F (Figure 3c) see 5.3.3.1 and 5.3.3.2 of this standard.

5.3.6 Single roller contra-rotating /synchronised machine (combined machine) - Contra-rotating working configuration (see Figure 4a)

5.3.6.1 Crushing, entanglement and trapping hazards referring to danger zone A, feed-in area, (see Figure 4a) shall be protected by:

5.3.6.1.1 A pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2 and category 3 of EN 954-1, along the full machine width, shall be installed in the feed-in zone to prevent the contact between the operator hands and coating roller.

The trip device actuation shall:

— stop the rollers;

— stop the conveying and spreading belts;

— stop the oscillating movement of the doctor blade;

— not drive away the doctor blade from coating roller;

— open automatically the coating roller and rubber-covered back pressure roller to 30 mm minimum.

5.3.6.1.2 The feed-in table height from the floor or working platform shall be equal to 1 000 mm ± 30 mm.

5.3.6.2 During cleaning, maintenance and adjustment, the doctor blade shall be moved out from coating roller. Cutting and trapping hazards referring to danger zone F (see Figure 4a) shall be reduced using warning labels, appropriate personal protective equipment and information in the instruction handbook. A closing movement of a distance in excess of EN 294:1992, Table 4 shall not be permitted without constant operator control, for example push button which, when released, stops movement, or a manual wheel.

5.3.7 Single roller contra-rotating /synchronised machine (combined machine) - Synchronised working configuration (see Figure 4b)

5.3.7.1 Crushing, entanglement and trapping hazards referring to danger zone A, feed-in area, (see Figure 4b) shall be protected by:

5.3.7.1.1 A pressure sensitive protective device of type 3.1 or 3.2 according to prEN 1760-2 and category 3 of EN 954-1, along the full machine width, shall be installed in the feed-in zone to prevent the contact between the operator hands and coating roller.

The trip device actuation shall:

— stop the rollers;

— stop the conveying belt;

— stop doctor blade oscillating movement;

— not drive away the doctor blade from coating roller;

— open automatically the coating roller and rubber-covered back pressure roller to 30 mm minimum.

5.3.7.1.2 The feed-in table height from the floor or working platform shall be equal to 1 000 mm ± 30 mm.

5.3.7.2 During cleaning, maintenance and adjustment, the doctor blade shall be moved out from coating roller. Cutting and trapping hazards referring to danger zone F (see Figure 4b) shall be reduced using warning labels, appropriate personal protective equipment and reminders in the instruction handbook. A closing movement of a distance in excess of EN 294:1992, Table 4 shall not be permitted without constant operator control, for example push button which, when released, stops movement, or a manual wheel.

6 Verification of the safety requirements and/or measures

Verification of the requirements defined in clauses 5 and 7 shall be made by means of inspection, calculation or testing. These shall be applied to a machine in a fully commissioned condition but partial dismantling may be necessary for the purpose of some checks. The verification shall check that:

— all “A” and “B” standards referred to in clause 5 are interpreted correctly (in particular see EN 292-1:1991, EN 292-2:1991, EN 294, EN 60204-1:1997, EN 954-1);

— categories of all safety related parts of control system are correct;

— particular specifications (e.g. velocities and forces) are within specified limits;

— all guards and safety devices are in place, effective and adequately dimensioned;

— adequate information is contained in the instruction handbook.

The criteria for acceptance shall follow the detailed requirements set out in clauses 5 and 7, or in this clause.

The following table gives a list of items to be verified:

Clause Subclause	Subject	Rel. Standards	Check
5.2.1.1	Transmission machinery - fixed enclosing guards	 EN 292-2:1991 EN 953:1997	 Verification of fastening type, measurement of distances, visual inspection according to: clause 4, Annex A clause 8 the guard shall withstand a minimum force of 800 N in an area of 0.01 m^2 in the middle of the guard
	- interlocking guard	EN 1088:1995 EN 954-1:1996	according to clause 7 examination of function, check of circuit diagram, visual inspection clause 9 examination of device level category
5.2.1.2 (to be continued)	Motion of tooling, feeding systems and workpieces		Verification of fastening type measurement of distances, visual inspection according to

Clause Subclause	Subject	Rel. Standards	Check
5.2.1.2 (concluded)	- fixed enclosing guards	EN 292-2:1991 EN 294:1992	clause 4, Annex A Tables 1, 3, 4
	- covers		
	- fixed distance guards	EN 953:1997	clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard
	- interlocking guard	see 5.2.1.1 EN 1088:1995	see 5.2.1.1 EN 1088:1995
	- pressure sensitive protective device	prEN 1760-2:1996	clause 7
	- electrosensitive protective device	EN 61496-1:1997 prEN 61496-2:1997	according to the general clause clause 5 (optoelectronic)
		EN 999:1998	placement distances
5.2.2	High pressure fluid		
		EN 292-2:1991	subclause 3.8
		EN 982:1996	clause 6
		EN 983:1996	clause 6
	-design		check of manufacturer's documentation (design and material used)
	- labelling	This European Standard	Visual inspection according to 7.2.b
5.2.3	Electrical equipment		
	- electrical equipment	EN 60204-1:1997	Examination with suitable measuring instruments (see clause 19)
	- control and safety device protection	EN 60529:1991	Table 1
	- operating controls	This European Standard	visual inspection see 5.2.3.2
5.2.4	Slip, trip and fall hazard - Instruction for use	This European Standard	Visual inspection

Clause Subclause	Subject	Rel. Standards	Check
5.2.5	Noise reduction	EN 292-1:1991/A1:1995 Annex A, 1.5.8 This European Standard	Measurement of noise emission (see below) to verify that noise reduction measures have been applied successfully Visual inspection
		EN ISO 11688	Visual inspection
	Measurement of noise emission	Until a noise test code for the machines covered by this standard is published, use one of the following methods: EN ISO 11201 EN ISO 11202 EN ISO 11203 EN ISO 11204	Measurement of the A-weighted emission sound pressure level at operator positions
		Until a noise test code for the machines covered by this standard is published, use one of the following methods: EN ISO 3743-1 EN ISO 3743-2 EN ISO 3744 EN ISO 3746 EN ISO 3747 EN ISO 9614	If required, measurement of the A-weighted sound power level
	Noise declaration and verification	EN ISO 4871	The noise declaration shall give: - the measured noise emission valued (see above), - the positions where A-weighted emission sound pressure levels have been measured, - the installation and operating conditions of the machine during noise testing. The noise declaration shall have the format of a dual-number declaration (measured value and corresponding uncertainty given separately). Verification of a declared value, if any, shall be done using one of the standardised measurement methods listed above. Installation and operating conditions shall be identical to those used for the determination of declared values.

Clause Subclause	Subject	Rel. Standards	Check
5.2.6	Controls - electrical system - pneumatic system - hydraulic system - safety related parts of control system	 EN 60204-1:1997 EN 983:1996 EN 982:1996 EN 60204-1:1997 This European Standard EN 954-1:1996	 visual inspection visual inspection visual inspection examination of safety of function in case of faults by means of circuit diagrams according to clause 9 5.2.6.3 clause 9
5.2.7	Emergency stop - design - category	 EN 292-2:1991 EN 60204-1:1997 EN 418:1992 This European Standard	 visual inspection examination of function according to 6.1.1 9.2.5.4; 9.2.2; 10.7 clause 4 5.2.7.2
5.2.8	Cleaning and maintenance - mode selection device	This European Standard	5.2.8 visual inspection
5.2.9	Hot surfaces - thermal protection	 EN 563:1994 This European Standard	according to specification of 5.3.3 5.2.9
5.2.10	Roller changing - balancing device - brake system	This European Standard	According to 5.2.10 visual inspection and examination of function
5.2.11	Disassembly	This European Standard	5.2.11 practical examination of function, instruction for use, visual inspection

Clause Subclause	Subject	Rel. Standards	Check
5.2.12	Belt washing system - fixed cover	EN 349:1993	minimum gaps
5.2.13	Various hazard - fixed enclosing guard	EN 292-2:1991	Verification of fastening type, measurement of distances, visual inspection clause 4, Annex A
		EN 953:1997	clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard
	- fixed distance guard	EN 294:1992 EN 953:1997	Tables 1, 3, 4 clause 8. the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard
5.3.1.1.1	Material feeding - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.1.1.2	Feed-in table - ergonomics	This European Standard	5.3.1.1.2 inspection and measurement

5.3.1.2	Doctor blade - warning labels - appropriate device	 EN 292-2:1991 EN 294:1992 EN 953:1997 This European Standard	Verification of fastening type, measurement of distances, visual inspection clause 4, annex A Table 4 clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard 5.3.1.2

Clause Subclause	Subject	Rel. Standards	Check
5.3.2.1	Spreading belts - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.2.2	Various hazard	see 5.3.1.2	
5.3.3.1.1	Material feeding - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.3.1.2	Feed-in table - ergonomics	This European Standard	5.3.3.1.2 inspection and measurement
5.3.3.2	Doctor blade - warning labels - appropriate device	EN 292-2:1991 EN 811:1993 EN 953:1997 prEN 1760-2:1996 This European Standard	Verification of fastening type, measurement of distances, visual inspection clause 4, annex A Table 1 clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard clause 7 practical examination of function 5.3.3.2
5.3.4.1	Spreading belts - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.4.2	Doctor blade	see 5.3.3.2	
5.3.5		see 5.3.3.1 and 5.3.3.2	

Clause Subclause	Subject	Rel. Standards	Check
5.3.6.1.1	Material feeding - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.6.1.2	Feed-in table - ergonomics	This European Standard	5.3.6.1.2 inspection and measurement
5.3.6.3	Doctor blade - warning labels - appropriate device	EN 292-2:1991 EN 294:1992 EN 953:1997 This European Standard	Verification of fastening type, measurement of distances, visual inspection clause 4, annex A Table 4 clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard 5.3.6.3
5.3.7.1.1	Material feeding - pressure sensitive protective device	prEN 1760-2:1996	clause 7 practical examination of function
5.3.7.1.2	Feed-in table - ergonomics	This European Standard	5.3.7.1.2 inspection and measurement
5.3.7.2	Doctor blade - warning labels - appropriate device	EN 292-2:1991 EN 294:1992 EN 953:1997	Verification of fastening type, measurement of distances, visual inspection clause 4, Annex A Tables 4 clause 8 the guard shall withstand a minimum force of 800 N in an area of 0,01 m^2 in the middle of the guard

7 Information for use

7.1 Instruction Handbook

5.5.2 of EN 292-2:1991 shall be considered.

The following instructions and detailed information shall be included:

7.1.1 Machine

a) description of the machine, of its fittings and of its safety devices;

b) information about how the machine will react following the actuation of safety devices;

c) range of applications for which the machine is intended;

d) information about the prohibited uses (if any);

e) diagrams, especially schematic representation;

f) noise emission values, according to EN 292-21991/A1:1995, annex A, 1.7.4 f, determined and declared according to clause 6. The same information shall also be given in the technical sales documentation of the machine.

If relevant, recommendations such as:

— implementation of enclosures, screens;

— use of low-noise operating modes;

— use of cabins for the personnel;

— wearing of personal hearing protection,

shall be given.

The instruction handbook shall state that careful attention to information given in the instruction handbook will avoid noise arising from incorrect usage or lubrication.

7.1.2 Installation of the machine

a) Space required for safe use and maintenance;

b) drawings and/or diagrams showing the static and dynamic forces which act on the base;

c) permissible ranges of environmental factors which would affect the machine: e.g. temperature, moisture, vibration, electromagnetic, radiation;

d) possible influence of the machine on the environment;

e) instruction for connecting the machine to a power supply, particularly about protection against electrical overloading;

f) instruction for the safe dismantling of the machine, for transportation, installation and subsequent maintenance and disposal, including any recommendations for special supports;

g) if necessary, information about additional safety requirements to be taken by the user, which could not materially be integrated into the design of the machine: for example, details regarding fire hazards;

h) information for the correct positioning and interlocking of fume and/or vapour extraction equipment, where necessary;

i) information regarding the recommended air speed and volume flow required at each extraction point;

j) information about means to avoid slip, trip and fall.

7.1.3 Transportation and Storage of the machine and machine parts

Dimensions, weight, position of the centre(s) of gravity, and of the grip points, instruction for handling.

7.1.4 Use of the machine

a) Function of controls;

b) Instructions for safe commissioning;

c) Instructions for safe setting and adjustment to doctor blade, roller;

d) Information about devices for stopping the machine (with particular reference to emergency stops);

e) Information about the residual risks: noise, access for adjustment, cleaning and maintenance;

f) Instructions for safe cleaning, especially for cleaning of the doctor blade in the installed position;

g) Instruction on the procedures required for the safe working of machines by one or two operators;

h) Instructions for fault-finding affecting safety, repair and for re-starting after a repair;

i) Instructions for the selection of use of personal protective equipment (see 5.2.8 of this standard).

NOTE For example in case of bandknife changing safety conditions are met using gloves complying to EN 388:1994

7.1.5 Maintenance

a) Information about required inspections and maintenance operating;

b) Instructions relating to maintenance operations which require a technical knowledge or particular skills and hence should be carried out exclusively by skilled persons (maintenance staff, specialists), for example: sanding and replacing the rubberized belt, centring the belt, sanding and replacing the doctor blade;

c) Instructions relating to maintenance operations, the execution of which does not require specific skills and hence may be carried out by users, operators etc., for example: cleaning the mechanical parts, greasing the mechanical parts, adjusting scraper, changing type of engraved cylinder;

d) Maintenance and inspection check list;

e) Statement that during repair and maintenance all the machines shall be isolated from all energy sources. EN 1037 shall be considered.

7.2 Marking

In addition to the legally required data, the main label, in case of monobloc machines, shall include the mass of the machine in kilogrammes.

Additional labels, if any, shall be fixed near the connecting points for power sources giving:

a) supply data for electrical systems;

b) supply data for hydraulic systems;

c) supply data for pneumatic systems.

The machine shall have an information sign - visible to the operator(s) - with the following texts "Use only by trained operator" or "Use and maintain only according to the instructions". This text shall be written in the official language of the country where the machine is used.

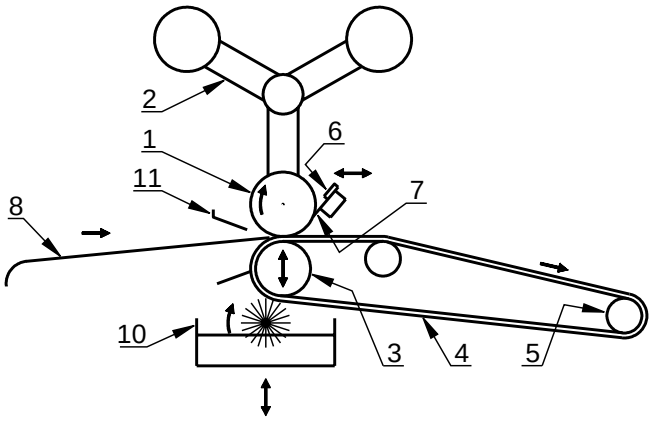


Figure 1a — Roller coating machine - Feeding-in table configuration

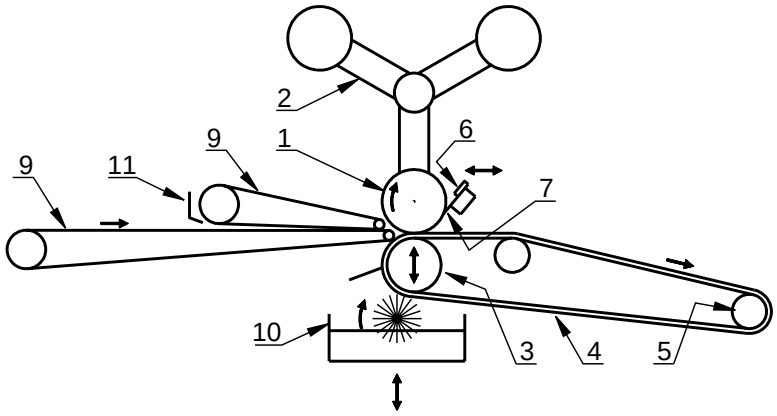
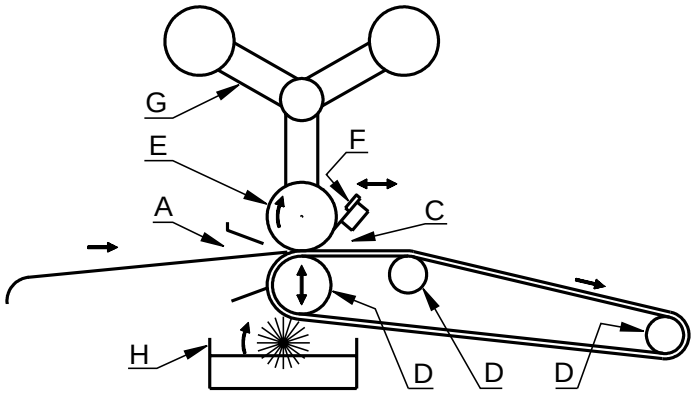


Figure 1b — Roller coating machine - Spreading belts configuration

Key

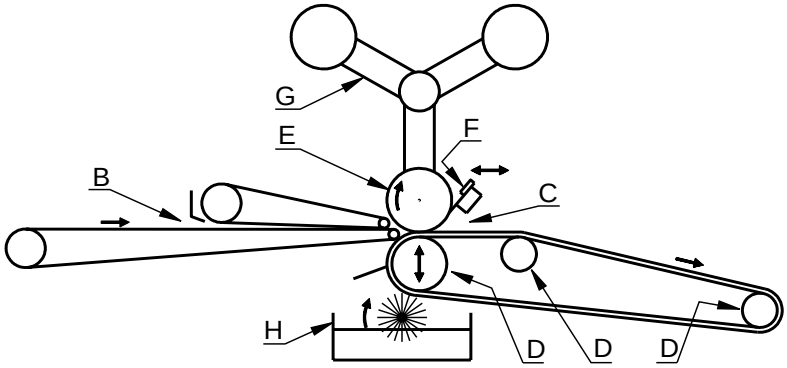
1 Coating roller
2 Turning device with coating roller
3 Rubberised counter pressure roller
4 Transport belt
5 Drive roller
6 Doctor blade
7 Colour space
9 Spreading belt
10 Belt washing system with brush roller and rubber scraping blade
11 Protection device
12 Feed-in table

Figure 1 – Roller coating machine



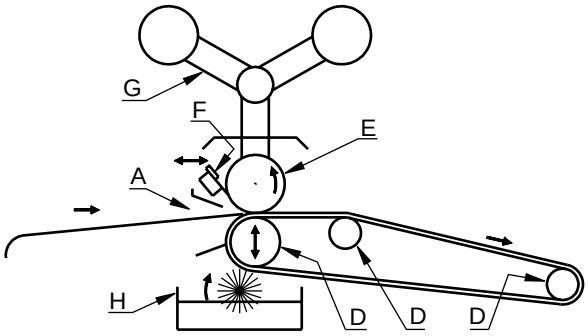
NOTE The letters identify the danger zones (see clause 4).

Figure 2a — Multi roller contra-rotating machine - Feeding-in table configuration



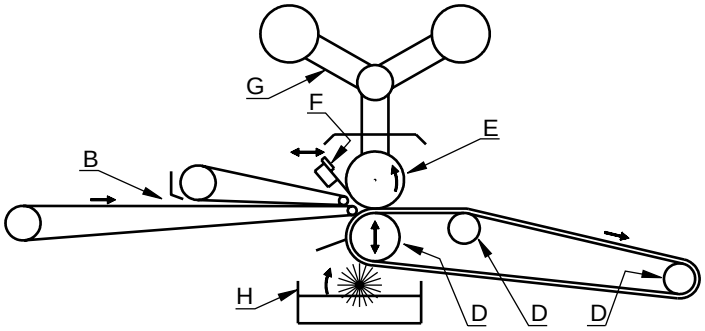
NOTE The letters identify the danger zones (see clause 4).

Figure 2b — Multi roller contra-rotating machine - Spreading belts configuration



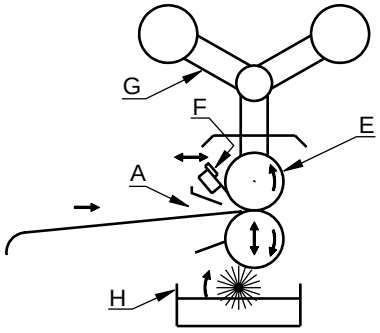
NOTE The letters identify the danger zones (see clause 4).

Figure 3a — Multi roller- synchronized machine - Feeding-in table configuration



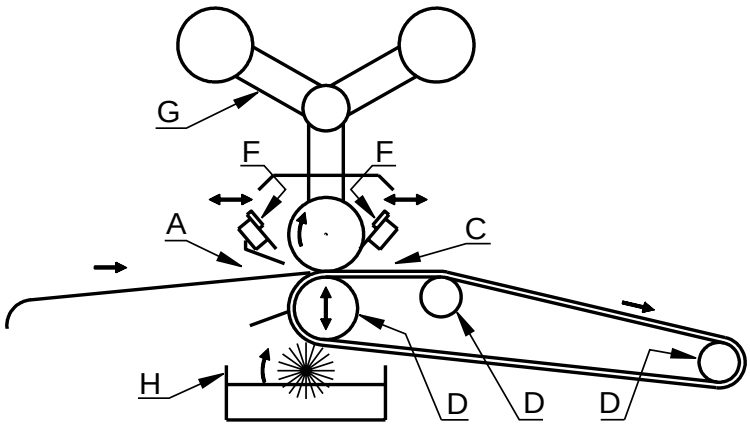
NOTE The letters identify the danger zones (see clause 4).

Figure 3b — Multi roller- synchronized machine - Spreading belts configuration



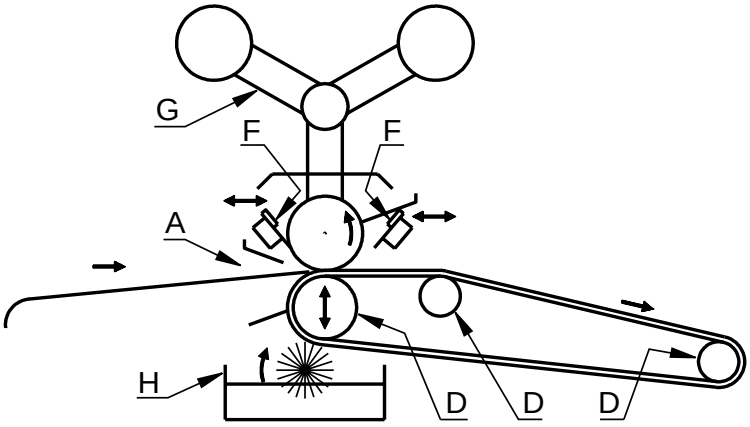
NOTE The letters identify the danger zones (see clause 4).

Figure 3c — Multi roller- synchronized machine - Machine with rubberised roller



NOTE The letters identify the danger zones (see clause 4).

Figure 4a — Roller- contra-rotating/synchronized machine (combined machine) - Contra-rotating working configuration



NOTE The letters identify the danger zones (see clause 4).

Figure 4b — Roller- contra-rotating/synchronized machine (combined machine) - Synchronized working configuration

Annex A
(normative)

Machinery description

A roller coating machine is a machine that is used to evenly apply liquid substances onto homogeneous hides or skins. The hides or skins are transported, under pressure, between two rollers (coating roller and rubber-covered back pressure roller).

The upper roller is a coating roller with an engraved surface. The substances are contained in the reservoir generated by the coating roller and a doctor blade when this is close to the roller. The coating roller rotation allows the hollows of the roller surface to fill with the substances. The surplus substances are removed by the doctor blade and remain in the reservoir formed by the doctor blade and the coating roller.

The lower roller is a rubber-covered back pressure roller. The rubber coating is used to balance out possible differences of hide thickness. The back pressure roller is adjustable in height so that the opening and back pressure can be changed.

When the hide is running through the two rollers, the substances are transmitted from the coating roller onto the hide or skin. The feeding of the hide to the working zone can take place either by:

a) feeding-in table;

b) conveyor belt running via back pressure roller;

c) lower conveyor belt and an upper spreading belt.

The individual roller or belt drive speed are variable.

The substances can be applied by two different methods:

a) synchronised method:

   in this configuration the direction of movement of all elements involved in transport is in the running-in mode (Figure 3);

b) contra-rotating method:

   in this configuration the movement direction of the coating roller is opposite to the running-in mode (Figure 2).

Annex ZA
(informative)

Relationship of this document with EC Directives

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 EC Directiv(e):

Machinery Directive 98/37/EC, amended by Directive 98/79/EC.

Compliance with this document provides one means of conforming to the specific essential requirements of the Directive concerned and associated EFTA regulations.

WARNING : Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this document.

Bibliography

EN ISO 3740, *Acoustics - Determination of sound power levels of noise sources - Guidelines for the use of basic standards (ISO 3740:2000).*

EN ISO 11200:1995, *Acoustics-Noise emitted by machinery and equipment. Guidelines for the use of basic standards for the determination of the emission sound pressure levels at work station and at other specified positions (ISO 11200:1995).*

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