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Textile machinery — Safety requirements —

Part 2: Spinning preparatory and spinning machines

Matériel pour l'industrie textile — Exigences de sécurité —

Partie 2: Machines de préparation de filature et machines de filature

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11111-2 was prepared by Technical Committee ISO/TC 72, *Textile machinery and machinery for dry-cleaning and industrial laundering*, Subcommittee SC 8, *Safety requirements for textile machinery*.

This first edition of ISO 11111-2, together with ISO 11111-1, ISO 11111-3, ISO 11111-4, ISO 11111-5, ISO 11111-6 and ISO 11111-7, cancels and replaces ISO 11111:1995, which has been technically revised.

ISO 11111 consists of the following parts, under the general title *Textile machinery — Safety requirements*:

— *Part 1: Common requirements*

— *Part 2: Spinning preparatory and spinning machines*

— *Part 3: Nonwoven machinery*

— *Part 4: Yarn processing, cordage and rope manufacturing machinery*

— *Part 5: Preparatory machinery to weaving and knitting*

— *Part 6: Fabric manufacturing machinery*

— *Part 7: Dyeing and finishing machinery*

Introduction

ISO 11111-1 to ISO 11111-7 were prepared simultaneously by ISO/TC 72 and CEN/TC 214 and adopted under the Vienna Agreement in order to obtain identical standards on technical safety requirements for the design and construction of textile machinery.

ISO 11111 as a whole is intended for use by any person concerned with the safety of textile machinery, for example, textile machinery designers, manufacturers and systems integrators. It is also of interest to users of textile machines and safety experts.

This document is a type C standard as stated in ISO 12100-1. The various parts of ISO 11111 deal with significant hazards generated by machines used in the textile industry. The machinery concerned and the extent to which hazards are covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence.

For hazards of machines or machine elements not dealt with in the relevant part of ISO 11111, the designer is to perform a risk assessment according to ISO 14121 and evolve means for reducing the risk from significant hazards.

This part of ISO 11111 is intended to be used in conjunction with ISO 11111-1. As far as possible, the requirements of this part of ISO 11111 are treated by way of reference to Clauses 5 and 6 of ISO 11111-1. Clause 5 of ISO 11111-1 contains safety requirements and/or measures for frequently occurring hazards of textile machinery which apply whenever referred to in this part of ISO 11111, while Clause 6 describes significant hazards and corresponding safety requirements and/or measures for certain machine elements and their combinations (e.g. rollers), which also apply whenever referred to in this part of ISO 11111.

Textile machinery — Safety requirements —

Part 2:
Spinning preparatory and spinning machines

1 Scope

This part of ISO 11111 is intended to be used in conjunction with ISO 11111-1. It specifies significant hazards and corresponding safety requirements and/or measures for spinning preparatory and spinning machinery. By taking into account the scope of ISO 11111-1 as far as is relevant, this part of ISO 11111 is applicable to all machinery, plant and related equipment intended to be used for opening, cleaning, blending, wool scouring, baling, carding, tow cutting and stretch breaking spinning, preparation subsequent to carding and spinning, as specified in Clause 5.

2 Normative references

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

ISO 9902-1, *Textile machinery — Noise test code — Part 1: Common requirements*

ISO 9902-2, *Textile machinery — Noise test code — Part 2: Spinning preparatory and spinning machinery*

ISO 11111-1:2005, *Textile machinery — Safety requirements — Part 1: Common requirements*

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 13849-1:1999, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13852:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs*

ISO 13853:1998, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

ISO 13854:1996, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

ISO 14119:1998, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 795, *Protection against falls from a height — Anchor devices — Requirements and testing*

EN 1760-1:1997, *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, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

prEN 1760-3:2002, *Safety of machinery — Pressure sensitive protective devices — Part 3: General principles for the design and testing of pressure sensitive bumpers, plates, wires and similar devices*

3 Terms and definitions

For the purposes of this part of ISO 11111, the terms and definitions given in ISO 11111-1 apply.

4 List of significant hazards

Significant hazards found in spinning preparatory and spinning machines which are common with those frequently occurring with other textile machines or with machine elements of other textile machines shall be considered in accordance with ISO 11111-1:2005, Clauses 5 and 6, whenever referred to under the heading “General safety requirements” in Clause 5 of this part of ISO 11111. Significant hazards which are particular to spinning preparatory and spinning machines are considered as “Specific hazards” in Clause 5 of this part of ISO 11111.

Before using this part of ISO 11111, it is important to carry out a check to ascertain that the specific machine has the significant hazards identified.

NOTE The significant hazards of spinning preparatory and spinning machines are always considered in conjunction with safety requirements.

5 Significant hazards and corresponding safety requirements and/or measures

5.1 General

Machinery shall conform to the safety requirements of ISO 11111-1:2005, Clauses 5 and 6, whenever referred to under the heading “General safety requirements” of this Clause 5 and shall conform to the additional “Specific safety requirements” of this Clause 5.

5.2 Opening, cleaning, blending machines

5.2.1 General

Opening, cleaning and blending machines for fibres and/or recycling material (e.g. mixing bale openers, bale breakers, blending hoppers, automatic mixers, porcupine openers, hopper feeders, horizontal openers, ultra cleaners, vertical openers, scutchers, feeders for wool, oilers, teasers, willows, roving waste openers, hard waste breakers, rag teasers, rag beaters and other similar machines equipped with beaters, swifts, rollers, cylinders, lattices, strippers, fitted with pins, spikes, pegs, metallic wires, fillet wires) are used to form flocks from the fibre material or waste. Condensers to supply fibre material to the machines are also included.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 1.

Table 1 — General safety requirements relating to opening, cleaning and blending machines

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3 and 6.3 f)
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Noise	5.4.7, 7, 8.2
Static electricity	5.4.4
Fluid power systems and components	5.4.5
Emission of dust and fly	5.4.10
Fire	5.4.11
Ergonomics	5.4.13
Devices for to special operation	5.5
Elevated servicing positions	5.6
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Particularly dangerous machine elements	6.3
Rollers, including lap rollers of scutchers	6.5
Entry into machines	6.8.4
Observation windows	6.9
Conveyors	6.10
Fans including pneumatic fibre transport systems	6.11
Complex installations	6.22

Specific hazards

Mechanical, from drive and transmission parts for particularly dangerous machine elements, when the longest stopping time exceeds the access time (e.g. crushing, shearing, entanglement, drawing-in and trapping).

Specific risks

Occasional access during special operations, particularly during changing of transmission parts, removal of fibre material, cleaning, stripping, grinding, leading to high probability of severe injury. There is a particular risk during run-down of rotating machine elements and associated drives.

Specific safety requirements

Interlocked movable guards with guard-locking in accordance with ISO 11111-1:2005, 5.3.3 shall be provided for drive and transmission parts such that they cannot be opened or removed if required for technical reasons until the drives and transmission parts have been brought to a standstill. For example, a guard-locking device in conjunction with a motion sensor or a timer can be used for this purpose. The guard-locking device shall

keep the guard closed when the control system or power supply fails. The precautions for drive and transmission parts may be designed also to protect particularly dangerous machine elements simultaneously [see ISO 11111-1:2005, 6.3 a)].

5.2.2 Automated blending bale openers

These include machines with a tower, running on a fixed track, parallel to which one or two lines of bales are laid. A horizontal arm projects from the tower at right angles and has a milling head on its underside.

The operating area over which this machine works is relatively large. Ready access is required to the currently non-operational side, or to the currently non-operational section, to install the next complement of bales in their working position.

General safety requirements

The safety requirements of 5.2.1 shall apply.

Specific hazards

Mechanical, from the milling head, in particular, entanglement, drawing-in or trapping, impact, and from the wheels, in particular, crushing.

Specific risks

Occasional access during normal operation, particularly for picking up flock from the floor and during special operation, particularly cleaning and removal of blockages, leading to a moderate probability of severe injury.

Specific safety requirements

a) Automated blending bale openers shall be provided with guards or safety devices to prevent access to the operating milling rollers.

b) In deviation from ISO 11111-1:2005, 6.3, this may be achieved by one of the following:

   1) A trip device to stop the milling roller immediately when an operator enters the zone within which the milling roller is operating. For example, a system of active opto-electronic protective devices (AOPD), in accordance with ISO 11111-1:2005, A.2, may be used around the boundaries of the operating zone, as in Figure 1, to act as a trip device.

      Where the height of the fibre tunnel in the middle of the two operational zones is 300 mm or more, the lower beam may be omitted in the tunnel area.

      As an alternative to AOPD, pressure-sensitive mats and floor according to EN 1760-1 or pressure-sensitive edges and bars according to EN 1760-2 may be used.

      The restart control shall be located so that it cannot be actuated from inside the operation zone.

   2) A provision during the normal production mode to protect any section of the milling roller not engaged with a bale, either by completely encasing the roller or by fitting a trip device or devices that stop the roller before access can be gained; provision shall be made for the rollers to come to a standstill as soon as the milling roller traverses beyond the line of bales, or is raised above the bales.

      In either case, a category of 3 or 4 according to ISO 13849-1:1999, Clause 6 of the safety related part of the control system shall be selected.

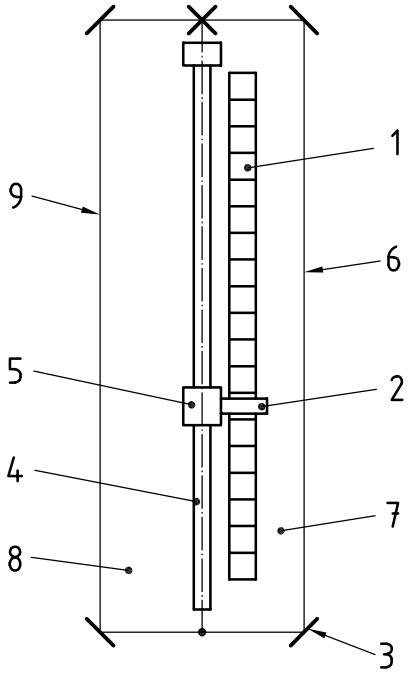
c) A signal to warn of automatic restart shall be installed (see ISO 11111-1:2005, 5.4.2.3).

d) Suitable support devices shall be provided for the milling roller arm to prevent the arm dropping unexpectedly. This may be in the form of two ropes, each of sufficient strength to support the arm.

e) A warning shall be given in the instruction handbook concerning the need to install the machine in such a position that the moving parts (e.g. the arm or the tower) do not pass closer than 500 mm to fixed structures within the work area (see ISO 13854) or to safeguard the crushing zone .

f) A device shall be provided to bring the tower to a standstill before it reaches the end of the track (see ISO 11111-1:2005, 6.21.3).

g) Wheels shall be protected according to ISO 11111-1:2005, 6.7.1.



Key

1 bales
2 arm incorporating milling roller
3 mirror
4 fibre tunnel
5 tower
6 photo-beam (active)
7 operative zone
8 inoperative zone, at present
9 photo-beam (inactive)

Figure 1 — Safeguarding of automated blending bale openers

5.2.3 Teasers, willows

General safety requirements

The safety requirements of 5.2.1 shall apply.

Specific hazards

Mechanical, from the particularly dangerous machine elements, in particular, entanglement, drawing-in or trapping, severe abrasion.

Specific risks

Occasional access during cleaning of bit boxes and grinding, leading to low probability of severe injury.

Specific safety requirements

a) Where teasers are fitted with bit boxes, openings into the box shall be restricted in size or so shaped or positioned that it is not possible to reach through and contact the swift (cylinder). Dimensions of access openings shall be in accordance with ISO 13852.

b) Teasers shall be provided with interlocked sectional guards with guard-locking according to ISO 14119. If sections of this guards can be removed to allow access for grinding devices, it shall not be possible to start the teaser until the guards or the grinding devices are firmly in place and integrated into the guard-locking system.

5.2.4 Bale breakers and hopper feeders

General safety requirements

The requirements of 5.2.1 shall be met.

Specific hazards

Drawing-in and trapping from the upright needle lattice winding onto the lower roller; puncture, crushing, abrasion from the needles of the upright needle lattice, if the person is trapped between in-running bales and the upright needle lattice.

Specific risks

Occasional access when removing flock and laps in front of the drawing-in zone of the on-running upright needle lattice during intermittent standstill, leading to severe hand and arm injury; low probability of being trapped between bales and the upright needle lattice leading to severe of fatal injury.

Specific safety requirements

a) Openings through which the drawing-in zone of the on-running upright needle lattice onto the lower roller can be reached shall be safeguarded by interlocking movable guards. If stopping time exceeds access time, the movable guard shall be guard-locked.

b) In the feeding zone where the bales run into the bale breaker, trip wires or trip bars or emergency stopping devices (mushroom pushbuttons) on both sides shall be fitted for use by persons at risk of being trapped between the in-running bale and the upright needle lattice.

5.2.5 Moving bin emptiers

A moving bin emptier is a unit arranged to travel on rails through a blending bin to remove the blended fibre. For cleaning purposes, a platform is fitted at a high level on the emptier unit. Additionally, the unit can travel sideways in order to empty a line of bins.

General safety requirements

The safety requirements of 5.2.1 shall apply.

Specific hazards

Mechanical, from the pinned lattice, in particular, entanglement, drawing-in or trapping; from sideways movement of the emptier, in particular, crushing and shearing between the emptier and the bin and by the platform and adjacent structures and between rails and wheels in falling from platforms.

Specific risks

Occasional access during special operation, leading to low probability of severe or fatal injury.

Specific safety requirements

a) Access to the moving pinned lattice shall be prevented. This may be achieved by interlocking the pinned lattice with the movement of the bin emptier so that the lattice stops before the bin emptier emerges from the bin or the side guards, if fitted.

b) Movement of the lattice when the bin emptier is outside a bin or the side guards shall be possible only by means of a hold-to-run device.

c) The movement of the bin emptier out of the bin shall be possible only by a hold-to-run control, unless a trip bar or panel is fitted on the front side of the emptier.

   The shear points which occur as the bin emptier enters the bin shall be safeguarded by one of the following:

   1) side guards extending outwards from the bin and conforming to ISO 11111-1:2005, 5.3.3;

   2) trip devices (e.g. trip bars) conforming to EN 1760-2 mounted on the edges of the bin emptier;

   3) a hold-to-run control actuated by an operator having a continuous view of both sides of the bin emptier.

   Wheels shall be protected according to ISO 11111-1:2005, 6.7.1.

d) Where the unit moves sideways, such movement shall be possible only with the lattice at rest, and in the presence of one of the following:

   1) a hold-to-run control fitted on the left side of the unit to move the unit left, and vice versa;

   2) full-height trip bars according to EN 1760-2, provided for all shear points between the emptier and the edges of the bin;

   3) a distance between the emptier and the bin greater than 500 mm.

e) Platforms fitted to moving bin emptiers shall be equipped in accordance with ISO 11111-1:2005, 6.13. Where access ladders are used instead of stairs, these shall be securely anchored when in use (see of ISO 11111-1:2005, 5.6).

   Where a platform is fitted on the bin emptier, provisions shall be made to ensure that the emptier unit cannot be set in operation from the main control position when a person is present on the platform (e.g. by a pressure-sensitive mat or floor according to EN 1760-1, or an interlocked door together with a reset control). However, movement into, within or out of the bin shall be possible by means of a hold-to-run control located on the platform, to enable the bin emptier to be used for cleaning the bin.

f) An emergency exit door shall be fitted at the extreme end of the bin according to ISO 11111-1:2005, 6.8.4. If this door enables access to the bin, it shall be interlocked with the drive of the lattice.

g) Access to the top of the bin for maintenance purposes shall be provided by either of the following:

   1) a platform conforming to the requirements of ISO 11111-1:2005, 6.13;

   2) a device to which a safety harness may be attached in accordance with EN 795.

h) A warning shall be given in the instruction handbook concerning the need to install the machine so that the moving bin emptier, including its platform, does not pass closer than 500 mm to fixed structures within the work area.

5.2.6 Bunker emptiers

The floor of the bunker (bin) consists of a horizontal conveyor, which, when moving, brings the contents of the bin towards the emptier section. The emptier is stationary during the process but can be moved sideways to operate in an adjacent bunker.

Bins fitted with bunker emptiers which can move sideways shall conform to the requirements given in 5.2.5 c), e), f) and g). Stationary bunker emptiers shall conform to the requirements of 5.2.5 e) and f).

5.3 Wool scouring (wool washing) machines

Wool-scouring machinery incorporates squeezing presses and washing bowls (either harrow or rake type) to clean woollen fibres in loose stock form.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 2.

Table 2 — General safety requirements relating to wool-scouring machines

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control system	5.4.2.3
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Hot surfaces	5.4.6.1
Hot liquor or steam	5.4.6.2
Fire	5.4.11
Ergonomics	5.4.13
Devices for special operation	5.5
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Rollers	6.5
Conveyors	6.10

Specific hazards

Mechanical, from the squeeze and stripper rollers, in particular, drawing-in or trapping, and between the harrow or rake motion and fixed parts, in particular, shearing.

Specific risks

Occasional access during normal operation, in particular, when attending to unevenly fed fibre at the squeezing presses and incidental cleaning, or access during special operation (e.g. major cleaning or setting up), leading to low probability of moderate-to-severe injury.

Specific safety requirements

a) Squeeze rollers and stripper rollers (where fitted) on the squeeze presses shall be guarded in accordance with ISO 11111-1:2005, 6.5. These guards may be in the form of fixed distance guards extending along the sides of the press in accordance with ISO 13852:1996, Table 1.

b) There shall be a clearance of at least 100 mm between the tips of the vanes of ducking rollers and an adjacent part of the machine or, alternatively, the trapping area shall have side guards fitted in accordance with ISO 13852:1996, Table 1.

5.4 Baling machines

Baling presses are used to compress fibres or waste into bales. They operate in either the vertical or horizontal mode, depending on the direction of the movement of the ram. Precompressing devices may be provided.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 3.

Table 3 — General safety requirements relating to baling presses

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Fluid power systems and components	5.4.5
Ergonomics	5.4.13
Devices for special operation	5.5
Elevated servicing positions	5.6
Escape and rescue of trapped persons	5.7
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Entry into items of plant	6.8.4
Conveyors	6.10
Work platforms and walkways	6.13

Specific hazards

Mechanical, from the ram, in particular, crushing and shearing between the ram and other parts or crushing of persons in the baling box; from a ram-type precompressing device, in particular, crushing and shearing between ram and other parts; from a band conveyor type precompressing device, in particular, drawing-in; from the doors of baling boxes, in particular, impact; from the press box and other machine parts during movement of the press box, in particular, crushing; and also falling off working platforms.

Specific risks

Occasional access during normal operation, in particular, during removal of fibre material or opening the doors of the baling box, and during special operation, in particular, during cleaning and maintenance work, leading to low probability of severe or fatal injury.

Specific safety requirements

a) Access to the danger zones between the ram and other parts of the press, including those present on a pre-compressing device, shall be prevented. This may be achieved by

   1) totally enclosing the stroke area of the ram, for example with a tunnel guard; or equipping the ram with a tunnel guard overlapping the edges of the baling box and other crush and shear points, when the ram is in the open position,

   2) interlocking any covers, flaps and doors with the movement of the ram to prevent access to crush and shear points between the ram and other parts,

   3) complying with the safety distances of ISO 13852, for all openings including the tying slots.

b) If converging band conveyors or a band conveyor and a roller are used for precompression, the drawing-in points shall be protected in accordance with ISO 11111-1:2005, 6.10. This may be in the form of enclosing guards together with an interlocked access door.

c) On hydraulic baling presses, the recoil of the ram due to the resultant stored energy in the bale shall be prevented. This may be achieved, for example, by means of a suitable flow control valve.

d) Discharge doors and fastenings shall be designed to prevent uncontrolled opening under pressure. This requirement may be met, for example, by using hydraulic guiding elements, threaded spindles or cams to guide doors which are under pressure due to expansion of the bale, until the pressure is released.

   In addition, the door of a horizontal baling press shall be interlocked with the movement of the ram such that

   1) the ram shall be able to effect a pressing movement if, and only if, the door is completely open or completely closed, and

   2) the door shall only be capable of being opened if the ram is in such a position that it exerts no pressure upon the bale.

a) Means shall be provided for vertical presses to prevent falling of the ram when the hydraulic system fails.

b) Means shall be provided to prevent exposed persons from falling into open filling holes. This may be achieved by ensuring that the rim of the filling hole is located at least 1 100 mm above the work level or a surrounding fence 1 100 mm high is provided. The fence shall be infilled with sheeting, mesh or vertical bars spaced at not more than 135 mm (see ISO 13853).

c) Flaps or doors to enable regular cleaning shall be safely accessible. Where cleaning cannot be carried out safely from floor level because of the location of the baling press, safe work platforms shall be provided, as specified in k).

d) On presses where the baling box is automatically moved under power (e.g. rotary presses), access to the danger zone (field of rotation) shall be prevented by one of the following means:

   1) a fence guard (see ISO 11111-1:2005, A.3) around the field of rotation with interlocking doors;

   2) a partial fence guard round the field of rotation and protection of the remaining area by photoelectric protective devices (see A.2 of ISO 11111-1:2005) — when the door is opened or the photoelectric protective devices are interrupted, it shall not be possible to start the changing process or, if such a process is occurring, it shall be interrupted;

   3) pressure-sensitive bumpers according to prEN 1760-3, fitted to those parts of frame or changing unit which form crush and shear points — where the rotation of the box is controlled manually, this shall be actuated by means of a hold-to-run control positioned so that the danger zones are in view;

   4) the inertia shall be such that when the boxes are rotated, they are easily stopped by hand.

e) When baling presses are of the hand-operated type or when automatic presses are switched over to hand operation, the ram shall only be activated by means of a hold-to-run control.

f) Controls shall be positioned such that the operator can view the entire machine, but cannot reach the danger zone (see ISO 11111-1:2005, 5.4.2.3 and ISO 12100-2:2003, 4.11.8).

g) Where work platforms and walkways (see ISO 11111-1:2005, 6.13) are required to give access to parts of the baling press, either they shall be provided with the press, or information shall be given in the instruction handbook concerning the need for such equipment.

h) Category 3 or 4 according to ISO 13849-1:1999, Clause 6 shall be selected for the safety-related part of the control system.

5.5 Carding machines

5.5.1 General

Carding machines (e.g. flat cards, roller and clearer cards, garnetting machines, sample carding machines and other similar machines) are equipped with rollers, cylinders (swifts) and lattices fitted with either wires or pins.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 4.

Specific hazards

Mechanical, from the feed rollers, other rollers, cylinders and lattices fitted with metallic wires or fillet wires, or pins, in particular, entanglement, drawing-in or trapping, and from running-down drive components, in particular, crushing, drawing-in.

Specific risks

Working close to the clothed rollers, particularly during special operation, including grinding, mounting and stripping, leading to medium probability of severe injury.

Particular risk exists during non-powered run-down of rotating working elements or drive components.

Specific safety requirements

a) The underside of the machine shall be protected by interlocked guards with guard-locking, or access to the underside of the machine shall be prevented by a fence guard or similar with guard-locking on the door or access points.

b) Access to the drives shall be prevented by movable enclosing guards that are interlocked and, if stopping time exceeds access time, interlocked with guard-locking.

c) Information shall be given in the instruction handbook concerning safe methods of work for maintenance, grinding and stripping, see ISO 11111-1:2005, 5.5.

Table 4 — General safety requirements relating to carding machines

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3 and 6.3 f)
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Noise	5.4.7, 7, 8.2
Static electricity	5.4.4
Emission of dust and fly	5.4.10
Fire	5.4.11
Ergonomics	5.4.13
Devices for special operation	5.5
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Particularly dangerous machine elements (e.g. rollers, cylinders and lattices fitted with metallic wires or fillet wires or pins as well as feed rollers)	6.3
Rollers (e.g. doffing rollers, crushing rollers, transfer rollers, redirecting rollers, calender rollers)	6.5
Conveyors	6.10
Fans	6.11
Automatic can transport systems	6.21
	This part of ISO 11111
Other items:	
Automatic sliver can-doffing units	5.7.10

5.5.2 Flat cards

Grinding and stripping of the clothing is indispensable for technological reasons.

General safety requirements

The safety requirements of 5.5.1 shall apply.

Specific hazards

Mechanical, from the rollers fitted with metallic wires or flexible card clothing, in particular, entanglement, drawing-in, trapping and abrasion.

Specific risks

Working close to the clothed rollers during grinding and stripping, leading to high probability of severe injury.

Specific safety requirements

Where access is required to facilitate grinding and stripping, the openings shall be protected by guards with guard-locking, interlocked to the roller drive so that, when the guards are removed, movement is only possible in the reverse direction. If the card is protected by an enclosing main guard, this shall be interlocked to the roller drive in the same manner.

5.5.3 Roller and clearer cards

On roller and clearer cards, access is possible from the underside to particularly dangerous machine elements, either from an operating pit beneath the card or directly from floor level where the machine is raised on a frame.

General safety requirements

The safety requirements and/or measures shall be in accordance with 5.5.1 and Table 5.

Table 5 — Additional safety requirements relating to roller and clearer cards

Application	Reference ISO 11111-1:2005
Particular machine elements:	
Intermediate feed conveyors	6.10

Specific hazards

Mechanical, when entering the area beneath the card or the intermediate feed passageway, and from the laying rollers of the intermediate feed, in particular, crushing and drawing-in or trapping.

Specific risks

Access during special operation, leading to high probability of severe injury.

Specific safety requirements

a) The particularly dangerous machine elements shall be protected according to ISO 11111-1:2005, 6.3. Alternatively, full-height fence guards (see ISO 11111-1:2005, A.3), extending along both sides of the roller and clearer card, shall be provided to prevent access to the particularly dangerous machine elements. The height shall be in accordance with ISO 13852:1996, Table 2. Each fence panel or door

shall be interlocked with guard-locking unless the access time exceeds the stopping time of all particularly dangerous machine elements, in which case interlocking is sufficient.

b) Access to these dangerous elements from below shall be prevented either by extending the safety requirements specified in ISO 11111-1:2005, 6.3 to the underside of the machine, or by providing interlocked doors or cover with guard-locking in front of the entrance to the pit or, where the machine is raised, a fence guard around the card together with an interlocked door with guard-locking.

   On cards equipped with tape condensers, provision shall be made to ensure that free access is limited to the underside of the tape condenser only (e.g. full-height cross-fence guards within the pit with interlocked doors with guard-locking). The manufacturer shall give information in the instruction handbook concerning guarding the underside of the card, particularly when the pit or frame is provided by the user.

c) Roller and clearer cards shall be provided with walkways, platforms or other means to enable safe grinding and stripping. The walkway shall comply with ISO 11111-1:2005, 6.13, but in deviation may have a width of at least 300 mm; handrails are not necessary if suitable handles are provided.

d) Access to feed rollers from the intermediate feed (carriage feed) passageway and access to particularly dangerous machine elements either from the floor of this passageway or by climbing on the machine from this passageway shall be prevented by additional guards (e.g. tunnel guards, fixed guards, see ISO 13852).

e) The laying rollers of the intermediate feed shall be so designed that they cannot cause injury (e.g. by using slipping clutches or a compressible covering).

5.5.4 Tape condensers

General safety requirements

The safety requirements of 5.5.1 shall apply.

Specific hazards

Mechanical, from the in-running rollers, rubbing leathers, tapes, etc., in particular, drawing-in or trapping and entanglement.

Specific risks

Occasional access during normal operation when removing grease, fly or laps from rollers, leading to low probability of severe injury.

Specific safety requirements

a) The fence guard for the carding set shall be extended along both sides of the tape condenser, or else side guards shall be provided. Interlocked doors shall be provided to give access to the walkway between the tape condenser and the finisher card doffer. The walkway shall be in accordance with ISO 11111-1:2005, 6.13, but in deviation may have a width of at least 300 mm. Handles may be provided instead of handrails. Access doors shall be interlocked with the tape condenser drive to allow only reduced speed not exceeding 25 % of the normal running speed when such a door is open. In this situation the machine shall be brought to a standstill as rapidly as technically possible.

   In addition, an emergency stop device (e.g. a trip-wire) shall be positioned between the walkway and the tape condenser.

b) Access to the pit beneath the tape condenser shall be prevented by a cover door or other guards which shall be interlocked with guard-locking such that the tape condenser can only be run at crawl speed (see ISO 11111-1:2005, A.1) when the means of access is opened. To provide additional protection in these circumstances, an emergency stop (e.g. a trip-wire) shall be positioned beneath the tape condenser.

5.6 Converters and stretch-breaking converters

Converters and stretch-breaking converters are used in the worsted industry to convert filament tow into staple fibre sliver.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 6.

Table 6 — General safety requirements relating to converters and stretch-breaking converters

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Fluid power systems and components	5.4.5
Noise	5.4.7, 7, 8.2
Emission of dust and fly	5.4.10
Ergonomics	5.4.13
Devices for special operation	5.5
Elevated servicing positions	5.6
Escape and rescue of trapped persons	5.7
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Rollers	6.5
Observation windows	6.9
Cutting devices	6.12
Complex installations	6.22
	This part of ISO 11111
Other items:	
Automatic sliver can-doffing units	5.7.10

Specific hazards

Mechanical, from the rollers (e.g. feed rollers, pressure rollers, tension rollers), in particular, entanglement, drawing-in or trapping; from the tow when it is removed from the bale, in particular, entanglement; from the knife roller, in particular, cutting.

Specific risks

Occasional access during normal operation, particularly on start-up and during special operation, and especially during removal of laps and cleaning, leading to low probability of severe injury.

Specific safety requirements

a) To prevent access to intakes between sets of rollers, and between rollers and on-running tow, guards shall be provided in accordance with ISO 11111-1:2005, 6.5, for example, by means of enclosing guards from the first to the final set of rollers. These shall be provided with interlocked doors. With the doors open, restart and running shall only be possible either by means of a limited movement control device, or at crawl speed (see ISO 11111-1:2005, A.1) by means of a hold-to-run control.

b) A suitable trip device shall be provided to stop the machine immediately should a person become entangled in the tow as it leaves the bale. This may be in the form of a trip bar according to EN 1760-2, in the first set of creel bars above the machine.

c) Access to the knife roller shall only be possible when the machine is at a standstill.

d) Category 3 or 4 according to ISO 13849-1:1999, Clause 6 shall be selected for the safety-related part of the control system.

5.7 Spinning preparation machines subsequent to carding

5.7.1 General

Drawing and combing machinery (e.g. draw frames, gill boxes, intersecting gill boxes, chain gill boxes, melange gill boxes, autoleveller gill boxes, open gills, porcupine draw boxes, sliver lap machines, ribbon lap machines, lap formers, combers, speed frames, high draft finishers, backwashers and similar machines) are used to prepare slivers and rovings for introduction at the spinning machines.

General safety requirements

The safety requirements and/or measures shall be in accordance with Table 7.

Table 7 — General safety requirements relating to spinning preparation machines subsequent to carding

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Static electricity	5.4.4
Fluid power systems and components	5.4.5
Noise [a]	5.4.7, 7, 8.2
Emission of dust and fly	5.4.10
Fire	5.4.11
Ergonomics	5.4.13
Devices for special operation	5.5
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Machine elements which normally do not require safeguarding, in particular, delivery rollers and drafting system rollers	6.4
Rollers	6.5
Rotating shafts	6.6
Fans	6.11
Overhead rails	6.21.5 b), 6.21.6 c)
Overhead transport of process material, in particular, cans, lap carriers, tubes and bobbins at the machines	6.21.6
	This part of ISO 11111
Other items:	
Automatic sliver can-doffing units	5.7.10
[a] Noise is not significant with draw frames for backwashers and can-doffing units.	

Specific hazards

Mechanical, from uncontrolled movement of raised hoods, in particular, crushing, shearing, impact.

Specific risks

Access during normal operation, particularly at start-up, removal of fibres or mending of broken ends and during special operation, particularly during removal of laps or blockages, leading to low probability of moderate-to-severe injury.

Specific safety requirements

The movable hood shall be fitted with a mechanical restraint device to hold it automatically in the raised position.

The hood shall be designed to reduce noise emission. This can be achieved, for example, by covering the inside with sound-absorbing materials and suitable sealing.

5.7.2 Draw frames for short fibres

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the draw-frame rollers, in particular, drawing-in or trapping.

Specific risks

Access during normal operation, in particular, threading-up and removal of fibre material, and during special operation, in particular, removal of laps and cleaning, leading to low probability of moderate-to-severe injury.

Specific safety requirements

To prevent access to the draw-frame rollers, interlocking enclosing guards (e.g. hoods) shall be provided, unless the risk assessment shows there is no significant hazard. With the hood open, the machine shall only be restarted by means of either a hold-to-run control or a limited movement control device.

5.7.3 Gill boxes, including “intersecting” and “chain-gill” types

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the fallers, chains, front and back rollers, the hinged head, the hood and autolevelling device, in particular, crushing, shearing, drawing-in, trapping or puncture.

Specific risks

Access during normal operation, in particular, threading-up and incidental removal of fibres, and during special operation, in particular, removal of laps, cleaning, changing of bars, leading to low probability of moderate-to-severe injury.

Specific safety requirements

a) The fallers, together with the front and back rollers, shall be fitted with an interlocked guard (e.g. by an interlocked hood). With the guard open, the machine shall only be capable of being restarted by means of one of the following:

1) a hold-to-run control with a crawl speed of the delivery rollers $\leqslant$ 10 m/min and a stopping distance of the delivery rollers $\leqslant$ 250 mm (starting from the release of the control);

2) a limited movement control device where one step shall be $\leqslant$ 250 mm.

b) The hinged head on intersecting gill boxes or chain gill intersectors shall be fitted with a mechanical device to hold it automatically in the raised position.

c) The shear points and in-running nips of autolevelling devices shall be guarded, e.g. by means of a fixed tunnel or by means of an interlocked movable guard.

5.7.4 Backwashers

Backwashers are used to wash and to pretreat worsted tops.

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the feed rollers, mangles, immersion and redirecting rollers, in particular, drawing-in.

Specific risks

Occasional access during special operation (e.g. threading-up, removal of laps and mending of broken ends), leading to low probability of severe injury.

Specific safety requirements

a) To prevent access to roller nips, arrangements according to ISO 11111-1:2005, 6.5 c), or, in the case of the feed rollers, fixed or interlocked movable sliver guides, shall be provided.

b) Guards for the immersion and redirecting rollers are not required, providing that rollers, fitted such that they are easily lifted by hand, are used.

c) A device for detecting laps shall be provided if fixed nip guards are used.

d) For mangles, arrangements according to ISO 11111-1:2005, 6.19 shall be provided.

5.7.5 Sliver and ribbon lap machines, lap formers

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the lapping unit, in particular, drawing-in.

Specific risks

Access during normal operation, leading to low probability of moderate-to-severe injury.

Specific safety requirements

The lapping unit of sliver and ribbon lap machines and lap formers shall be guarded (e.g. by means of an interlocked movable enclosing guard with guard-locking).

5.7.6 Cotton combers

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the cylinders, nippers, top combs and the detaching rollers, in particular, crushing, shearing, drawing-in.

Specific risks

Occasional access during normal operation, in particular, threading-up and incidental removal of fibre material, and during special operation, in particular, removal of laps and cleaning, leading to low probability of moderate injury.

Specific safety requirements

Each individual combing head mechanism (i.e. cylinder, nippers, top comb and detaching rollers) shall be provided with an interlocked enclosing guard (e.g. a hood) enclosing all these parts. When the machine needs to operate with the guard open, it shall only be restarted and run by means of a hold-to-run control or a limited movement control device.

5.7.7 Rectilinear combs (for worsted yarn and flax yarn and similar)

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the circular comb, nipper jaws, reciprocating carriage, the hood, transmission parts accessible through the noil box, in particular, crushing, shearing, drawing-in or trapping, puncture.

Specific risks

Access during normal operation, in particular, threading-up and incidental removal of fibre material, and during special operation, in particular, cleaning and removal of laps, leading to the probability of moderate-to-severe injury.

Specific safety requirements

a) An interlocked enclosing guard (e.g. a hinged hood) shall be provided to prevent access to the circular comb, nipper jaws and reciprocating carriage. In special operation mode with the hood open, the comber shall be capable of operation as specified below only from a single position. The mechanism (circular comb, nipper jaws and reciprocating carriage) shall be accessible from this position.

b) The comber may be operated with open hood only by means of one of the following:

   1) a hold-to-run control together with a crawl speed of the circular comb $\leqslant$ 20 comb cycles/min and a stopping distance of $\leqslant$ 1 comb cycle;

   2) a limited movement control device where one step shall be less than 1 comb cycle. It shall not be possible to speed up the comber to normal operation speed by repeated actuation of the limited movement control device;

   3) permanent operation at reduced running speed together with an adjacent emergency stop control where the stopping distance is less than 1 comb cycle.

The instruction handbook shall contain information about the residual risk and clear instruction about the operation with the hood open.

c) Access to the feed gills shall be prevented by movable interlocked guards.

d) To prevent access to dangerous parts such as vee-belt and pulley drives, the noil box shall be fixed in its position or, alternatively, additional fixed distance guards shall be provided for these drives.

5.7.8 Speedframes

General safety requirements

The safety requirements of 5.7.1 shall apply.

Specific hazards

Mechanical, from the flyers and lifter racks, in particular, crushing, entanglement and impact.

Specific risks

Access during normal operation, in particular, threading-up, changing of bobbins, removal of fibres, and during special operation (e.g. cleaning, removal of parts which have fallen), leading to the probability of light-to-moderate injury.

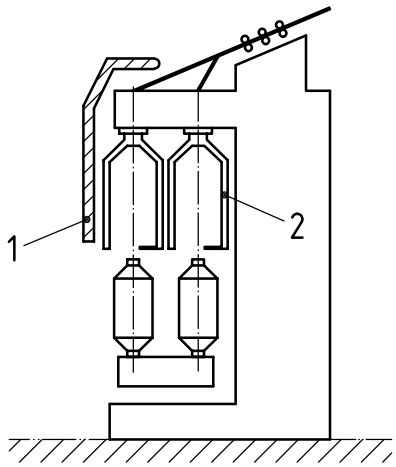
Specific safety requirements

a) Speedframes shall be guarded in front of the flyers.

This may be done by interlocked movable guards (see ISO 12100-1:2003, 3.25.4), e.g. sectional pivoting or sliding panels at the height of the flyer on the operator's side in accordance with Figure 2. Limited movement (inching) with the guard open shall be possible by means of a limited-movement control device which ensures a stopping distance within one revolution, or by means of a hold-to-run control at a rotational speed not exceeding 1,5 s^{-1}.

A warning signal shall be given before starting the machine in the special operation modes mentioned above (see ISO 11111-1:2005, 5.4.2.3, for the interval between activation and actual starting-up), unless the risk assessment shows there is no significant hazard.

b) Lifter racks and pinions shall be guarded (e.g. by fixed guards at the rear of the machine).



Key

1 interlocked movable distance guard
2 flyers

Figure 2 — Safeguarding of speedframes in front of the flyers

5.7.9 High draft finishers

General safety requirements

The safety requirements of 5.7.1 shall apply:

Specific hazards

Mechanical, from the drafting aprons and the rubbing apron, in particular, drawing-in hazard.

Specific risks

Access during normal operation, in particular, threading-up, and during special operation, in particular, cleaning and removal of laps, leading to low probability of moderate injury.

Specific safety requirements

a) The intakes between the drafting aprons and between the rubbing aprons shall be guarded, for example, by means of an interlocked enclosing guard (e.g. with doors).

b) In special operation mode with one door open, the machine may be run by means of one only of the following:

   1) a hold-to-run control together with a crawl speed of the delivery rollers of $\leqslant$ 10 m/min and a stopping distance of the delivery rollers of $\leqslant$ 250 mm;

   2) a limited movement control device where one step shall be $\leqslant$ 250 mm.

c) The instruction handbook shall contain information about the residual risk and clear instruction on operation with the door open.

d) If more than one door is open, a clearly observable warning signal at each position of the operating side shall be given before the start of the machine under the above conditions (see ISO 11111-1:2005, 5.4.2.3, for the interval between activation and actual start up).

e) The door shall be designed so as to reduce noise emission.

5.7.10 Automatic sliver can-doffing units

Automatic can-doffing units are used in carding, combing and drawing processes to change cans of sliver.

General safety requirements

The safety requirements of ISO 11111-1:2005, 5.7.1, and 5.4.2.4 c), concerning automatic restart after process interruption, shall apply.

Specific hazards

Mechanical, from the can-doffing mechanism including the sliver-breaking arm, in particular, crushing and shearing, impact.

Specific risks

Occasional access during normal operation, in particular, surveillance, and during special operation, in particular, removal of blocked cans, leading to low probability of moderate injury.

Specific safety requirements

a) Automatic can-doffing units shall be designed without crushing and shearing points between the can-doffing mechanism (e.g. revolving arms), cans and fixed parts of the parent machine or doffing unit itself (see ISO 13854).

b) Where crush and shear points cannot be avoided, guards or trip devices shall be provided. Manual operation shall only be possible by means of a hold-to-run control actuator.

c) If the absence of a can results in a dangerous condition for the operator, guards or safety devices shall ensure that access cannot be gained and the machine prevented from starting or that the unit stops and cannot be restarted until the can is inserted.

d) Where the sliver-severing arm can cause a hazard, access shall be prevented, e.g. by a trip device.

e) A reference shall be made in the instruction handbook concerning the danger of stored energy in a can jammed in the doffing mechanism and the instruction handbook shall draw attention to the fact that damaged cans cause frequent jamming.

5.8 Spinning machines

5.8.1 General

Spinning machines (e.g. ring spinning machines, open-end spinning machines, gill spinning machines and other machines) are used to draw slivers or rovings and to twist them into yarns.

The safety requirements and/or measures shall be in accordance with Table 8.

5.8.2 Ring spinning machines

General safety requirements

The safety requirements of 5.8.1 shall apply.

Specific hazards

Mechanical, from the drafting system, delivery rollers, laps, knives for the removal of laps, the piecing unit and doffing unit, in particular, crushing, shearing, entanglement, drawing-in or trapping, abrasion, puncture.

Specific risks

Frequent access during normal operation and occasional access during special operation, leading to the probability of minor to moderate injury.

Specific safety requirements

a) Information relating to safe methods for guiding the material through the drafting system and delivery rollers, braking the ring bobbins, removing laps and carrying out of maintenance work shall be provided in the instruction handbook in accordance with ISO 11111-1:2005, 8.2.

b) For mobile automatic equipment (such as mobile piecing or doffing units) in accordance with ISO 11111-1:2005, 6.21.3. If trip bars or trip plates according to ISO 11111-1:2005, 6.21.3 d) are selected, they shall be provided on both traversing sides extending over the whole height of the device.

c) Hazards caused by stationary doffers shall be reduced by design and/or guards or safety devices (e.g. trip wires, trip bars, AOPD).

d) If pushbuttons are used as emergency stopping devices, there should be one on each end section at least.

Table 8 — General safety requirements relating to spinning machines

Application	Reference ISO 11111-1:2005
All machines:	
Electrical equipment in general	5.4.2.1 and 5.4.2.2
Electrical control systems	5.4.2.3
Starting and stopping	5.4.2.4
Reduction of risks by design	5.3.2
Reduction of risks by safeguarding	5.3.3
— with guards	Table 2
— with safety devices	Table 3
Static electricity	5.4.4
Fluid power systems and components	5.4.5
Noise	5.4.7, 7, 8.2
Emission of dust and fly	5.4.10
Fire	5.4.11
Ergonomics	5.4.13
Devices for special operation	5.5
Fitting of parts	5.8
Particular machine elements:	
Drive and transmission enclosures	6.2
Machine elements which normally do not require safeguarding, in particular, spindles, flyers, ring frame drafting systems, thread guides for the winding unit	6.4
Rollers	6.5
Rotating shafts	6.6
Conveyors, including ring bobbin conveyors, waste conveyors	6.10
Fans	6.11
Mobile machines, handling devices (if present)	6.21.3
Mobile machines, handling devices which could leave their defined path (if present)	6.21.4
Floor-mounted and overhead rails (tracks)	6.21.5
Overhead transport of process material	6.21.6
Complex installations	6.22

5.8.3 Open-end spinning machines

Including rotor spinning, friction spinning, wrap spinning and pneumatic spinning machines.

General safety requirements

The safety requirements of 5.8.1 shall apply.

Specific hazards

Mechanical, from the spinning head, laps and knives for removal of laps, and from the piecing unit and doffing unit.

Specific risks

Frequent access during normal operation and occasional access during special operation, leading to high probability of minor to moderate injury.

Specific safety requirements

a) Information relating to adequate training methods for cleaning the spinning head, for the removal of laps and for maintenance work shall be provided in the instruction handbook in accordance with ISO 11111-1:2005, 8.2.

b) For automatic equipment (such as mobile piecing or doffing units) in accordance with ISO 11111-1:2005, 6.21.3. If trip bars or trip plates according to ISO 11111-1:2005, 6.21.3 d) are selected, they shall be provided on both traversing sides extending over the whole height of the device.

5.8.4 Gill spinning machines

The safety requirements of 5.7.3 and of 5.8.1 shall apply.

6 Verification of the safety requirements and/or measures

Final verification shall be carried out when the machine is in a fully commissioned condition in accordance with ISO 11111-1:2005, Clause 7, and ISO 11111-1:2005, Annex C.

Noise emission values shall be determined in accordance with ISO 9902-1 and ISO 9902-2 for all machines covered by this part of ISO 11111, whether or not noise is a significant hazard.

7 Information concerning machine use

Information for use of the machine shall be provided in accordance with ISO 11111-1:2005, Clause 8. It shall include all elements specified in Clause 5 of this part of ISO 11111.

Noise emission values shall be declared for all machines covered by this part in accordance with ISO 9902-1 and ISO 9902-2 whether or not noise is a significant hazard.

Bibliography

[1] ISO 14121, *Safety machinery — Principles of risk assessment*

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