INTERNATIONAL STANDARD

ISO 11111-2

First edition
2005-02-15

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

Reference number
ISO 11111-2:2005(E)

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Published in Switzerland

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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.

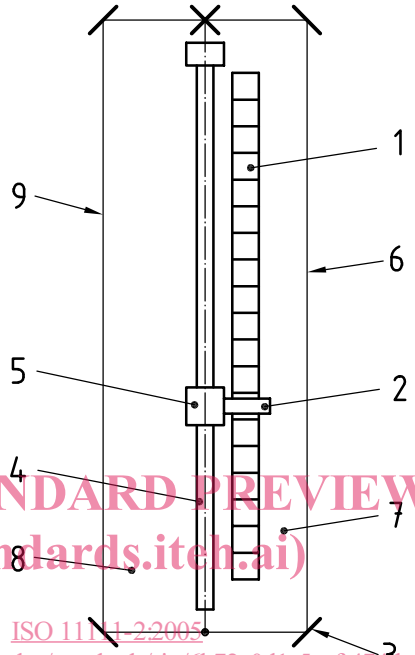
c) A signal to warn of automatic restart shall be installed (see ISO 11111-1:2005, 5.4.2.3).

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.