BRITISH STANDARD

BS EN ISO 10472-5:2008

Safety requirements for industrial laundry machinery

Part 5: Flatwork ironers, feeders and folders (ISO 10472-5:1997)

ICS 97.060

BSI British Standards

National foreword

This British Standard is the UK implementation of EN ISO 10472-5:2008. It is identical to ISO 10472-5:1997. It supersedes BS EN ISO 10472-5:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee TCI/33, Textile machinery.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Sicherheitsanforderungen für industrielle Wäschereimaschinen - Teil 5: Mangeln, Eingabe- und Faltmaschinen (ISO 10472-5:1997)

This European Standard was approved by CEN on 23 October 2008.

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Foreword

The text of ISO 10472-5:1997 has been prepared by Technical Committee ISO/TC 72 “Textile machinery and machinery for dry-cleaning and industrial laundering” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10472-5:2008 by Technical Committee CEN/TC 214 “Textile machinery and accessories” the secretariat of which is held by SNV.

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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

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

This document supersedes EN ISO 10472-5:1997.

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 Directives.

For relationship with EC Directives, see informative Annexes ZA and ZB, which are integral parts of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of ISO 10472-5:1997 has been approved by CEN as a EN ISO 10472-5:2008 without any modification.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 98/37/EC, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements (except 1.7.4. (f)) of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 2006/42/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements (except 1.4.2.1 § 2, 1.7.3, 1.7.4.2 t) and u)) of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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.

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.

International Standard ISO 10472-5 was prepared by Technical Committee ISO/TC 72, *Textile machinery and machinery for dry-cleaning and industrial laundering*, Subcommittee SC 5, *Industrial laundry and dry-cleaning machinery*.

ISO 10472 consists of the following parts, under the general title *Safety requirements for industrial laundry machinery*:

— *Part 1: Common requirements*

— *Part 2: Washing machines and washer-extractors*

— *Part 3: Washing tunnel lines including component machines*

— *Part 4: Air dryers*

— *Part 5: Flatwork ironers, feeders and folders*

— *Part 6: Ironing and fusing presses*

Introduction

This part of ISO 10472 is intended to instruct the designer of industrial laundry machinery in a systematic manner, focusing on his particular type of machine, regarding the relevant essential safety requirements, and to suggest possible state-of-the-art safety solutions.

The extent to which hazards are covered is indicated in the scope of this part of ISO 10472. In addition, machinery should comply as appropriate with ISO/TR 12100-1 and ISO/TR 12100-2 for hazards which are not specifically referred to in this part of ISO 10472.

All examples given in this part of ISO 10472 represent the state of the art. Equivalent solutions are acceptable, provided they attain at least the same safety level.

The designer is presumed to have taken into account all the provisions of ISO 10472-1 before considering this part of ISO 10472.

INTERNATIONAL STANDARD © ISO **ISO 10472-5:1997(E)**

Safety requirements for industrial laundry machinery —

Part 5:
Flatwork ironers, feeders and folders

1 Scope

This part of ISO 10472 covers, together with ISO 10472-1, most significant hazards associated with flatwork ironers, feeders and folders, such as:

— cylinder and bed ironers for flatwork finishing having a contact area (for bed ironers under pressure) > 0,25 m^2;

— flatwork feeding machines for the automatic feeding of flatwork into bed or cylinder ironers, or directly to folders;

— flatwork folding machines for the automatic folding of flatwork in association with cylinder and bed ironers;

— folding machines for the automatic folding of small pieces (excluding endless towels);

— multi-function machines.

This part of ISO 10472 complements the basic requirements as laid down in ISO/TR 12100-1 and ISO/TR 12100-2. It also gives guidance to the designer on assessing the risks associated with the hazards (see EN 1050) and on selecting measures for attaining the required safety level.

This part of ISO 10472 does not apply to ancillary equipment, e. g chemical supply pumps, steam valves and supply pipe work, vent systems, work feed systems and discharge systems and ducting to the atmosphere.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10472. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this part of ISO 10472 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10472-1:1997, *Safety requirements for industrial laundry machinery — Part 1: Common requirements.*

ISO 11111:1995, *Safety requirements for textile machinery.*

ISO/TR 12100-1:1992, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*

ISO/TR 12100-2:1992, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*

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

1) To be published.

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

ISO 14119:—[1)], *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection.*

IEC 335-1:1991, *Safety of household and similar electrical appliances — Part 1: General requirements.*

IEC 335-2-44:1987, *Safety of household and similar electrical appliances — Part 2: Particular requirements for electric ironers.*

EN 953:1997, *Safety of machinery — General requirements for the design and construction of guards (fixed, movable).*

EN 1050:1996, *Safety of machinery — Risk assessment.*

EN 60204-1:1992, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements.* [IEC 204-1:1992, modified]

3 Definitions

For the purposes of this part of ISO 10472, the following definitions apply:

3.1
flatwork
Textile article (e.g. a bed sheet) which can be satisfactorily dried and smoothed by being passed through a flatwork ironing machine.

3.2
bed ironer
Machine for the ironing of flatwork generally providing a heated bed against which the work is pressed by one or several fabric-covered roller(s).

3.3
cylinder ironer
Machine for the ironing of flatwork in which the work to be treated is drawn against one or more heated cylinder(s) where it is held by means of an appropriate system, for example by bands.

3.4
flatwork feeding machine
Machine, into which operator(s) load damp unfinished flatwork items, that presents the items, tensioned and spread to the feed-bands of an ironer or to a folding machine.

NOTE — This machine is also used for feeding blankets, polyester sheets and similar items to folding machines.

3.5
spreader carrier
Mechanism consisting of clamp(s) for take-up and spreading of flatwork to prepare it for the feeding operation.

3.6
flatwork folding machine
Machine generally fitted in conjunction with an ironer which will automatically fold flatwork items.

NOTE — This machine is also used for folding blankets, polyester sheets and similar items.

1) To be published.

3.7
folding mechanism
Moving part of a folding machine which folds flatwork.

3.8
folding machine for small pieces
Machine for automatically folding towels, pillow cases and similar items.

3.9
multi-function machine
Machine which combines feeding, ironing and folding in one unit.

3.10
raised machine part
Conveyor bridge at the exit of a feeding machine which can be lifted to enable direct access to the feeding table of the ironer, or similar equipment.

4 Hazards

4.1 General

The hazards common to most industrial laundry machinery are listed in ISO 10472-1. Significant particular hazards found in flatwork ironers, feeders and folders are listed in 4.2 to 4.10.

4.2 Mechanical hazards

4.2.1 Bed and cylinder ironers

4.2.1.1 Drawing-in or trapping between:

a) roller and heated bed, for bed ironers;

b) heated cylinder and idle roller or pressure roller, for cylinder ironers;

c) roller and edge of feedbands or table.

4.2.1.2 Trapping or entanglement between feedbands and drive roller.

4.2.1.3 Falling into or from the ironers.

4.2.2 All types of feeding, folding and multi-function machines

4.2.2.1 In-running nips between rollers or belts and rollers: drawing-in or trapping.

4.2.2.2 Spreader carriers: impact from the moving clamps.

4.2.2.3 Folder mechanism: crushing, shearing or impact.

4.2.2.4 Falling into or from the folding machine or into the feeding pit.

4.2.2.5 Raised machine parts (e.g. lifting section of feeding machine): crushing and shearing.

4.2.2.6 Spreader roller: entanglement, in particular entanglement from trapped work, friction or abrasion.

4.3 Electrical hazards

See ISO 10472-1:1997, 4.2.

4.4 Thermal hazards

4.4.1 Heated bed or rollers and heating system: burns.

4.4.2 Radiation to the workplace close to the ironer: physiological stress.

4.4.3 Ironed work: burns.

4.4.4 Ignition of the work for gas- and oil-heated ironers: burns.

4.5 Hazards generated by noise

Noise emitted by the vacuum device on the feeding machine may cause a hazard.
See ISO 10472-1:1997, 4.4.

4.6 Hazards caused by fire and explosion from gas-heated machines: burns

4.7 Hazards caused by harmful fumes from gas-heated machines: intoxication

4.8 Hazards due to neglect of ergonomic principles in machine design

Unhealthy posture resulting from inadequate height of the feeding table on ironing machines, or the folding table on folding machines, or inadequate location of flatwork feeding clamps.

4.9 Hazards caused by unexpected ejection of fluids from oil-heated systems: impact and burns

4.10 Failure of control systems

5 Safety requirements and/or measures for the hazards identified in clause 4

5.1 General

The designer shall consider the common safety requirements and measures described in ISO 10472-1 in addition to the particular hazards and measures described in this part of ISO 10472.

5.2 Mechanical hazards

5.2.1 Bed and cylinder ironers

5.2.1.1 Drawing-in or trapping between:

a) <u>roller and heated bed, for bed ironers</u>

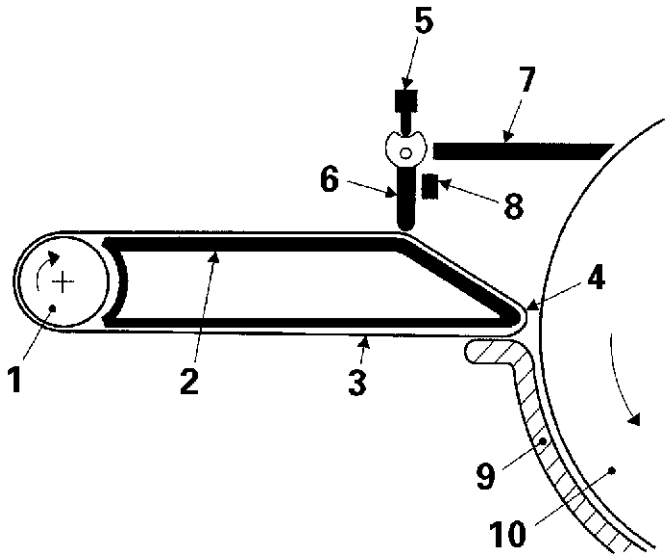
The nip zone between roller and bed at the feed point shall be protected by guards and safety devices (see ISO 10472-1:1997, 5.1.2), as described in examples 1 to 4:

EXAMPLE 1

Drawing-in on bed ironers with feedbands:

The nip between roller and bed may be guarded by an easily activated hinged trip guard (figure 1). For bed ironers with feedbands, it shall be arranged so that the maximum gap between the trip guard and feedbands and the distance between this gap and the nip are not greater than specified in table 4 of ISO 13852:1996.

It shall not be possible to reach over the hinged trip guard to the nip, e.g. by provision of a fixed guard.



Key

1 drive roller
2 bed plate
3 feedband
4 edge of feedband
5 limit switch
6 hinged trip guard
7 fixed guard
8 mechanical stop
9 bed
10 roller

Figure 1 — Safeguarding ironers with feedbands

The roller and the feedbands shall be stopped by means of a limit switch if the hinged trip guard is moved towards the roller or away from the roller, see ISO 14119.

A mechanical stop shall be arranged to stop the hinged trip guard moving towards the roller immediately after the limit switch has been activated. The gap between the hinged trip plate and the feedbands shall not be reduced by moving the trip guard towards the stop.

The roller shall stop as fast as possible but within 5 s at the maximum roller speed. This does not apply if an interlocked feeding machine is installed in front of the ironer (see paragraph on automatic feeding machine below) and the hinged trip guard is used as an additional guard for maintenance work.

The trip guard shall be of substantial construction and shall maintain a parallel gap across the width of the machine as far as practicable (see clauses 6 and 7 of EN 953:1997).

It shall not be possible to increase the gap by lowering the feedbands.

An automatic feeding machine can be a guard for this hazard provided it prevents access to any part of the nip in accordance with ISO 13852. The manufacturer shall provide information for the user in the instruction handbook concerning necessary side guards.

Means shall be provided to prevent exposure to hazard when the feeder is out of position. This may be achieved by interlocking the feeder with the ironer, in which case the manufacturer of the ironer shall provide the technical means and sufficient information in the instruction handbook to enable the connection with the feeder to be made.

EXAMPLE 2

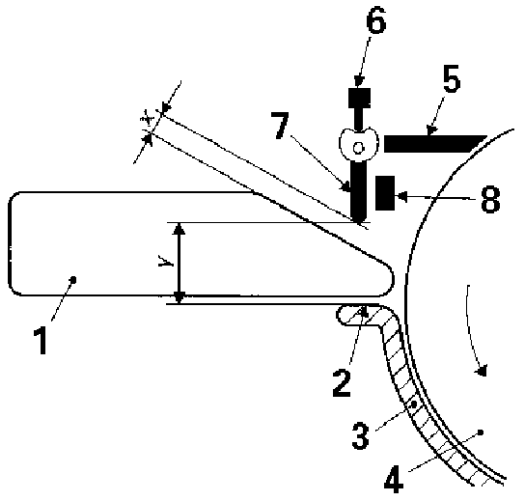
Drawing-in on bed ironers with fixed feed table:

For single-roller ironers using a fixed feed table, having a maximum speed of 6 m/min,

— the gap (*x*) between the hinged trip plate and the table or roller shall be the minimum practicable to feed the material and shall not exceed 18 mm (see figure 2).

NOTE — Table 4 of ISO 13852:1996 is not applicable in this case.

After the trip guard has been activated, the roller shall come to rest within a roller surface movement which does not exceed the distance (*y*) between the trip plate and the upper edge of the bed, and in addition the roller and bed shall be separated.



Key

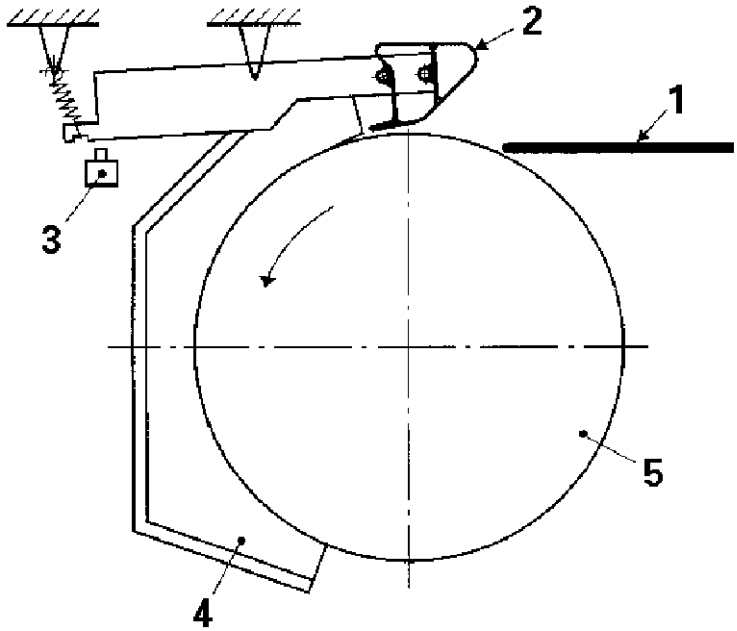
1 fixed feed table
2 upper edge
3 bed
4 roller
5 fixed guard
6 limit switch
7 hinged trip plate
8 mechanical stop
x 18 mm max.
y distance between the trip guard and the upper edge of bed

Figure 2 — Safeguarding ironers with fixed feed table

or

— a hinged trip guard (see figure 3) shall cause the roller to stop before the nip point between roller and bed can be reached.

For multi-roller bed ironers, it shall not be possible to reach the in-running nips between beds and rollers. This may be achieved by means of side panels or covers in accordance with EN 953.



Key

1 fixed feed table
2 hinged trip guard
3 limit switch
4 bed
5 roller

Figure 3 — Safeguarding ironers with fixed feed table - (variation)

EXAMPLE 3

Drawing-in due to reverse running:

Attention shall be given to the in-running nips created by a reversing machine.

Guards for these nips may be a combination of those described before.

For single-roller bed ironers having a roller diameter < 600 mm, the reverse running may be controlled by hold-to-run control at normal speed or slower, see EN 60204-1:1992, 9.2.5.6.

For single-roller bed ironers having a roller diameter > 600 mm and for multi-roller ironers, a hold-to-run control at normal speed or slower may be used provided that it can be actuated only when roller and bed have been separated previously.

EXAMPLE 4

Release of entrapped persons:

The machine shall be fitted with power- or hand-operated means for releasing any entrapped person, e.g. by increasing the gap between bed and roller.

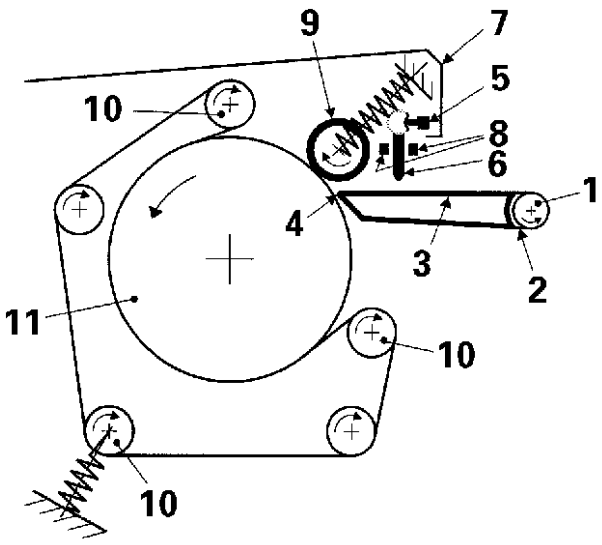
The procedure for releasing entrapped persons shall be marked on the machine and shall be described in the instruction handbook.

b) heated cylinder and idle roller or pressure roller for cylinder ironers

The safety measures shall be the same as for roller and heated bed. Table 4 of ISO 13852:1996 shall apply for the gap between trip guard and feedbands and for the distance between this gap and the nip.

Where a hinged trip guard is used, an additional mechanical stop shall prevent movement away from the roller (see figure 4).

The procedure for releasing entrapped persons shall be marked on the machine and shall be described in the instruction handbook.



Key

1 drive roller
2 feedband
3 bed plate
4 edge of feedband
5 limit switch
6 hinged trip guard
7 fixed guard
8 mechanical stops
9 pressure roller
10 idle roller
11 cylinder

Figure 4 — Safeguarding cylinder ironers

c) roller and edge of feedbands, or bed plate

The nip point between roller and edge of feedbands, or bed plate shall be protected by guards or safety devices, see ISO 10472-1:1997, 5.1.2.

NOTE — This guard or safety device is generally the same as for the nip point between roller and bed or cylinder and pressure roller.

5.2.1.2 Trapping or entanglement between feedbands and drive rollers

The nip point shall be protected to prevent entrapment (e.g. by a bed plate between the upper and lower part of the feedbands close to the drive roller, see figures 1 and 4). The distance between bed plate and drive roller shall not exceed 6 mm.

5.2.1.3 Falling into or from the ironer

For multi-roller machines with working width > 2100 mm, fixed guards (e.g. covers) shall be provided unless all maintenance and fault elimination work can be carried out from the floor level (see ISO 10472-1:1997, 5.1.2), e. g. by

— covering the top of the machine by a flat platform, removable for maintenance, that will support a 200 kg load in the middle of each section (see figure 5),

or

— providing covers over the cylinders and a walkway between the covers (see figure 6).

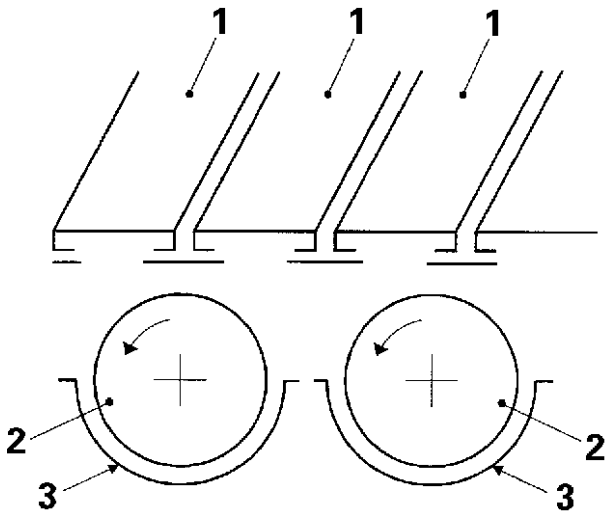
A hold-to-run control shall be provided that will allow the machine to run at normal speed or slower when the covers are removed. This may be an independent unit for remote control for the purpose of reclothing the roller or other maintenance or fault elimination purposes, and shall override the normal machine control. In any event, the location of the control shall permit a clear view of the hazardous area. The instruction handbook shall contain details of the safe procedure for reclothing.

Means shall be provided to prevent falling into the machine during maintenance and fault elimination work (e.g. handles) unless the distance between the service level and the fault position is < 300 mm (see figure 7).

Side walkways at a height of > 800 mm above the ground shall be provided with a handrail where there is a risk of falling off, or into, the machine. One handrail is sufficient for each walkway. It shall be fitted at the outer side. The height of the handrail shall be 1 m. Midrails and toeboards are not required. The width of the walkway shall be at least 300 mm. The walkway shall support a 200 kg load in the middle. It shall not tilt and the surface shall be of non-slip design.

When one or more walkways are provided for maintenance access, at least one stairway or ladder, fixed or movable and secured to the machine, shall be provided for every multi-roller machine whose top can be entered.

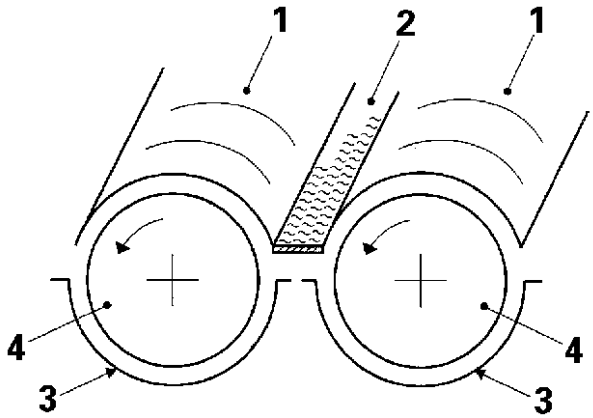
The machine frame shall have a notice posted near the stairway or ladder drawing attention to the requirement that only authorized maintenance staff may use it and reference to this shall be made in the instruction handbook.



Key

1 cover
2 cylinder
3 bed

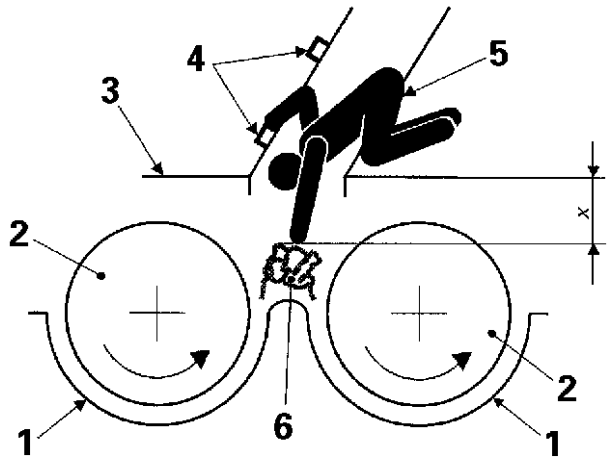
Figure 5 — Covers with removable sections



Key

1 cover
2 walkway
3 bed
4 cylinder

Figure 6 — Walkway and covers



Key

1 bed
2 cylinder
3 cover
4 handles
5 authorized person
6 fault
x distance greater than 300 mm

Figure 7 — Maintenance and fault elimination

5.2.2 All types of feeding, folding and multi-function machines

5.2.2.1 In-running nips between rollers or belts and rollers

In-running nips created by rollers shall be guarded against drawing-in of hands and entranglement of hair. See ISO 10472-1:1997, 5.1.2. Detailed advice about safeguarding in-running nips is given in ISO 11111:1995, 6.4, particularly figures 1 through 4, 6 and 7. This applies also to nips between rollers and fixed parts. Guarding is not necessary if the distance between such rollers or rollers and fixed parts is between 120 mm and 150 mm or greater than 500 mm. The in-running nip between belts and rollers shall be guarded (e.g. by means of fixed guards).

Guards are not necessary if the torque applied to the rollers provides an in-running force of less than 150 N during the whole lifetime of the machine (e.g. by slipping clutches). The instruction handbook shall contain details of the maintenance necessary for these devices.

In the instruction handbook, the manufacturer shall give details of the design of the guard required to secure the gap between the ironer and the feeding and folding machines.

5.2.2.2 Spreader carriers

The manufacturer shall fit distance guards (e.g. panels), in front of the carriers and clamps, except in the loading position, and ensure absence of sharp edges (ISO 10472-1:1997, 5.1.2). Guarding is not necessary if the travelling speed of the clamps does not exceed 0,5 m/s.

5.2.2.3 Folder mechanism

The manufacturer shall provide guarding (e.g. fixed guards) for the moving parts of the folder mechanism (see of ISO 10472-1:1997, 5.1.2).

5.2.2.4 Falling into or from the folding machine or into the feeding pit

For folding machines with operational components at a height > 1500 mm above the floor, working width > 2100 mm and a depth > 2000 mm, the manufacturer shall provide maintenance access walkways and, if necessary, side walkways in accordance with 5.2.1.3. In this case, one or more stairways or ladders shall be provided unless there is a walkway from the ironer to the folder on the top of the machines.

Where floor pits are required in conjunction with feeding machines, and there is a risk of falling into the pit, the manufacturer shall describe in the instruction handbook the measures to be taken by the user to reduce this risk (e.g. fixed rails).

5.2.2.5 Raised machine parts

The lifting motion shall be controlled by a hold-to-run control (see ISO 10472-1:1997, 5.1.2).

All machine parts that are raised to facilitate operation shall be secured in position by a secondary independent system. For example, the conveyor bridge of a feeding machine may be raised hydraulically and may be secured by a mechanical latch, or by moving it over the centre.

5.2.2.6 Spreader roller

The manufacturer shall provide a fixed rail or guard (see ISO 10472-1:1997, 5.1.2) in front of the automatic feeding section to prevent operator access to the danger zone unless the torque applied to the roller provides a circumferential force of < 150 N during the whole lifetime of the machine (e.g. by slipping clutch or a motor with limited torque).

5.3 Electrical hazards

For flatwork ironers having a surface contact area (under pressure for bed ironers) ≥ 1,20 m², the electric design shall be in accordance with EN 60204-1 as defined in ISO 10472-1:1997, 5.2.

For flatwork ironers having a surface contact area (under pressure for bed ironers) between 0,25 m² and 1,20 m², the manufacturer shall decide if IEC 335-1 and IEC 335-2-44 apply (see ISO 10472-1:1997, 5.2) or EN 60204-1 applies (see ISO 10472-1:1997, 5.2).

The manufacturer shall explain his decision in the instruction handbook.

To prevent hazards due to inadequate protection of the flexible electric power cabling to the feeding machine, the manufacturer shall comply with EN 60204-1:1992, 15.4.3. The instruction on how to secure the cable when the feeding machine is removed from the ironer shall be contained in the instruction handbook (see ISO 10472-1:1997, 7.1).

5.4 Thermal hazards

5.4.1 Heated bed or rollers and heating system

Measures shall be taken to protect operators from thermal hazards in accordance with ISO 10472-1:1997, 5.3 (e.g. by an enclosing guard), except for the delivery end of the bed or cylinder. A warning shall be contained in the instruction handbook drawing attention to the residual thermal hazard.

5.4.2 Heat radiation to the workplace

Heat radiation from the heated bed or roller and from the integrated heat source shall be reduced by technical means (e.g. insulation).

NOTE — For insulation see ISO 10472-1:1997, 5.3.

5.4.3 Ironed work

The manufacturer shall state in the instruction handbook the measures to be taken by the user to prevent injury to operators due to the temperature of the flatwork leaving the machine (e.g. introduction of cooling air, wearing of protective gloves).

5.4.4 Ignition of the work

For gas- or electrically-heated machines, the heat energy supply shall be interrupted immediately when the machine stops for any reason and the bed shall be separated from the cylinder.

For thermal fluid-heated machines, bed separation from cylinder only shall apply.

Alternatively, single-roller bed ironers and cylinder ironers may be provided with a heat energy supply interruption as well as a crank handle to remove the work.

The manufacturer shall advise the user in the instruction handbook to provide fire extinguishers for use in case the work ignites.

5.5 Hazards generated by noise

For design of the vacuum device, or any other noisy item, see ISO 10472-1:1997, 5.4.

5.6 Hazards caused by fire and explosion from gas-heated machines

The safety requirements and/or measures of ISO 10472-1:1997, 5.5.2 apply to machines with a contact area (for bed ironers under pressure) ≥ 1,20 m². For machines with a contact area (for bed ironers under pressure) of < 1,20 m² see the note in 5.5.2 of ISO 10472-1:1997.

5.7 Hazards caused by harmful fumes from gas-heated machines

The machine shall be provided with means to fix an exhaust system for harmful combustion products.

5.8 Hazards due to neglect of ergonomic principles in machine design

The clamps of feeding devices, input positions of ironers and feeding devices or the take-off positions of folding devices should be in accordance with ISO 10472-1:1997, 5.6.

5.9 Hazards caused by unexpected ejection of fluids

Oil-heating pipework shall be installed in accordance with the recommendations of the heat tranfer oil suppliers and of the heat source suppliers. This pipework shall withstand mechanical stress and corrosion during their lifetime. The instruction handbook shall give information to the user for installation, maintenance and repair of heating systems.

5.10 Failure of control systems

The category of the safety-related part of the control systems (see ISO 13849-1:—, clause 6) shall be not lower than 1, except for the hinged trip plate on bed ironers having a bed width of more than 2 m. For the design of this hinged trip plate the category shall be not lower than 2.

6 Verification of safety requirements and/or measures

The verification shall follow the general requirements of ISO 10472-1 and the particular requirements of clause 5 of this part of ISO 10472. Table 1 gives a list of verifications.

Table 1 — List of verifications

Sub-clause	Subject	Reference	Test method
5.2.1.1 a)	Roller and heated bed for bed ironers	ISO 10472-1:1997, 5.1.2	
	EXAMPLE 1		
	Drawing-in on ironers with feedbands		
	Hinged trip guard, distance between this gap and the nip	ISO 13852:1996, table 4	Measure gap including parallelism Demonstration of stability of trip guard and deflection of feedbands
	Fixed guard above the hinged trip guard		Visual inspection Measurement
	Limit switch for the hinged trip guard	ISO 14119	Demonstration of function (both directions) Test and inspection Demonstration
	Mechanical stop		Demonstration (position)
	Stopping time		Measurement
	Feeding machine interlocked with ironer	ISO 14119 EN 953	Test and inspection Visual inspection
	Feeding machine used as guard for the nip point, side guards	ISO 13852 Instruction handbook	Measurement Confirm accuracy and content
	EXAMPLE 2		
	Drawing-in on bed ironers with fixed feed table		
	Figure 2: Gap between the hinged trip plate and the table		Measurement
	Limit switch for the hinged trip plate Stopping distance		Check function Measurement

Table 1 *(continued)*

Sub-clause	Subject	Reference	Test method
	Figure 3:		
	Limit switch for the hinged trip guard		Check function
	Multi-roller bed ironers:		
	Guards	EN 953 ISO 13852	Visual inspection Measurement
	EXAMPLE 3		
	Drawing-in due to reverse running		
	Guards for the in-running nips created by a reversing machine	ISO 13852	Visual inspection Measurement
	Hold-to-run control	EN 60204-1:1992, 9.2.5.6	Check function and location
	EXAMPLE 4		
	Release of entrapped persons		
	Means to release	Instruction handbook Display notice	Confirm accuracy and content Visual inspection
5.2.1.1 b)	Heated cylinder and idle roller or pressure roller for cylinder ironers	See 5.1.1.1 a) above	
	Gap between trip guard and feed band	ISO 13852:1996, table 4	Measurement
	Additional mechanical stop		Demonstration
	Release procedure	Instruction handbook Display notice	Confirm accuracy and content Visual inspection
5.2.1.1 c)	Roller and edge of feedbands, or bed plates		
	Nip guard or safety device	ISO 10472-1:1997, 5.1.2	
5.2.1.2	Feedbands and drive rollers		
	Bed plate		Check presence
	Distance between bed plate and drive roller		Measurement

Table 1 *(continued)*

Sub-clause	Subject	Reference	Test method
5.2.1.3	Falling into and from the ironer		
	Fixed guard	EN 953	Inspection, test and measurement
	- platform	EN 953 ISO 13852	Visual inspection Measurement
	- covers and walkways		Visual inspection and calculation
	Hold-to-run control	ISO/TR 12100-1:1992, 3.23.3 EN 60204-1:1992, 9.2.5.6	Check function and location
	Safe procedure for reclothing	Instruction handbook	Confirm accuracy and content
	Handles		Check presence and location
	Height and width of the walkways, handrails		Measurement
	Tilting		Demonstration
	Non-slip design		Visual inspection
	Ladder		Check presence and means for securing
	Use of the ladder		Confirm accuracy and content
	Notice	Instruction handbook	Check presence
5.2.2.1	In-running nips		
	Distance between rollers		Measurement
	Guards for nips	ISO 10472-1:1997, 5.1.2 ISO 11111:1995, 6.4	
	In-running force		Measurement
	Maintenance of slipping clutch	Instruction handbook	Confirm accuracy and content
	Side guards - fixed - movable, interlocked	EN 953 ISO 13852	Visual inspection Measurement
	Gap between the ironer and the feeding and folding machine	Instruction handbook	Confirm accuracy and content

Table 1 *(continued)*

Sub-clause	Subject	Reference	Test method
5.2.2.2	Spreader carriers		
	Distance guards	ISO 10472-1:1997, 5.1.2	Visual inspection, measurement
	Speed and force of clamps		Measurement
	Sharp edges		Demonstration
5.2.2.3	Folder mechanism		
	Fixed guards for moving parts	ISO 10472-1:1997, 5.1.2	
5.2.2.4	Falling into or from the folding machine or into the feeding pit		
	Access and side walkways	5.2.1.3	
	Stairway or ladder		Check presence
	Floor pit: fixed rails	Instruction handbook	Confirm accuracy and content
5.2.2.5	Raised machine parts		
	Hold-to-run control	ISO 10472-1:1997, 5.1.2	Demonstration
	Means for securing the machine parts in the raised position		Demonstration
5.2.2.6	Spreader roller		
	Fixed rail or guard	ISO 10472-1:1997, 5.1.2	
	Force		Measurement

Table 1 *(continued)*

Sub-clause	Subject	Reference	Test method
5.3	Electrical hazards		
	Machine ≥ 1,20 m² surface contact area	ISO 10472-1:1997, 5.2 EN 60204-1	
	Machine between 0,25 m² and 1,20 m² surface contact area	IEC 335-1 and IEC 335-2-44 or EN 60204-1	
	Explanation of choice	Instruction handbook	Confirm accuracy and content
	Flexible electric power cabling	EN 60204-1:1992, 15.4.3 Instruction handbook	Confirm accuracy and content
5.4.1	Heated bed or rollers and heating system		
	Temperature of hot surfaces including insulation shields	ISO 10472-1:1997, 5.3	Measurement after 30 min of operation
5.4.2	Heat radiation in the workplace		
	Means to reduce heat radiation in workplace	ISO 10472-1:1997, 5.3	Demonstration
5.4.3	Ironed work		
	Protective measures	Instruction handbook	Confirm accuracy and content
5.4.4	Ignition of the work		
	Interruption of energy supply and separation of bed and roller		Check function
	Crank handle		Check function
	Fire extinguishers	Instruction handbook	Confirm accuracy and content
5.5	Noise of vacuum device	ISO 10472-1:1997, 5.4	Inspection and test

Table 1 *(concluded)*

Sub-clause	Subject	Reference	Test method
5.6	Fire and explosion from gas-heated machines Contact area	ISO 10472-1:1997, 5.5.2	Measurement
5.7	Harmful fumes from gas-heated machines Means for fixing an exhaust system		Visual inspection
5.8	Neglect of ergonomic principles	ISO 10472-1:1997, 5.6	Visual inspection and measurement
5.9	Unexpected ejection of fluids Mechanical stress and corrosion	Instruction handbook	Confirm accuracy and content Check manufacturer's technical file
5.10	Failure of control system Category	ISO 13849-1:—, clause 6	Check manufacturer's technical file
7.1	Instruction handbook	ISO 10472-1:1997, 7.1	Check completeness
7.2	Warning signs	ISO 10472-1:1997, 7.2	Visual inspection

7 Information concerning machine use

7.1 Instruction handbook

All information called for in ISO 10472-1:1997, 7.1 shall be provided. Furthermore, the manufacturer shall provide detailed information as required in clause 5 of this part of ISO 10472 on:

5.2.1.1, side guards;
5.2.1.1, connection of feeder;
5.2.1.1, release of entrapped persons;
5.2.1.3, reclothing procedure;
5.2.1.3, notice concerning access;
5.2.2.1, maintenance of clutch;
5.2.2.1, guard between feeding machine and ironer;
5.2.2.4, guard for floor pit;
5.3, decision if EN 60204-1 or IEC 335 applies;
5.3, flexible cable;
5.4.1, residual thermal hazard;
5.4.3, thermal hazard from ironed work;
5.4.4, ignition of work;
5.9, oil-heating information.

7.2 Warning signs

The manufacturer shall provide machine marking in accordance with ISO 10472-1:1997, 7.2 and additional marking as required in clause 5 of this part of ISO 10472 on:

5.2.1.3, access to walkways.

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