
**Safety requirements for industrial laundry
machinery —**

**Part 1:
Common requirements**

*Exigences de sécurité pour les machines de blanchisserie industrielle —
Partie 1: Prescriptions communes*
(standards.iteh.ai)

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Printed in Switzerland

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 10472-1 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*

Annex A forms an integral part of this part of ISO 10472. Annexes B and C are for information only.

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Introduction

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. The manufacturer's attention is drawn to the fact that 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 ISO 10472 represent the state of the art. Equivalent solutions are acceptable, provided they attain at least the same safety level.

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Safety requirements for industrial laundry machinery —

Part 1: Common requirements

1 Scope

The individual parts of ISO 10472 identify all significant hazards associated with laundry machinery designed for use in industrial laundry premises, which includes hotels, hospitals, nursing homes, prisons and similar premises, as well as machines designed for use in self-service establishments subject to the minimum capacities stated in the separate parts of ISO 10472. Dry-cleaning presses and garment presses are also included.

Certain specialized finishing machines used for shaped items are excluded.

Household and similar electrical appliances (see IEC 335) are not covered by ISO 10472.

The individual parts of ISO 10472 complement the basic requirements laid down in ISO/TR 12100-1 and ISO/TR 12100-2. They give guidance to the designer on assessing the risks associated with the hazards (see EN 1050) and on selecting measures to attain the required safety level. "Use of machinery" comprises both intended use and reasonably foreseeable misuse.

The individual parts of ISO 10472 do not give specific technical advice about:

- the phases of life of the machine other than use;
- noise;
- laser;
- maintenance operations and elimination of process faults;
- ergonomics;
- explosions;
- isolation of energy sources;
- pressure vessels;
- hot surfaces necessarily exposed for production purposes [but see ISO 10472-6 (press head surface)].

The individual parts of ISO 10472 do not cover electromagnetic compatibility.

Hazards due to the use of gas within a machine which is not included in the range described in 5.5.2 of this part of ISO 10472 are not covered by the individual parts of ISO 10472.

Examples of layouts of a large- and a medium-size plant which show the machines of parts 2 to 6 of ISO 10472 are given in annex B.

The individual parts of ISO 10472 apply to machines which are manufactured after the date of issue of the relevant parts.

NOTE — For significant hazards concerned with construction, transport, commissioning, decommissioning, dismantling and disposal of the machine, see ISO/TR 12100-1:1992, 3.11, 3.12 and ISO/TR 12100-2:1992, 5.5.

The guidance contained in the individual parts of ISO 10472 is based on the assumption that the designer has completed a risk analysis of the machine under consideration. This will enable him to identify and fulfil the significant requirements for the machine as stipulated by the individual parts of ISO 10472.

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 5232:—¹⁾, *Graphical symbols for textile machinery*.

ISO 9398-1:1993, *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics — Part 1: Flatwork ironing machines*.

ISO 9398-2:1993, *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics — Part 2: Batch drying tumblers*.

ISO 9398-3:1993, *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics — Part 3: Washing tunnels*.

ISO 9398-4:1993, *Specifications for industrial laundry machines — Definitions and testing of capacity and consumption characteristics — Part 4: Washer-extractors*.

ISO 10472-2:1997, *Safety requirements for industrial laundry machinery — Part 2: Washing machines and washer-extractors*.

ISO 10472-3:1997, *Safety requirements for industrial laundry machinery — Part 3: Washing tunnel lines including component machines*.

ISO 10472-4:1997, *Safety requirements for industrial laundry machinery — Part 4: Air dryers*.

ISO 10472-5:1997, *Safety requirements for industrial laundry machinery — Part 5: Flatwork ironers, feeders and folders*.

ISO 10472-6:1997, *Safety requirements for industrial laundry machinery — Part 6: Ironing and fusing presses*.

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:—²⁾, *Safety of machinery — Safety related parts of control systems — Part 1: General principles for design*.

ISO 13850:1996, *Safety of machinery — Emergency stop — Principles for design*.

ISO 13851:—²⁾, *Safety of machinery — Two-hand control devices — Functional aspects and design principles*.

1) To be published. (Revision of ISO 5232:1988)

2) To be published.

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

ISO 13853:—²⁾, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs.*

ISO 14119:—²⁾, *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 335-2-7:1993, *Safety of household and similar electrical appliances — Part 2: Particular requirements for washing machines.*

IEC 335-2-11:1993, *Safety of household and similar electrical appliances — Part 2: Particular requirements for tumbler dryers.*

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

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

EN 614-1:1995, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles.*

EN 746-2:1997, *Industrial thermoprocessing equipment — Part 2: Safety requirements for combustion and fuel handling systems.*

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

EN 999:—²⁾, *Safety of machinery — Hand/arm speed — Approach speed of parts of the body for the positioning of safety devices.*

EN 1037:1995, *Safety of machinery — Prevention of unexpected start-up.*

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 sensitive floors.*

EN 1760-2:—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.*

EN 50100-1:—²⁾, *Safety of machinery — Electro-sensitive protective devices — Part 1: General requirements and tests.*

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 definitions given in ISO 10472-2 to ISO 10472-6 and the following definition apply.

2) To be published.

3.1

industrial laundry machinery

Machines used for the purpose of washing, extracting, drying or finishing of flat and shaped textile items in an industrial laundry.

NOTE — This definition includes machines intended for use in hotels, hospitals, nursing homes, prisons and similar premises.

4 Significant hazards connected with most industrial laundry machinery

4.1 Mechanical hazards:

- crushing;
- shearing;
- entanglement;
- drawing-in or trapping;
- impact;
- high pressure fluid ejection;
- slipping, tripping and falling.

4.2 Electrical hazards: iTeh STANDARD PREVIEW

- electrical contact, direct or indirect. (standards.iteh.ai)

4.3 Thermal hazards: <https://standards.iteh.ai/catalog/standards/sist/48276e4f-fe51-485f-970c-12f5758c05c2/iso-10472-1-1997>

- incidental or intended contact with hot surfaces, flames or explosions and also radiation from heat sources;
- health-damaging effects of hot or cold working environments.

4.4 Hazards generated by noise:

- hearing loss (deafness);
- other physiological disorders (e. g. loss of balance, loss of awareness).

4.5 Hazards associated with materials and substances processed, used or exhausted by machinery:

- contact with or inhalation of harmful fluids, gases, mists, fumes and dusts;
- fire and explosion;
- decomposition of substances (e. g. by a naked flame);
- biological hazards.

4.6 Hazards due to neglect of ergonomic principles in machine design:

- unhealthy posture in case of inadequate height of feeding and unloading equipment.

4.7 Failure of energy supply, breakdown of machinery parts and other malfunction:

- failure of energy supply (of energy and/or control circuits);
- failure/malfunction of control system (unexpected start-up, unexpected overrun).

4.8 Hazards arising during maintenance and/or elimination of process faults

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

5.1 Mechanical hazards

5.1.1 Escape and rescue of trapped persons

Where there is a residual risk of entrapment, for example due to malfunction of a safety device or during maintenance, the manufacturer shall provide means and instructions for releasing an entrapped person to minimize injury.

EXAMPLES

- reversal of a roller ironer;
- separation of roll and bed;
- dismantling of the mechanism of a scissor press.

5.1.2 Guards and safety devices

The following safety requirements and/or measures apply. For guards, see table 1, for safety devices, see table 2.

The instruction handbook shall state that the machine shall not be operated until the fixed guards are put correctly in place.

Table 1 — Safety requirements and/or measures for guards

Application	Reference
Guard selection, unless specified in ISO 10472-2 to ISO 10472-6	ISO/TR 12100-2:1992, 4.1 EN 953:1997, clause 5
Guard design and construction	ISO/TR 12100-2:1992, 4.2 EN 953:1997, clauses 6 and 7
Guard fastening	EN 953:1997, 5.4, 7.2 and 7.3
Guard arrangement, unless specified in ISO 10472-2 to ISO 10472-6 ¹⁾	ISO 13852:1996, tables 1 and 4 ISO 13853
Guard interlocking, unless specified in ISO 10472-2 to ISO 10472-6	ISO 14119:—, clause 5
Fence guard	annex A

1) The safety distances for guards shall apply to all operating positions for normal operation as well as setting, adjustment, maintenance work, and elimination of process faults.

Table 2 — Safety requirements and/or measures for safety devices

Application	Reference
Selection of safety devices, unless specified in ISO 10472-2 to ISO 10472-6	ISO/TR 12100-2:1992, 4.1
Technical characteristics of safety devices	ISO/TR 12100-2:1992, 4.2.3 EN 50100-1:—, clause 4
Positioning of safety devices unless specified in ISO 10472-2 to ISO 10472-6 ¹⁾	EN 999:—, clauses 5 to 7
Interlocking guard - selection - design	ISO 14119:—, 3.2 ISO 14119:—, 7.5 ISO 14119:—, clauses 5 and 6
Interlocking guard with guard locking - selection - design	ISO 14119:—, 3.3 ISO 14119:—, 7.5 ISO 14119:—, 5.3 EN 50100-1:—, A5, A6, A8
Electrosensitive protective devices, - selection ²⁾ - installation - when used for start-up	EN 50100-1:—, clause 4 ISO 13849-1:—, 4.3 EN 50100-1:—, annex C EN 50100-1:—, A5
Photoelectric protective devices - selection ²⁾ - positioning	EN 50100-1:—, clause 4 EN 999:—, clause 6, 6.1 to 6.4
Two-hand controls - selection ³⁾	ISO 13851:—, clause 5 EN 60204-1:1992, 9.2.5.7 ISO 13849-1:—, 4.3
Pressure-sensitive protective devices	EN 1760-1:1997, clause 4 EN 1760-2:—, clause 4
Hold-to-run control devices ⁴⁾	ISO/TR 12100-1:1992, 3.23.3 EN 60204-1:1992, 9.2.5.6
<p>1) The safety distances for safety devices shall apply to all operating positions for normal operation as well as setting, adjustment, maintenance work, and elimination of process faults.</p> <p>2) Type 2 shall be used unless specified in ISO 10472-2 to ISO 10472-6.</p> <p>3) Type II shall be used unless specified in ISO 10472-2 to ISO 10472-6.</p> <p>4) This device shall be positioned so that the operator can clearly see but not reach the danger zone(s).</p>	

5.1.3 Fault-finding, cleaning or maintenance

For fault-finding, cleaning or maintenance (e. g. clearing of blockages), safety measures in accordance with ISO/TR 12100-2:1992, 3.7.10 shall be taken and described in the instruction handbook.

5.1.4 Complex installation

For complex installations comprising a combination of machines and service equipment, arranged to work as one integrated production unit and subject to an overall control system, the following safety requirements and/or measures shall be taken:

- a) there shall be a power supply disconnecting device (master isolator) for the entire complex installation, and each machine or section shall be provided with individual power supply disconnecting devices, where such can be operated individually (see EN 1037:1995, 4.1); and
- b) additional guards and safety devices shall be installed as necessary for either the complex installation in its entirety or on individual constituent machines, together with the interfaces between any given machine and those adjoining; and
- c) all movable guards and safety devices shall be in position and activated before it is possible to start the entire complex installation for normal operation. It is permitted to have guards and safety devices out of position or inactivated on any constituent machine whilst it is purposely inoperative and at standstill, provided that access to dangerous parts on adjacent operating machines is prevented; and
- d) in the case of a machine, or a combination of machines, comprising unit items selected from the proprietary range of products of two or more manufacturers, it shall be ensured that a comprehensive complement of safety measures is provided by the party responsible for the overall installation according to how this responsibility is defined in the ruling contract(s). Particular attention shall be given to the interfaces between the unit items.

[ISO 10472-1:1997](https://standards.iteh.ai/catalog/standards/sist/48276e4f-f51-485f-970c-125759e0592/iso-10472-1-1997)

NOTE – Failure to complete the overall assessment of hazards and risks arising from the entire assembly of components may lead to an insufficient level of safety for the whole installation.

5.2 Electrical hazards

The electrical equipment of machines shall be designed in accordance with EN 60204-1:1992, option 1, or IEC 335 [see b)] as specified in 5.3 of ISO 10472-2:1997, ISO 10472-4:1997 and ISO 10472-5:1997, depending on the intended use of the machine.

- a) If EN 60204-1 applies, the appropriate clauses given in table 3 shall be used.

These machines shall be equipped with an emergency stop device in accordance with ISO 13850:1996, 4.1.5 - category 0, unless specified otherwise in ISO 10472-2 to ISO 10472-6. The manufacturer shall fit emergency stop devices as required in ISO 13850:1996, 4.4 and at each loading and unloading position.

In addition, the manufacturer shall ensure that there are sufficient devices so that at least one is visible from any normal operator access area within 2 m from the machine, and that each device is located within 8 m of any such operator position. If the device is an emergency stop button, it shall be positioned at a height from the working floor or platform of between 700 mm and 1700 mm.

This emergency stop device may be omitted on machines designed for coin, token or similar operation for use in self-service situations; in such cases, the instruction handbook shall describe the arrangement for a remote-located emergency stop device, which shall be provided by the user and connected to each machine.