
**Graphic technology — Safety
requirements for binding and finishing
systems and equipment**

*Technologie graphique — Exigences de sécurité pour les systèmes et
les équipements de reliure et de finition*

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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 12649 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

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Introduction

During the development of this International Standard, existing relevant standards of other countries were taken into consideration. An effort has been made to harmonize the requirements of all countries, recognizing that national standards or laws may dictate national requirements. In cases where it was known that there is a national requirement that differs from this International Standard, that has been noted.

This International Standard was developed to harmonize three U.S. safety standards:

- ANSI B65.2, Safety standard — Binding and finishing systems,
- ANSI B65.3 Safety standard — Guillotine cutters, mill trimmers, and integral handling equipment,
- ANSI B65.4, Safety standard — Three-knife trimmers, including rotary, and single- and multiple-knife trimmers;

and three European standards:

- prEN 1010-1, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machinery — Part 1: Common requirements,*
- EN 1010-3, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machinery — Part 3: Cutting machines,*
- EN 1010-4, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machinery — Part 4: Bookbinding, paper converting and paper finishing machines.*

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Graphic technology — Safety requirements for binding and finishing systems and equipment

1 Scope

This International Standard provides safety specifications for the design and construction of binding and finishing equipment operated in a system configuration or in stand-alone mode.

This International Standard provides safety requirements for the design and construction of equipment used to convert printed or blank substrates into cut, folded, collated, assembled, bound, or otherwise finished product. It may also be applied to processes for preparing substrate for the printing process.

It addresses recognized hazards specific to binding and finishing equipment and systems in the following areas:

- mechanical;
- electrical;
- slipping, tripping, falling;
- ergonomics;
- noise;
- radiation;
- fire and explosion;
- thermal;
- emissions.

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This International Standard applies to new machines manufactured after December 31 of the year following the year of issue of this International Standard.

Equipment covered by this International Standard may be used in a stand-alone configuration, or in combination with other machines affected by an integrated control system. These may include but are not limited to, the combinations of the machines noted in Clause 4.

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 8031, *Rubber and plastic hoses and hose assemblies — Determination of electrical resistance*

ISO 11553, *Safety of machinery — Laser processing machines — Safety requirements*

ISO 12649:2004(E)

ISO/TR 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*

ISO 12100-1, *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 12648:2003, *Graphic technology — Safety requirements for printing press systems*

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

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

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

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

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

ISO 13855, *Safety of machinery — Positioning of protective equipment with respect to the approach speeds of parts of the human body*

ISO 13856-1, *Safety of machinery — Pressure-sensitive protective devices — Part 1: General principles for the design and testing of pressure-sensitive mats and pressure-sensitive floors*

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

ISO 14120, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 14122-1, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of a fixed means of access between two levels*

ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and gangways*

ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

ISO 14123-1, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

ISO 14123-2, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 2: Methodology leading to verification procedures*

ISO 15847:—¹⁾, *Graphic technology — Graphical symbols for printing press systems and finishing systems, including related auxiliary equipment*

1) To be published.

- IEC 60079-1, *Electrical apparatus for explosive gas atmospheres — Part 1: Flameproof enclosures “d”*
- IEC 60079-2, *Electrical apparatus for explosive gas atmospheres — Part 2: Pressurized enclosures “p”*
- IEC 60079-5, *Electrical apparatus for explosive gas atmospheres — Part 5: Powder filling “q”*
- IEC 60079-6, *Electrical apparatus for explosive gas atmospheres — Part 6: Oil-immersion “o”*
- IEC 60079-7, *Electrical apparatus for explosive gas atmospheres — Part 7: Increased safety “e”*
- IEC 60079-11, *Electrical apparatus for explosive gas atmospheres — Part 11: Intrinsic safety “I”*
- IEC 60079-14, *Electrical apparatus for explosive gas atmospheres — Part 14: Electrical installations in hazardous areas (other than mines)*
- IEC 60079-18, *Electrical apparatus for explosive gas atmospheres — Part 18: Encapsulation “m”*
- IEC 60204-1:2000, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*
- IEC 60825-1, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide*
- IEC 60947-5-1, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*
- IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements*
- IEC 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals*
- IEC 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking*
- IEC 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests*
- IEC 61496-2, *Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs)*
- EN 563, *Safety of machinery — Temperatures of touchable surfaces — Ergonomics data to establish temperature limit values for hot surfaces*
- EN 1127-1, *Explosive atmosphere — Explosion prevention and protection — Part 1: Basic concepts and methodology*
- EN 1539, *Dryers and ovens, in which flammable substances are released — Safety requirements*
- 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*
- EN 12198-1:2000, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 1: General principles*
- EN 13023, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy grades 2 and 3*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 13849-1:1999 and the following apply.

- 3.1 actuator**
part of the actuating system to which an external actuating force is applied
[IEV 441-15-22]^[39]
- NOTE 1 The actuator may take the form of a handle, knob, pushbutton, roller, plunger, etc.
- NOTE 2 There are some actuating means that do not require an external actuating force, but only an action.
- NOTE 3 See also **machine actuator (3.48)**
- 3.2 anti-repeat device**
mechanical or electromechanical mechanism to ensure that only one cutting cycle occurs for each manual activation or automatic cut if the primary stopping system or **single-cycle device (3.83)** fails
- 3.3 armed condition**
machine status in which machine motion can be automatically initiated
- NOTE **Zero speed (3.92)** can be considered to be an armed condition.
- 3.4 audible alarm**
horn, bell or other distinctive audible warning device which sounds to indicate impending machine motion
- 3.5 authorized person**
person identified by plant management as having special training or designated to act in specified situations
- NOTE The specified situations can include special tasks to be performed; the function of the adjustments in the work zone; proper operation of adjustments and controls; all types of hazards in the area where the task is to be performed; the application of equivalent, alternative protection to perform the task; improper actions that can cause injury; and the consequences of those improper actions.
- 3.6 automatic cutting sequence**
programmed succession of clamping operations and/or cutting movements that is initiated by the operator and proceeds to a specified point without further intervention by the operator
- 3.7 back rounding and pressing machine**
apparatus for processing book signatures, i.e. for rounding the spine and the trimmed front edge of book signatures and compressing the resulting signatures
- 3.8 backgauge**
movable device (automatic or manual) on a guillotine cutter, positioned square to the cutting table, and which is used to stop the stack of material to be cut when the material is pushed into the opening under the cutting blade by the operator, and to determine the dimensions of the cut
- 3.9 backgauge drive**
mechanism to position the **backgauge (3.8)** prior to the initiation of the cut

3.10**backlining and head banding machines**

equipment for the automatic production of hard cover books where the binding together of the signatures is rounded or flat, with glue, gauze, or paper

3.11**barrier guard****distance guard**

guard (3.35) that reduces or prevents physical access to a hazard zone by closing off access to an area containing one or more hazards

EXAMPLE A perimeter fence or tunnel guard.

3.12**binding and finishing system**

combination of machines functioning in an integrated configuration to turn an incomplete printed product into a finished product by means of one or more processes, such as cutting, folding, binding, stitching, gluing, wrapping, etc.

3.13**book cover crease forming machine**

(hard-cover bookbinding) apparatus for creating, under heat and pressure, a permanent bend in the cover of a hard-cover book, then pressing the entire cover surface

3.14**book press**

press used for flattening books after binding

3.15**book signature press**

power-operated press used for flattening book signatures, which are fed and aligned manually

3.16**casing-in machine**

(hard-cover bookbinding) apparatus for gluing the end papers of the book signatures to the interior surfaces of the book cover

3.17**category 0 stop****uncontrolled stop**

stopping by immediate removal of power to the **machine actuators (3.48)**

[IEC 60204-1:2000]

3.18**category 1 stop**

controlled stop with power available to the **machine actuators (3.48)** to achieve the stop and then removal of power when the stop is achieved

[IEC 60204-1:2000]

3.19**category 2 stop**

controlled stop with power left available to the **machine actuators (3.48)**

[IEC 60204-1:2000]

3.20**clamp**

device using pressure to secure product so that it does not move during an operation

3.21

clamp drive

mechanism by which the **clamp(s) (3.20)** of the paper cutter is/are forced against the material to be cut

3.22

coater

finishing machine that applies a predetermined thickness of a liquid substance (for example glue, varnish, ink) on substrates made of paper or a similar material

3.23

counter-stacker

machine for stacking of piles of leaflets, books, magazines or newspapers such that the successive layers are at 180°

3.24

cutting cycle

⟨for machines with (a) manually driven **clamp(s) (3.20)**⟩ programmed succession of operations that begins when the knife drive is activated and ends when the knife returns to its retracted position

3.25

cutting cycle

⟨for machines with (a) power-driven **clamp(s) (3.20)**⟩ programmed succession of operations that begins when high-pressure clamping is initiated and ends when the knife(s) and clamp(s) return to their retracted positions after a single clamp/knife stroke

3.26

cutting zone

three-dimensional space through which any part of the knife(s) and/or **clamp(s) (3.20)** travel(s) during the entire **cutting cycle (3.24, 3.25)**

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3.27

drive

mechanism, divided into the following two general categories, which causes a machine or any of its elements to move:

- drives with no stored energy, which include, but are not limited to, direct-motor drives;
- drives having stored energy, which include, but are not limited to, motor-flywheel-clutch drives and hydraulic-pneumatic drives

3.28

electrical hazard

source of potential injury or death from electric shock or burn

[adapted from ISO 12100-1:2003]

3.29

electro-sensitive protective device

ESPD

apparatus that detects the presence of a person or part of a person or object in a defined area, using any detection means including, but not limited to, photoelectric, light screen, ultrasonic, etc.

3.30

emergency stop device

manually actuated control used to initiate an **emergency stop function (3.31)**

[adapted from ISO 13850:1996]

3.31**emergency stop function**

mechanism activated by a single human motion and intended to halt machine activity in order to avoid injury to persons, damage to machinery or damage to work in progress

3.32**fixed guard**

guard (3.35) that is securely affixed by fasteners that require a tool(s) to remove in order to gain access to an area with a significant hazard

3.33**gang stitcher**

machine for stitching folded sheets of paper, during the operation of which individual folded sheets are removed by feeding grippers and the open sheets are stacked on top of each other on a transport chain for subsequent back stitching

3.34**gathering machine**

apparatus that assembles sheets or folded sheets in a binding line

3.35**guard**

physical barrier that restricts access to a significant hazard

3.36**guillotine cutter**

power-driven machine having a single knife which is used primarily to cut paper products, stacks of paper, or other substrates as specified by the manufacturer

NOTE This definition includes equipment classified as mill trimmers.

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3.37**hazard zone**

any area within and/or around machinery in which a person is exposed to risk of injury or damage to health

[adapted from ISO 12100-1:2003]

3.38**high-pressure clamping**

operation of **clamps (3.20)** with a dynamic force in excess of 300 N for machines up to and including 1,6 m in width, or 500 N for machines greater than 1,6 m in width, when measured at 75 % of the clamp opening (e.g. with the clamp at 25 % of its maximum travel distance measured from the retracted position)

NOTE The 75 % requirement is to ensure the measurement is made at the position that approximates the size of an operator's hand.

3.39**hold-to-run control**

control that starts and maintains machine motion only as long as the control is activated

3.40**inch****jog**

(operation of machinery) machine motion requiring maintained activation engagement of a hold-to-run control and which will continue until the control is released or until a pre-determined displacement (limited inch) has been reached

3.41**inch speed**

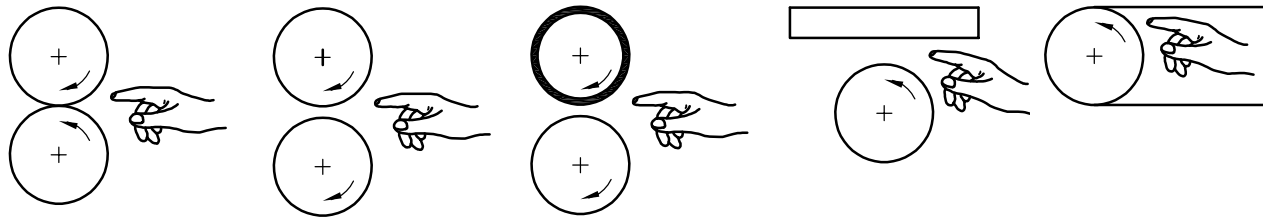
how fast the machine is operating while in **inch (3.40)** mode

3.42
infrequently used workplace

area in which an activity is carried out, such as observation, make-ready, jam clearing, minor servicing, crossing inserting hoppers or conveyer belts, etc., that is routine, repetitive, integral to (but not necessarily during) production, and done only on an occasional basis

3.43
in-running nip

area created either by two rotating components that are rotating inward, or by one component rotating toward an adjacent surface (see Figure 1)



- a) Two counter-rotating rolls
- b) Two rolls rotating in the same direction at different speeds
- c) Two rolls rotating in the same direction, but with different surface properties (friction)
- d) One rotating roll and an adjacent fixed object
- e) Belt, chain or web which is driving, or being driven by, a roll

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Figure 1 — In-running nips
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3.44
inserting machine

apparatus that inserts printed matter such as leaflets and magazines at a predetermined position in other printed products, such as newspapers or magazines

3.45
knife drive

mechanism by which the knife of the guillotine is forced through the material to be cut

3.46
laminator

paper finishing machine that applies a solid material (e.g. foil, paper) on a substrate made of paper or a similar material

3.47
low-pressure clamping

(for machines with a power-driven clamp(s)) operation of **clamps (3.20)** at a dynamic force not exceeding 300 N for machines up to and including 1,6 m in width, or 500 N force dynamic for machines greater than 1,6 m in width, when measured at 75 % of the clamp opening (with the clamp at 25 % of its maximum travel measured from the retracted position)

NOTE The 75 % requirement is to ensure the measurement is made at the position that approximates the size of an operator's hand.

3.48
machine actuator

power mechanism used to effect motion of a machine

[ISO 13850:1996]

3.49**maintained-contact control**

control that remains in an open or closed state after its activation

3.50**maintenance**

operation(s) required to assure that the machine remains in acceptable operating condition and that is/are usually performed when the machine is not available for production

NOTE Maintenance (for example, repairing or replacing broken, worn or damaged parts; performing lubrication; preventive servicing; etc.) is normally performed by qualified maintenance personnel, or operators, who have been trained about the types of hazards in the area in which their tasks are to be performed and about how these hazards can be avoided. Such maintenance is generally performed with energy isolated, when possible.

3.51**manual clamping**

operation of **clamps (3.20)** in which the dynamic and static forces and motion of the clamp are directly supplied by the operator

3.52**manual control device**

mechanism comprising part of the actuating system to which a manual action is applied

[Adapted from IEC 60204-1:2005]^[39]

3.53**mechanical hazard**

source of potential injury to a person created by motion of machinery, components or material (for example, crushing and shearing points; trapping points; in-running nips; cutting, punching and impact points)

EXAMPLES Gear, chain and worm drives; V-belt, flat belt, cord and rope drives; pulling and supporting elements on continuous conveyors; spoke wheels and fly wheels; shafts and shaft ends; rollers, slides; push rods and similar parts, tools and clamping devices.

3.54**mechanical hazard point**

location of a mechanical hazard on a machine where a person can be injured by parts of a machine or by machine movement, such as tools of machines or parts thereof, work pieces or parts thereof, or materials being processed

3.55**momentary contact control**

control that is opened or closed only during its actuation

3.56**motion control**

control that initiates machine movement or movement at **zero speed (3.92)**, or places the machine in the **armed condition (3.3)**

3.57**motion control station**

device station that contains at least an emergency stop control and which may contain a motion-initiation control

3.58**motion zone**

area defined by any machine component, or group of machine components, which is driven directly by the binding and finishing system drive motor(s) or indirectly by other means