
**Graphic technology — Safety
requirements for printing press systems**

*Technologie graphique — Exigences de sécurité pour systèmes de
presses d'impression*

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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 12648 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 has taken into consideration material contained in ANSI B65.1-1995 *Safety standard — Printing press systems*, prEN 1010-1, *Technical safety requirements for the design and construction of printing and paper converting machines — Part 1: Common requirements*, and prEN 1010-2, *Technical safety requirements for the design and construction of printing and paper converting machines — Part 2: Printing and varnishing machines including pre-press machinery*.

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Graphic technology — Safety requirements for printing press systems

1 Scope

This International Standard applies to printing press systems, including auxiliary equipment and finishing machines, in which all the machine actuators (e.g. drives) of the equipment in the system are controlled by the same control system.

It is applicable only to systems in which a printing press is part of the system. In cases where a binding/finishing system is not integrated with a printing press, ISO 12649 will apply.

This International Standard provides safety requirements for the design and construction of the classes of machines listed in Clause 2. It addresses recognized hazards specific to printing press 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 (see Clause 2) manufactured after December 31 of the year following the year of publication of this International Standard.

2 Classifications

2.1 Machines for producing printing by various processes

- relief (letterpress, flexographic);
- offset (lithographic);
- gravure (rotogravure, intaglio);
- screen printing;
- digital presses (electrostatic, ink jet, thermal, airbrush, etc.).

2.2 Auxiliary equipment

- washing equipment for cylinders and rollers;
- powder spraying devices;
- alcohol dosing devices;
- imprinting/addressing/numbering equipment;
- automatic plate clamping devices, automatic pile handling equipment;
- washing equipment;
- inserting machines;
- pile turners, reel turners, elevators;
- dryers/pollution control;
- radiation equipment;
- in-line processing and finishing equipment;
- stackers;
- palletizers;
- bundlers;
- coaters;
- chilling systems;
- electrostatic equipment;
- humidifiers;
- accumulating or piling-off devices;
- conveyors;
- unwinding, rewinding, reel transport devices.

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3 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 plastics hoses and hose assemblies — Determination of electrical resistance*

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

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, *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 13850:1996, *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 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 fixed means of access between two levels*
- ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*
- ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*
- ISO 14122-4, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*
- 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)*

ANSI/NFPA 86, *Standard for Ovens and Furnaces*

EN 378-1, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Basic requirements, definitions, classification and selection criteria*

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

EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — 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*

prEN 13023, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy grades 2 and 3*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1

actuator

part of the actuating system to which an external actuating force is applied

[IEV 441-15-22]

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** (4.32).

4.2

alcohol dosing equipment

equipment for dosing the amount of alcohol in the dampening water of offset printing presses

4.3**armed condition**

machine condition in which machine motion can be automatically initiated

NOTE **Zero speed** (4.88) may be considered to be an armed condition.

4.4**audible alarm**

horn, bell or other distinctive audible warning device which, when sounded, indicates impending machine motion

4.5**authorized person**

person designated as such by plant management as having been trained in the following:

- a) the task to be performed;
- b) the function of the adjustments in the work zone;
- c) proper operation of adjustments and controls;
- d) all types of hazards in the area where the task is to be performed;
- e) the application of equivalent, alternative protection to perform the task;
- f) improper actions that can cause injury; and
- g) the consequences of those improper actions

4.6**automatic plate clamping device**

device for automatic or semi-automatic changing of printing plates

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4.7**auxiliary devices for printing presses**

devices used for the production process which are either built in or attached to the printing press

4.8**barrier guard**

guard closing off access to an area containing one or more hazards

4.9**category 0 stop**

stopping by immediate removal of power to the machine actuators (i.e. an uncontrolled stop)

[IEC 60204-1]

4.10**category 1 stop**

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

[IEC 60204-1]

4.11**category 2 stop**

controlled stop with power to the drive elements of the machines being maintained

[IEC 60204-1]

4.12
coating unit
coater

type of finishing machine for applying liquid substances (for example glue, varnish, ink) on substances made of paper or similar material in a predetermined thickness; the thickness of the layer is determined by a doctor blade (scraper) or by the gap between two rollers (metering gap)

4.13
continuous flow drying and curing device

device built into printing presses for drying and curing substrates after the printing process (for example by hot air, IR or UV radiation)

4.14
crawl speed

continuous motion at a steady slow speed, and initiated by a momentary contact control

4.15
cylinder screen printing press

sheet-fed printing press where the substrate (sheet) is guided along the screen by a printing cylinder

4.16
digital printing press

printing press where the printing image is produced from data stored in digital form

EXAMPLE Exposing a photo-sensitive drum or film in the machine.

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4.17
electrical hazard

source of potential injury or death from electric shock or burn

4.18
emergency stop device

manually actuated control device used to initiate an emergency stop function

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[ISO 13850:1996]

4.19
emergency stop function

function initiated by a single human action that is intended to avoid injury to persons, damage to machinery or damage to work in progress

4.20
enabling device

actuating device that needs to be operated in addition to at least one more actuator or device in order to start a machine under hold-to-run control; machine movement is stopped as soon as one of the hold-to-run controls or enabling devices is released

4.21
exposing equipment

machinery used for taking images by exposing photo-sensitive material such as printing plates or printing forms

4.22
fixed guard

guard that is securely affixed by fasteners that require a tool(s) to gain access to a significant hazard

4.23

**forms printing press
leporello printing press**

machine for the production of continuous forms where paper webs printed with one or multiple colours are leporello folded or wound onto a reel

NOTE In addition to the printing section, the machine consists of devices for punching, rema liners, cross perforation, longitudinal perforation and leporello folding.

4.24

gravure press

machine consisting of a printing cylinder, an impression cylinder and an inking system, in which ink is applied to the printing cylinder by an ink roll or spray, and the excess is removed by a doctor blade; the impression cylinder, covered with a rubber composition, presses the substrate into contact with the ink in the cells of the printing surface

4.25

guard

physical barrier that restricts access to a significant hazard

4.26

hazard zone

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

NOTE Adapted from ISO 12100-1.

4.27

hold-to-run control

control that starts and maintains machine motion only as long as the control is activated (see 5.5)

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4.28

**in-running nip
in-going nip**

area created by either two rotating components that are rotating inward, or one rotating component rotating toward an adjacent surface

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See Figure 1.

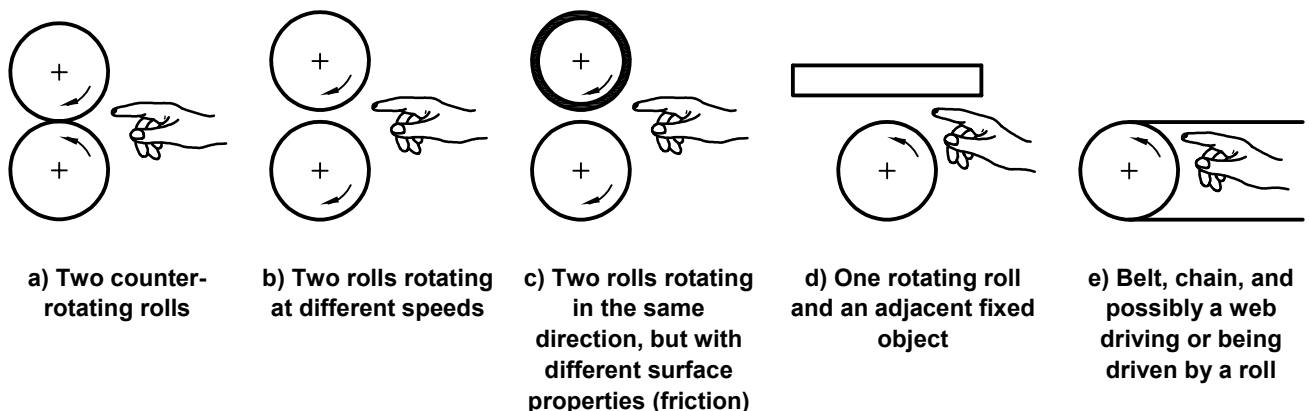


Figure 1 — In-running nips

4.29
inch
jog

motion condition requiring maintained activation of a hold-to-run control; motion will continue until the control is released or until a pre-determined displacement has been reached (limited inch)

4.30
inch speed

speed at which the press is operating while in inch mode

4.31
infrequently used workplace

area where a function that is routine, repetitive, and integral to (but not necessarily during) production, but done on an infrequent basis, is conducted

NOTE Examples of such activities include observation, refill of the ink pan, blanket change and plate change, access to elevated sheet-fed presses, make-ready, minor servicing, jam clearing, etc.

4.32
machine actuator

power mechanism used to effect motion of a machine

[ISO 13850:1996]

4.33
maintained contact control

control that remains opened/closed after activation of the control

4.34
maintenance

operation that is usually performed when the machine is not available for production

EXAMPLE Examples of maintenance operations are repairing or replacing broken, worn or damaged parts; performing lubrication; preventive servicing, etc. Maintenance 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. When possible, this should be performed with energy isolated.

4.35
make-ready

tasks preceding a production run, such as adjusting ink controls for proper colour, plate alignment for proper registration, adjusting pressures, measurement with quality control devices, etc.

4.36
manual control device

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

NOTE Adapted from IEV 441-15-22.

4.37
mechanical hazard

source of potential injury to a person that is created by motion of machinery, components or material

4.38
mechanical hazard points

locations in the machines where persons can be injured by parts of machines or machine movement, such as

- tools of machines, or parts thereof;
- work pieces, or parts thereof; or
- materials being processed

4.39**momentary contact control**

control that is opened/closed only during actuation of the control

4.40**motion control**

control that initiates machine motion

4.41**motion control station**

operator control station containing both an emergency stop and a motion initiation control

4.42**motion zone**

area defined by any press component, or group of press components, that is driven directly by the press system drive motor(s) or indirectly by the web

4.43**movable control station**

control station that is permanently wired to the equipment, but can be moved within the confines of the attached cable

4.44**movable guard**

guard that does not require a tool to gain access to a significant hazard

4.45**newspaper printing presses**

presses that are designed and built mainly for printing newspapers

4.46**nip guard**

guard (nip bar, finger bar, finger guard) located at an in-going nip

4.47**non-motion zone**

area defined by any press component, or group of press components that, due to press configuration, is not driven by the press system drive motor(s) or the web

NOTE

When the console is freestanding (not press-mounted), it is a non-motion zone.

4.48**non-operational press**

press configured for functions other than delivering products, such as make-ready or wash-up

4.49**normal operation**

condition that exists during set-up, make-ready, production and minor servicing/adjusting and cleaning performed by operators; this does not include maintenance operations (see 4.34)

4.50**operating position**

the location where normal operations (make-ready and other routine, repetitive tasks) requiring control of main drive motor(s) are performed

4.51**operational press**

press that is configured to deliver product, is composed of at least one motion zone, and may include non-motion zones