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

*Technologie graphique — Exigences de sécurité pour systèmes de  
presses à imprimer*

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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*.

This second edition cancels and replaces the first edition (ISO 12648:2003), the following subclauses of which have been technically revised.

- 5.1: A requirement has been added to enable needed observation and adjustment with guards closed.
- 5.2.2.1: The use of risk assessment has been added to requirements, as appropriate.
- 5.5.6.3: A requirement to protect against malfunction of the interlock circuit as a result of short circuits has been added.
- 5.9.2.11: The exception to the requirements for protection of hazard zones on the unwinding unit of automatic reel-loading systems has been removed.
- 5.9.7 – 5.9.9: Requirements relating to guarding of the gripper area have been added.
- 6.5.2.4: For access platforms, a maximum handle diameter has been added.
- 9.2: A requirement for the use of symbology defined in ISO 15847 has been added.
- 9.2.3: A requirement for the colour of manual control devices in accordance with IEC 60204-1 has been added.
- 9.2.4.1.2: The location of emergency control devices has been clarified.
- 13.2.2: The timing of the audible alarm during the warning period has been changed.
- 13.2.6: Requirements for optional personnel warning lights for auxiliary equipment having armed status have been added.
- 15.2: Additional requirements for the contents of the instruction handbook have been defined.

## 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 [55] , EN 1010-1 [11] and EN 1010-2 [12].

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of one or more patents concerning the use of ESPDs in the delivery area. The patents identified are:

- German Patent DE 103 10 236 B3
- PCT patent application WO 2004/078626 A1

ISO takes no position concerning the evidence, validity and scope of this patent right.

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# Graphic technology — Safety requirements for printing press systems

## 1 Scope

This International Standard provides safety requirements for the design and construction of machines used in 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<sup>[32]</sup> will apply.

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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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.

This International Standard applies to machines manufactured one year or more after the date of publication of this International Standard.

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

ISO 11553:1996, *Safety of machinery — Laser processing machines — Safety requirements*

## ISO 12648:2006(E)

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

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

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

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

ISO 13851:2002, *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 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 walkways*

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

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

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”*

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1) To be published.



- 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: Construction, test and marking of type of protection encapsulation ‘m’ electrical apparatus*
- 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 61496-1:2004, *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 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 — 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*
- NFPA 86, *Ovens and furnaces*. Available from Internet <<http://www.nfpa.org/>>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13849-1 and the following apply.

**3.1 access height in the sheet-fed press delivery zone**  
dimension of the maximum opening into the area below the sheet gripper, measured between the access level (floor, fixed platform or footboard) and the lower edge of fixed machine parts (e.g. fixed guard, fixed cover, fixed parts such as a sheet stop) (see Figure 18)

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

[IEV 441-15-22]<sup>[54]</sup>

NOTE 1 The actuator can 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** (3.39).

**3.3 alcohol dosing equipment**  
device(s) used to regulate the amount of alcohol in the dampening water of offset printing presses

**3.4 armed condition**  
machine status in which machine motion can be automatically initiated

NOTE **Zero speed** (3.92) can be considered an armed condition.  
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**3.5 audible alarm**  
horn, bell or other distinctive audible warning device that sounds to indicate impending machine motion

**3.6 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; the consequences of those improper actions.

**3.7 automatic plate clamping device**  
mechanism used to secure a printing plate during the automatic or semi-automatic changing of the plates

**3.8 auxiliary devices for printing presses**  
mechanisms or machines, either built-in or attached, used for the production process

**3.9 barrier guard**  
**guard** (3.32) that reduces or prevents access to a hazard zone by closing off access to an area containing one or more hazards

**3.10****bypass function  
bypass sequence**

temporary, time-limited suppression of one or more safety functions through the use of safety-relevant parts of a control system

**3.11****category 0 stop  
uncontrolled stop**

stopping by immediate removal of power to the **machine actuators** (3.39)

[IEC 60204-1:2000]

**3.12****category 1 stop**

controlled stop with power available to the **machine actuators** (3.39) to achieve the stop and then removal of power when the stop is achieved

[IEC 60204-1:2000]

**3.13****category 2 stop**

controlled stop with power to the **machine actuators** (3.39) being maintained

[IEC 60204-1:2000]

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**3.14****coating unit  
coater**

machine that applies a predetermined thickness of a liquid substance (e.g. glue, varnish, ink, etc.) on substrates made of paper or a similar material

NOTE The thickness of the layer is determined by a doctor blade (scraper) or by the gap between two rollers (metering gap).

**3.15****continuous-flow drying and curing device**

mechanism built into printing presses to dry and cure inks and coatings that have been applied to substrates after the printing process (e.g. by hot air, IR or UV radiation)

**3.16****continuous run**

machine motion at a steady speed initiated by a momentary contact control

**3.17****control station**

defined location containing one or more controls

**3.18****control zone**

control configuration of single or multiple machine motions using the same control devices (see Clause 8)

**3.19****crawl speed**

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

**3.20  
cylinder  
smooth roller**

elongated solid body with a circular cross-section having a smooth surface; i.e. with grooves or elevations no more than 4 mm deep and with circumferential slots no more than 8 mm wide with no sharp or cutting edges (see Figure 1)

Dimensions in millimetres

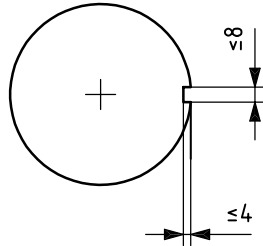


Figure 1 — Smooth roller/cylinder

**3.21  
cylinder screen printing press**

sheet-fed machine in which the substrate (sheet) to be printed is guided along the screen by a printing cylinder (3.20)

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**3.22  
digital printing press**

machine in which the printed image is produced from data stored in digital form (e.g. exposing a photo-sensitive drum or film in the machine)

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**3.23  
electrical hazard**

source of potential injury or death from electric shock or burn

**3.24  
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.

**3.25  
emergency stop device**

manually actuated control used to initiate an **emergency stop function** (3.26)

[ISO 13850:1996]

**3.26  
emergency stop function**

mechanism initiated 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

**3.27  
enabling device**

mechanism that must be in a specified state or condition in order for a second actuator or device to start a machine under **hold-to-run control** (3.34), and which will stop machine movement as soon as one of the hold-to-run controls is released or the status of the mechanism changes

**3.28****exposing devices**

machinery used for creating images by exposing photo-sensitive material such as printing plates or printing formes

**3.29****fixed guard**

**guard** (3.32) that is securely affixed by fasteners that require a tool(s) to gain access to an area with a significant hazard

**3.30****forms printing press****leporello printing press**

machine for the production of continuous forms where paper webs printed with one or more colours are accordian-folded or wound on to a reel

NOTE In addition to the printing section, the machine consists of devices for punching, remaliners (sprocket punching), cross perforation, longitudinal perforation and leporello (zig-zag) folding.

**3.31****gravure press**

machine consisting of a printing cylinder, 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 and an impression cylinder covered with a rubber composition, which presses the substrate into contact with the ink in the cells of the printing cylinder

**3.32****guard**

physical barrier that restricts access to a **significant hazard** (3.80)

**3.33****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]

**3.34****hold-to-run control**

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

**3.35****inch****jog**

(operation of machinery) machine motion requiring maintained activation engagement of a **hold-to-run control** (3.34) and which will continue until the control is released or until a pre-determined displacement (limited inch) has been reached

**3.36****inch speed**

how fast the press is operating while in **inch** (3.35) mode

**3.37****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

**3.38**  
**in-running nip**

area created either by two rotating components that are rotating inward, or by one rotating component rotating toward an adjacent surface (see Figure 2)

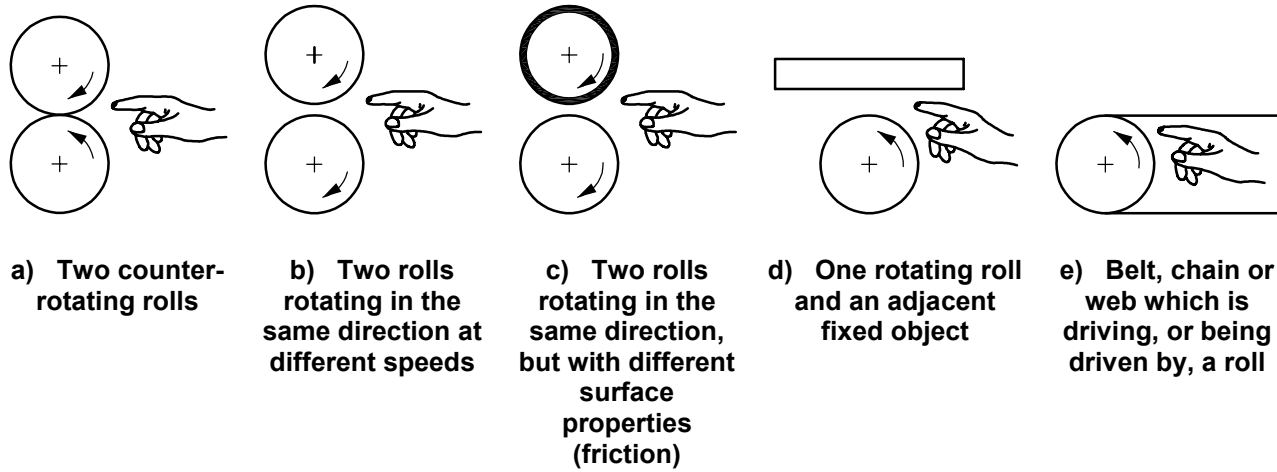


Figure 2 — In-running nips

**3.39**  
**machine actuator**

power mechanism used to effect motion of a machine

[ISO 13850:1996]

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**3.40**  
**maintained-contact control**

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

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**3.41**  
**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 (e.g., 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.

**3.42**  
**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.

**3.43**  
**manual control device**

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

[Adapted from IEV 441-15-22]<sup>[54]</sup>

**3.44**  
**mechanical hazard**

source of potential injury to a person, created by motion of machinery, components or material (e.g. 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.

### 3.45

#### **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 (knife blades, etc.) of machines, or parts thereof; work pieces or parts thereof, or materials being processed.

### 3.46

#### **momentary contact control**

control that is opened or closed only during its actuation

### 3.47

#### **motion control**

control that initiates machine movement or movement at **zero speed** (3.92), or places the machine in the **armed condition** (3.4)

### 3.48

#### **motion control station**

station that contains a **motion control** (3.47)

### 3.49

#### **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 **machine actuator**(s) (3.39), or indirectly by the web

### 3.50

#### **movable control station**

control station that is permanently wired to the equipment, but which can be moved within a range limited by the length of the attached cable

### 3.51

#### **movable guard**

**guard** (3.32) that does not require a tool to move or remove it to gain access to a significant hazard

### 3.52

#### **newspaper printing presses**

machines that are designed and built mainly for printing newspapers

### 3.53

#### **nip guard**

**guard** (3.32) located at an in-going nip

**EXAMPLES** Nip bar, finger bar, finger guard.

### 3.54

#### **non-motion zone**

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

**NOTE** A freestanding (not press mounted) console is considered to be a non-motion zone.

### 3.55

#### **normal operation**

usual functioning and conditions that exist during set-up, make-ready, production and minor servicing, adjusting and cleaning performed by operators, but not including **maintenance** (3.41) operations