
**Graphic technology — Safety
requirements for graphic technology
equipment and systems —**

**Part 2:
Press equipment and systems**

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*Technologie graphique — Exigences de sécurité pour les systèmes et
l'équipement de technologie graphique —
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Partie 2: Systèmes et équipement pour la presse

ISO 12643-2:2007

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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.

ISO 12643-2 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This first edition, together with ISO 12643-1, cancels and replaces ISO 12648:2006, which has been technically revised.

ISO 12643 consists of the following parts, under the general title *Graphic technology — Safety requirements for graphic technology equipment and systems*:

— *Part 1: General requirements*

— *Part 2: Press equipment and systems*

— *Part 3: Binding and finishing equipment and systems*

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Introduction

During the development of this part of ISO 12643, existing relevant standards of other countries were taken into consideration. An effort has been made to take into consideration the requirements of many 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 part of ISO 12643, that has been noted.

This part of ISO 12643 was developed to harmonize the following U.S. and European safety standards:

- ANSI B65.1, *Graphic technology — Safety standard — Printing press systems*
- EN 1010-1, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 1: Common requirements*
- EN 1010-2, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 2: Printing and varnishing machines including pre-press machinery*

The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with 5.7.2 of this part of ISO 12643 may involve the use of one or more patents concerning the use of electro-sensitive protective devices (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.

The holders of this patent right have assured ISO that they declare not to enforce any rights resulting from the patents identified above against any third parties in any countries that intend to comply with the ISO/TC 130, CEN/TC 198, ANSI B65 standards, or any other local or regional standards that use the ISO/TC 130 standards or the relevant parts thereof or any derivative standards thereof. In this respect, the statement of the holders of this patent right is registered with ISO. Information may be obtained from:

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO shall not be held responsible for identifying any or all such patent rights.

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Graphic technology — Safety requirements for graphic technology equipment and systems —

Part 2: Press equipment and systems

1 Scope

This part of ISO 12643 provides requirements specific to press equipment and systems. It is used in conjunction with the general requirements given in ISO 12643-1.

This part of ISO 12643 provides additional safety requirements for the design and construction of new press equipment and the auxiliary equipment integrated into the press control system.

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 12643-1:2007, *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 1: General requirements*

ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 13849-1:1999¹⁾, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

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

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

EN 1539, *Dryers and ovens, in which flammable substances are released — Safety requirements*

1) ISO 13849-1:1999, has been cancelled and replaced by ISO 13849-1:2006.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12643-1, ISO 13849-1:1999 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 1.

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

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

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

**3.5 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

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3.6 continuous flow drying and curing device
mechanism built into printing presses to dry and cure inks and coatings that have been applied to substrates (e.g. by hot air, IR or UV radiation)

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

3.8 cylinder screen printing press
sheet-fed machine in which the substrate (sheet) to be printed is pressed against the screen by an impression cylinder

3.9 digital printing press
machine in which the image is printed directly from data stored in digital form without using an intermediate material

3.10 enabling device
mechanism that needs to be in a specified state or condition in order for a second actuator or device to start a machine under hold-to-run control, 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

3.11**forms printing press
leporello printing press**

machine for the production of continuous forms where paper webs printed with one or more colours are accordion-folded or wound onto 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.

3.12**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 (device for scraping excess ink off a gravure cylinder); 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

3.13**pile turner**

device attached to sheet-fed printing presses and used to turn piles of printed paper for further processing, such as back-printing on a second run

3.14**powder spraying device**

equipment used to spray powder onto the printed material on the delivery side of sheet-fed printing presses

3.15**press system**

printing press and a series of machines that supply substrate into and through the printing press and guide or direct the substrate to a cutting, folding or delivery device that delivers the product to the last working station integrated with the printing press control system

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3.16**printing forme
printing plate**

base material that stores the image to be printed (pictures and/or text) and transfers ink onto a substrate, thus printing the image

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3.17**printing table**

supportive surface to hold the substrate to be printed during the printing process (as on certain types of screen printing presses)

3.18**proofing press**

machine with manual feeding and delivery used for printing a small number of copies, and generally used for assessing print quality before the printing forme is mounted in the production machine

3.19**reel rewinding device**

part of a machine used for rewinding the processed web-type material

3.20**reel turner**

device used to turn reels (webs) of substrate for easier handling; e.g. for correct positioning of the reel when feeding webs to printing presses

3.21**reel unwinding device**

part of a machine used for unrolling web-type material for processing

3.22

screen frame

device for taking up the printing screen

3.23

screen printing press

machine using printing formes with woven material (sieve-like screens) that partially allow ink to penetrate through the material

3.24

sheet-fed press

machine for printing sheet-size substrates, including proofing presses, in which sheets may be fed by feeders (automatic or manual), or from sheeters attached to unwinding units

3.25

speed limit

control that when activated, prevents acceleration of machine motion

3.26

washing device for roller/cylinder

equipment integrated into the printing press for washing cylinders and rollers such as ink rollers, blanket cylinders, printing cylinders, plate cylinders

3.27

washing equipment for printing formes

machines for washing printing formes outside the printing press

EXAMPLE

Screen washing equipment.

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3.28

web-fed press

press in which a substrate passes through the printing couple, or couples, in a continuous form, as fed from a roll

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3.29

web-type material

web of paper, board, foil or similar material that is to be handled or processed

4 Effective date

This part of ISO 12643 is applicable to new machines manufactured after December 31 of the year following the year of issue of this part of ISO 12643.

5 Guarding of significant hazards

5.1 General

Guarding, consistent with operation of the machine, shall be provided in those areas where it is recognized that operators are exposed to significant hazards. The guarding requirements of ISO 12643-1 apply.

5.2 Guard openings

Guard openings shall comply with ISO 12643-1.

In addition, on sheet-fed flexographic printing presses, the feed opening between the side lays and the sides of the machine shall be guarded by means of adjustable or self-adjustable guards.

EXCEPTION — On sheet-fed printing presses that are also used for printing on board, sheet metal or other inflexible materials, it is possible that for production reasons ISO 13852 (as required by ISO 12643-1) cannot be applied in the feeding area. In this case, the height of the material-feeding aperture shall be as small as possible, but shall not exceed 20 mm. The existence of residual risk shall be identified in the instruction handbook.

5.3 Guarding in-running nips

5.3.1 Guarding in-running nips on sheet-fed presses

If technically feasible, trip nip bars in accordance with ISO 12643-1, shall be used where frequent access is required to the area during machine motion, and cylinders are directly accessible after the interlocking guard has been opened.

If it is not possible to use trip nip bars as described above, hold-to-run control speed limitations defined in ISO 12643-1 apply.

NOTE Use of trip nip bars is not possible, for example, on small-size offset presses where trip nip bars would impede access to the cylinder for activities such as plate changing.

Where cylinders have gaps that exceed those defined for smooth cylinders (see ISO 12643-1), trip nip bars, in accordance with ISO 12643-1, should be used. Nip guards shall not be used with these cylinders. For such trip guards, the requirements of Category 3 of ISO 13849-1:1999 shall be satisfied and the interlocking system shall be designed such that the requirements for stopping paths defined in ISO 12643-1, 9.7 are satisfied. Trip nip bars and cylinder gaps shall be designed such that cylinder nips cannot be accessed behind trip nip bars, thus causing a hazard.

To comply with the requirements of ISO 12643-1, the interlocking systems normally will have to be designed such that, after opening the interlocking guard, a predetermined number of revolutions, depending on the functional characteristics of the trip guard, is not exceeded.

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5.3.2 Guarding in-running nips on web-fed presses

In-running nips that are not in the operator's view from the position where the hold-to-run control or enabling device is operated shall be safeguarded by additional measures.

NOTE For example, such measures include:

- guarding;
- an electrically interlocked, movable nip bar on the outgoing side between the two blanket cylinders of a web offset printing press, that ensures that the bar is in position prior to reverse movement.

On machines with varying web paths where such measures for safeguarding the in-running nip existing between blanket cylinders during the reverse movement are not feasible, the following procedure using a hold-to-run with limited inch control is permitted, providing all of the following conditions are met:

- speed shall not exceed 3 m/min;
- movement shall not exceed 1,2 cylinder revolutions;
- a stop control element with mechanical latch (such as a stop/safe pushbutton) or an emergency stopping device shall be in the immediate vicinity of the in-running nip;
- a distinctive audible warning signal, different from the audible warning signal used for forward inch, shall be used;
- a red flashing light shall be provided that can be seen during the warning and permissive periods, and a red warning light (steady burn, not flashing) shall be provided during operating time of the hold-to-run control in the immediate vicinity of any unguarded in-running nip that cannot be observed.

5.3.3 Guarding in-running cylinder nips on newspaper presses

In deviation from ISO 12643-1, nip guards may be used for web-fed newspaper printing presses on cylinder gaps of up to 19 mm circumferential slots (see ISO 12643-1). For new machines, however, efforts should be made to limit cylinder gaps to 12 mm circumferential.

NOTE Some press cylinder lock-up devices, such as on newspaper presses, require gaps up to 19 mm, measured without the blanket. With the blanket in place, the gap is reduced significantly.

5.3.4 Guarding in-running nips on cylinder screen printing presses

On cylinder screen printing presses, the in-running nip on the printing cylinder shall be safeguarded.

NOTE This can be achieved, for example, by interlocking guards, or guarding by the screen printing forme.

Where the printing forme is used as a means of guarding, additional protective measures are required for lifting and removal of the printing forme.

Such additional measures can include electrical interlocking, which allows cylinder rotations only under hold-to-run control according to ISO 12643-1 as long as the printing forme is lifted.

5.4 Interlocks

5.4.1 General

Interlocks shall function in accordance with ISO 12643-1.

5.4.2 Continuous motion at crawl speed with an interlocking guard open

As an exception to ISO 12643-1, if the only hazard being protected by the interlocking guard is an in-running nip, continuous machine motion at crawl speed with a guard open shall be permitted only if all in-running nips remain guarded by either a nip guard or a trip nip guard conforming to the requirements of ISO 12643-1. Maximum crawl speed is determined by the ability of the slowest acting trip nip guard to safeguard the hazard.

5.4.3 Closing an interlocking guard

As an exception to ISO 12643-1, closing the interlocking guard on dampening, coating or inking devices may initiate the rotation of dampening or coating ductor rollers or metering rollers if it is ensured that at this time no hazard points can be accessed.

NOTE Restarting any independently driven dampening, coating, metering, or ink fountain rollers can be required in order to prevent malfunctions due to dried up coating or dampening agents.

5.5 Hold-to-run controls

5.5.1 General

In addition to the requirements of ISO 12643-1, the specific requirements set forth in 5.5.2 and 5.5.3 apply.

5.5.2 Specific requirements for sheet-fed presses

When interlocking guards are opened and any exposed hazard point is not safeguarded, sheet-fed printing press systems shall only be allowed to be started under hold-to-run according to ISO 12643-1.

When interlocking guards are opened and all hazards are protected, crawl speed is permitted under the provisions of 5.4.2.

When interlocking guards are opened and direct access to unprotected in-running nips on plate cylinders, blanket cylinders, and impression cylinders, or unprotected hazard points on the sheet transport system is not possible, the machine may be started under hold-to-run control according to ISO 12643-1. In this case, continuous run while an interlocking guard is open shall not be possible.

NOTE 1 "Sheet transport systems" are, for example, gripping systems, transport drums.

NOTE 2 "Direct access" is, for example, possible where in-running nips can be reached after falling in or where nips are located in the immediate vicinity of places where setting-up or cleaning operations need to be carried out.

5.5.3 Specific requirements for forms presses

In deviation from the requirements of ISO 12643-1, on forms printing presses, starting the machine by two-hand control with guards open shall be possible with a speed higher than 10 m/min where this is required for production reasons and all of the following requirements are met.

- other interlocking guards outside the area that can be observed shall be closed;
- a selector switch shall be used for this kind of operation;
- hold-to-run speed shall be as low as possible under production conditions;
- a warning shall be provided in the instruction handbook (including, a statement of the operator's responsibility and a description of safe working practices).

5.6 Automatic format setting operations

Where a hazard exists, automatic format setting operations may be performed at speeds up to, and including, 0,5 m/min without additional safety measures. However, if there is a crushing hazard for the head or trunk of the body, format setting shall be permitted only with a hold-to-run control. The location of the hold-to-run control shall allow the operator to clearly see the hazard points.

EXAMPLES Automatic format setting devices include sheet side lays, suction heads, turner bars, compensators, slitters, etc.

If additional safety measures are needed in the area of the format setting device, personnel shall be protected from motion of the device(s) by one or more of the following methods:

- a) provision of trip devices;
- b) a separate stop device that is not included in the emergency stop circuit of the printing press;
- c) zone control using the emergency stop circuit.

5.7 Additional safeguarding methods for machine devices and components

5.7.1 General

General requirements for guarding are defined in ISO 12643-1.

5.7.2 Feeding units, delivery units (pile lifting and lowering devices)

5.7.2.1 Guarding sheet gripper from unintentional hand access

In the area of the sheet delivery any unintentional access to movable parts of the sheet gripper system from above and from the side shall be prevented by fixed or interlocked protective devices. At the sides and in the area of the sample sheet removal, these protective devices shall reach down at least to the bottom edge of the sheet gripper system.

Any residual risk caused by reaching underneath protective devices (e.g. in order to remove sample sheets or to place wedges in the pile) shall be indicated in the instruction handbook (see ISO 12643-1).

5.7.2.2 Guarding rotating sheet gripper systems from full body access

In the area of rotating sheet gripper systems on sheet deliveries, measures for safeguarding the full body access of persons shall be in place on all access sides if either

- the access height, *h*, is 800 mm or more (see Figure 1); or
- full body access is necessary more than once a week.

NOTE Full body access more than once a week is generally only necessary when make-ready and cleaning work can be carried out only by accessing the area with the whole body.

5.7.2.3 Safeguarding full body access by electro-sensitive protective devices (ESPDs)

5.7.2.3.1 Arrangement of light beams of ESPDs for machines having a single access level

The light beams of the ESPD on machines having a single access level shall be arranged as specified in Table 1 and shown in Figure 1. For the arrangement of light beams of the ESPD on multi-level machines, see 5.7.2.3.3. The requirements of ISO 13855 relating to the horizontal distance between the light beams and the rotating gripper systems need not be met.

NOTE The primary protective action lies in the prevention of unexpected start-up of the press. In addition, the basic shape of the printing press, the delivery pile carrier and the pile itself prevent or impede unhindered access to the hazard zone, making consideration of access time to the hazard unnecessary.

For information in instruction handbooks on the residual hazards of ESPDs, see 5.7.2.3.4 and ISO 12643-1:2007, 15.6.

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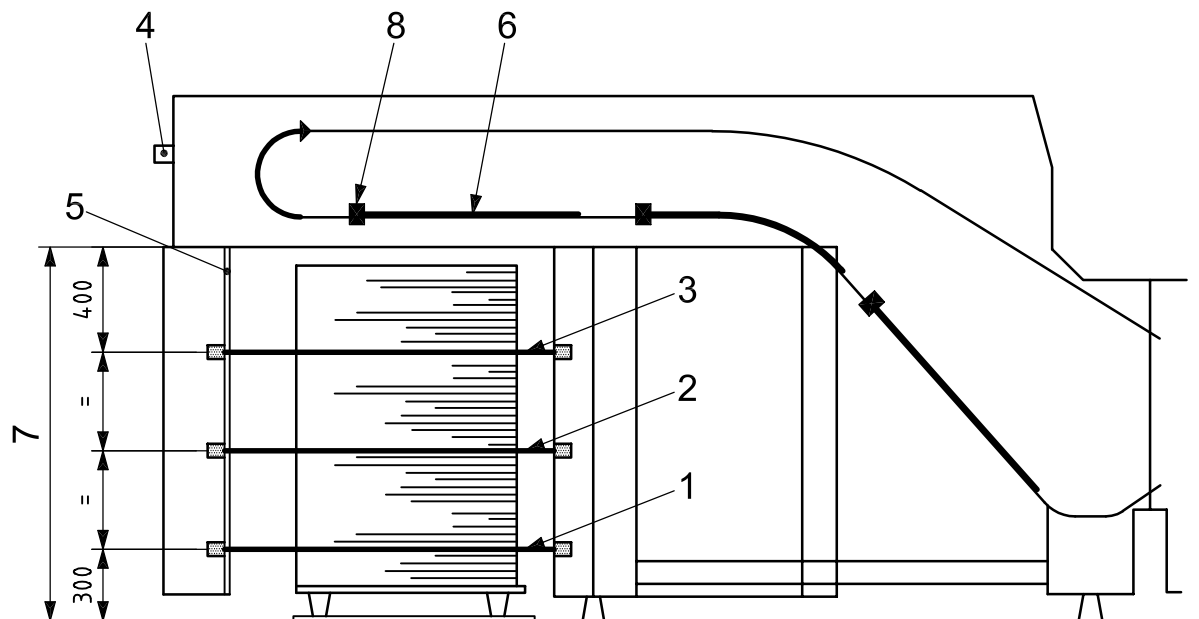
Table 1 — Arrangement of the ESPD in relation to the access height

Dimensions in millimetres

Access height <i>h</i>	Arrangement of the ESPD in relation to the access level(s)		
	Light beam 1 ^a	Light beam 2 ^b	Light beam 3 ^c
$h \leq 1\ 200$	300	not required	400 below <i>h</i> (<i>h</i> – 400) ^d
$1\ 200 < h \leq 1\ 500$	300	in the centre between light beam 1 and 3	400 below <i>h</i> (<i>h</i> – 400) ^d
$h > 1\ 500$	300	700	1 100

^a Arrangement measured from the access level or from a fixed or swinging platform; due to the structural tolerances at the location of installation, the permissible tolerance for the arrangement is ± 35 mm.
^b Light beam between light beam 1 and 3, if the distance between light beam 1 and light beam 3 is greater than 500 mm.
^c A maximum of 1 100 mm in height.
^d See Figure 1.

Dimensions in millimetres

**Key**

- | | | | |
|---|--------------|---|----------------------|
| 1 | light beam 1 | 5 | sample sheet removal |
| 2 | light beam 2 | 6 | sheet |
| 3 | light beam 3 | 7 | access height, h |
| 4 | reset button | 8 | sheet gripper system |

Figure 1 — Access height in the delivery zone
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5.7.2.3.2 Bypassing light beams

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5.7.2.3.2.1 General

For the functions of sample sheet removal, insertion of wedges into the pile, correction of pile formation, exit of the pile, complete pile removal (including insertion of empty pallets and moving in equipment, such as a hand forklift truck), a time-limited bypass of individual or several light beams is permissible only if the respective requirements for the individual functions are met under the conditions defined in 5.7.2.3.2.2 to 5.7.2.3.2.6.

The duration of the individual bypass sequences shall not exceed 20 s. After that time, the bypassed light beams shall be reactivated automatically.

The bypass function may be activated by either a manual control or an automated sequence.

5.7.2.3.2.2 Bypass function for removing sample sheets

Bypassing only the top light beam (see Figure 1) in the area where sample sheets are removed by the sample sheet removal equipment shall be permitted only if

- the machine is in paper run mode (sheets are being delivered), and
- the light beams are active on all other access sides of the delivery.

As an exception to the requirements of ISO 12643-1, the detection of the paper run mode, the sample sheet removal equipment and its individual signal processing shall meet the requirements of at least Category B of ISO 13849-1:1999.