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

**Part 2:
Press equipment and systems**

*Technologie graphique — Exigences de sécurité pour les systèmes et
l'équipement de technologie graphique —*

Partie 2: Systèmes et équipement pour la presse



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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*

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

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

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

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.

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

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.

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.

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

Dimensions in millimetres

Access height h	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 h ($h - 400$) ^d
$1\,200 < h \leq 1\,500$	300	in the centre between light beam 1 and 3	400 below h ($h - 400$) ^d
$h > 1\,500$	300	700	1 100

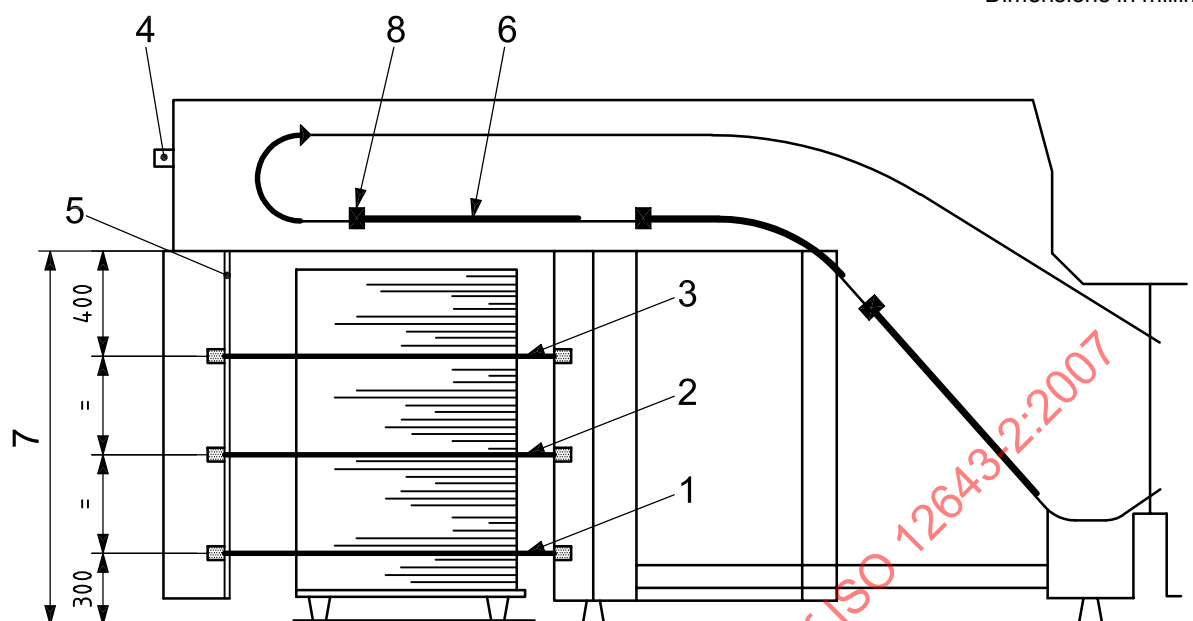
^a Arrangement measured from the access level or from a fixed or swinging platform; due to the structural tolerances at the location of installation, the permissible tolerance for the arrangement is ± 35 mm.

^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**5.7.2.3.2 Bypassing light beams****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.

5.7.2.3.2.3 Bypass function for inserting wedges and correcting the pile formation

Bypassing the top light beam on any single side (see Figure 1) shall be possible only if all the following conditions are met:

- the bypass control is a pushbutton positioned on the side being accessed;
- three light beams are installed for safeguarding the access side;
- all light beams are active on all other access sides.

Bypassing the top beam on more than one side at the same time shall not be permitted.

When a bypass function is active and the main drive is at standstill, start-up shall be prevented.

5.7.2.3.2.4 Bypass function for inserting empty pallets and moving in equipment

Bypassing the bottom light beam (see Figure 1) on the side being accessed shall be possible only if all the following conditions are met:

- the bypass control is a pushbutton positioned on the side being accessed;
- three light beams are installed to safeguard the access side;
- the auxiliary pile support (e.g. rake, wooden pile board, roller blind) or an equivalent device prevents access to the hazard zone;
- all top and middle light beams on all access sides and all bottom light beams on all other access sides are active;
- the pile support plate is raised no more than 120 mm.

Detection to determine correct positioning of the auxiliary pile support (preventing access to the hazard zone) may be done by means of a personnel safety switch, which is activated when the plate is in the correct position. In this case, the personnel safety switch does not require a separate actuating element. The switch control system shall comply with Category 3 of ISO 13849-1:1999.

NOTE Since metal rods and wooden boards, which need to be removed from the press and can be used for several presses, are used as auxiliary pile supports, it is not possible to use encoded personnel safety switches with separate actuating elements.

5.7.2.3.2.5 Automatic bypass function for pile removal

Bypassing the light beams at the side where the pile is moved out shall be possible only if there is a means of detecting pile movement from the safeguarded area to a position outside the safeguarded area.

Pile removal may be detected by the use of a sensor (e.g. ultrasound, light beam, etc.), which is arranged inside the delivery zone, behind the ESPD. Easy manipulation of the sensor shall be prevented.

EXAMPLE Manipulation of the sensor can be prevented, for example, through the arrangement of sensors, a plausibility check of signals, etc.

As an exception to the requirements of ISO 12643-1, the sensor and the related control system shall meet the requirements of at least Category B of ISO 13849-1:1999.

5.7.2.3.2.6 Manual bypass function for pile removal, including inserting empty pallets

Bypassing the light beams on the side where the pile is moved out by pressing the pile removal control located on the side from which the pile is being removed shall be possible only if all the following conditions are met:

- a) the machine is in press run mode;
- b) the pile support plate is no more than 120 mm above the floor;
- c) paper run has been present and detected since the last pile removal and the last tripping/malfunction;
- d) three light beams are arranged to safeguard the access side;
- e) all top, middle and bottom light beams on all other access sides are active during the entire process.

The bypass sequence shall meet all of the following requirements:

- bypass only the bottom light beam (see Figure 1) on the removal side for not more than 20 s;
- during this time, a sensor is to be triggered, which detects the exit of the pile and switches off the light beams on the exit side for a maximum of 20 s;
- light beams 2 and 3 (see Figure 1) shall be reactivated automatically after this time (maximum of 20 s) has elapsed;
- light beam 1 (see Figure 1) remains switched off for a further duration of maximum 20 s for inserting the empty pallet;
- during this period (maximum 20 s), it is possible to bypass the bottom light beam (see Figure 1) for only one additional period of 20 s by activating the remove pile control again;
- the bottom light beam (see Figure 1) is automatically activated again after the expiration of its bypass time.

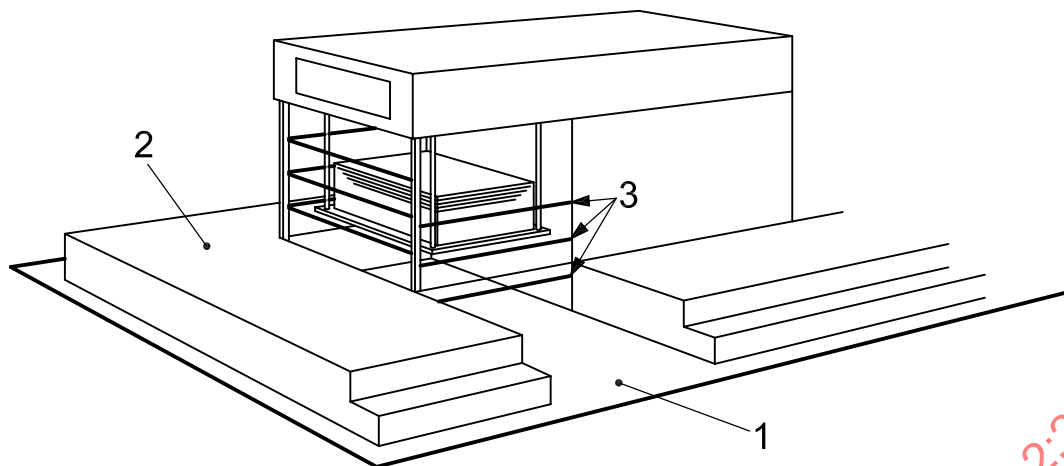
5.7.2.3.2.7 Status lights for bypass function

A yellow status light shall be used to indicate that the bypass function is activated (released automatically or at the push of a button). The end of the bypass duration may be indicated by the yellow status light flashing. A green status light shall be used to indicate that all light beams are activated and uninterrupted. The interruption of a light beam shall be indicated by a red status light. The status lights shall be placed on all access sides that are protected by light beams. The integration of the status lights into the control system may be single-channel, e.g. via an electronic control system. Status lights shall be positioned in such a way as to ensure that they cannot be confused with the optional personnel warning lights defined in ISO 12643-1:2007, 13.2.4, if used.

5.7.2.3.3 Machines with multiple access levels

On machines with several access levels (e.g. with movable platforms), the protective measures described in 5.7.2.3.1 to 5.7.2.3.2.7 shall be provided on every access level (see Figures 2 and 3).

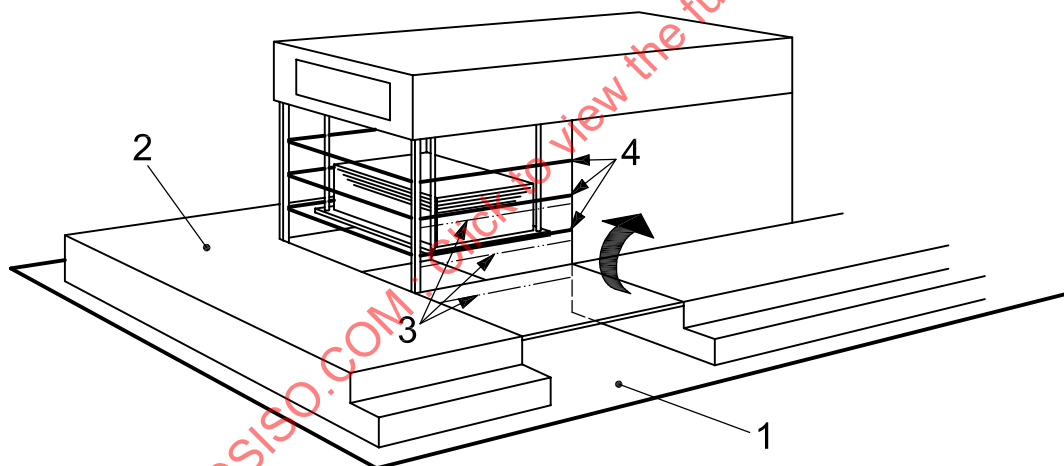
NOTE Figure 2 shows two reference levels, one for the ground and one for the platform. This requires a set of light beams on each side positioned at a height appropriate for that reference level. Figure 3 shows a situation in which a movable ramp may create an additional reference level on that side, and necessitates additional light beams to ensure that all reference levels are considered.



Key

- 1 access level 1 (e.g. pile exit)
- 2 access level 2 (e.g. platform, footboard)
- 3 light beams of level 1

Figure 2 — Multiple access levels without movable platform



Key

- 1 access level 1 (e.g. pile exit)
- 2 access level 2 (e.g. platform, footboard)
- 3 light beams of level 1
- 4 additional light beams of level 2

Figure 3 — Multiple access levels with movable platforms

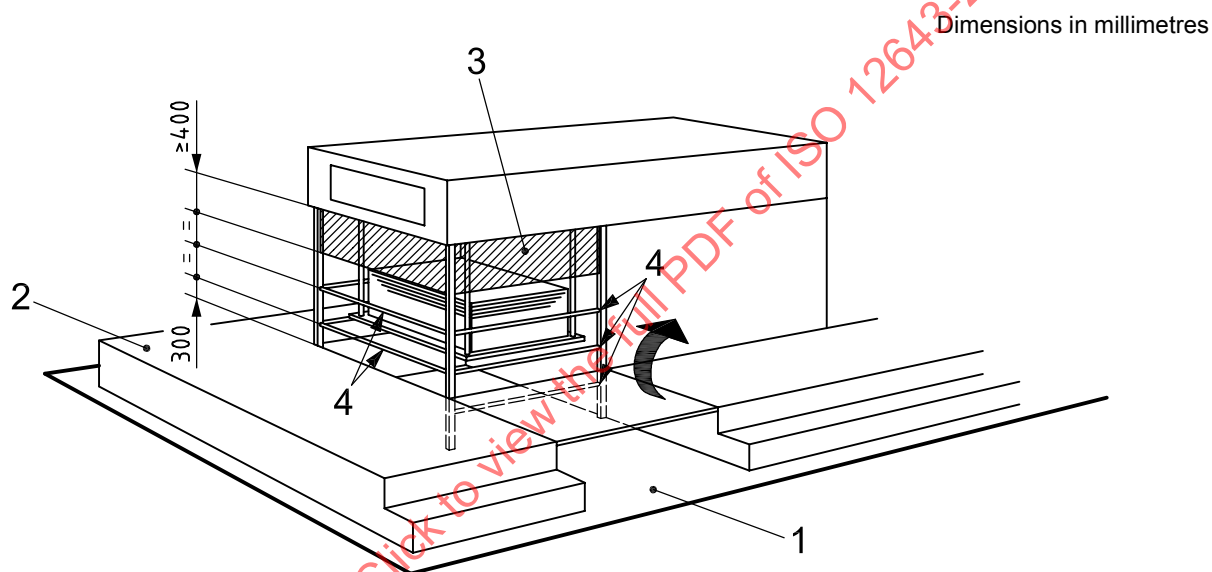
5.7.2.3.4 Information on ESPDs in the instruction handbook

When using ESPDs to safeguard the delivery, all residual risks that still exist shall be indicated in the instruction handbook in accordance with ISO 12643-1.

5.7.2.4 Other methods of full body access safeguarding

As an alternative to safeguarding in accordance with 5.7.2.3, full body access safeguarding can be achieved using one or more of the following methods, providing an equivalent level of safety is met:

- fixed and interlocking guards (see ISO 12643-1);
- pressure-sensitive mats (see ISO 12643-1);
- laser scanners;
- trip bars (see 5.7.2.2 and Figure 4);
- light curtains (see Figure 5).

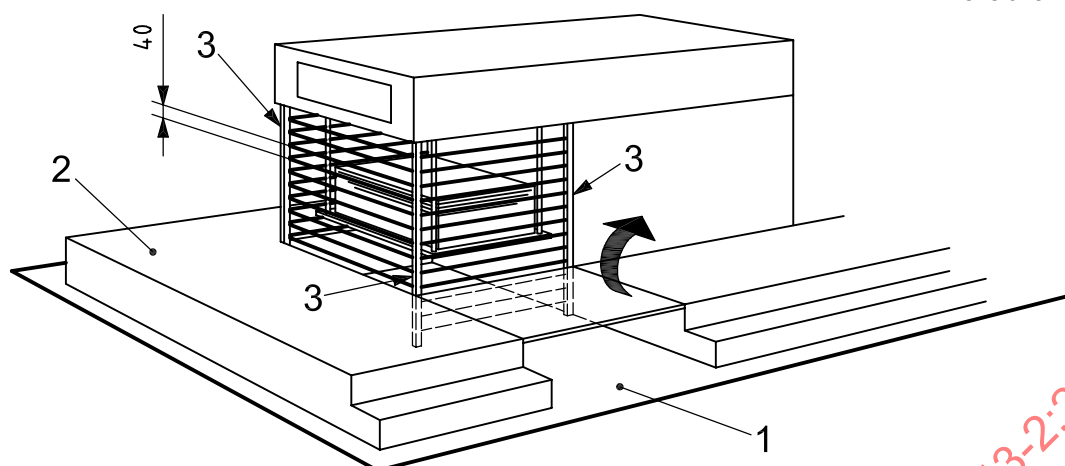


Key

- 1 access level 1
- 2 access level 2
- 3 area to be protected by a movable, electronically interlocking guard
- 4 trip bars

Figure 4 — Full body access safeguarding using a combination of trip bars and a movable guard

Dimensions in millimetres

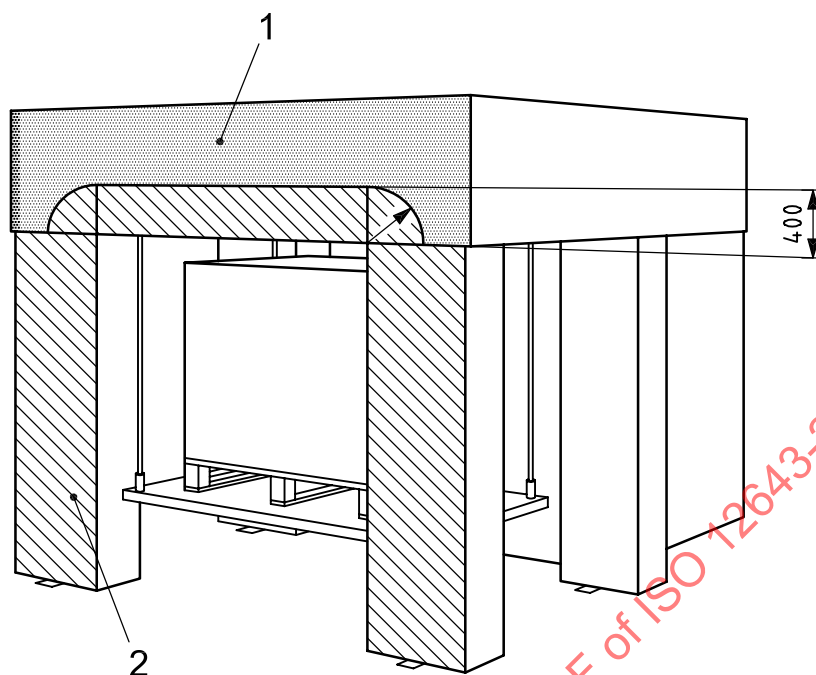
**Key**

- 1 access level 1
- 2 access level 2
- 3 outer boundary of light curtain

Figure 5 — Full body access safeguarding using light curtains**5.7.2.5 Reset pushbutton**

The reset pushbutton shall be placed in a location from which the hazard area can be fully viewed and reaching the reset pushbutton from inside the hazard area is prevented. This requirement is met if the reset button is inside the permissible area at least 400 mm away from, but not lower than, the bottom edge of the press contour (see Figure 6).

Dimensions in millimetres

**Key**

- 1 permissible area
- 2 not permissible area

Figure 6 — Permissible area for reset button location

On presses having several access areas where all hazard zones cannot be fully viewed from a single location, additional reset buttons shall be provided. This is to ensure that the hazardous area affected by each of the reset pushbuttons can be viewed from the position of that pushbutton.

EXAMPLE Examples of presses having several access areas where all hazard zones cannot be fully viewed from a single location include elevated presses or presses with dual deliveries.

It shall be necessary to press the reset pushbutton before movement in the delivery area can be initiated using a separate control

- after switching on the press at the main switch,
- after activating the ESPDs, and
- when the protective device that safeguards full body access to hazard areas has been tripped.

EXCEPTION — It is not necessary to press the reset pushbutton if persons inside the hazard area are safely detected due to the construction of the protective devices (e.g. laser scanners).

Pressing the reset pushbutton shall not lead to an automatic start-up of the hazardous motion.

EXCEPTION — Pressing a reset pushbutton may initiate motion of the main pile and auxiliary pile system.

5.7.2.6 Safeguarding the sheet gripper system

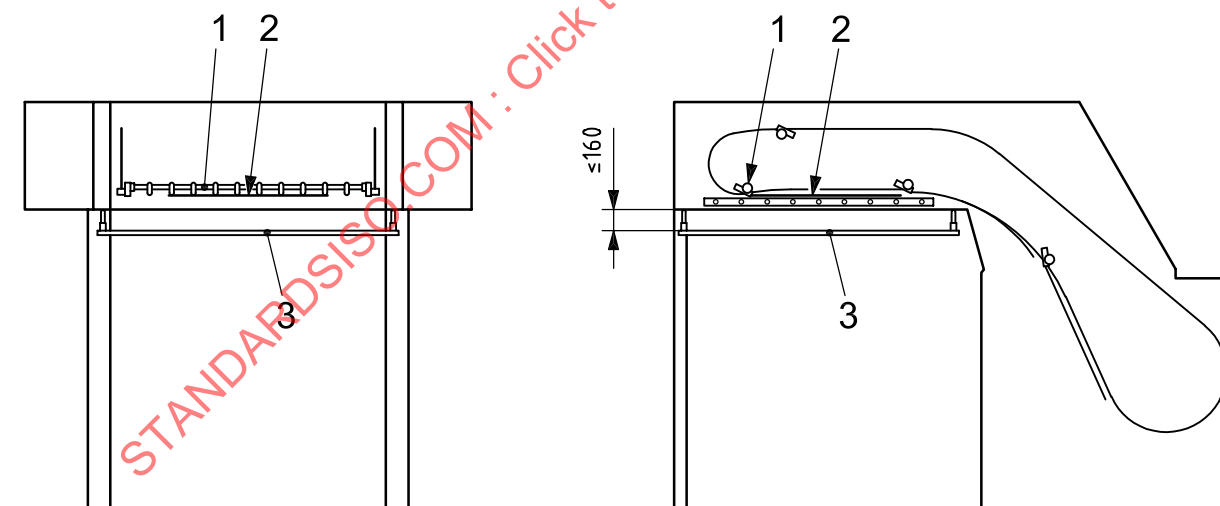
The delivery is considered to be sufficiently safeguarded against full body access to the hazard zone of the sheet gripper system under the following operating states.

- While the delivery is separated from the drive train using couplings; the coupling action and restart shall not cause any hazardous movements.
- The opening above the pile carrier or the moved-in auxiliary pile support (e.g. rake, wooden pile board, roller blind) or equivalent device, shall be no greater than 160 mm.
- While the press is delivering material to a raised pile support plate or to an auxiliary pile support (e.g. rake, wooden pile board, roller blind) or equivalent device; and the presence of the pile support in use is detected either at insertion or by the time it has reached 160 mm below the access to the hazard; and the opening above the uppermost pile carrier shall be no greater than 300 mm; and no change of state of the main drive has occurred.
- While the machine is at a standstill, the use of horizontal light beams, arranged underneath the gripper system in accordance with ISO 13855, shall prevent the start of the machine (see Figure 7). If the existing light curtains do not meet the requirements of the ISO 13855, other protective devices shall be provided in accordance with 5.7.2.2. The distance between the individual light beams underneath the gripper system shall not exceed 40 mm.

If none of the above conditions exist, the delivery shall not operate without the presence of additional safeguarding against entry into the hazardous area.

For example, if the pile support has not been detected by the time it has descended to a distance of 160 mm below the access to the hazard, the machine shall either shut down, or the hazardous area shall be protected by additional safeguarding, such as light beams, guards, etc.

Dimensions in millimetres



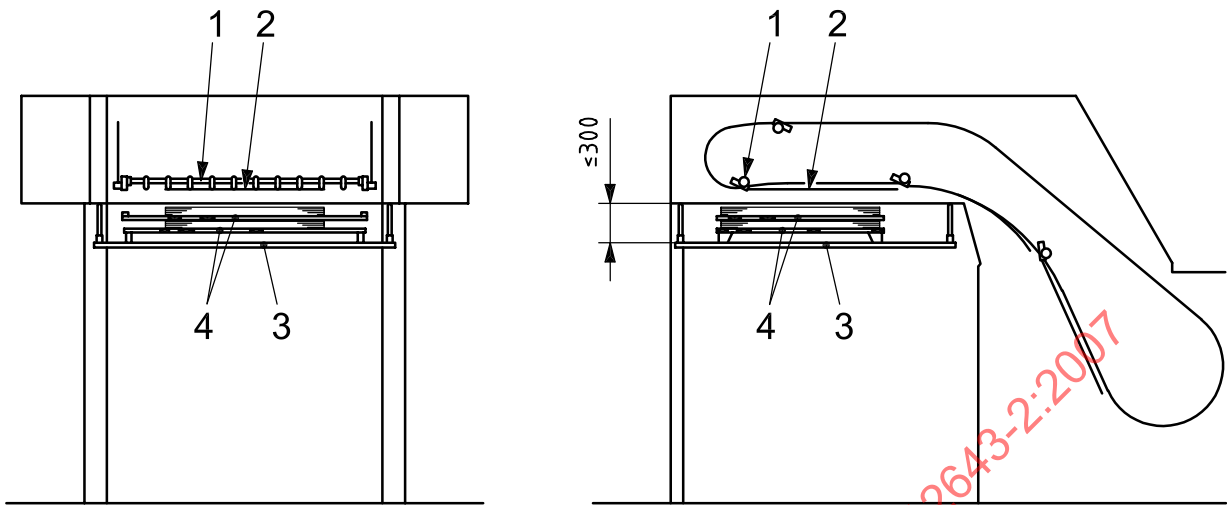
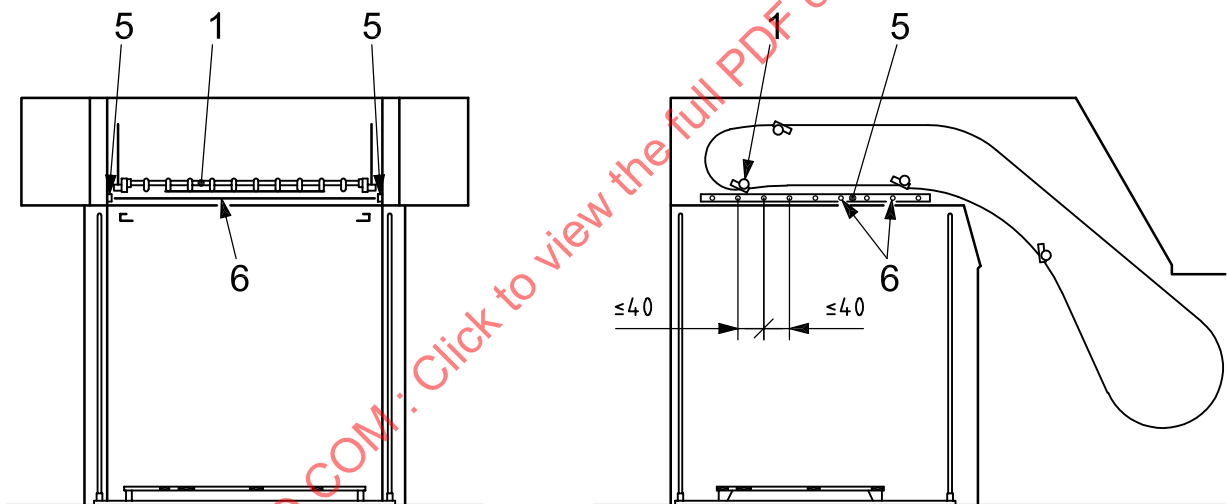
a) Front and side views with pile carrier support in place (≤ 160)

Key

- 1 sheet gripper system
- 2 sheet
- 3 pile carrier

Figure 7 — Guarding of sheet gripper system (continued)

Dimensions in millimetres

b) Front and side views with pile and pile carrier support in place (≤ 300)c) Front and side views with light beams (≤ 40)**Key**

- | | |
|------------------------|----------------|
| 1 sheet gripper system | 4 pile support |
| 2 sheet | 5 sensor parts |
| 3 pile carrier | 6 light beams |

Figure 7 — Guarding of sheet gripper system**5.7.2.7 Guarding the area beneath the pile carrier on presses having an access height of 800 mm or more**

On presses having an access height to the delivery of 800 mm or more (see 5.7.2.2), access to the area beneath the pile carrier plate and the lowerable auxiliary pile device shall be safeguarded in addition to safeguarding the edge of the pile carrier plate in accordance with ISO 12643-1. This safeguarding shall be achieved using area protection devices with ESPDs or other protective devices in accordance with 5.7.2.3 and 5.7.2.4. The bypass functions as defined in 5.7.2.3.2 also include safeguarding of the area beneath the pile support systems.

As an alternative, the provisions of ISO 12643-1 may be applied for the arrangement of the beams.

Independent movement of the pile carrier without the use of additional guarding defined in 5.7.2.3 or 5.7.2.3.2 is also permitted by hold-to-run control if the hazardous area can be viewed from the position of the hold-to-run control.

5.7.3 Transport carriages

Where transport carriages are driven automatically and cylinders are handled automatically, the hazard points between fixed and movable parts shall be safeguarded by one of the following measures:

- trip devices and/or photoelectric curtains;
- hold-to-run control as defined in ISO 12643-1 where hazard points are within operator's view from the location of the hold-to-run control;
- safeguarding the hazard zone as described in 5.2 and ISO 12643-1.

Carriages for transporting cylinders shall be resistant against tilt and shall be secured against unintended travel (see ISO 12643-1). Where carriages are moved manually, handles shall be provided.

Cylinders on the carriage shall be secured against falling by means of securing supports or safety stirrups.

When removing printing cylinders, hazardous over-travelling on the transport carriage shall be safely prevented by the use of mechanical stops.

5.7.4 Guarding plate clamping devices

Movements of automatic plate clamping devices shall be safeguarded. Means of safeguarding include the following:

- fixed or interlocking guards in accordance with 5.2 and ISO 12643-1;
- trip nip bars in accordance with ISO 12643-1 (satisfying the requirements of Category 3 of ISO 13849-1:1999);
- electro-sensitive protective devices according to ISO 12643-1;
- limiting the operating force to a non-hazardous level;
- limiting the maximum clearance between movable and fixed parts to 4 mm.

5.7.5 Continuous flow drying devices on web presses

For continuous flow drying devices, when guards cannot be used to protect against heat hazards, a warning shall be provided in accordance with 11.6.5. See also ISO 12643-1.

5.7.6 Folders for web presses

5.7.6.1 Exception for folder set-up

Where access to the folder is required for folder set-up, speeds up to 8 m/min are permitted with the guard(s) open in accordance with the requirements of ISO 12643-1.

EXAMPLE For removing waste sheets.

5.7.6.2 Exception for folder delivery guarding

In contrast to ISO 12643-1:2007, 5.2.3, the distance between the guard and the delivery surface shall be no more than 75 mm, regardless of the distance between the unguarded access area and the hazard (see Figure 8).

The distance between the delivery fly (fan) and the enclosure that forms an in-running nip shall be a minimum of 120 mm (see Figure 8).

Dimensions in millimetres

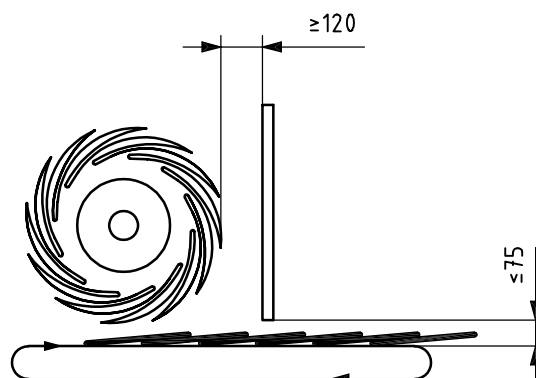


Figure 8 — Openings for folder guards

Folders shall be designed to allow observation of moving components or product flow, and to allow adjustments to folder operation with the guards closed.

NOTE 1 An example would be the provision of a transparent guard or remote viewing system by which the necessary observation of moving components or product could be made.

EXCEPTION — However, it is recognized there may be areas in the folder delivery that cannot be observed with the guard closed, and it may be necessary for an authorized person to observe moving components or product flow at production speed with an interlocking guard open. Under these circumstances, alternative safety measures shall be taken. All adjustments shall be made from outside the hazardous area.

The following alternative safety measures shall be taken, keeping in mind that this exception does not comply with current European standards or the Machinery Directive^[7]:

- A mechanical key lock shall be provided adjacent to the access area. There shall be only one key for this lock. The key for this lock shall be accessible only by an authorized person.
- The key lock shall be interlocked with a timer that has a maximum capability of 4 min. See Note 2.
- When the key is inserted into the lock, the interlock on the guard is overridden for a maximum of 4 min, and the authorized person can access the area.
- The bypassing means shall meet the requirements of Category 3 of ISO 13849-1:1999.
- When adjustments are necessary, they shall be performed from outside the hazardous area.
- When the key is removed from the lock, the timer shall automatically stop and the interlock on the guard shall be automatically reactivated.
- If the guard remains open longer than the allotted time, the interlock on the guard shall be automatically reactivated and the press safety system shall stop machine motion.

NOTE 2 An alerting mechanism can be helpful in warning the operator that the allotted period is about to elapse.

A danger label warning of the possible existing hazards with the guard open shall be provided adjacent to the lock. The label shall clearly indicate that when the key is in the lock, the adjacent guard is overridden.

If a machine is provided with this alternative safety measure, information regarding its safe use shall be contained in the instruction handbook.

Under no circumstances shall the guards in the cutting area of the folder be designed in such a manner that allows them to be open during machine motion at production speed.

5.7.7 Web feed on web-fed presses — Safety distances

On web-fed presses in the areas where the web is fed through a webbing slot, if it is impossible to apply the safety distances specified in ISO 13852 (as required by ISO 12643-1), a safety distance of 200 mm shall be observed for gaps with a width of more than 20 mm and less than 30 mm.

Where web material runs over passageways, the height of the passage shall be at least 2 m. If this is not possible for constructional reasons, and if there is a risk of injury to face and neck, web edges shall be safeguarded.

NOTE Safeguarding can be, for example, by use of a guard with black and yellow markings.

As an exception to ISO 12643-1, a maximum operating speed of 10 m/min is permitted for web-up on newspaper presses. Under this exception, to initiate machine motion at 10 m/min, a special web-up mode shall be added to the control system. However, this exception does not comply with EN 1010-1^[9] or the Machinery Directive^[7].

5.7.8 Screen printing presses

5.7.8.1 Crushing point between screen printing frame and machine frame

The crushing point between the screen printing frame (upper unit holding the screen printing stencil) and the machine frame (table) shall be safeguarded. This may be accomplished by one of the following methods.

- Using trip devices, which shall be arranged such that their operation is positively ensured each time the gap between screen printing frame and machine table is accessed. Hazardous reaching over the device shall be prevented. The force to operate the device shall be a maximum of 300 N (dynamic). Where the material is manually fed directly between the screen printing frame and the machine table, and the stopping function of the device is being tripped by personnel safety switches, a trip device shall be arranged with redundant personnel safety switches to ensure initiation of the stopping operation, even in the event of a single switch failure.
- Using ESPDs, the arrangement of which shall take account of the hand approach speed as defined in ISO 13855. Such devices shall be arranged such that it is not possible to access the machine between two adjacent beams or to defeat them.
- Limiting the closing force of the screen printing frame to a non-hazardous low level. A non-hazardous level is a maximum of 300 N, if there are no crushing hazards due to sharp edges.
- Using fixed guards in accordance with ISO 13852 that can be provided on that side of the machine where access for feeding and ink replenishment is not required.

5.7.8.2 Crushing point between doctor blade and screen printing frame

The crushing point between the doctor blade and screen printing frame shall be safeguarded.

NOTE This can be done, for example, by adjusting the stop gauge such that the minimum distance of 25 mm between the doctor blade and the screen frame is ensured.

Where various sizes of screen frames are used, the instruction handbook shall give advice on the proper adjustment of stop gauges.

5.7.8.3 Crushing hazards caused by the movement of the doctor blade

Crushing hazards caused by the movement of the doctor blade shall be safeguarded.

NOTE 1 This can be done, for example, by using the safety distances defined in ISO 13852 between the doctor blade and fixed parts of the printing press.

Where the descending doctor blade causes crushing points between the doctor blade and the printing table or printing cylinder, and where such crushing points cannot be safeguarded for operational reasons, the instruction handbook shall contain a warning of the residual risk existing. The lifting path of the doctor blade shall be as short as possible.

NOTE 2 For example, the crushing point between the doctor blade and the printing table or printing cylinder on screen printing presses can generally not be safeguarded because ink replenishing needs to be done manually.

5.7.8.3.1 Protection during access between screen printing frame and machine frame

Where access between the screen printing frame and the machine frame is required (e.g. for cleaning the screen), a control element shall be provided in addition to the measures described under 5.7.8.1 that, when actuated, prevents unintended start-up of the machine.

5.7.8.3.2 Protection between movable screen frame and fixed machine parts

On cylinder screen printing presses, safeguarding shall be provided for the crushing point between the movable screen frame and fixed machine parts.

NOTE This can be achieved, for example, by the use of safety distances in accordance with ISO 13854^[1], or interlocking guards.

6 Requirements for protection against other hazards

6.1 General

Protection shall be provided against other hazards as defined in ISO 12643-1. In addition, the requirements of the following subclauses apply.

See Annex A for a list of hazards associated with printing press systems.

6.2 Protection against fire and explosion in continuous flow devices

6.2.1 Explosion zones

For a list of explosion-protection zones, see Annex B.

6.2.2 Continuous flow drying devices

6.2.2.1 General

Continuous flow drying devices built into printing and coating units where flammable substances are released during the drying and/or curing process of the ink or coating shall satisfy the requirements of EN 1539, unless these requirements are superseded by national requirements.

NOTE 1 In the United States, NFPA 86^[6] supersedes the requirements of EN 1539.

Evaporation of flammable substances is generally not expected where inks and/or coatings are used for which the safety data sheet indicates that the explosion limit is "not applicable" at the operating temperature of the drying device. Where the use of such inks and/or coatings is required in order to comply with the requirements stated, this shall be indicated in the instruction handbook.

NOTE 2 Evaporation of flammable substances during the drying process may, for example, be expected on gravure, screen printing and web presses. This may, however, not be the case on offset web presses when using commercial offset printing inks (for example, cold set inks instead of heat set inks) that are absorbed by the substrate.

6.2.2.2 Interface with automatic cylinder and roller washing devices

6.2.2.2.1 Substrate transporting solvents

On continuous flow drying devices, any hazards from emission of flammable substances caused by the substrate transporting solvents out of the automatic cylinder and roller-washing device shall be avoided.

This requirement is fulfilled:

- a) on a sheet-fed printing press,
 - 1) where the design of the continuous flow drying unit takes account of the solvent transported by the substrate in accordance with EN 1539 (see Note 1 to 6.2.2.1); or
 - 2) where the cylinder and/or roller washing device is electrically interlocked with the paper transport system, so the paper transport during the washing process is prevented and can be restarted only after the cylinders are sufficiently dry;
- b) on a web-fed rotary printing press, where the design of the continuous flow drying unit takes account of the solvent in accordance with EN 1539 (see Note 1 to 6.2.2.1), including a combination of:
 - 1) design-stage calculations of maximum solvent flow;
 - 2) commissioning-stage testing of the blanket wash system, usually done by qualified personnel or a qualified agent of the wash system manufacturer, to verify the calculations and to determine the safety of the wash system (part of the testing procedure is the measurement of solvent concentrations inside the dryer and exhaust duct using a total hydrocarbon analyser equipped with a flame ionization detector at worse-case conditions of solvent flow).

6.2.2.2.2 Vapours and mists

On printing presses, where continuous flow drying devices are fitted on one press together with automatic cylinder- and roller-washing devices, any risk of ignition when solvent vapours and mists released during the washing process are heated up by the drying unit shall be prevented.

This requirement is fulfilled by one or more of the following:

- a) by designing the continuous flow drying unit to take into account the solvent vapours and mists in accordance with EN 1539 unless these requirements are superseded by national requirements (see Note 1 to 6.2.2.1);
- b) by providing an exhaust unit between the washing and the drying unit, thus reducing the risk of ignition;
- c) by interlocking the washing and the drying devices so as to allow starting of the washing operation only if the dryer temperature is in a non-hazardous condition, and to prevent starting of the drying device until there is no risk of ignition of the flammable solvent vapours if the control system satisfies Category 3 of ISO 13849-1:1999 (one means of accomplishing this is the use of a flammable vapour sensor that monitors the level of solvent vapours and prevents heating of the drying device until there are no flammable solvent vapours present in the zone or area of the drying device).

6.2.2.2.3 Leakage and spillage of solvents

The risk of ignition due to leaks of the solvent from the washing device shall be prevented.

EXAMPLE Such risks on web presses would be solvent leaking onto the substrate running into the drying device; on sheet-fed presses, solvent leaking onto the drying device, or spillage during the filling process.

This requirement is fulfilled by one or more of the following:

- when the solvent reservoir and washing device are fixed and sealed, by providing hose and connections of highest leak-proof quality, permanently fitted, adequately dimensioned and of materials that are suitable for the solvent used;
- by positioning the washing devices and hoses so that, in case of leakage, neither the liquid solvent nor its vapours can reach the continuous flow drying device;
- by monitoring the area surrounding the continuous flow drying device so that the device is disabled in the event of spillage/leakage.

6.2.2.3 Ignition of substrate

Ignition of the substrate by the continuous-flow drying device shall be prevented. This can be achieved, for example, by reducing the dryer temperature when the printing process is stopped, or by separating the substrate from the radiation source by use of air knives (air curtain) or deflectors.

6.2.2.4 Exhaust systems of drying devices

When exhaust systems are provided as a safety ventilation system to prevent hazards of fire and explosion, their function shall be monitored. Failures in the exhaust system shall cause automatic stopping of the substrate feeding system. For example, on sheet-fed printing presses, failures in the dryer exhaust system cause both the feeders and the drying system to stop automatically. On rotary web presses, failures in the dryer exhaust system cause automatic stopping of the solvent dispensing areas (for example, ink form rollers on units, or automatic blanket washing devices).

The control system for monitoring the function of the exhaust system shall satisfy Category 3 of ISO 13849-1:1999.

6.3 Explosion protection exceptions

6.3.1 General

The explosion protection exceptions defined in ISO 12643-1 apply, in addition to the exceptions defined in 6.3.2 and 6.3.3 below.

6.3.2 Exceptions for screen printing presses

Explosion protection measures on screen printing presses need not be provided, even when using screen printing inks with a flashpoint of 40 °C to 55 °C, if adequate air ventilation in the working area is ensured. The need for adequate air ventilation shall be indicated in the instruction handbook.

Where the intended use of a machine allows the use of screen printing inks with a flashpoint below 40 °C, see ISO 12643-1.

6.3.3 Exceptions for automatic washing devices

Where automatic cylinder-washing (e.g. impression or blanket) and roller-washing devices are attached to printing presses, explosion protection measures otherwise required due to the washing solvent being used are not required if all of the following conditions are met:

- the flash point of the washing solvent is at least 55 °C; or the flash point of the washing solvent is at least 40 °C, and the amount of washing solvent used does not exceed 0,08 l per printing unit and washing cycle;
- the solvent does not heat up to a temperature in excess of the flash point (for example, due to heating equipment or waste heat from motors);
- explosive concentrations cannot build up when applying the solvent.

6.4 Spillage from washing devices

Safe replenishing of the washing agent shall be ensured.

The following are examples of ways to satisfy this requirement:

- designing washing agent tanks to allow one person handling the equipment to replenish the washing agent without the hazard of spilling or overflowing;
- avoiding tank overflow when replenishing the washing agent by use of devices that check the filling level (tank full indicators, inspection glasses, adequate openings for filling, etc.).

When the washing device is disconnected by the user, provision shall be made to prevent leakage of washing agents from the lines.

EXAMPLE An example of a means to prevent leakage is the use of self-locking hose couplings.

6.5 Working platforms, access stairs, passageways and raised workplaces

6.5.1 General

Working platforms, access stairs, passageways and raised workplaces shall meet the requirements of ISO 12643-1.

6.5.2 Exception for sheet-fed presses

As an exception to ISO 12643-1, on sheet-fed offset printing presses with a format width of no more than 750 mm, it is acceptable to provide a single footstep for access to the platform fitted between units (printing units, coating units, delivery units) if all the following conditions are met:

- the difference in height between floor or gangway and platform is not more than 750 mm;
- the depth of the footstep is at least 250 mm, and the width at least 300 mm;
- the footstep is fitted half way between the floor or gangway and the platform;
- suitable handles are provided.

6.6 Electrostatic toner dust

Where electrostatic toners are used as printing substances (such as in digital printing presses), it shall be ensured that persons are not endangered by toner dust.

NOTE This can be achieved, for example, by

- using the least hazardous toners needed for the process;
- providing totally enclosed systems;
- providing adequate dust separation equipment and filters.

6.7 Washing equipment for printing formes, rollers and doctor blades

6.7.1 Hazards due to emission of washing agents

Personnel shall be protected from hazards from emissions of washing agents used in external washing devices for printing formes, rollers, and doctor blades.

NOTE This can be done by one or more of the following measures:

- using non-hazardous solvents when possible (respective warnings shall be given in the instruction handbook);

- using closed-type washing equipment, equipped with interlocking guard locking for the charging doors, so that the doors can be opened only after the drying process is finished, and a means of exhausting solvent vapours;
- exhausting solvent vapours.

6.7.2 Grounding of washing equipment

Where solvents with a flash point below 55 °C are used on external washing equipment for printing formes, rollers and doctor blades, and where explosion hazards exist due to spraying of the washing agent, all parts inside the washing device shall be conductive and electrostatically grounded (resistance less than $10^6 \Omega$).

6.7.3 Unintended escape of solvents

Where solvents with a flash point below 55 °C are used on external washing equipment for printing formes, rollers and doctor blades, hazards from unintended escape of solvents, for example, leakage or during pumping, shall be prevented.

Penetration into non-explosion-proof areas can be prevented, for example, by using catch tanks of adequate size.

NOTE For further information on fire and explosion protection, see 6.2.

6.8 Alcohol dosing devices

6.8.1 Concentration

Alcohol dosing devices as auxiliary devices on dampening units shall be equipped with means to limit the concentration of alcohol in the dampening water to the percentage required for the printing process.

Additional explosion protection measures in the dosing equipment and printing press area are not required if the dosing device is equipped such that a maximum of 15 % by volume of alcohol in the dampening water for normal operation cannot be exceeded.

In addition, if an electric/electronic control system is used to control the alcohol concentration in the dampening water, this system shall satisfy the requirements of ISO 12643-1 to ensure that a failure of the primary control system shall not allow the alcohol in the dampening water to exceed 20 % by volume.

6.8.2 Prevention of leakage and overflow

Adequate measures for alcohol dosing devices shall be provided to prevent leakage and overflow of concentrated alcohol into non-explosion-proof areas. Adequate measures include the use of collecting tanks or means of draining the alcohol into the dampening recirculator.

Alcohol dosing devices shall be designed such that the tank cannot fall, and that the tank and the hoses connecting the tank to the dosing device are safeguarded against damage. The instruction handbook shall contain instructions for the proper setting up of the tanks.

Alcohol tanks are safeguarded against falling, for example, by placing them in closed cabinets.

6.9 Refrigerating devices in ink and dampening units

Refrigerating devices of auxiliary devices in ink and dampening units shall comply with EN 378-1.

6.10 Powder spraying devices

Safe replenishing of anti-setoff powder used during the printing process shall be ensured.

6.11 Hazardous emissions of sheet-fed presses

Guidelines for designers relating to the measurement of hazardous emissions of sheet-fed presses are contained in Annex C.

7 Additional requirements for functions, operations, colours and mechanical specifications, of manual control devices

7.1 General

In addition to the requirements of ISO 12643-1, the requirements of 7.2 to 7.5 apply.

7.2 Emergency stop and ink, dampening, metering, coating or fountain rollers

Actuation of an emergency stop or stop/safe button need not cause stopping of auxiliary motion of the ink, dampening and coating roller where this is required for operational reasons and all hazard points are safeguarded; that is,

- in-running nips between the ink fountain roller and the ductor roller are not accessible, even when the ink fountain is in the open position, or
- all in-running nips on the dampening and the coating fountain roller and metering roller are safeguarded by fixed guards.

If interlocking guards are used, motion protected by the guard shall stop when the guard is opened.

7.3 Ready control

The ready control shall be a maintained-contact pushbutton, mechanically interlocked with the associated stop/safe pushbutton. When depressed, it shall release the associated stop/safe pushbutton and may place the machine in the ready condition.

EXAMPLE If all guards are closed and all stops are released, the machine will go to the ready condition.

7.4 Speed limit control

When the press is at a standstill, activating any speed limit control shall prevent any machine motion until all speed limit controls are deactivated.

When the press is in continuous run, activating any speed limit control shall prevent acceleration until all speed limit controls are deactivated (speed limit function). Press speed can be reduced using the slower control.

Pressing a stop/safe pushbutton shall take precedence over the speed limit function.

7.5 Plate position control

If all hazards are protected, activating a plate position control shall initiate press motion and rotate (index) the press cylinders to stop at a predefined position (a new plate position) for ease of mounting a printing plate. Successive depressions of the control during the permissive period may initiate indexing to the next plate position. The plate position control may be a momentary-contact control.

When an interlocking guard is open and hazard points are unprotected, activating the plate position control shall initiate the press motion only according to hold-to-run conditions as defined in ISO 12643-1:2007, 5.6.

NOTE This device is not used for registration purposes.

7.6 Colours for manual control devices

In addition to the requirement for colours for manual control devices specified in ISO 12643-1, the colours shown in Table 2 shall also apply.

Table 2 — Colours for manual control devices

Control	Requirement	Preference	Remarks
Speed limit	green, black, white or grey	green	used primarily on newspaper presses
Plate position (or comparable control)	black, white or grey	grey	

8 Control systems for screen printing presses

The control system shall comply with ISO 12643-1. Trip devices shall comply with ISO 12643-1.

In addition, the following requirements shall be satisfied on screen printing presses where substrates are fed manually between the printing forme and the printing table:

- the safety-related parts of the control system that relate to the closing movement of the screen frame and the printing table shall comply with ISO 12643-1;
- trip devices shall satisfy Category 4 of ISO 13849-1:1999 in addition to the requirements of ISO 12643-1;
- electro-sensitive protective devices shall comply with ISO 12643-1.

NOTE Manual feeding of the substrate between the printing forme and the printing table is used on several types of semi-automatic screen printing presses.

9 Control zones for web presses having multiple folders

As an exception to the requirements of ISO 12643-1 for control zones on a web press system having multiple folders, the emergency stop control shall stop the printing units and associated operating equipment on both sides of the unit where the emergency stop control was activated.

10 Signals and warning devices

10.1 General

A warning system as defined in ISO 12643-1 is required for systems in which the overall visibility of personnel to the operator is obstructed, or communication between operating personnel may be difficult.

EXAMPLE On automatic platen machines, this condition may exist, for example, if the control panels are located such that the waste discharge cannot be observed from the control panels.

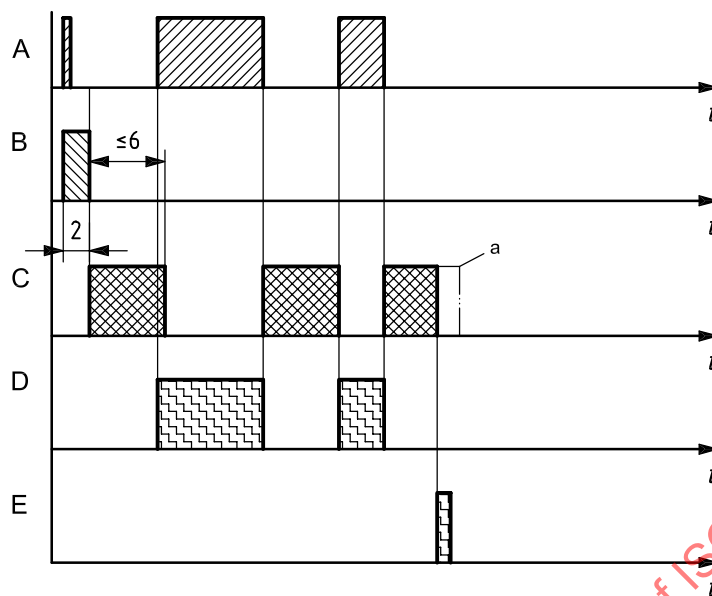
10.2 Permissive period

The permissive period shall be as defined in ISO 12643-1.

EXCEPTION — If for operational reasons it is necessary that the permissive period exceed 6 s, a permissive period of no more than 12 s is permitted with the addition of a flashing light or an audible signal (or both) in the hazardous area(s) (e.g. in the delivery area). The warning shall cycle throughout the entire permissive period.

A change in direction of machine motion at inch speed within the same permissive period is permitted without the initiation of a new warning period (see Figure 9 and Figure 10).

Dimensions in seconds

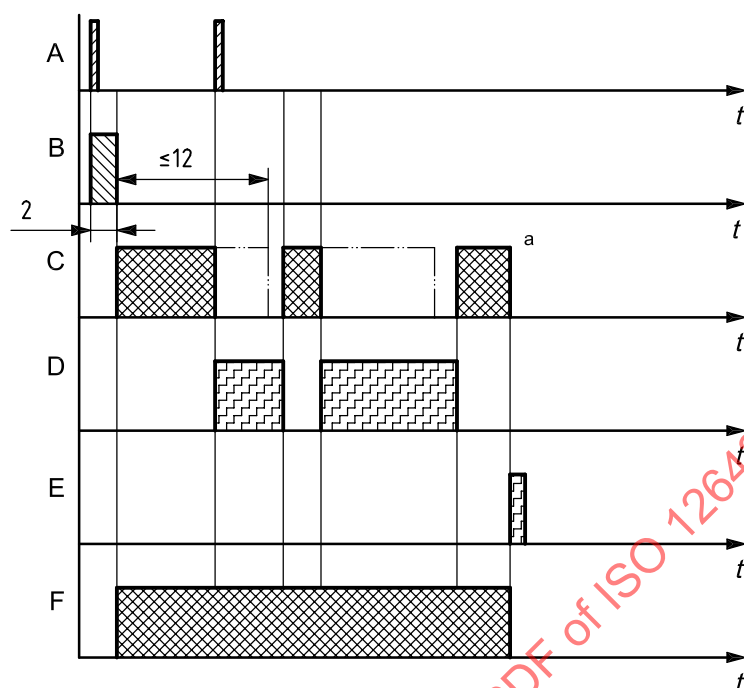


Key

- A inch-reverse operation
- B warning period and audible alarm
- C permissive period
- D machine motion
- E stop, stop/safe, breaking a safety circuit
- t time, s
- ^a Cancellation of the permissive period.

Figure 9 — Audible warning system with double-push sequence

Dimensions in seconds

**Key**

- A automatic start button
- B warning period and audible alarm
- C permissive period
- D machine motion
- E stop, stop/safe, breaking a safety circuit
- F flashing light or audible signal in the hazardous area(s)
- t time, s
- ^a Cancellation of the permissive period.

Figure 10 — Audible warning system for automatic machine mode with double-push sequence

11 Contents of instruction handbook

11.1 General

In addition to the requirements of ISO 12643-1, the requirements of 11.2 to 11.9 apply.

11.2 Sheet-fed printing press systems

11.2.1 Residual risk from ink ducts

The instruction handbook shall warn the user of any residual risk existing when ink ducts are swung down.

NOTE For example, there may be in-running nips between ink ducts and ductor roller.

11.2.2 Residual risks in sheet delivery area

The instruction handbook shall warn the user of residual risks existing when gaining access under the guards in the sheet delivery area.

NOTE For example, access might be needed for removing sample sheets or for inserting pile wedges.

11.2.3 Sheet-fed presses used for printing on board or metal sheet

The instruction handbook shall warn the user of the residual risk existing where the requirements of ISO 13852 cannot be applied in the feeding area for production reasons on sheet-fed printing presses that are also used for printing on board or metal sheet.

11.2.4 Rollers

If activation of the emergency stop control does not stop ink, dampening, metering, coating or fountain rollers, the instruction handbook shall provide information on how these rollers are to be stopped.

NOTE For example, an adequate measure for stopping is operation of the main supply switch.

11.2.5 Powders (anti-setoff powders)

The instruction handbook shall specify the use of the least hazardous powders needed for the process.

11.3 Web-fed printing press systems

11.3.1 Rollers

If activation of the emergency stop control does not stop ink, dampening, metering, coating or fountain rollers, instructions shall be provided in the handbook regarding how these rollers are to be stopped.

NOTE For example, an adequate measure for stopping is operation of the main supply switch.

11.3.2 In-running nips

The instruction handbook shall identify hazards that exist when operations are carried out in the vicinity of areas where in-running nips could be generated under hold-to-run control and where such areas cannot be observed from the point of operation of the hold-to-run control. It shall also describe safe working practices, for example, operation of a stop control with mechanical latch or emergency stop device before beginning operation in the hazardous area.

11.3.3 Operation by two-hand control with guard open

Where production reasons require the printing press to be started by two-hand control with guards open with a speed higher than 10 m/min, the instruction handbook shall contain a warning that the person operating the two-hand control shall make sure that there is no second person in the hazardous area before starting the hold-to-run operation.

11.4 Screen printing presses

11.4.1 Ventilation and admissible liquids

The instruction handbook shall indicate the admissible inks, coatings, washing liquids and solvents (admissible flash point), and shall provide instructions for adequate ventilation of the working area at the place of installation.

11.4.2 Access between screen printing frame and machine frame

The instruction handbook shall indicate that, before access between the screen printing frame and the machine frame (for example, for cleaning the screen) is allowed, unintended start-up of the machine shall be prevented, for example, by actuation of a selector switch.

11.4.3 Use of different size screens

Where screens of different sizes are being used, instruction handbooks shall contain instructions for adjusting stop gauges so that the distance between doctor blade and screen frame is no less than 25 mm.

11.4.4 Crushing point between doctor blade and screen or machine table

Where the crushing point between the doctor blade and the screen or machine table cannot be safeguarded for operational reasons, the instruction handbook shall warn the user of the residual risks existing, for example, when replenishing inks.

11.4.5 Residual risks related to doctor blade

The instruction handbook shall warn the user of residual risks caused by the doctor blade being used without a screen, or a screen of a smaller size being installed.

11.5 Automatic cylinder and roller washing device

The instruction handbook shall specify the requirement to set the washing parameters such that, depending on the washing agent used, solvent vapours will not be created.

Such parameters, for example, can be the pressure of the washing liquid, the speed of rotation of washing rollers and brushes, the length of the washing process, etc.

NOTE For example, solvent vapours can cause risks of explosion or damage to health.

11.6 Continuous flow drying devices

11.6.1 Inks and coatings

Where the use of inks and coatings is restricted to certain types for avoidance of explosion risks in accordance with 6.2.2 and ISO 12643-1, the instruction handbook shall contain relevant information. The handbook should also include the suggested maximum flow rate at a specific lower explosive limit of ink, coating and wash solvents into the dryer.

11.6.2 Solvents

The instruction handbook shall contain a warning that to avoid an explosive hazard, solvents shall not be placed in the area of the continuous-flow drying device (for example, during manual washing of cylinders or rollers).

11.6.3 Mist of UV inks and UV coatings

The instruction handbook for UV continuous-flow drying devices shall note that the use of some types of UV inks or UV coatings may result in an inhalation hazard due to the build-up of mists. Exhaust equipment may be required to remove mists, to prevent such build-up.

11.6.4 Solvents for manual washing

The instruction handbook shall provide information that when washing cylinders and rollers by hand (manually), rather than with an automatic washing device, solvent ignition within the drying device should be avoided by one or more of the following means:

- removing the web from its operating position (threaded through the drying device) before starting the washing;

- using cleaning material (solvents) that has a safety data sheet indicating that the explosion limit is “not applicable” at the expected operating temperature of the drying device;
- using user-created “standard operating procedures” for press operators so that the flow rate of solvents into the drying device is limited to that rate producing acceptable solvent concentration limit as defined by EN 1539, unless these requirements are superseded by national requirements (see Note 1 in 6.2.2.1).

11.6.5 High contact temperatures on continuous-flow drying devices

The surface temperature of those parts of continuous-flow drying devices where access is possible shall not exceed the limit values as specified in ISO 13732-1. Those parts of continuous-flow drying devices that are accessible after opening the interlocking device, and where temperatures are in excess of limit temperatures, shall be provided with a hazard warning.

11.7 Oxidizers, incinerators and thermal cleaning plants

The instruction handbook shall provide information on methods for reducing the following residual risks:

- inlet concentration of flammable substances not limited to established maximum design concentration standards;
- flammable condensate and deposits on internal duct surfaces;
- insufficient forced ventilation;
- insufficient oxygen, process space temperature, mixing, residence time, and catalyst function (if applicable) for oxidation of flammable substances;
- uncontrolled ignition sources such as electrical and mechanical sparks, static electricity, and flashback;
- overheating caused by failure of temperature control, heater failures and insulation failure.

11.8 Alcohol dosing devices

The instruction handbook shall indicate that alcohol spillages need to be removed immediately.

11.9 Washing equipment for printing plates

For washing equipment for printing formes, rollers and doctor blades where only washing solvents with a flash point above 55 °C may be used, this shall be noted in the instruction handbook.

Annex A (informative)

Hazards associated with printing press systems

Table A.1 lists many significant hazards that may be encountered in printing press systems. When performing risk assessment for an individual piece of equipment, this list may assist the manufacturer in identifying the risks on their piece of equipment. The manufacturer should be aware there may be other hazards not included in this list that need to be identified during the risk assessment process.

NOTE Additional information on hazard analysis is given in ISO 14121^[2].

Table A.1 — Significant hazards and hazard zones

Significant hazards	Hazard zone
Mechanical hazards: — crushing; — shearing; — cutting or severing; — entanglement; — drawing-in; — trapping; — impacts.	Production area: — between rollers, cylinders, drums; — short linear movements; — wheels for floor travel; — revolving handwheels; — guards; — make-ready, cleaning, maintenance operations and trouble-shooting (hold-to-run); — impact hazards in passageways, access ways; — loss of stability; — stationary knives; — rotary tools; — transport of hazardous tools; — on feeding and delivery units (pile lifting and lowering devices); — unwinding and rewinding units for web material. Sheet-fed printing presses and coating units: — sheet gripping devices, rollers, cylinders, perforating tools, feed openings; — in-running nips behind interlocking guards; — dampening unit, coating unit; — sheet delivery; — automatic format setting; — pile changing devices; — offset proofing presses. Web-fed rotary printing presses and coating units: — in-running nips on rollers and cylinders, feed openings; — in-running nips behind interlocking guards; — dampening unit, coating unit; — automatic format setting; — automatic travel of transport carriages; — folder; — webs; — automatic loading on unwinding unit; — hold-to-run control for forms printing; — rollers with equi-directional revolutions; — digital printing presses.

Table A.1 (continued)

Significant hazards	Hazard zone
Mechanical hazards (continued)	Screen printing presses: — crushing points — screen frame/printing table; — crushing points — doctor blade/screen frame; — crushing points by doctor blade movement; — unintentional start-up; — danger points — cylinder screen printing presses. Cylinder and roller washing devices: — built into machines. Continuous flow drying devices: — built into machines. Powder spraying devices: — built into machines; — powder replenishment. Auxiliary devices on inking and dampening units: — built into machines; — refrigerating devices. Plate clamping devices: — built into machines; — hazardous movements. Washing devices for printing plates, rollers and scrapers: — installation in machine. Pile turners and reel turners: — crushing hazard — floor/lifting member; — uncontrolled gravity falling in case of leakage or hose breakage; — load lifting device; — emergency stop device. Measuring and control devices: — crushing and shearing points in machines.
Slipping, tripping, falling	Production area: — work platforms, access stairs, passageways, steps.
Thermal hazards: — burns due to possible contact.	All machinery: — hot machine parts. Continuous flow drying devices: — surface temperature.
Electrical hazards: — direct or indirect contact thermal radiation (burns).	All machinery — electrical equipment; — equipment made live under electrical fault conditions.
Hazards generated by radiation: — laser; — UV radiation.	Sheet-fed printing presses, web-fed printing presses, coating units: — laser exposing equipment. Continuous flow drying devices: — emission of UV radiation.

Table A.1 (continued)

Significant hazards	Hazard zone
Hazards generated by noise resulting in hearing loss	All printing machines and their ancillary equipment.
Hazards from substances and material used for processing, machine operation or that are emitted during the process: — hazards resulting from contact with or inhalation of harmful fluids, gases, fumes, dusts.	Sheet-fed printing presses, web-fed printing presses, coating units: — ozone build-up; — toner dust; — exhaust fans and suction devices. Cylinder and roller washing devices: — replenishing of washing agent; — removal of washing device. Continuous flow drying devices: — ozone build-up. Auxiliary devices on inking and dampening units: — leakage of washing agents.
Hazards from fire and explosion	Web-fed printing presses and coating units: — explosion hazards on exhaust fans. Screen printing presses: — explosion hazard. Cylinder and roller washing devices: — use of washing agent. Continuous flow drying devices: — heating; — leakages; — emission of flammable substances; — ignition of flammable substances. Auxiliary devices on inking and dampening units: — alcohol dosing devices. Washing equipment for plates, rollers and doctor blades: — explosive atmospheres, fire hazards.
Hazards generated by neglect of ergonomic principles in machine design: — unhealthy body postures.	Production area: — operating postures; — lifting of heavy loads; — design of actuators and displays, handles. Sheet-fed printing presses and coating units: — hold-to-run control; — gangways; — installation and removal of heavy machine parts. Web-fed printing presses and coating units: — hold-to-run control; — installation and removal of heavy machine parts.
Failure, malfunction of control system: — faults or failures in safety circuits.	Sheet-fed and web-fed printing presses, coating units and all auxiliary equipment.