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

**Part 2:  
Prepress and press equipment  
and systems**

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

*Partie 2: Systèmes et équipement pour la préimpression et la presse*

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Published in Switzerland

# Contents

Page

Foreword .....	v
Introduction.....	vi
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Conformity with this part of ISO 12643 .....	4
5 Equipment subject to requirements .....	5
5.1 General .....	5
5.2 Prepress equipment .....	5
5.3 Printing presses and coating/varnishing machines .....	5
5.4 Other equipment covered by this part of ISO 12643 .....	6
6 Guarding of significant hazards .....	7
6.1 General .....	7
6.2 Guard openings .....	7
6.3 Guarding in-running nips .....	7
6.4 Interlocks .....	8
6.5 Hold-to-run controls .....	9
6.6 Automatic format-setting operations .....	9
6.7 Additional safeguarding methods for machine devices and components .....	10
7 Changing of printing plates .....	23
7.1 General .....	23
7.2 Automatic printing plate changes .....	23
7.3 Semi-automatic printing plate changes .....	23
8 Requirements for protection against other hazards .....	24
8.1 General .....	24
8.2 Protection against fire and explosion in continuous-flow devices .....	24
8.3 Explosion protection exceptions .....	26
8.4 Spillage from washing devices .....	26
8.5 Working platforms, access stairs, passageways and raised workplaces .....	27
8.6 Electrostatic toner dust .....	27
8.7 Washing equipment for printing plates, rollers and doctor blades .....	27
8.8 Alcohol dosing devices .....	28
8.9 Refrigerating devices in ink and dampening units .....	28
8.10 Powder-spraying devices .....	28
8.11 Hazardous emissions of sheet-fed presses .....	28
9 Additional requirements for functions, operations, colours and mechanical specifications of manual control devices .....	28
9.1 General .....	28
9.2 Emergency stop and ink, dampening, metering, coating or fountain rollers .....	29
9.3 Emergency stop on auxiliary draw nips .....	29
9.4 Alternative controls for stop/safe function on sheet-fed presses .....	29
9.5 Ready control .....	30
9.6 Speed limit control .....	30
9.7 Plate position control .....	30
9.8 Colours for manual control devices .....	30
10 Control systems for screen printing presses .....	30

<b>11</b>	<b>Safety requirements for prepress equipment.....</b>	<b>31</b>
<b>11.1</b>	<b>Electrical equipment of prepress machinery.....</b>	<b>31</b>
<b>11.2</b>	<b>Electric/electronic control system of prepress machinery .....</b>	<b>31</b>
<b>11.3</b>	<b>Exposing equipment .....</b>	<b>31</b>
<b>11.4</b>	<b>Safeguarding the discharge of liquids .....</b>	<b>31</b>
<b>11.5</b>	<b>Safeguarding in-running nips on engraving machines .....</b>	<b>31</b>
<b>11.6</b>	<b>Safeguarding against copper swarf hazard .....</b>	<b>32</b>
<b>11.7</b>	<b>Safeguarding bending unit on printing plate bending machines .....</b>	<b>32</b>
<b>11.8</b>	<b>Safeguarding printing plate punching devices .....</b>	<b>32</b>
<b>12</b>	<b>Signals and warning devices.....</b>	<b>32</b>
<b>13</b>	<b>Control zones for web presses having multiple folders.....</b>	<b>33</b>
<b>14</b>	<b>Contents of instruction handbook .....</b>	<b>33</b>
<b>14.1</b>	<b>General.....</b>	<b>33</b>
<b>14.2</b>	<b>Sheet-fed printing press systems .....</b>	<b>34</b>
<b>14.3</b>	<b>Web-fed printing press systems .....</b>	<b>34</b>
<b>14.4</b>	<b>Screen printing presses.....</b>	<b>35</b>
<b>14.5</b>	<b>Automatic cylinder and roller washing device .....</b>	<b>35</b>
<b>14.6</b>	<b>Continuous-flow drying devices .....</b>	<b>35</b>
<b>14.7</b>	<b>Oxidizers, incinerators and thermal cleaning plants .....</b>	<b>36</b>
<b>14.8</b>	<b>Alcohol dosing devices.....</b>	<b>36</b>
<b>14.9</b>	<b>Washing equipment for printing plates.....</b>	<b>36</b>
<b>14.10</b>	<b>Prepress machinery .....</b>	<b>36</b>
<b>Annex A</b>	<b>(informative) Hazards associated with printing press systems.....</b>	<b>37</b>
<b>Annex B</b>	<b>(informative) Protection zones against explosion.....</b>	<b>40</b>
<b>Annex C</b>	<b>(informative) Emission levels of sheet-fed presses resulting from tests conducted in Europe.....</b>	<b>43</b>
<b>Bibliography</b>	<b>.....</b>	<b>49</b>

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

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

This second edition of ISO 12643-2 constitutes a technical revision of the first edition (ISO 12643-2:2007). Significant changes incorporated into this second edition include, but are not limited to, the following:

- inclusion of prepress equipment;
- requirements for performance levels (PL) or safety integrity levels (SIL) as defined in the current version of ISO 13849-1 and IEC 62061, respectively;
- addition of requirements for printing plate changes;
- addition of requirements for emergency stop on auxiliary draw nips.

It is the intent of ISO/TC 130 that both the first and second editions of ISO 12643-2 be applicable until 2011-12-31. ISO 12643-2:2007 is thus provisionally retained until this date.

As from 2012-01-01, ISO 12643-2:2010 will cancel and replace ISO 12643-2:2007. Accordingly, as from 2012-01-01, only ISO 12643-2:2010 will be applicable to new equipment manufactured.

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: Prepress and press equipment and systems*
- *Part 3: Binding and finishing equipment and systems*
- *Part 4: Converting equipment and systems*
- *Part 5: Stand-alone platen presses*

## 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 harmonize the requirements of all countries, recognizing that national standards or laws may dictate national requirements. In cases where it was known that there is a national requirement that differs from this part of ISO 12643, that has been noted.

This part of ISO 12643 was developed to harmonize the requirements of the following US 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*

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

## Part 2: Prepress and press equipment and systems

### 1 Scope

This part of ISO 12643 provides safety requirements specific to prepress and press equipment and systems. It is intended to be 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 prepress and 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, *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, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

IEC 62061, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

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*

### 3 Terms and definitions

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

#### 3.1 access height

(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)

NOTE 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

EXAMPLE 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 machine

machine used in commercial/industrial applications where the printing image is produced in the machine from data stored in digital form and transferred to the substrate without the use of a printing plate

NOTE This includes digital printing presses and wide-format ink jet printing devices.

#### 3.10 draw roller

power-driven roller that pulls a substrate

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**3.11****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

**3.12****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.

**3.13****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

**3.14****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

**3.15****powder-spraying device**

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

**3.16****prepress equipment**

machines used in the first stage of the graphic technology workflow, prior to printing, that include all the operations necessary for the preparation of images and image carriers

NOTE Adapted from ISO 12637-1.

**3.17****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

**3.18****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

**3.19****printing table**

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

**3.20****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 plate is mounted in the production machine

**3.21**

**reel rewinding device**

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

**3.22**

**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

**3.23**

**reel unwinding device**

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

**3.24**

**screen frame**

device for taking up the printing screen

**3.25**

**screen printing press**

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

**3.26**

**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

**3.27**

**speed limit**

control that, when activated, prevents acceleration of machine motion

**3.28**

**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, etc.

**3.29**

**washing equipment for printing plates**

machines for washing printing plates outside the printing press

EXAMPLE      Screen washing equipment.

**3.30**

**web-fed press**

press in which a substrate passes through the printing couple(s) in a continuous form, as fed from a roll

**3.31**

**web-type material**

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

## **4 Conformity with this part of ISO 12643**

In order to claim conformity with this part of ISO 12643, all equipment manufactured as of 2012-01-01 shall be in accordance with this second edition of ISO 12643-2 rather than ISO 12643-2:2007.

## 5 Equipment subject to requirements

### 5.1 General

This part of ISO 12643 is applicable to the equipment listed in 5.2 to 5.4. This equipment may be used in a stand-alone configuration, or in combination with other machines affected by an integrated control system. This may include combinations of the machines noted below.

**NOTE** This part of ISO 12643 is intended to include the wide range of equipment used in the printing process. The equipment listed in 5.2 to 5.4 provides examples of the more typical equipment covered by this part of ISO 12643, but is not all-inclusive.

### 5.2 Prepress equipment

The following prepress equipment is covered by this part of ISO 12643:

- a) exposure equipment for the production of films and printing formes;
- b) equipment for developing films and printing formes;
- c) washing machines for printing formes;
- d) machines for bending printing formes;
- e) punching machines for film and printing plates;
- f) cutting machines for film and printing formes;
- g) machines for the production of gravure printing formes;
- h) scanners;
- i) proofing presses.

### 5.3 Printing presses and coating/varnishing machines

The following are machines used for printing by various processes and are covered by this part of ISO 12643:

- a) relief (letterpress, flexographic);
- b) offset (lithographic);
- c) sheet-fed printing presses, including coating/varnishing machines;
- d) web-fed rotary presses, including coating/varnishing machines and similar machinery;
- e) gravure (rotogravure, intaglio);
- f) screen printing;
- g) digital printing machines (electrostatic, ink jet, thermal, airbrush, etc.), including sheet-fed digital printing machines, web-fed digital printing machines, wide-format ink jet machines and similar machinery;
- h) combination presses (e.g. offset/flexo/screen).

#### 5.4 Other equipment covered by this part of ISO 12643

In addition to the equipment listed above, the following equipment is also covered by this part of ISO 12643:

- a) washing equipment for cylinders and rollers;
- b) washing equipment for printing plates, rollers and scrapers;
- c) varnishing equipment;
- d) powder-spraying devices;
- e) alcohol dosing devices;
- f) imprinting/addressing/numbering equipment;
- g) automatic plate-clamping devices, automatic pile-handling equipment;
- h) washing equipment;
- i) inserting machines;
- j) pile turners, reel turners, elevators;
- k) dryers/pollution control, including continuous-flow drying devices, ultraviolet curing, infrared drying, electron beam, hot air, etc.;
- l) radiation equipment;
- m) in-line processing and finishing equipment; [ISO 12643-2:2010](https://standards.iteh.ai/catalog/standards/sist/fe9c6b9c-844f-4d22-8406-7f31d60fe52d/iso-12643-2-2010)
- n) stackers; <https://standards.iteh.ai/catalog/standards/sist/fe9c6b9c-844f-4d22-8406-7f31d60fe52d/iso-12643-2-2010>
- o) palletizers;
- p) bundlers;
- q) coaters;
- r) chilling systems;
- s) electrostatic equipment;
- t) humidifiers;
- u) accumulating or piling-off devices;
- v) conveyors;
- w) unwinding, rewinding, reel transport devices;
- x) measuring and control devices;
- y) auxiliary devices on inking and dampening units.

## 6 Guarding of significant hazards

### 6.1 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 and this part of ISO 12643 apply.

### 6.2 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-adjusting 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, guarding in accordance with ISO 13857 (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.**

### 6.3 Guarding in-running nips

#### 6.3.1 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 PL<sub>r</sub> d of ISO 13849-1 or SIL 2 of IEC 62061 shall be satisfied and the interlocking system shall be designed such that the requirements for stopping paths defined in ISO 12643-1 are satisfied. Trip nip bars and cylinder gaps shall be designed such that cylinder nips cannot be accessed behind trip nip bars, causing a hazard.

To comply with the requirements of ISO 12643-1, the interlocking systems will normally 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.

#### 6.3.2 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:

- the speed shall not exceed 3 m/min;
- the 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.

### 6.3.3 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. For new machines, however, efforts should be made to limit cylinder gaps to 12 mm circumferentials slots.

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.

### 6.3.4 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 plate.

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

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

## 6.4 Interlocks

### 6.4.1 General

Interlocks shall function in accordance with ISO 12643-1.

### 6.4.2 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.

### 6.4.3 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 might be required in order to prevent malfunctions due to dried-up coating or dampening agents.

## 6.5 Hold-to-run controls

### 6.5.1 General

In addition to the requirements of ISO 12643-1, the specific requirements set forth in 6.5.2 and 6.5.3 apply.

### 6.5.2 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 in accordance with ISO 12643-1.

When interlocking guards are opened and all hazards are protected, crawl speed is permitted under the provisions of 6.4.2.

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 possible, the machine may be started under hold-to-run control in accordance with ISO 12643-1, with a maximum speed of 1 m/min or a displacement limited to a maximum of 25 mm.

NOTE 1 Sheet-fed presses usually have non-smooth cylinders with large gaps that are more hazardous than smooth cylinders on web presses.

NOTE 2 Examples of "sheet transport systems" include gripping systems and transport drums.

NOTE 3 For example, direct access is possible where such in-running nips can be reached in the event of a person inadvertently entering a hazardous area, or where nips are located in the immediate vicinity of places where setting-up or cleaning operations need to be performed.

### 6.5.3 Specific requirements for forms presses

In deviation from the requirements for hold-to-run controls specified in 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 when this is required for production reasons and all of the following requirements are met:

- other interlocking guards that cannot be seen from the operating position shall be closed;
- a selector switch shall be used for this kind of operation;
- the 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).

## 6.6 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.

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