DRAFT INTERNATIONAL STANDARD

ISO/DIS 12643-2

ISO/TC **130**

Secretariat: **SAC**

Voting begins on:
2014-05-22

Voting terminates on:
2014-10-22

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

Part 2:
Prepress and 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 préimpression et la presse

ICS: 37.100.10

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 12643-2:2014(E)

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 Safety requirements and/or protective measures 7
6.1 General 7
6.2 Guarding of significant hazards 7
6.3 Interlocks 8
6.4 Hold-to-run controls 9
6.5 Automatic format-setting operations 10
6.6 Additional safeguarding methods for machine devices and components 10

7 Changing of printing plates 24
7.1 General 24
7.2 Automatic printing plate changes 24
7.3 Semi-automatic printing plate changes 25

8 Requirements for protection against other hazards 25
8.1 General 25
8.2 Protection against fire and explosion in continuous-flow devices 25
8.3 Explosion protection exceptions 27
8.4 Spillage from washing devices 27
8.5 Working platforms, access stairs, passageways and raised workplaces 28
8.6 Electrostatic toner dust 28
8.7 Washing equipment for printing plates, rollers and doctor blades 28
8.8 Alcohol dosing devices 29
8.9 Refrigerating devices in ink and dampening units 29
8.10 Powder-spraying devices 29
8.11 Hazardous emissions of sheet-fed presses 29
8.12 Large-format ink jet digital printing machines (wide-format ink jet digital printing machines) 30
8.13 Noise control requirements on web offset printing presses 30
8.14 Dust protection requirements on web offset printing presses 31
8.15 Emergency stop and stop/safe devices at stationary control stands of web offset printing presses 31
8.16 Cableless motion control 31

9 Additional requirements for functions, operations, colours and mechanical specifications of manual control devices 31
9.1 General 31
9.2 Emergency stop and ink, dampening, metering, coating or fountain rollers 31
9.3 Emergency stop on auxiliary draw nips 31
9.4 Alternative controls for stop/safe function on sheet-fed presses 31

9.5 Ready control 32
9.6 Speed limit control 32
9.7 Plate position control 32
9.8 Colours for manual control devices 33

10 Control systems for screen printing presses 33

11 Safety requirements for prepress equipment 33
11.1 Electrical equipment of prepress machinery 33
11.2 Electric/electronic control systems of prepress machinery 33
11.3 Exposing equipment 34
11.4 Safeguarding the discharge of liquids 34
11.5 Safeguarding in-running nips on engraving machines 34
11.6 Safeguarding against copper swarf hazard 34
11.7 Safeguarding bending unit on printing plate bending machines 34
11.8 Safeguarding printing plate punching devices 34

12 Signals and warning devices 34

13 Control zones for web presses having multiple folders 35

14 Verification of safety requirements and/or protective measures 36

15 Contents of instruction handbook 36
15.1 General 36
15.2 Sheet-fed printing press systems 36
15.3 Web-fed printing press systems 36
15.4 Screen printing presses 37
15.5 Automatic cylinder and roller washing device 37
15.6 Continuous-flow drying devices 38
15.7 Oxidizers, incinerators and thermal cleaning plants 38
15.8 Alcohol dosing devices 38
15.9 Washing equipment for printing plates 39
15.10 Prepress machinery 39
15.11 Large –format inkjet digital printing machines 39

Annex A (informative) List of significant hazards 40

Annex B (informative) Emission levels of sheet-fed presses resulting from tests conducted in Europe 44

Bibliography 50

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 third edition of ISO 12643-2 constitutes a technical revision of the second edition (ISO-12643-2:2010). Significant changes incorporated into this third edition include, but are not limited to, the following:

— addition of Clause 8.12 Large-format ink jet digital printing machines (wide-format ink jet digital printing machines)

— addition of Clause 9.2 Emergency stop locations

— addition of Clause 14, Verification of safety requirements and/or protective measures

— addition of Clause 15.11 Information for use in the instruction handbook

— reorganization of clauses to align with requirements in ISO Guide 78, *Safety of machinery – Rules for* drafting and presentation of safety standards.

It is the intent of ISO/TC 130 that there be a transition period between the second and third editions of ISO 12643-2. The user is referred to Clause 4 of this standard for guidance in this area.

As from 2014-01-01, ISO 12643-2:2014 will cancel and replace ISO 12643-2:2010. Accordingly, as from 2014-01-01, only ISO 12643-2:2014 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

This part of ISO 12643 is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope and Clause 5 of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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 requirements for graphic technology equipment and systems — Part 1: General requirements*

— ANSI B65-2, *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 2: Prepress and press equipment and 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*

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 12100, *Safety of Machinery - General Principles for Design - Risk Assessment and Risk Reduction*

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 1 to entry See Figure 1.

3.2
alcohol dosing device
mechanism 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 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 1 to entry This includes digital printing presses and wide-format ink jet printing devices.

3.10
draw roller
power-driven roller that pulls a substrate

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 1 to entry 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 printing machine
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 1 to entry 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 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

3.22
screen frame
device for taking up the printing screen

3.23
screen printing press
machine using printing plates 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
equipment integrated into the printing press for washing cylinders and rollers such as ink rollers, blanket cylinders, printing cylinders, plate cylinders, etc.

3.27
washing equipment for printing plates
machines for washing printing plates outside the printing press

EXAMPLE Screen washing equipment.

3.28
web-fed press
press in which a substrate passes through the printing couple(s) 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

3.30
Stand-alone Large-format digital printing machine (wide-format digital printing machine)
digital printing machine for the commercial production of large-format print products of different materials, such as paper, plastic films/foils, textiles and flat structures in which an ink jet printing head arranged across the transport of the product produces print on the printing substrate line by line. The substrate to be printed on may be sheets or webs.

NOTE 1 to entry Generally these machines have an image area wider than 600 mm

4 Conformity with this part of ISO 12643

In order to claim conformity with this part of ISO 12643, all equipment manufactured as of 2014-01-01 shall be in accordance with this third edition of ISO 12643-2 rather than ISO 12643-2:2010.

NOTE Although this third version of ISO 12643-2 cancels and replaces the second edition (ISO 12643-2:2010), a transition period might be necessary for equipment manufactured prior to 2014-01-01. To meet this need, it is noted that both versions of ISO 12643-1 can be purchased from ISO and its National Bodies.

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:

— exposure equipment for the production of films and printing formes;

— equipment for developing films and printing formes;

— washing machines for printing formes;

— machines for bending printing formes;

— punching machines for film and printing plates;

— cutting machines for film and printing formes;

— machines for the production of gravure printing formes;

— scanners;

— 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:

— relief (letterpress, flexographic);

— offset (lithographic);

— sheet-fed printing presses, including coating/varnishing machines;

— web-fed rotary presses, including coating/varnishing machines and similar machinery;

— gravure (rotogravure, intaglio);

— screen printing;

— 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;

— 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:

— washing equipment for cylinders and rollers;

— washing equipment for printing plates, rollers and scrapers;

— varnishing equipment;

— powder-spraying devices;

— alcohol dosing devices;

— imprinting/addressing/numbering equipment;

— automatic plate-clamping devices, automatic pile-handling equipment;

— washing equipment;

— inserting machines;

— pile turners, reel turners, elevators;

— dryers/pollution control, including continuous-flow drying devices, ultraviolet curing, infrared drying, electron beam, hot air, etc.;

— radiation equipment;

— in-line processing and finishing equipment;

— stackers;

— palletizers;

— bundlers;

— coaters;

— chilling systems;

— electrostatic equipment;

— humidifiers;

— accumulating or piling-off devices;

— conveyors;

— unwinding, rewinding, reel transport devices;

— measuring and control devices;

— auxiliary devices on inking and dampening units.

6 Safety requirements and/or protective measures

6.1 General

Machinery shall comply with the safety requirements and/or protective measures of this subclause. In addition, machinery shall be designed according to the principles of ISO 12100 for relevant but not significant hazards that are not dealt with by this part of ISO 12643.

6.2 Guarding of significant hazards

6.2.1 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.

6.2.2 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.

6.2.3 Guarding in-running nips

6.2.3.1 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 ISO 13849-1, PL d or IEC 62061, SIL 2 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.

6.2.3.2 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.

6.2.3.3 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. 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.

6.2.3.4 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.

6.3 Interlocks

6.3.1 General

Interlocks shall function in accordance with ISO 12643-1.

6.3.2 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.

6.3.3 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.

6.4 Hold-to-run controls

6.4.1 General

In addition to the requirements of ISO 12643-1, the specific requirements set forth in 6.4.2 – 6.4.7 apply.

6.4.2 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 6.3.2.

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.

6.4.3 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).