INTERNATIONAL STANDARD

ISO 12643-1

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

Part 1: General requirements

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

Partie 1: Exigences générales

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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 12643-1 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This first edition of ISO 12643-1, together with ISO 12643-2, cancels and replaces ISO 12648:2006, which has been technically revised. This edition of ISO 12643-1, together with ISO 12643-3, cancels and replaces ISO 12649:2004, 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*

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*;

— ANSI B65.2, *Binding and Finishing Systems*;

— ANSI B65.3, *Safety standard — Guillotine paper cutters, mill trimmers, and integral handling equipment;*

— ANSI B65.4, *Safety standard — Three-knife trimmers, including rotary, and single- and multiple-knife trimmers*;

— 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;*

— EN 1010-3, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 3: Cutting machines;*

— EN 1010-4, *Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 4: Bookbinding, paper converting and finishing machines*.

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

Part 1: General requirements

1 Scope

This part of ISO 12643 provides safety specifications for the design and construction of new machines used in printing press systems and in binding and finishing systems. It includes equipment used in a stand-alone mode, or in combination with other machines, including ancillary equipment, in which all the machine actuators (e.g. drives) of the equipment are controlled by the same control system.

The requirements listed in this part of ISO 12643 are applicable to the equipment covered by all parts of ISO 12643, unless otherwise noted. Requirements specific to press and binding and finishing equipment and systems, that are not included in this part of ISO 12643, are given in ISO 12643-2 and ISO 12643-3, respectively.

This part of ISO 12643 addresses recognized hazards specific to equipment and systems in the following areas:

— mechanical;

— electrical;

— slipping, tripping, falling;

— ergonomics;

— noise;

— radiation;

— fire and explosion;

— thermal;

— other emissions.

It is advisable that technologies not identified in this part of ISO 12643 incorporate the safety principles set forth herein in their design.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8031, *Rubber and plastic hoses and hose assemblies — Determination of electrical resistance*

ISO 11553-1, *Safety of machinery — Laser processing machines — Part 1: General safety requirements*

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

ISO 11689, *Acoustics — Procedure for the comparison of noise-emission data for machinery and equipment*

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

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

ISO 12643-2:2007, *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 2: Press equipment and systems*

ISO 12643-3:—[1)], *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 3: Binding and finishing equipment*

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

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

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

ISO 13851, *Safety of machinery — Two-hand control devices — Functional aspects and design principles*

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

ISO 13854, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

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

ISO 13856-1, *Safety of machinery — Pressure-sensitive protective devices — Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors*

ISO 14119:1998, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

ISO 14120, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

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1) To be published.

ISO 14122-1, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of a fixed means of access between two levels*

ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

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

ISO/TR 15847:— [2], *Graphic technology — Graphical symbols for printing press systems and finishing systems, including related auxiliary equipment*

IEC 60079-1, *Electrical apparatus for explosive gas atmospheres — Part 1: Flameproof enclosures "d"*

IEC 60079-2, *Electrical apparatus for explosive gas atmospheres — Part 2: Pressurized enclosures "p"*

IEC 60079-5, *Electrical apparatus for explosive gas atmospheres — Part 5: Powder filling "q"*

IEC 60079-6, *Electrical apparatus for explosive gas atmospheres — Part 6: Oil-immersion "o"*

IEC 60079-7, *Explosive atmospheres — Part 7: Equipment protection by increased safety "e"*

IEC 60079-11, *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-14, *Electrical apparatus for explosive gas atmospheres — Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60079-18, *Electrical apparatus for explosive gas atmospheres — Part 18: Construction, test and marking of type of protection encapsulation "m" electrical apparatus*

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60825-1, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide*

IEC 60947-2, *Low-voltage switchgear and controlgear — Part 2: Circuit-breakers*

IEC 60947-3, *Low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-5-1, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements*

IEC 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals*

IEC 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking*

IEC 61310-3, *Safety of machinery — Indication, marking and actuation — Part 3: Requirements for the location and operation of actuators*

IEC 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests*

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2) To be published.

IEC 61496-2, *Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs)*

EN 1127-1, *Explosive atmosphere — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 1760-2, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

EN 12198-1:2000, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 1: General principles*

EN 13023, *Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy categories 2 and 3*

NFPA 79 [3], *Electrical Standard for Industrial Machinery*

3 Terms and definitions

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

3.1
actuator
part of the actuating system to which an external actuating force is applied

[IEV 441-15-22][24]

NOTE 1 The actuator can take the form of a handle, knob, pushbutton, roller, plunger, trip wire, pressure-sensitive mat, etc.

NOTE 2 There are some actuating means that do not require an external actuating force, but only an action; e.g. light beams. Such actuating means are not considered to be actuators.

3.2
armed condition
machine status in which machine motion can be automatically initiated

NOTE **Zero speed** (3.64) can be considered to be an armed condition.

3.3
audible alarm
horn, bell or other distinctive audible warning device that sounds to indicate impending machine motion

3.4
authorized person
person identified by management as having special training or designated to act in specified situations

NOTE Examples of “specified situations” include:

— special tasks to be performed;

— the function of the adjustments in the work zone;

— proper operation of adjustments and controls;

3) Available from National Fire Protection Agency, Batterymarch Park, Quincy, Massachusetts, USA 02169-7471; www.nfpa.org.

— all types of hazards in the area where the task is to be performed;

— the application of equivalent, alternative protection to perform the task;

— improper actions that can cause injury and the consequences of those improper actions.

3.5
auxiliary device
mechanism or machine, either built-in or attached, used for the production process

3.6
barrier guard
guard (3.21) that reduces or prevents physical access to a hazard zone by closing off access to an area containing one or more hazards

EXAMPLE A perimeter fence or tunnel guard.

3.7
binding and finishing system
combination of machines functioning in an integrated configuration to turn an incomplete printed product into a finished product by means of one or more processes, such as cutting, folding, binding, stitching, gluing, wrapping, etc.

3.8
Category 0 stop
uncontrolled stop
stopping by immediate removal of power to the **machine actuators** (3.29)

[IEC 60204-1]

3.9
Category 1 stop
controlled stop with power available to the **machine actuators** (3.29) to achieve the stop and then removal of power when the stop is achieved

[IEC 60204-1]

3.10
Category 2 stop
controlled stop with power left available to the **machine actuators** (3.29)

[IEC 60204-1]

3.11
continuous run
machine motion at a steady speed initiated by a momentary-contact control

3.12
control station
defined location containing one or more controls

3.13
control zone
control configuration of single or multiple machine motions using the same control devices

NOTE See Clause 8.

3.14
drive
mechanism, divided into the following two general categories, which causes a machine or any of its elements to move:

— drives with no stored energy, which include, but are not limited to, direct-motor drives;

— drives having stored energy, which include, but are not limited to, motor-flywheel-clutch drives and hydraulic-pneumatic drives

3.15
electrical hazard
source of potential injury or death from electric shock or burn

NOTE Adapted from ISO 12100-1:2003.

3.16
electro-sensitive protective device
ESPD
apparatus that detects the presence of a person or part of a person or object in a defined area, using any detection means including, but not limited to, photoelectric, light screen, ultrasonic, etc.

3.17
emergency stop device
manually actuated control used to initiate an **emergency stop function** (3.18)

NOTE Adapted from ISO 13850:1996.

3.18
emergency stop function
mechanism activated by a single human motion and intended to halt machine activity in order to avoid injury to persons, damage to machinery or damage to work in progress

3.19
exposing device
machinery used for creating images by exposing photo-sensitive material such as printing plates or printing formes

3.20
fixed guard
guard (3.21) that is securely affixed by fasteners that require a tool(s) to remove in order to gain access to an area with a significant hazard

3.21
guard
physical barrier that restricts access to a significant hazard

3.22
hazard point
location of a hazard on a machine where a person can be injured

3.23
hazard zone
any area within and/or around machinery in which a person is exposed to risk of injury or damage to health

NOTE Adapted from ISO 12100-1:2003.

3.24
hold-to-run control
control that starts and maintains machine motion only as long as the control is activated

3.25
inch
jog
〈operation of machinery〉 machine motion requiring maintained activation engagement of a hold-to-run control and which will continue until the control is released or until a pre-determined displacement (limited inch) has been reached

3.26
infrequently used workplace
area in which an activity is carried out, such as observation, make-ready, jam clearing, minor servicing, crossing inserting hoppers or conveyer belts, etc., that is routine, repetitive, integral to (but not necessarily during) production, and done only on an occasional basis

3.27
in-running nip
in-going nip
area created either by two rotating components that are rotating inward, or by one component rotating toward an adjacent surface

See Figure 1.

NOTE Rollers rotating in the same direction do not create a hazardous in-running nip if the rollers have the same surface characteristics and circumferential speeds.

a) Two counter-rotating rolls **b) Two rolls rotating in the same direction at different speeds** **c) Two rolls rotating in the same direction, but with different surface properties (friction)** **d) One rotating roll and an adjacent fixed object** **e) Belt, chain or web which is driving, or being driven by, a roll**

Figure 1 — In-running nips

3.28
interlock
〈for safeguarding〉 arrangement that interconnects guard(s) or device(s) with the control system and/or all or part of the electrical energy distributed to the machine

[IEC 60204-1]

3.29
machine actuator
power mechanism used to affect motion of a machine

[ISO 13850:1996]

3.30
maintained-contact control
control that remains in an open or closed state after its activation

3.31
maintenance
operation(s) required to assure that the machine remains in acceptable operating condition and that is/are usually performed when the machine is not available for production

NOTE Maintenance (for example, repairing or replacing broken, worn or damaged parts; performing lubrication; preventive servicing) is normally performed by qualified maintenance personnel, or operators, who have been trained about the types of hazards in the area in which their tasks are to be performed and about how these hazards can be avoided. Such maintenance is generally performed with energy isolated, when possible.

3.32
make-ready
tasks preceding a production run, such as adjusting ink controls for proper colour, plate alignment for proper registration, adjusting pressures, measurement with quality control devices, etc.

3.33
manual control device
mechanism comprising part of the actuating system to which a manual action is applied

NOTE Adapted from IEV 441-15-22[24].

3.34
mechanical hazard
source of potential injury to a person created by motion of machinery, components or material

EXAMPLES Crushing and shearing points; trapping points; in-running nips; cutting, punching and impact points; gear, chain and worm drives; V-belt, flat belt, cord and rope drives; pulling and supporting elements on continuous conveyors; spoke wheels and fly wheels; shafts and shaft ends; rollers; slides; push rods and similar parts, tools and clamping devices.

3.35
momentary-contact control
control that is opened or closed only during its actuation

3.36
motion control
control that initiates machine movement or movement at **zero speed** (3.64), or places the machine in the **armed condition** (3.2)

3.37
motion-control station
station that contains a **motion control** (3.36)

3.38
motion zone
area defined by any machine component, or group of machine components, which is driven directly by the system drive motor(s) or **machine actuator**(s) (3.29), or indirectly by other means

3.39
movable control station
control station that is permanently wired to the equipment, but which can be moved within a range limited by the length of the attached cable

3.40
movable guard
guard (3.21) that does not require a tool to move or remove it to gain access to a significant hazard

3.41
nip guard
guard (3.21) located at an in-going nip

EXAMPLES Nip bar, finger bar, finger guard.

3.42
normal operation
usual functioning and conditions that exist during set-up, make-ready, production and minor servicing, adjusting and cleaning performed by operators, but not including **maintenance** (3.31) operations

3.43
operating position
location where normal functions (make-ready and other routine, repetitive tasks) requiring control of the main drive motor(s) are performed

3.44
permissive period
time interval during which machine motion can be initiated

NOTE See 13.2.3.

3.45
personnel warning light
red or green light used to indicate the ready, running and safe conditions of the machine relative to personnel safety

NOTE These lights are not the same as machine **status lights** (3.57).

3.46
portable control station
control station that can be disconnected from one location, moved to another location and be reconnected

NOTE This is not the same as a **remote control** (3.51).

3.47
positive mechanical action

linkage of one component with another component such that movement of the former inevitably compels movement of the latter, either by direct contact or by a rigid connection

NOTE 1 This definition also applies to a component that prevents any movement of another component by virtue of its presence.

NOTE 2 When the movement of one mechanical component simply allows another component to move freely (e.g. by gravity, spring force, etc.), there is no positive mechanical action of the former component on the latter.

3.48
positive opening
contact separation as the direct result of a specified movement of the **actuator** (3.1) through non-resilient members, e.g. those not dependent on springs

3.49
raised workplace
area where functions are regularly performed, and are at least 0,5 m above access level

3.50
ready condition
status of a machine in which motion can be initiated by the operator

3.51
remote control
access connection to one or more control stations of a machine by use of an external communication link

NOTE This is not the same as **portable control station** (3.46).