

Second edition
2023-11

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

Part 4: Converting equipment and systems

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

Partie 4: Systèmes et équipement de façonnage



Reference number
ISO 12643-4:2023(E)

© ISO 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

Contents

	Page
Foreword.....	viii
Introduction.....	x
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
4 Significant hazards.....	8
5 Equipment and interrelation between this document and ISO 12643-1:2023.....	8
5.1 General.....	8
5.2 Machines used primarily in a converting operation.....	8
5.3 Machines used in both printing and converting processes.....	8
6 Machinery for the production of corrugated board.....	9
6.1 All machines.....	9
6.1.1 Emergency stop.....	9
6.1.2 Control zones with stop/safe pushbuttons.....	9
6.1.3 Steam pipes.....	10
6.2 Unwinding stations.....	10
6.2.1 General.....	10
6.2.2 Chucking cones and lifting arms.....	10
6.2.3 Braking systems.....	10
6.3 Splicers.....	10
6.3.1 Guarding hazard points.....	10
6.3.2 Dancer roller.....	11
6.3.3 Splicers.....	11
6.3.4 Knife.....	12
6.3.5 Pneumatic and hydraulic control systems.....	12
6.3.6 Frame edges.....	12
6.3.7 Splicers in elevated positions.....	12
6.3.8 Warning lights.....	12
6.4 Preheater.....	12
6.4.1 In-running nips.....	12
6.4.2 In-running nips between preheating cylinder and cross beams.....	13
6.4.3 Wrap roller and rotating arms.....	13
6.4.4 Hot surfaces.....	14
6.4.5 Walkways.....	14
6.5 Single facer.....	14
6.5.1 In-running nips.....	14
6.5.2 Corrugating rollers.....	15
6.5.3 Hazard points during roller change.....	15
6.5.4 In-running nip between pressure roller or pressing belt and corrugating roller.....	15
6.5.5 Pressing belt breakage.....	16
6.5.6 Walkway.....	16
6.5.7 In-running nips between glue rollers.....	16
6.5.8 Hazard points between movable gluing unit and fixed machine parts.....	17
6.5.9 Moveable glue units.....	17
6.5.10 Inclined belt conveyor.....	18
6.5.11 In-running nips between pulleys and fixed machine parts.....	19
6.5.12 Steam pipes.....	19
6.5.13 Warning signs.....	19
6.5.14 Noise enclosures.....	19
6.6 Bridge.....	19
6.6.1 Slots.....	19

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

6.6.2	Fall-off protection.....	19
6.6.3	Access stairs.....	19
6.6.4	Passage height underneath the bridge.....	20
6.7	Braking and web aligning systems.....	20
6.8	Gluing machine.....	20
6.8.1	Steps and handles.....	20
6.8.2	Hazard points.....	20
6.8.3	Pressing device.....	20
6.9	Heating and pulling section.....	20
6.9.1	In-running nips.....	20
6.9.2	Hazard points.....	21
6.9.3	Heating plates.....	21
6.9.4	Preventing the weighting device from falling.....	21
6.9.5	Web threading in the heating section.....	21
6.10	Transition point from gluing machine to heating and pulling section.....	23
6.11	Rotary shear unit.....	23
6.11.1	Rotary shear.....	23
6.11.2	Knife driving shaft.....	23
6.11.3	Guarding a non-powered movement of the rotary shear.....	23
6.11.4	Waste removal.....	23
6.12	Pulling unit.....	23
6.13	Slitter-scorer units.....	24
6.13.1	Automatic positioning.....	24
6.13.2	Movement of slitting and scoring units under hold-to-run control.....	24
6.14	Web diverter.....	24
6.15	Cut-off.....	25
6.16	Stacker devices.....	25
6.16.1	Whole-body access.....	25
6.16.2	Guarding of downstackers.....	26
6.16.3	Maintenance and inspection.....	28
6.16.4	Guarding of upstackers.....	29
6.16.5	Roller conveyors.....	30
7	Folder gluer machines.....	30
7.1	Entire machine.....	30
7.1.1	Emergency stop.....	30
7.1.2	Power-driven shafts.....	30
7.1.3	Power-driven format setting.....	30
7.1.4	Reaching of hazard points between format-limiting parts.....	31
7.2	Feeder.....	31
7.3	Folding section.....	31
7.3.1	Roller tracks.....	31
7.3.2	Folding hooks.....	32
7.4	Gluing section.....	33
7.5	Folding belts.....	33
7.6	Pressure rollers.....	34
7.6.1	In-running nips between pressure rollers in the area between machine frame and format-limiting parts.....	34
7.6.2	In-running nips between pressure rollers in the area between format-limiting parts.....	34
7.7	Ejection module.....	35
7.8	Pressing and gathering device (pressing band).....	35
7.8.1	Pulleys.....	35
7.8.2	Pressure rollers.....	35
8	Pre-feeders.....	36
8.1	Feeding and transfer bridge.....	36
8.2	All pre-feeders with pile carrier plate.....	36
8.2.1	Opening for pallet movement.....	36

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

8.2.2	Guarding on feeding and transfer bridges	37
8.2.3	Rotating shafts	37
8.2.4	Guarding hazards created by automatic format setting	37
8.2.5	Guarding hazards when moving pre-feeder	37
8.3	Pre-feeder with pile turner	37
8.3.1	Opening for pallet movement	37
8.3.2	Guarding on feeding and transfer bridge	38
8.3.3	Guarding transport belts	38
8.3.4	Guarding hazards created by automatic format setting	38
8.3.5	Guarding hazards when moving pre-feeder	38
9	In-line machines	40
9.1	Entire machine	40
9.1.1	Moving units together	40
9.1.2	Separating units	41
9.1.3	Rotary tools on separated units	41
9.1.4	Travel wheels	41
9.2	Feeding unit	41
9.2.1	Slide-in rollers	41
9.2.2	Side aligning devices	41
9.2.3	Hopper side lays	41
9.2.4	Feed rollers	41
9.3	Printing unit	42
9.3.1	Rotating rollers and drive elements	42
9.3.2	Separated units	42
9.3.3	Guarding of rollers	43
9.4	Slitter-scoring unit, rotary die-cutter	43
9.4.1	Automatic format setting	43
9.4.2	Waste removal	43
9.4.3	Waste discharge conveyor belts	43
9.5	Separators	44
9.6	Folding unit (folding box gluer)	44
9.7	Taping unit	44
9.8	Stitching unit	44
10	Automatic flatbed die-cutting machines	44
10.1	Entire machine	44
10.1.1	Tool	44
10.1.2	Automatic die-cutting devices	44
10.2	Punching section	45
10.2.1	Hazard points between sheet feeding grippers and feeding table	45
10.2.2	Die-cutting tools	45
10.3	Breaking section	45
10.4	Blank separating section, blank delivery	45
10.4.1	Guarding sheet gripper from unintentional hand access	45
10.4.2	Area below blank separating section, blank delivery	45
10.5	Trimming and delivery of gripper edge	54
11	Roller press die-cutters	54
12	Tube winding machines	54
12.1	Ply reels	54
12.2	In-running nip between winding belt and winding mandrel	54
12.3	In-running nips on shaft bearings	56
12.4	In-running nips	56
12.5	Tube cutting and sawing section	57
12.6	Tube transfer	57
13	Machinery for the production of envelopes	57
13.1	Emergency stop device	57
13.2	Interlocks	57

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

13.2.1	Interlocking with guard locking.....	57
13.2.2	Requirements regarding the unlocking of interlocking guards with guard locking.....	58
13.3	Printing unit guarding.....	58
13.4	Form cutting section.....	59
13.5	Driven guide rollers.....	59
13.5.1	Guarding in-running nips.....	59
13.5.2	Delivery side guards.....	59
13.6	Window cutting section.....	59
13.7	Scraper gluing unit.....	59
13.8	Separating cutting section.....	59
13.9	Bottom flap folding section.....	59
13.10	Transport rolls.....	60
13.11	Staggering wheel.....	60
13.11.1	Guarding staggering wheel hazards.....	60
13.11.2	Guarding in-running nips between paper guide supports and staggering wheel.....	60
13.12	Roller gluing unit.....	60
13.12.1	Guarding in-running nips.....	60
13.12.2	Feeding aperture.....	60
13.13	Separation roller before aligner section.....	61
13.14	Seal flap folding section.....	62
13.15	Separating disc delivery.....	62
13.16	Starting the machine with interlocking guards open.....	62
14	Handkerchief machines.....	63
14.1	Emergency stop devices.....	63
14.2	Starting the machine with interlocking guards open.....	63
14.3	Star-type unwinding (Turret unwinding).....	63
14.4	Longitudinal folding section.....	64
14.5	Product inspection station.....	64
14.6	Ejection.....	64
14.7	Packing station.....	64
15	Noise.....	64
16	Verification of the safety requirements and/or protective/risk reduction measures.....	64
17	Instruction handbook.....	70
17.1	General.....	70
17.2	Corrugated board machinery.....	70
17.2.1	Threading paper web.....	70
17.2.2	Residual risks relating to hot parts.....	70
17.2.3	Hearing protection.....	70
17.2.4	Tubes used for material reels.....	70
17.2.5	Residual risks on conveyor belts.....	70
17.2.6	Warning for hot surfaces.....	70
17.2.7	Instructions for use of personal protection equipment when changing knives.....	70
17.2.8	Instructions for mechanical device on downstackers and upstackers.....	70
17.2.9	In-line machines.....	71
17.2.10	Instructions for personal protection equipment when working with hot surfaces.....	71
17.3	Folding box gluers.....	71
17.4	Machines for the production of envelopes.....	71
17.4.1	General.....	71
17.4.2	Dosing and ductor rollers.....	71
17.5	Machines for the production of handkerchiefs.....	71
17.5.1	Fault-finding and trouble-shooting by means of stroboscopes.....	71
17.5.2	Hot parts.....	71

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

17.6 Noise	72
Annex A (informative) List of significant hazards	73
Annex B (informative) Example of a noise declaration for a paper converting machine according to the specifications of EN 13023:2003+A1:2010, ISO 12643-1:2023 and this document	78
Bibliography	79

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 198, *Printing and paper machinery — Safety*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 12643-4:2010), which has been technically revised.

The main changes are as follows:

- in [Clause 3](#), terms and definitions, in particular concerning corrugated board machinery, have been added;
- a new [Clause 4](#) has been added and subsequent clauses have been renumbered;
- throughout the document, requirements related to hazards dealt with in ISO 12643-1:2023 have been deleted (e.g. Safeguarding automatic reel loading in [6.2](#));
- in [Clause 6](#), the requirements for machinery for the production of corrugated board, e.g. terminological amendments, has been revised;
- [Figure 14](#) has been updated;
- in [6.3.3](#), the description of measures to safeguard the movable splicer module have been revised;
- in [6.8.2](#), an exception to the continued running of glue rollers in the gluing unit in case of an emergency stop has been added;
- in [6.16.1](#), limitation of the speed of the conveyor belt to 45 m/min, if access is required for production reasons, has been specified;

This is a preview of ISO 12643-4:2023. [Click here to purchase the full version from the ANSI store.](#)

- [Clause 7](#) has been revised;
- in [Clause 8](#), the requirement to safeguard entry into the pile carrier plate with ESPDs has been amended;
- in [9.2.4](#), requirement for residual pile monitoring as safety device set to PL d / SIL 2, and a figure showing the safeguarding of hazard points outside the sidelays on feeders has been added;
- in [Clause 10](#), requirements on safeguarding the delivery on automatic flatbed die-cutting machines (sheet gripper system, analog ISO 12643-2:2023) have been added;
- in [Clause 13](#), a subclause on requirements for interlocks has been added;
- [Clause 14](#), which is also applicable to machinery for the production of interfolded facial tissues, has been added (taken and adapted from EN 1010-5);
- a new [Clause 15](#) has been added;
- in [Clause 16](#), a table on the verification of the safety requirements and/or protective/risk reduction measures has been added;
- a new [Annex A](#) with a list of significant hazards has been added;
- in [Annex B](#), an example of noise declaration for paper converting machines has been added.

This document is intended to be used in conjunction with ISO 12643-1:2023.

A list of all parts in the ISO 12643 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is a type-C standard as stated in ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e. g. trade unions, organizations for people with special needs);
- service providers, e. g. for maintenance (small, medium and large enterprises);
- consumers (in the case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

The purpose of this document is to reduce the risk of injury to operating personnel working on converting equipment.

During the development of this document, existing relevant standards of other countries were taken into consideration. In cases where it was known that there is a national requirement that differs from this document, that has been noted.

This document was developed to harmonize the following US and European safety standards:

- ANSI/PMMI B155.1^[8]
- EN 1010 4^[9]
- EN 1010-5^[10]

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.

The full set of requirements for graphic technology equipment and systems are those given in the part of ISO 12643 applicable to that type, together with the relevant requirements from ISO 12643-1:2023, to the extent specified in the Scope of the applicable part of ISO 12643.

This document supplements and modifies the general requirements of ISO 12643-1:2023. Where a requirement of this document conflicts with a requirement of ISO 12643-1:2023 the requirement of this document will take precedence.