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

**Part 1:
General requirements**

iTeh STANDARD PREVIEW
*Technologie graphique — Exigences de sécurité pour les systèmes et
l'équipement de technologie graphique —
(standards.iteh.ai)
Partie 1: Exigences générales*

ISO 12643-1:2009

<https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 12643-1:2009

<https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction.....	vi
1 Scope	1
2 Normative references	2
3 Terms and definitions	4
4 Conformity with this part of ISO 12643	11
5 Risk assessment	11
6 Guarding of significant hazards	12
6.1 General	12
6.2 Guards	12
6.3 In-running (in-going) nips.....	16
6.4 Guarding in-running nips	17
6.5 Interlocks.....	20
6.6 Hold-to-run controls.....	23
6.7 Other safeguarding measures	24
6.8 Guarding reel unwinding, rewinding and transport devices	25
6.9 Threading of web material.....	28
6.10 Feeding units, delivery units (pile lifting and lowering devices).....	28
7 Requirements for protection against other hazards.....	33
7.1 General	33
7.2 Fire and explosion	33
7.3 Electrical equipment	34
7.4 Working platforms, access stairs, passageways and raised workplaces.....	36
7.5 Stability.....	39
7.6 High contact temperatures	40
7.7 Noise.....	41
7.8 Radiation hazards.....	41
7.9 Stationary knives	42
7.10 Rotary tools.....	42
7.11 Transport and storage of hazardous tools	42
7.12 Protruding machine parts.....	42
7.13 Handwheels and cranks.....	42
7.14 Routine handling of heavy machine parts	43
7.15 Oxidizers, incinerators or thermal cleaning plants.....	43
7.16 Protection against crushing and shearing hazards.....	43
7.17 Contact with hazardous substances	44
8 Release from hazardous situation	45
9 Control zones.....	45
9.1 General	45
9.2 Purpose of zone configuration	45
9.3 Motion-control stations in control zones.....	45
10 Controls	46
10.1 General	46
10.2 Manual control devices.....	46
10.3 Initiating machine motion	54
10.4 Hold-to-run controls	54
10.5 Two-hand controls	55

10.6	Electro-sensitive protective devices	55
10.7	Pressure-sensitive mats, pressure-sensitive bumpers, trip devices	55
10.8	Braking devices and clutches	56
11	Control stations	57
11.1	Motion-control stations	57
11.2	Remote access	58
12	Control systems	61
12.1	Hydraulic, pneumatic, electric and electronic control systems	61
12.2	Electronic adjustable speed drives	62
12.3	Cut-off of main energy source	62
12.4	Residual-pile monitoring systems	62
12.5	Unobserved unguarded hazard zones	63
12.6	Cableless controls	63
12.7	Additional requirements for hand-fed machines	63
13	Ergonomics and labelling of indicators and actuators	64
14	Signals and warning devices	64
14.1	General	64
14.2	Audible warning system	64
14.3	Area-light warning system	67
15	Safety signs and labels	67
15.1	General	67
15.2	Specific requirements for machine markings	68
16	Contents of instruction handbook	68
16.1	General	68
16.2	Machines using flammable liquids	69
16.3	Machines with cutting knives	69
16.4	Handling heavy machine parts	69
16.5	Machines with automatic paper loading	70
16.6	Residual risks using ESPDs	70
16.7	Pile turners and reel turners	70
16.8	Pile carriers	70
16.9	Residual risk for hold-to-run speeds of above 10 m/min under two-hand control	70
16.10	Use of stroboscopes	70
Annex A	(informative) Risk analysis relating to the pitch angle of access stairs	71
Annex B	(informative) Noise	73
Annex C	(normative) Area-light warning system	75
Annex D	(informative) Example layout of instruction handbooks	77
Bibliography	79

ITC STANDARD PREVIEW

(standards.itech.ai)

ISO 12643-1:2009

[https://standards.itech.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-](https://standards.itech.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009)

[4e8593078528/iso-12643-1-2009](https://standards.itech.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009)

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 second edition of ISO 12643-1 constitutes a technical revision of the first edition (ISO 12643-1:2007). Significant changes incorporated into this second edition include, but are not limited to, the following:

- addition of prepress systems, converting equipment and systems, and stand-alone platen presses to the Scope;
- requirements for performance levels (PL) or safety integrity levels (SIL) as defined in the current version of ISO 13849-1 and IEC 62061, respectively;
- additional requirements for fixed guards;
- additional requirements for interlocking with guard locking;
- additional requirements for hydraulic, pneumatic, electric and electronic control systems.

It is the intent of ISO/TC 130 that both the first and second editions of ISO 12643-1 be applicable until 2010-12-31. ISO 12643-1:2007 is thus provisionally retained until this date.

As from 2011-01-01, ISO 12643-1:2009 will cancel and replace ISO 12643-1:2007. Accordingly, as from 2011-01-01, only ISO 12643-1:2009 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*

Requirements specific to printing prepress and press equipment and systems, binding and finishing equipment and systems, converting equipment and systems and stand-alone platen presses that are not included in this part of ISO 12643, are given in subsequent parts of ISO 12643 that contain additional requirements specific to that type of 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 requirements of the following U.S. and European safety standards:

- ANSI B65.1, *Graphic technology — Safety standard — Printing press systems*;
- ANSI B65.2, *Graphic technology — Safety requirements for binding and finishing systems and equipment*;
- 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*;
- ANSI B65.5, *Safety standard — Stand-alone platen presses*;
- 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 equipment used in prepress systems, printing press systems, binding and finishing systems, converting systems and stand-alone platen presses. It is applicable to equipment used in 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 given in this part of ISO 12643 are applicable to the equipment covered by all parts of ISO 12643, unless otherwise noted. This part of ISO 12643 is intended to be used in conjunction with the applicable part of ISO 12643 that contains additional requirements specific to a particular type of equipment.

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

- mechanical; <https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009>
- electrical;
- slipping, tripping, falling;
- ergonomics;
- noise;
- UV and laser radiation;
- fire and explosion;
- thermal;
- other types of emissions [e.g. ozone, ink mist, volatile organic compounds (VOCs), etc.].

The safety principles established in this part of ISO 12643 can also be applicable to the design of equipment within areas of technology that are not specified in ISO 12643.

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 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 3864-2, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 3864-3, *Graphical symbols — Safety colours and safety signs — Part 3: Design principles for graphical symbols for use in safety signs*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Safety signs used in workplaces and public areas*

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

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

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

ISO 12643-4, *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 4: Converting equipment and systems*

ISO 12643-5, *Graphic technology — Safety requirements for graphic technology equipment and systems — Part 5: Stand-alone platen presses*

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

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

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

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*

ISO 14121-1, *Safety of machinery — Risk assessment — Part 1: Principles*

ISO 14122-1, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of 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, *Graphic technology — Graphical symbols for printing press systems and finishing systems, including related auxiliary equipment*

IEC 60079-1, *Explosive atmospheres — Part 1: Equipment protection by flameproof enclosures “d”*

IEC 60079-2, *Explosive atmospheres — Part 2: Equipment protection by pressurized enclosures “p”*

IEC 60079-5, *Explosive atmospheres — Part 5: Equipment protection by powder filling “q”*

IEC 60079-6, *Explosive atmospheres — Part 6: Equipment protection by 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, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection*

IEC 60079-18, *Explosive atmospheres — Part 18: Equipment protection by encapsulation “m”*

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 and requirements*

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, acoustic 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*

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

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

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 grades 2 and 3*

iteh STANDARD PREVIEW
(standards.iteh.ai)
ISO 12643-1:2009
<https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009>

3 Terms and definitions

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

3.1 actuator

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

[IEV 441-15-22]^[22]

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** (3.68) is 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;
- 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 60204-1:2009, 9.2.2]

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 60204-1:2009, 9.2.2]

3.10**Category 2 stop**

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

[IEC 60204-1:2009, 9.2.2]

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 9.

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.

<https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009>

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 is 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

NOTE See Figure 3 for examples of in-running nips.

[ISO 12643-1:2009](https://standards.iteh.ai/catalog/standards/sist/360cf591-e8e4-4d2a-937c-4e8593078528/iso-12643-1-2009)

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 60204-1:2009, definition 3.32]

3.29**machine actuator**

power mechanism used to affect motion of the machine

[IEC 60204-1:2009, definition 3.34]

3.30**maintained-contact control**

control that remains in an open or closed state after its activation

3.31**maintenance**

operation(s) required to ensure 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

[IEV 441-15-22]^[22]

3.34

manually fed

substrate is placed into and/or removed from the machine by hand

3.35

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.

3.36

momentary-contact control

control that is opened or closed only during its actuation

3.37

motion control

control that initiates machine movement or movement at **zero speed** (3.68), or places the machine in the **armed condition** (3.2)

3.38

motion-control station

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

3.39

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

3.40

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

3.41

movable guard

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

3.42

nip guard

guard (3.21) located at an in-going nip

EXAMPLES Nip bar, finger bar, finger guard.

3.43**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

3.44**operating position**

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

3.45**permissive period**

time interval during which machine motion can be initiated

NOTE See 14.2.3.

3.46**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** (3.60).

3.47**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** (3.52).

3.48**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.

3.49**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

3.50**raised workplace**

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

3.51**ready condition**

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

3.52**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** (3.47).