

INTERNATIONAL STANDARD

ISO
14119

First edition
1998-05-01

Safety of machinery — Interlocking devices associated with guards — Principles for design and selection

*Sécurité des machines — Dispositifs de verrouillage associés à des
protecteurs — Principes de conception et de choix*



Reference number
ISO 14119:1998(E)

Contents

1 Scope	1
2 Normative references	1
3 Definitions	2
4 Operating principles and typical forms of interlocking devices associated with guards	3
5 Provisions for the design of interlocking devices (independent of the nature of the energy source)	9
6 Additional technological requirements for electrical interlocking devices	15
7 Selection of an interlocking device	16
Annex A Guard-operated interlocking device with one cam-operated position detector (see Introduction)	18
Annex B Guard-operated interlocking device with tongue-operated switch (see Introduction)	20
Annex C Direct (mechanical) interlocking between guard and start/stop manual control (see Introduction) ..	22
Annex D Captive-key interlocking device (see Introduction)	24
Annex E Trapped-key interlocking device (see Introduction)	26
Annex F Plug and socket interlocking device (plug/socket combination) (see Introduction)	28
Annex G Guard-operated interlocking device incorporating two cam-operated position detectors (see Introduction)	30
Annex H Mechanical interlocking between a guard and a movable element (see Introduction)	32
Annex J Electrical interlocking device incorporating magnetically actuated (magnetic) switches (see Introduction)	33
Annex K Electrical interlocking device incorporating two proximity detectors (see Introduction)	35
Annex L Pneumatic/hydraulic interlocking devices (see Introduction)	37
Annex M Interlocking device with spring-applied/power-released guard locking device	39
Annex N Interlocking device with guard locking, with manually operated delay device	41
Annex P Bibliography	42

© ISO 1998

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 the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

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.

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.

International Standard ISO 14119 was prepared by Technical Committee ISO/TC 199, *Safety of machinery*. ISO 14119 has been published by the European Committee on Standardization (CEN) as EN 1088.

Annexes A to P of this International Standard are for information only.

This document is a preview generated by EVS

Introduction

This International Standard has been prepared to give guidance to machinery designers and writers of product safety standards on how to design or to select interlocking devices associated with guards. It may also be used as guidance in controlling the risk where there is no product safety standard for a particular machine.

Relevant sections of this International Standard, used alone or in conjunction with provisions from other standards, can be used as a basis for verification procedures for the suitability of a device for interlocking duties.

A statement by a manufacturer that an interlocking device complies with this International Standard, without reference to specific clauses, has no meaning.

Annexes A to N contain only examples complying with the principles set out in this International Standard, and the application of which has been validated by experience. Other solutions may be adopted, provided that they comply with the same principles.

This document is a preview generated by EVS

Safety of machinery — Interlocking devices associated with guards — Principles for design and selection

1 Scope

This International Standard specifies principles for the design and selection, independent of the nature of the energy source, of interlocking devices associated with guards (as defined in 3.23.1 "interlocking device [interlock]", 3.22.4 "interlocking guard" and 3.22.5 "interlocking guard with guard locking" of ISO/TR 12100-1:1992).

It also provides requirements specifically intended for electrical interlocking devices (see clause 6).

This International Standard covers the parts of guards which actuate interlocking devices.

NOTE Requirements for guards are given in prEN 953. The processing of the signal from the interlocking device to stop and immobilize the machine is dealt with in ISO 13849-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/TR 12100-1:1992, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology*

ISO/TR 12100-2:1992, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications*

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

ISO 13852:1996, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs*

ISO 14118:—¹⁾, *Safety of machinery - Prevention of unexpected start-up*

ISO 14121:—¹⁾, *Safety of machinery - Principles for risk assessment*

IEC 60204-1:1992, *Safety of machinery - Electrical equipment of industrial machines - Part 1: General requirements*

¹⁾ To be published.

IEC 60947-5-1:1990, *Low-voltage switchgear and controlgear - Part 5: Control circuit devices and switching elements - Section 1: Electromechanical control circuit devices*

prEN 953, *Safety of machinery - General requirements for the design and construction of guards (fixed, movable)*

prEN 999, *Safety of machinery - The positioning of protective equipment in respect of approach speed of parts of the human body*

3 Definitions

For the purposes of this International Standard the following definitions apply :

3.1 interlocking device; interlock

Mechanical, electrical or other type of device, the purpose of which is to prevent the operation of machine elements under specified conditions (generally as long as a guard is not closed).

[ISO/TR 12100-1:1992]

3.2 interlocking guard

Guard associated with an interlocking device so that :

- the hazardous machine functions "covered" by the guard cannot operate until the guard is closed ;
- if the guard is opened while the hazardous machine functions are operating, a stop instruction is given ;
- when the guard is closed, the hazardous machine functions "covered" by the guard can operate, but the closure of the guard does not by itself initiate their operation.

[ISO/TR 12100-1:1992]

NOTE In English "stop signal" and "stop command" are synonyms for "stop instruction". In German "Stop-Signal" and "Stop-Befehl" are synonyms for "Halt-Befehl". In French "ordre d'arrêt" is an all-encompassing term.

3.3 interlocking guard with guard locking

Guard associated with an interlocking device and a guard locking device so that :

- a) the hazardous machine functions "covered" by the guard cannot operate until the guard is closed and locked ;
- b) the guard remains closed and locked until the risk of injury from the hazardous machine functions has passed ;
- c) when the guard is closed and locked, the hazardous machine functions "covered" by the guard can operate, but the closure and locking of the guard do not by themselves initiate their operation.

[ISO/TR 12100-1:1992]

3.4 guard locking device

Device intended to lock a guard in the closed position and linked to the control system so that

- a) the machine cannot operate until the guard is closed and locked ;
- b) the guard remains locked until the risk has passed.

3.5 automatic monitoring

A back-up safety function which ensures that a safety measure is initiated if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed in such a way that hazards are generated.

NOTE There are two categories of automatic monitoring :