

Australian/New Zealand Standard™

Safety of machinery

Part 1803: Safety distances and safety gaps—Minimum gaps to prevent crushing of parts of the human body



AS/NZS 4024.1803:2014

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee SF-041, General Principles for the Guarding of Machinery. It was approved on behalf of the Council of Standards Australia on 4 June 2014 and on behalf of the Council of Standards New Zealand on 24 April 2014. This Standard was published on 30 June 2014.

The following are represented on Committee SF-041:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Manufacturing Workers Union
Department of Mines and Petroleum, WA
Department of the Premier and Cabinet, SA
Engineers Australia
Federal Chamber of Automotive Industries
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This Standard was issued in draft form for comment as DR AS/NZS 4024.1803.

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Originated in Australia as part of AS 4024.1(Int)—1992.
Previous edition AS 4024.1803—2006.
Jointly revised and designated AS/NZS 4024.1803:2014.

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Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

ISBN 978 1 74342 744 6

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-041, General Principles for the Guarding of Machinery, to supersede AS 4024.1803—2006.

It is emphasized that this Standard is part of the AS(/NZS) 4024.1 series and it is imperative that it is used in conjunction with other applicable parts of the series. A complete listing of all current parts of the AS(/NZS) 4024.1 series can be found at the Standards Australia website <www.standards.org.au> and in AS/NZS 4024.1100, *Safety of machinery, Part 1100: Application Guide*.

The objective of this Standard is to enable the user (designers, modifiers of machinery, etc.) to avoid hazards from crushing zones. It specifies the minimum gaps relative to parts of the body and is applicable when adequate safety can be achieved by this method.

This Standard is identical with, and has been reproduced from ISO 13854:1996, *Safety of machinery—Minimum gaps to avoid crushing of parts of the human body*.

As this Standard is reproduced from an International Standard, the following applies:

- (a) In the source text ‘this International Standard’ should read ‘this Australian/New Zealand Standard’.
- (b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>	<i>Australian/New Zealand Standard</i>
ISO/TR	AS/NZS
12100 Safety of machinery—basic concepts, general principles for design	4024 Safety of machinery
12100-1 Part 1: Basic terminology, methodology	4024.1201 Part 1201: General principles for design—Risk assessment and risk reduction
12100-2 Part 2: Technical principles and specifications	4024.1201 Part 1201: General principles for design—Risk assessment and risk reduction
ISO	
13852 Safety of machinery—Safety distances to prevent danger zones being reached by the upper limbs	4024.1801 Part 1801: Safety distances to prevent danger zones being reached by upper and lower limbs

The term ‘informative’ has been used in this Standard to define the application of the annex to which it applies. An ‘informative’ annex is only for information and guidance.

INTRODUCTION

According to ISO/TR 12100-1, in general machinery is said to be safe if it can perform its function, be transported, installed, adjusted, maintained, dismantled and disposed of under the conditions of its intended use without causing injury or damaging health.

One method of avoiding the hazard of crushing of parts of the human body is to make use of the minimum gaps specified in this International Standard.

In specifying minimum gaps, a number of aspects have to be taken into consideration, such as:

- accessibility of the crushing zones;
- anthropometric data, taking into account ethnic groups likely to be found in the countries concerned;
- technical and practical aspects.

If these aspects were further developed, the current state of the art, reflected in this International Standard, could be improved.

NOTES

AUSTRALIAN/NEW ZEALAND STANDARD

Safety of machinery

Part 1803:

Safety distances and safety gaps—Minimum gaps to prevent crushing of parts of the human body

1 Scope

The object of this International Standard is to enable the user (e.g. standard makers, designers of machinery) to avoid hazards from crushing zones. It specifies minimum gaps relative to parts of the human body and is applicable when adequate safety can be achieved by this method.

This International Standard is applicable to risks from crushing hazards only and is not applicable to other possible hazards (e.g. impact, shearing, drawing-in).

NOTE — For impact, shearing or drawing-in hazards, for example, additional or other measures need to be taken.

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

3 Definitions

For the purposes of this International Standard, the definitions given in ISO/TR 12100-1 and ISO 13852 and the following definition apply.

3.1 crushing zone: Zone in which the human body or parts of the human body are exposed to a crushing hazard. This hazard will be generated if

- two movable parts are moving towards one another, or
- one movable part is moving towards a fixed part.

NOTE — See also annex A.

4 Minimum gaps

4.1 Methodology for the use of this International Standard

The method of using this International Standard shall form part of the iterative safety strategy outlined in clause 5 “Strategy for selecting safety measures” of ISO/TR 12100-1:1992.

The user of this International Standard shall:

- a) identify the crushing hazards;
- b) assess the risks from these hazards in accordance with ISO/TR 12100-1, paying particular attention to the following:
 - where it is foreseeable that the risk from a crushing hazard involves different parts of the body, the minimum gap given in table 1 relating to the largest of these parts shall be applied [see also d)],
 - the unpredictable behaviour of children and their body dimensions if children are included in the population at risk,
 - whether parts of the body could enter the crushing zone in a configuration other than those indicated in table 1,
 - whether thick or bulky clothing (e.g. protective clothing for extreme temperatures) or tools have to be taken into account,
 - whether machinery will be used by persons wearing thick-soled footwear (e.g. clogs) which will increase the effective dimension of the foot;
- c) select from table 1 the appropriate minimum gap relating to the body part at risk (see also annex A);
- d) if adequate safety cannot be achieved by the minimum gaps selected from table 1, other or additional measures and/or means shall be used (see e.g. ISO/TR 12100-1, ISO/TR 12100-2 and ISO 13852).

If the minimum gap for the largest expected body part cannot be achieved, the following example gives one particular means of restricting access to smaller body parts.

EXAMPLE

Access of larger body parts to the crushing zone can be prevented by the use of protective structures having a restricted opening, as indicated in figure 1.

The possibility of access to a crushing zone for a particular part of the body is dependant on the following:

- the gap a between the fixed and moving part or between two moving parts;
- the depth b of the crushing zone;
- the dimensions c of the opening in the protective structure and its distance d from the crushing zone.

NOTE — The dimensions for openings in relation to safety distances can be found in ISO 13852.

For certain applications there may be justifiable reasons to deviate from the minimum gaps in table 1. Standards dealing with these applications indicate how adequate safety can be reached.

- two movable parts are moving towards one another, or
- one movable part is moving towards a fixed part.

NOTE — See also annex A.

4 Minimum gaps

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 - the unpredictable behaviour of children and their body dimensions if children are included in the population at risk,
 - whether parts of the body could enter the crushing zone in a configuration other than those indicated in table 1,
 - whether thick or bulky clothing (e.g. protective clothing for extreme temperatures) or tools have to be taken into account,
 - whether machinery will be used by persons wearing thick-soled footwear (e.g. clogs) which will increase the effective dimension of the foot;
- c) select from table 1 the appropriate minimum gap relating to the body part at risk (see also annex A);
- d) if adequate safety cannot be achieved by the minimum gaps selected from table 1, other or additional measures and/or means shall be used (see e.g. ISO/TR 12100-1, ISO/TR 12100-2 and ISO 13852).

If the minimum gap for the largest expected body part cannot be achieved, the following example gives one particular means of restricting access to smaller body parts.

EXAMPLE

Access of larger body parts to the crushing zone can be prevented by the use of protective structures having a restricted opening, as indicated in figure 1.

The possibility of access to a crushing zone for a particular part of the body is dependant on the following:

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- the depth b of the crushing zone;
- the dimensions c of the opening in the protective structure and its distance d from the crushing zone.

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For certain applications there may be justifiable reasons to deviate from the minimum gaps in table 1. Standards dealing with these applications indicate how adequate safety can be reached.

- two movable parts are moving towards one another, or
- one movable part is moving towards a fixed part.

NOTE — See also annex A.

4 Minimum gaps

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 - whether parts of the body could enter the crushing zone in a configuration other than those indicated in table 1,
 - whether thick or bulky clothing (e.g. protective clothing for extreme temperatures) or tools have to be taken into account,
 - whether machinery will be used by persons wearing thick-soled footwear (e.g. clogs) which will increase the effective dimension of the foot;
- c) select from table 1 the appropriate minimum gap relating to the body part at risk (see also annex A);
- d) if adequate safety cannot be achieved by the minimum gaps selected from table 1, other or additional measures and/or means shall be used (see e.g. ISO/TR 12100-1, ISO/TR 12100-2 and ISO 13852).

If the minimum gap for the largest expected body part cannot be achieved, the following example gives one particular means of restricting access to smaller body parts.

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- the gap a between the fixed and moving part or between two moving parts;
- the depth b of the crushing zone;
- the dimensions c of the opening in the protective structure and its distance d from the crushing zone.

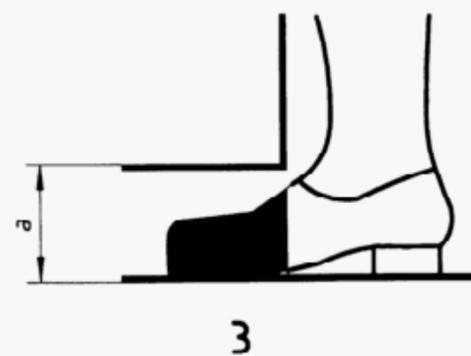
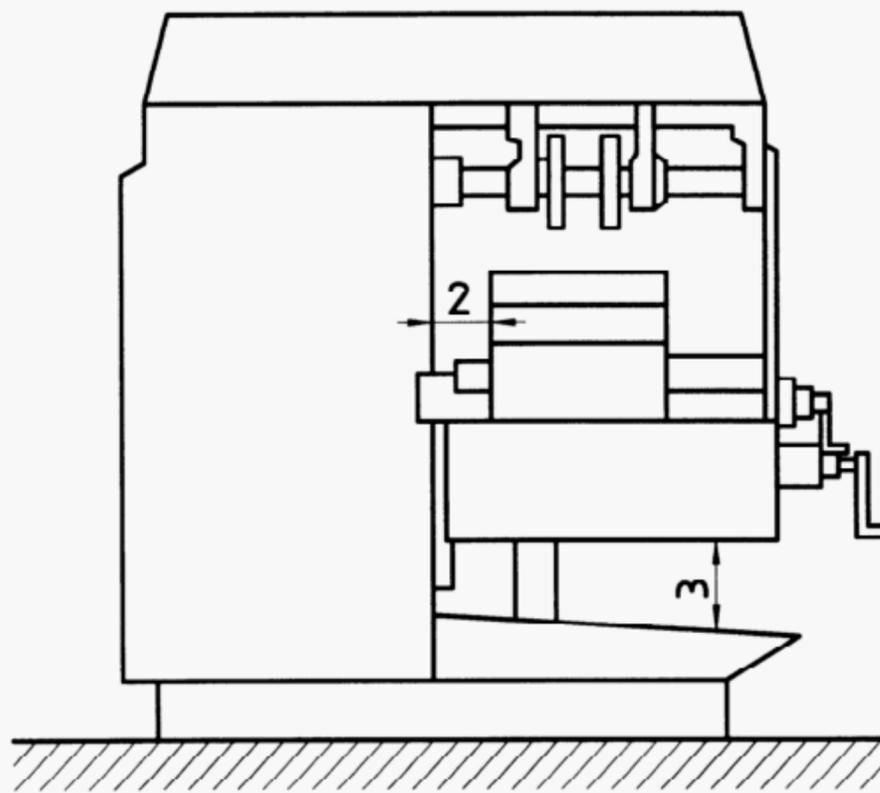
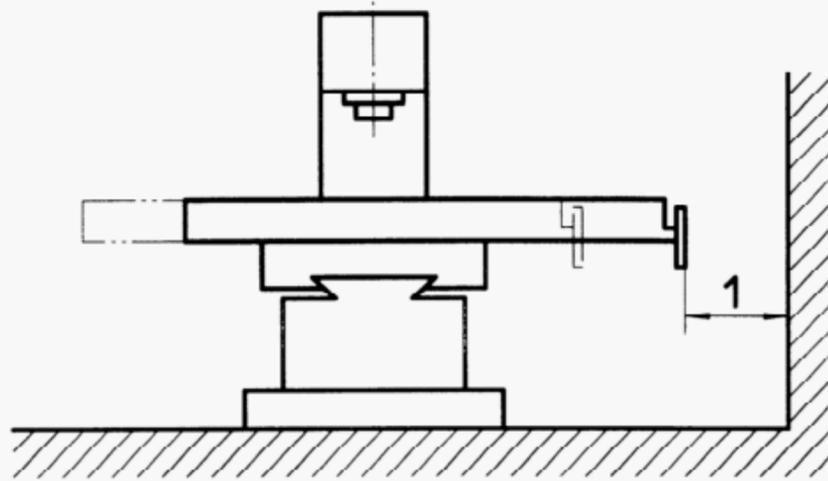
NOTE — The dimensions for openings in relation to safety distances can be found in ISO 13852.

For certain applications there may be justifiable reasons to deviate from the minimum gaps in table 1. Standards dealing with these applications indicate how adequate safety can be reached.

Annex A (informative)

Illustration of crushing zones

The indicated crushing zones and the parts of the human body considered in figure A.1 are examples only. For the application of risk assessment, see 4.1.



NOTE — *a* is the minimum gap.

Figure A.1

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