AS 4024.3303:2017
ISO/TS 15066:2016

AS 4024.3303:2017

Australian STANDARD

Safety of machinery

Part 3303: Robots and robotic devices—Collaborative robots

STANDARDS Australia

This Australian Standard® was prepared by Committee SF-041, Safety of Machinery. It was approved on behalf of the Council of Standards Australia on 8 June 2017.
This Standard was published on 30 June 2017.

The following are represented on Committee SF-041:

- Australian Industry Group
- Australian Manufacturing Workers Union
- Department of Industry, Skills and Regional Development, NSW
- Engineers Australia
- Human Factors and Ergonomics Society of Australia
- Institute of Instrumentation, Control and Automation, Australia
- National Safety Council of Australia
- Safety Institute of Australia
- SafeWork NSW
- The University of Melbourne
- Workplace Health and Safety Queensland
- WorkSafe Victoria

This Standard was issued in draft form for comment as DR AS 4024.3303:2017.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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First published as AS 4024.3303:2017.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 76035 845 7

PREFACE

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee SF-041, Safety of Machinery. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify safety requirements for collaborative industrial robot systems and the work environment, and to supplement the requirements and guidance on collaborative industrial robot operation given in AS 4024.3301, *Safety of machinery*, Part 3301: *Robots and robotic devices—Safety requirements for industrial robots—Robots*, and AS 4024.3302, *Safety of machinery*, Part 3302: *Robots and robotic devices—Safety requirements for industrial robots—Robot systems and integration*. This Standard does not apply to non-industrial robots, although the safety principles presented can be useful to other areas of robotics.

This Standard is identical with, and has been reproduced from ISO/TS 15066:2016, *Robots and robotic devices—Collaborative robots*.

As this Standard is reproduced from an International Technical Specification, a full point substitutes for a comma when referring to a decimal marker.

None of the normative references in the source document have been adopted as Australian or Australian/New Zealand Standards.

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.

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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.

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 299, *Robots and robotic devices*.

This Technical Specification is relevant only in conjunction with the safety requirements for collaborative industrial robot operation described in ISO 10218-1 and ISO 10218-2.

INTRODUCTION

The objective of collaborative robots is to combine the repetitive performance of robots with the individual skills and ability of people. People have an excellent capability for solving imprecise exercises; robots exhibit precision, power and endurance.

To achieve safety, robotic applications traditionally exclude operator access to the operations area while the robot is active. Therefore, a variety of operations requiring human intervention often cannot be automated using robot systems.

This Technical Specification provides guidance for collaborative robot operation where a robot system and people share the same workspace. In such operations, the integrity of the safety-related control system is of major importance, particularly when process parameters such as speed and force are being controlled.

A comprehensive risk assessment is required to assess not only the robot system itself, but also the environment in which it is placed, i.e. the workplace. When implementing applications in which people and robot systems collaborate, ergonomic advantages can also result, e.g. improvements of worker posture.

This Technical Specification supplements and supports the industrial robot safety standards ISO 10218-1 and ISO 10218-2, and provides additional guidance on the identified operational functions for collaborative robots.

The collaborative operations described in this Technical Specification are dependent upon the use of robots meeting the requirements of ISO 10218-1 and their integration meeting the requirements of ISO 10218-2.

NOTE Collaborative operation is a developing field. The values for power and force limiting stated in this Technical Specification are expected to evolve in future editions.

AUSTRALIAN STANDARD

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Part 3303:
Robots and robotic devices—Collaborative robots

1 Scope

This Technical Specification specifies safety requirements for collaborative industrial robot systems and the work environment, and supplements the requirements and guidance on collaborative industrial robot operation given in ISO 10218-1 and ISO 10218-2.

This Technical Specification applies to industrial robot systems as described in ISO 10218-1 and ISO 10218-2. It does not apply to non-industrial robots, although the safety principles presented can be useful to other areas of robotics.

NOTE This Technical Specification does not apply to collaborative applications designed prior to its publication.

2 Normative references

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

ISO 10218-1:2011, *Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots*

ISO 10218-2:2011, *Robots and robotic devices — Safety requirements for industrial robots — Part 2: Robot systems and integration*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10218-1, ISO 10218-2 and ISO 12100 and the following apply.

3.1
collaborative operation
state in which a purposely designed robot system and an operator work within a collaborative workspace

[SOURCE: ISO 10218-1:2011, 3.4, modified]

3.2
power
mechanical power
mechanical rate of doing work, or the amount of energy consumed per unit time

Note 1 to entry: Power does not pertain to the electrical power rating on an electronic device, such as a motor.