AS 4024.3302:2017
ISO 10218-2:2011

AS 4024.3302:2017

Australian STANDARD

Safety of machinery

Part 3302: Robots and robotic devices—Safety requirements for industrial robots—Robot systems and integration

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 30 April 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 4024.3302:2017.

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.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting **www.standards.org.au**

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard®

Safety of machinery

Part 3302: Robots and robotic devices—Safety requirements for industrial robots—Robot systems and integration

First published as AS 4024.3302:2017.

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

ISBN 978 1 76035 844 0

PREFACE

This Standard was prepared by the Standards Australia Committee SF-041, Safety of Machinery.

The objective of this Standard is to specify safety requirements for the integration of industrial robots and industrial robot systems, as defined in ISO 10218-1:2011, and industrial robot cell(s). The integration includes the following:

(a) The design, manufacturing, installation, operation, maintenance and decommissioning of the industrial robot system or cell.

(b) Necessary information for the design, manufacturing, installation, operation, maintenance and decommissioning of the industrial robot system or cell.

(c) Component devices of the industrial robot system or cell.

It describes the basic hazards and hazardous situations identified with these systems, and provides requirements to eliminate or adequately reduce the risks associated with these hazards.

This Standard is identical with, and has been reproduced from ISO 10218-2:2011, *Robots and robotic devices—Safety requirements for industrial robots*, Part 2: *Robot systems and integration*.

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

(i) In the source text ‘this part of ISO 10218’ should read ‘this Australian Standard’.

(ii) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

CONTENTS

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 10218-2 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 2, *Robots and robotic devices*.

ISO 10218 consists of the following parts, under the general title *Robots and robotic devices — Safety requirements for industrial robots*:

— *Part 1: Robots*

— *Part 2: Robot systems and integration*

INTRODUCTION

This part of ISO 10218 has been created in recognition of the particular hazards that are presented by industrial robot systems when integrated and installed in industrial robot cells and lines.

Hazards are frequently unique to a particular robot system. The number and types of hazards are directly related to the nature of the automation process and the complexity of the installation.

The risks associated with these hazards vary with the type of robot used and its purpose and the way in which it is installed, programmed, operated, and maintained.

For the purpose of understanding requirements in this part of ISO 10218, a word syntax is used to distinguish absolute requirements from recommended practices or suggested actions. The word “shall” is used to identify requirements necessary for compliance with this part of ISO 10218. Such requirements have to be accomplished unless an alternative instruction is provided or a suitable alternative is determined by a risk assessment. The word “should” is used to identify suggestions, recommended actions or possible solutions for requirements, but alternatives are possible and the suggested actions are not absolute.

In recognition of the variable nature of hazards with the application of industrial robots, this part of ISO 10218 provides guidance for the assurance of safety in the integration and installation of robots. Since safety in the use of industrial robots is influenced by the design of the particular robot system, a supplementary, though equally important, purpose is to provide guidelines for the design, construction and information for use of robot systems and cells. Requirements for the robot portion of the system can be found in ISO 10218-1.

Providing for a safe robot system or cell depends on the cooperation of a variety of “stakeholders” – those entities that share in a responsibility for the ultimate purpose of providing a safe working environment. Stakeholders may be identified as manufacturers, suppliers, integrators and users (the entity responsible for using robots), but all share the common goal of a safe (robot) machine. The requirements in this part of ISO 10218 may be assigned to one of the stakeholders, but overlapping responsibilities can involve multiple stakeholders in the same requirements. While using this part of ISO 10218, the reader is cautioned that all of the requirements identified may apply to them, even if not specifically addressed by “assigned” stakeholder tasks.

This part of ISO 10218 is complementary and in addition to ISO 10218-1, which covers the robot only. This part of ISO 10218 adds additional information in line with ISO 12100 and ISO 11161, International Standards for requirements to identify and respond in a type-C standard to unique hazards presented by the integration, installation and requirements for use of industrial robots. New technical requirements include, but are not limited to, instructions for applying the new requirements in ISO 10218-1 for safety-related control system performance, robot stopping function, enabling device, programme verification, cableless pendant criteria, collaborating robot criteria and updated design for safety.

This part of ISO 10218 and ISO 10218-1 form part of a series of standards dealing with robots and robotic devices. Other standards cover such topics as integrated robotic systems, coordinate systems and axis motions, general characteristics, performance criteria and related testing methods, terminology, and mechanical interfaces. It is noted that these standards are interrelated and also related to other International Standards.

For ease of reading this part of ISO 10218, the words “robot” and “robot system” refer to “industrial robot” and “industrial robot system” as defined in ISO 10218-1.

Figure 1 describes the relationship of the scope of machinery standards used in a robot system. The robot alone is covered by ISO 10218-1, the system and cell is covered by this part of ISO 10218. A robot cell may include other machines subject to their own C level standards, and the robot system can be part of an integrated manufacturing system covered by ISO 11161 which in turn can also make reference to other relevant B and C level standards.

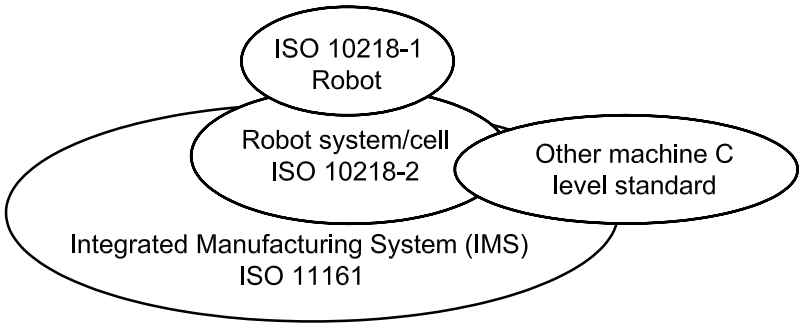

Figure 1 — Graphical view of relationships between standards relating to robot system/cell

AUSTRALIAN STANDARD

Safety of machinery

Part 3302:
Robots and robotic devices—Safety requirements for industrial robots—Robot systems and integration

1 Scope

This part of ISO 10218 specifies safety requirements for the integration of industrial robots and industrial robot systems as defined in ISO 10218-1, and industrial robot cell(s). The integration includes the following:

a) the design, manufacturing, installation, operation, maintenance and decommissioning of the industrial robot system or cell;

b) necessary information for the design, manufacturing, installation, operation, maintenance and decommissioning of the industrial robot system or cell;

c) component devices of the industrial robot system or cell.

This part of ISO 10218 describes the basic hazards and hazardous situations identified with these systems, and provides requirements to eliminate or adequately reduce the risks associated with these hazards. Although noise has been identified to be a significant hazard with industrial robot systems, it is not considered in this part of ISO 10218. This part of ISO 10218 also specifies requirements for the industrial robot system as part of an integrated manufacturing system. This part of ISO 10218 does not deal specifically with hazards associated with processes (e.g. laser radiation, ejected chips, welding smoke). Other standards can be applicable to these process hazards.

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 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 8995-1, *Lighting of work places — Part 1: Indoor*

ISO 9946, *Manipulating industrial robots — Presentation of characteristics*

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

ISO 11161, *Safety of machinery — Integrated manufacturing systems — Basic requirements*

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

