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Robotics — Safety requirements —

Part 1: Industrial robots

Robotique — Exigences de sécurité —

Partie 1: Robots industriels

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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This document was prepared by Technical Committee ISO/TC 299, *Robotics,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 310, *Advanced automation technologies and their applications,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 10218-1:2011), which has been technically revised.

The main changes are as follows:

— additional requirements for design;

— mode requirements;

— clarifying requirements for functional safety;

— robot classification (Class I and Class II) for functional safety requirements;

— test methodology to determine the maximum force per manipulator for Class I robots;

— adding requirements for cybersecurity to the extent that it applies to industrial robot safety;

— incorporating safety requirements for industrial robots intended for use in collaborative applications (formerly, the content of ISO/TS 15066).

A list of all parts in the ISO 10218 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

The ISO 10218 series has been created in recognition of the hazards that are presented by robotics in an industrial environment. This document addresses robots as partly completed machinery, while ISO 10218-2 addresses robots integrated into machinery (robot applications and cells).

This document is a type-C standard according to ISO 12100.

This document is of relevance for the following stakeholder groups representing the market players regarding robot safety:

— robot manufacturers (small, medium and large enterprises);

— robot application integrators (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organisations, market surveillance, etc.).

Others can be affected by the level of safety achieved with the means of the document by the above mentioned stakeholder groups:

— robot application users/employers (small, medium and large enterprises);

— robot application users/employees (e.g. trade unions);

— service providers, e.g. for maintenance (small, medium and large enterprises);

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document.

Robots and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When provisions of a type-C standard are different from those that are stated in type-A or type-B standards, the provisions of the type-C standard take precedence over the provisions of the other standards for machines that have been designed and built in accordance with the provisions of the type-C standard.

In recognition of the variable nature of hazards with different uses of industrial robots, the ISO 10218 series is divided into two parts. This document provides requirements for safety of the robot. For safety of the integration and commissioning of industrial robot applications, ISO 10218-2:2025 provides requirements for the safeguarding of operators during integration, commissioning, functional testing, programming, operation, maintenance and repair.

The ISO 10218 series deals with robotics in an industrial environment, which is comprised of workplaces where the public is excluded and the allowed people (operators) are working adults. Other standards cover topics such as general characteristics, coordinate systems and axis motions, mechanical interfaces performance criteria and related testing methods, and end-effectors.

For ease of reading this document, the words “robot” and “robot application” refer to “industrial robot” and “industrial robot application” as defined in this document.

This document has been updated based on experience gained since the release of the ISO 10218 series in 2011. This document remains aligned with the minimum requirements of a harmonized type-C standard for robots in an industrial environment.

Where appropriate, ISO/TS 15066:2016 on the safety of collaborative robot applications was added to the ISO 10218 series. Because human-robot collaboration relates to the application and not to the robot alone, most of the requirements of ISO/TS 15066 have been incorporated into ISO 10218-2:2025. Safety functions that enable a collaborative task can be part of the robot or can be provided by a protective device, or a combination.

It is important to emphasize that the terms “collaborative operation” and “collaborative robot” are not used in this document. Only the application can be developed, verified and validated as a collaborative application.