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BSI Standards Publication

Robotics — Safety requirements

Part 2: Industrial robot applications and robot cells

bsi.

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National foreword

This British Standard is the UK implementation of EN ISO 10218-2:2025. It is identical to ISO 10218-2:2025. It supersedes BS EN ISO 10218-2:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee AMT/10, Robotics.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

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UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2025.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD **EN ISO 10218-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM March 2025

ICS 25.040.30 Supersedes EN ISO 10218-2:2011

English Version

Robotics - Safety requirements - Part 2: Industrial robot applications and robot cells (ISO 10218-2:2025)

Robotique - Exigences de sécurité - Partie 2: Applications robotisées industrielles et cellules robotisées (ISO 10218-2:2025)

Robotik - Sicherheitsanforderungen für Robotersysteme in industrieller Umgebung - Teil 2: Robotersysteme, Roboteranwendungen und Integration von Roboterzellen (ISO 10218-2:2025)

This European Standard was approved by CEN on 3 January 2025.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN ISO 10218-2:2025) has been prepared by Technical Committee ISO/TC 299 "Robotics" in collaboration with Technical Committee CEN/TC 310 “Advanced automation technologies and their applications” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2025, and conflicting national standards shall be withdrawn at the latest by March 2027.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 10218-2:2011.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

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Endorsement notice

The text of ISO 10218-2:2025 has been approved by CEN as EN ISO 10218-2:2025 without any modification.

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Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Directive2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request "M/396 Mandate to CEN and CENELEC for Standardisation in the field of machinery" to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC

The relevant Essential Requirements of Directive 2006/42/EC	**Clause(s)/sub-clause(s) of this EN**
1.1.2 (a)	5, 6, 7
1.1.2 (c)	5, 6, 7
1.1.2 (d)	5.2.2
1.1.2 (e)	5.2.7
1.1.3. Materials and products	5.2.2.2
1.1.4. Lighting	5.15.2, 5.15.4
1.1.5. Design of machinery to facilitate its handling	5.2.2, 5.2.3
1.1.6. Ergonomics	5.4.1, 5.4.3, 5.4.4, 5.8.6.1, 5.12.2.1, 5.14.4.2
1.2.1. Safety and reliability of control systems	5.2.8, 5.3, 5.4.7, 5.5, 5.6.1, 5.7, 5.9
1.2.2. Control devices	5.2.13, 5.7, 5.12.2.3, 5.14.4.1
1.2.3. Starting	5.5.7, 5.7.5
1.2.4.1. Normal stop	5.6.1, 5.6.4
1.2.4.2. Operational stop	5.5.8, 5.6.3
1.2.4.3. Emergency stop	5.6.2
1.2.4.4. Assembly of machinery	5.3
1.2.5. Selection of control or operating modes	5.7.2, 5.7.6.2
1.2.6. Failure of the power supply	5.2.10, 5.5.2, 5.6.1, 5.5.7.1, 5.9.1
1.3.1. Risk of loss of stability	5.2.5, 7.5.5

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The relevant Essential Requirements of Directive 2006/42/EC	**Clause(s)/sub-clause(s) of this EN**
1.3.2. Risk of break-up during operation	5.2.2, 5.2.11, 5.2.13, 5.3.6, 7.5.9
1.3.3. Risks due to falling or ejected objects	5.9.1
1.3.4. Risks due to surfaces, edges or angles	5.2.2.4, 5.4.4, 5.9, 5.14.1
1.3.6. Risks related to variations in operating conditions	5.7.2
1.3.7. Risks related to moving parts	5.2.7, 5.8, 5.9, 5.10, 5.12, 5.14, 7.5.7
1.3.8. Choice of protection against risks arising from moving parts	5.2.2.4, 5.8, 5.9, 5.10.3, 5.12, 5.14
1.3.8.1. Moving transmission parts	5.2.2.4
1.3.8.2. Moving parts involved in the process	5.2.2.4, 5.8, 5.9, 5.10, 5.12, 5.14
1.3.9. Risks of uncontrolled movements	5.2.8, 5.2.12.1
1.4.1. General requirements	5.2.2, 5.8.5, 5.8.6, 5.8.9
1.4.2.1. Fixed guards	5.8.5.1
1.4.2.2. Interlocking movable guards	5.8.5
1.4.2.3. Adjustable guards restricting access	5.8.5.1
1.4.3. Special requirements for protective devices	5.8.6, 5.8.9
1.5.1. Electricity supply	5.2.13
1.5.2 Static electricity	5.2.13
1.5.3. Energy supply other than electricity	5.2.13
1.5.4. Errors of fitting	5.2.2.4, 5.2.13, 7.5.9
1.5.5. Extreme temperature	5.2.6
1.5.6. Fire	5.2.6
1.5.8 Noise	Not covered
1.5.9 Vibrations	5.14.4.1 7.5.19
1.5.12. Laser radiation	5.11
1.5.13. Emissions of hazardous materials and substances	5.2.4
1.5.14. Risk of being trapped in a machine	5.4.5, 5.8, 5.12.2.2, 5.14.1
1.5.15. Risk of slipping, tripping or falling	5.4.1, 5.7.8.3, 5.10.1,
1.6.1. Machinery maintenance	5.4.1, 5.7.8.1, 5.8.9.1, 5.16, 7.5.9
1.6.2. Access to operating positions and servicing points	5.4.1
1.6.3. Isolation of energy sources	5.2.13, 5.2.12
1.6.4. Operator intervention	5.4.1, 5.4.3
1.7.1. Information and warnings on the machinery	7.1, 7.2, 7.3, 7.4
1.7.1.1. Information and information devices	7.1, 7.2, 7.3, 7.4
1.7.1.2. Warning devices	5.7.2.5, 5.7.4, 7.2

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The relevant Essential Requirements of Directive 2006/42/EC	**Clause(s)/sub-clause(s) of this EN**
1.7.2. Warning of residual risks	7.5.3, 7.5.17, 7.5.21
1.7.3. Marking of machinery	7.3
1.7.4. Instructions	7
1.7.4.1. General principles for the drafting of instructions	7.1, 7.5.3
1.7.4.2. Contents of the instructions	7.5
2.2.1. General	5.14.4
2.2.1.1. Instructions	7.5.19
2.3. Machinery for working wood and material with similar physical characteristics	5.8.1, 5.9.1, 5.9.4, 5.12.2.1
4.1.2.2. Machinery running on guide rails and rail tracks	5.2.5
4.1.2.3. Mechanical strength	5.2.2
4.1.2.4. Pulleys, drums, wheels, ropes and chains	5.2.2.3
4.1.2.6. Control of movements	5.2.8, 5.4.7, 5.9.1
4.1.2.7. Movements of loads during handling	5.2.8, 5.7.8.2, 5.8, 5.14.4.2
4.1.2.8.1. Movements of the carrier	5.8, 5.10
4.1.3. Fitness for purpose	5.2.2.3
4.2.1 Control of movements	5.10.4
4.2.3 Installations guided by ropes	5.10.1

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

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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 document 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).

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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 second edition cancels and replaces the first edition (ISO 10218-2:2011), which has been technically revised.

The main changes are as follows:

— emphasising robot application and not robot system, as the robot application includes the workpieces, task program, and the machinery and equipment to support the application and intended tasks;

— incorporating safety requirements for collaborative applications (formerly, the content of ISO/TS 15066);

— clarifying requirements for functional safety;

— adding requirements for cybersecurity to the extent that it applies.

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.

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This document has been created in recognition of the hazards that are presented by robots when they are integrated and installed with end-effectors into robot applications and robot cells. ISO 10218-1 addresses robots as partly completed machinery, while this document addresses robots integrated into completed machinery for specific robot applications.

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 safety of robot applications and robot cells:

— 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 at the drafting process of this document.

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

When provisions of a type-C standard are different from those which 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.

Hazards associated with robot applications are well recognized, but the sources of the hazards are frequently unique to each robot application. The number and type(s) of hazard(s) are directly related to the nature of the automation process and the complexity of the application. The risks associated with these hazards vary with the robot used, its safety functions, and the integration, installed, programs, use, and maintenance. This document provides requirements for safety in the integration of robots into robot applications and robot cells. The requirements include safeguarding of operators during integration, commissioning, functional testing, programming, operation, maintenance and repair. Requirements for the robot can be found in ISO 10218-1.

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

There are a broad range of robot applications and robot cell(s). Therefore, it is not possible to provide a list of all significant hazards, hazardous situations or events into which a robot application can be integrated. Moreover, the same kind of applications can have different levels of risk, resulting from different designs which correspond to the intended application (e.g. paint spraying on large or small parts, handling of a small harmful payload like a hot metal bolt or a large harmless payload like a box of paper tissues).

Other standards can be applicable to associated machinery and equipment in robot applications and robot cells.

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

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standard for robot applications and robot cells in an industrial environment. Providing for a safe robot application and a safe robot cell depends on the cooperation of a variety of "stakeholders". Stakeholders can include designers, manufacturers, suppliers and integrators. Users are the entity responsible for using robot applications and robot cells. Users can also be any of the other stakeholder roles.

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 this document. Safety functions that enable a collaborative application can be part of the robot (e.g. PFL), or can be provided by a protective device, or a combination.

It is important to emphasize that the term "collaborative robot" is not used in this document. Only the application can be developed, verified, and validated as a collaborative application. In addition, the term "collaborative operation" is not used in this document.

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International Standard ISO 10218-2:2025(en)

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Robotics — Safety requirements —

Part 2: Industrial robot applications and robot cells

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This document specifies requirements for the integration of industrial robot applications and industrial robot cells. The following are addressed:

— the design, integration, commissioning, operation, maintenance, decommissioning and disposal;

— integration of machines and components;

— information for use for the design, integration, commissioning, operation, maintenance, decommissioning and disposal.

This document is not applicable to the following uses and applications of industrial robots:

— underwater;

— law enforcement;

— military (defence);

— airborne and space, including outer space;

— medical;

— healthcare of a person;

— prosthetics and other aids for the physically impaired;

— service robots, which provide a service to a person and as such the public can have access;

— consumer products, as this is household use to which the public can have access;

— lifting or transporting people;

— multi-purpose lifting devices or machinery, e.g. cranes, forklift trucks.

NOTE Applications for the automation of laboratories are not considered as medical or healthcare of a person.

This document deals with the significant hazards, hazardous situations or hazardous events when used as intended and under specified conditions of misuse which are reasonably foreseeable by the integrator.

This document provides basic requirements for industrial robot applications, but does not cover the hazards related to the following:

— emission of airborne noise;

— severe conditions (e.g. extreme climates, freezer use, strong magnetic fields) outside of manufacturer's specifications;

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