



BSI Standards Publication

## Machine tools safety – Machining centres, Milling machines, Transfer machines

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Part 1: Safety requirements (ISO 16090-1:2017)

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## National foreword

This British Standard is the UK implementation of EN ISO 16090-1:2018. It is identical to ISO 16090-1:2017. It supersedes BS EN 12417:2001+A2:2009, BS EN 13128:2001+A2:2009 and BS EN 14070:2003+A1:2009, which will be withdrawn on 30 April 2021.

BSI, as a member of CEN, is obliged to publish EN ISO 16090-1:2018 as a British Standard. However, attention is drawn to the fact that during the development of this European Standard, the UK committee voted against its approval as a European standard. The UK committee submitted a negative vote for the following reasons:

- a) The UK committee believe that any unrestricted use of Mode of safe operation 3 (MSO 3) (see subclause 5.2.4.6) and Mode of safe operation, service (MSO Service) (see subclause 5.2.4.7) has the potential to lower the levels of protection on machine tools by allowing safeguarding systems to be disabled unnecessarily, and without the necessary additional protective measures being implemented.
- b) The original intended use of MSO 3 was limited to situations in which operator access to the work area was deemed absolutely necessary. In the opinion of the UK committee, the final standard does not give a clear list of defined and acceptable circumstances under which MSO 3 should be provided and used, which means the standard could be open to interpretation. The UK committee believes this could result in MSO 3 being provided and used in situations where it is not absolutely required, which may expose machine operators to a greater level of risk than necessary.
- c) The level of protection defined by the current requirements is a minimum level applicable to all MSO 3 applications. The UK committee believes it is not what can be achieved at the state of the art, and that it is not tailored for the different MSO 3 applications.
- d) The UK committee believes that removing the use of an enabling device during the application of MSO 3 for ergonomic reasons (see subclause 5.2.4.6.2, i) causes a reduction in the level of protection provided, despite the application of alternative engineering control measure combinations like those cited as examples 1) and 2).
- e) It is the UK committee's opinion that where the standard covers machines with multiple functions (e.g. milling, turning and grinding), the safety requirements applied to these functions in this standard is not consistent with those that appear in the machine tool standards in which they are the primary function, e.g. clause 5 "Safety requirements and/or measures" in BS EN ISO 16089:2015 *Machine tools – Safety – Stationary grinding machines*.
- f) Annex J does not contain any safety functional requirements for MSO Service. Consequently, the UK committee recommends that users of this standard determine appropriate safety functions and suitable performance levels where this mode is provided.
- g) In the UK committee's opinion, Figure 2 (see subclause 5.2.5.7, d) does not show a safe area of conveyor. The UK committee believes that because a conveyor can continue to run without a chip container in position (because the chip container is not interlocked to ensure it remains in place), an unsafe situation could be created whereby

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an operator could reach into the hazardous area between the return belt and casing while the chip conveyor is moving.

- h) The UK committee believes that the potential for the ejection of workpieces (see subclause 5.12.2) has not been properly considered as a significant hazard, nor has the associated residual risk been determined and communicated.

The UK committee also draws users' attention to the fact that although EN ISO 16090-1:2018 supersedes

- EN 12417:2001+A2:2009 *Machine tools – Safety – Machining centres*
- EN 13128:2001+A2:2009 *Safety of machine tools – Milling machines (including boring machines)* and
- EN 14070:2003+A1:2009 *Safety of machine tools – Transfer and special-purpose machines,*

it is these three standards that are cited in the Official Journal of the European Union under EU Directive 2006/42/EC *Machinery (MD)*, and therefore continue to confer a presumption of conformity with the essential health and safety requirements of that directive. At the time of publication, EN ISO 16090-1:2018 is not cited. For further information, see [www.ec.europa.eu/growth/single-market/european-standards/harmonised-standards/machinery\\_en](http://www.ec.europa.eu/growth/single-market/european-standards/harmonised-standards/machinery_en).

The UK participation in its preparation was entrusted to Technical Committee MTE/1/1, Machine tools - Safety.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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English Version

## Machine tools safety - Machining centres, Milling machines, Transfer machines - Part 1: Safety requirements (ISO 16090-1:2017)

Sécurité des machines-outils - Centres d'usinage, fraiseuses, machines transfert - Partie 1: Exigences de sécurité (ISO 16090-1:2017)

Werkzeugmaschinen Sicherheit - Bearbeitungszentren, Fräsmaschinen, Transfermaschinen - Teil 1: Sicherheitsanforderungen (ISO 16090-1:2017)

This European Standard was approved by CEN on 24 January 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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## European foreword

This document (EN ISO 16090-1:2018) has been prepared by Technical Committee ISO/TC 39 "Machine tools" in collaboration with Technical Committee CEN/TC 143 "Machine tools - Safety" the secretariat of which is held by SNV.

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 October 2018, and conflicting national standards shall be withdrawn at the latest by April 2021.

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 13128:2001+A2:2009, EN 12417:2001+A2:2009 and EN 14070:2003+A1:2009.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 16090-1:2017 has been approved by CEN as EN ISO 16090-1:2018 without any modification.

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 10, *Safety*.

## Introduction

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organisations, market surveillance, etc.).

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

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

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

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

When requirements of this type-C standard are different from those stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

Milling machines present a wide range of hazards. Protection of operators and other persons from contact with moving cutting tools, especially when being rapidly rotated in the spindle or being swung from a tool magazine to the spindle during power-operated tool changing, or from contact with fast-moving workpieces, is of great importance.

When power-operated mechanisms are provided for workpiece transfer, they can also create hazardous situations during loading/unloading and workpiece alignment, clamping or releasing of the workpiece.

The significant hazards covered by this document are those listed in [Clause 4](#). The safety requirements and/or protective measures to prevent or minimize those hazards identified in [Table 2](#) and procedures for verification of these requirements or measures are found in [5.17](#).

The figures in [Annex D](#) are examples only and are not intended to illustrate the only interpretation of the text.

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# Machine tools safety — Machining centres, Milling machines, Transfer machines —

## Part 1: Safety requirements

### 1 Scope

This document specifies the technical safety requirements and protective measures for the design, construction and supply (including installation and dismantling, with arrangements for transport and maintenance) of stationary milling machines (see [3.1.1](#)), including machines capable of performing boring operations (see [3.1.2](#)), machining centres and transfer machines which are intended to cut cold metal, and other non-combustible cold materials except for wood or materials with physical characteristics similar to those of wood as defined in ISO 19085-1, and for glass, stone and engineered/agglomerated materials as defined in EN 14618.

This document covers the following machines:

- a) manually, without numerical control, operated boring and milling machines (see [3.2.1](#), Group 1), e.g. knee and column type milling machines (see [Figures C.1](#) and [C.2](#));
- b) manually, with limited numerical control, operated boring and milling machines (see [3.2.2](#), Group 2), e.g. profile and contouring milling machines (see [Figures C.3](#) and [C.4](#));
- c) numerically controlled milling machines and machining centres (see [3.2.3](#), Group 3), e.g. automatic milling machines and milling centres, e.g. multi-spindle milling machines, gear-milling machines (see [Figures C.5](#), [C.6](#) and [C.7](#));
- d) transfer and special-purpose machines (see [3.2.4](#), Group 4), which are designed to process only pre-specified workpieces or limited range of similar workpieces by means of a predetermined sequence of machining operations and process parameters (see [Figures C.8](#), [C.9](#), [C.10](#), [C.11](#), [C.12](#) and [C.13](#)).

This document also applies to machines fitted with the following devices/facilities:

- tool magazine(s);
- tool changer(s);
- workpiece handling mechanism(s);
- powered workpiece clamping mechanism(s);
- swarf/chip conveyor(s);
- power-operated door(s);
- additional equipment for turning;
- additional equipment for grinding.

When in this document the sole word “machine” or “machines” is being used, it is referred to all above-mentioned groups and types of machines.

This document deals with all significant hazards, hazardous situations and events relevant to this type of machinery which may occur during transportation, assembly and installation, setting, operation, cleaning and maintenance, troubleshooting, dismantling or disabling according to ISO 12100, when the