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**oSIST prEN ISO 23125-1:2023**

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Machine tools safety - Turning machines - Part 1: Safety requirements (ISO/DIS 23125-1:2023)

Werkzeugmaschinen - Sicherheit - Drehmaschinen (ISO/DIS 23125-1:2023)

Sécurité des machines outils - Machines de tournage - Partie 1: Exigences de sécurité (ISO/DIS 23125-1:2023)

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**ICS:**

13.110	Varnost strojev	Safety of machinery
25.080.10	Stružnice	Lathes

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# DRAFT INTERNATIONAL STANDARD

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## Machine tools safety — Turning machines —

### Part 1: Safety requirements

*Sécurité des machines outils — Machines de tournage —**Partie 1: Exigences de sécurité*

ICS: 25.080.01

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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.

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 23125-1 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 10, *Safety Turning machines*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

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## ISO/DIS 23125-1:2023(E)

### Introduction

This International Standard has been prepared to be a Harmonized Standard to provide one means of conforming to the Essential Safety Requirements of the Machinery Directive of the European Union and associated EFTA regulations.

This International Standard is a type-C standard as defined in ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered is indicated in the Scope of this International Standard. In addition, turning machines shall comply as appropriate with ISO 12100:2010 for hazards which are not covered by this International Standard.

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

The requirements of this International Standard concern designers, manufacturers, suppliers and importers of machines described in the Scope.

This International Standard also includes a list of informative items to be provided by the manufacturer to the user.

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# Machine tools safety — Turning machines —

## Part 1: Safety requirements

### 1 Scope

This International Standard specifies the requirements and/or measures to eliminate the hazards or reduce the risks in the following groups of turning machines and turning centres, which are designed primarily to shape metal by cutting.

- **Group 1:** Manually controlled turning machines without numerical control.
- **Group 2:** Manually controlled turning machines with limited numerically controlled capability.
- **Group 3:** Numerically controlled turning machines and turning centres.
- **Group 4:** Single- or multi-spindle automatic turning machines.

NOTE 1 For detailed information on the machine groups, see the definitions in 3.5, features and limitations in 5.1.1 and mandatory and optional modes of operation in 5.1.2.1.

NOTE 2 Requirements in this International Standard are, in general, applicable to all groups of turning machines. If requirements are applicable to some special group(s) of turning machines only, then the special group(s) of turning machine(s) is/are specified.

NOTE 3 The automatic exchange of clamping devices are excluded from this standard

This international standard takes account of intended use, including reasonably foreseeable misuse, maintenance, cleaning, and setting operations. It specifies access conditions to operators positions and manual load/unload stations. It presumes accessibility to the machine from all directions. It describes means to reduce risks to operators and other exposed persons.

This international standard also applies to workpiece transfer devices including transport devices for loading/unloading when they form an integral part of the machine.

This international standard deals with significant hazards relevant to turning machines when they are used as intended and under the conditions foreseen by the manufacturer (see 4).

Risk analysis of hazards arising from other metal working processes (e.g. grinding, milling, friction welding, forming, electro discharge, laser processing) are covered by other standards (see Bibliography). However, if additional milling and grinding operations are provided hazard arising from additional clamping condition and ejection of parts shall be considered.

This International Standard also applies to machines which are integrated into an automatic production line or turning cell in as much as the hazards and risks arising are comparable to those of machines working separately.

This International Standard also includes a minimum list of safety-relevant information which the manufacturer has to provide to the user. See also ISO 12100:2010, Figure 2, which illustrates the interaction of manufacturer's and user's responsibility for the operational safety.

The user's responsibility is to identify specific hazards (e.g. fire and explosion) and reduce the associated risks can be critical (e.g. whether the central extraction system is working correctly).

This International Standard applies to machines that are manufactured after the date of issue of this International Standard.

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### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to 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 230-5:2000, *Test code for machine tools — Part 5: Determination of the noise emission*

ISO 447:1984, *Machine tools — Direction of operation of controls*

ISO 702 (all parts), *Machine tools — Connecting dimensions of spindle noses and work holding chucks*

ISO 841:2001, *Industrial automation systems and integration — Numerical control of machines — Coordinate system and motion nomenclature*

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 6385:2016, *Ergonomics principles in the design of work systems*

ISO 8525:2008, *Airborne noise emitted by machine tools — Operating conditions for metal-cutting machines*

ISO 9241 (all parts), — *Ergonomics of human-system interaction*

ISO 9355-1:1999, *Ergonomic requirements for the design of displays and control actuators — Part 1: Human interactions with displays and control actuators*

ISO 9355-2:1999, *Ergonomic requirements for the design of displays and control actuators — Part 2: Displays*

ISO 9355-3:2006, *Ergonomic requirements for the design of displays and control actuators — Part 3: Control actuators*

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

ISO 11161:2007+Amd.1:2010, *Safety of machinery — Integrated manufacturing systems — Basic requirements*

ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections*

ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*

ISO 11228 (all parts), *Ergonomics — Manual handling*

- ISO/TR 11688-1:1995, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*
- ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*
- ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*
- ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*
- ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design*
- ISO 13851:2019, *Safety of machinery — Two-hand control devices — Principles for design and selection*
- ISO 13854:2017, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*
- ISO 13855:2010, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body*
- ISO 13856-2:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars*
- ISO 13856-3:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices*
- ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*
- ISO 14118:2017, *Safety of machinery — Prevention of unexpected start-up*
- ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*
- ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*
- ISO 14122-1:2016, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means and general requirements of access*
- ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*
- ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*
- ISO 14122-4:2016, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*
- ISO 14159:2002, *Safety of machinery — Hygiene requirements for the design of machinery*
- ISO 15534-1:2000, *Ergonomic design for the safety of machinery — Part 1: Principles for determining the dimensions required for openings for whole-body access into machinery*
- ISO 15534-2:2000, *Ergonomic design for the safety of machinery — Part 2: Principles for determining the dimensions required for access openings*
- ISO 16156:2004, *Machine-tools safety — Safety requirements for the design and construction of work holding chucks*
- IEC 60204-1:2016, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*
- IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
- IEC 60825-1:2014, *Safety of laser products — Part 1: Equipment classification and requirements*

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IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments*

IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments*

IEC 61800-5-2:2016, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional*

IEC 62061:2021, *Safety of machinery - Functional safety of safety-related control systems*

EN 1837:1999+A1:2009, *Safety of machinery — Integral lighting of machines*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010 and ISO 13849-1:2015 and the following apply.

#### 3.1 General terms

##### 3.1.1

##### **turning machine**

machine tool for cutting operations where the main movement is the rotation of the workpiece against the cutting tool(s)

##### 3.1.2

##### **manual control**

each movement of the machine is individually initiated and controlled by the operator

##### 3.1.3

##### **direction control**

positive actuation device to select and maintain a movement

##### 3.1.4

##### **Numerical control NC**

##### **computerized numerical control CNC**

automatic control of a process performed by a device that makes use of numeric data entered while the operation is in progress

Note 1 to entry: Adapted from ISO 2806:1994, definition 2.1.1.

##### 3.1.5

##### **manually controlled turning machine**

turning machine for which process steps for the machining are controlled or started by an operator without support by an NC-machining program

##### 3.1.6

##### **numerically controlled turning machine**

##### **NC turning machine**

turning machine that operates under numerical control or computerized numerical control (CNC)

##### 3.1.7

##### **turning centre**

numerically controlled turning machine equipped with power-driven tools and the capability to orientate the work holding spindle around its axis

Note 1 to entry: A turning centre can also include, but is not limited to, functions such as gauging, burnishing, threading, boring, milling, grinding and drilling.

Note 2 to entry: If grinding processes are involved, see ISO 16089:2015 for additional safety measures.

### 3.1.8

#### **work zone**

zone where the cutting process is taking place

### 3.1.9

#### **accessible work zone**

hazard zone of a machine where a stationary standing position with access for the whole body is required with its intended use

## 3.2 Functional terms

### 3.2.1

#### **Safety functions SF**

function of a machine whose failure can result in an immediate increase of risk(s).

[SOURCE: ISO 12100:2010, 3.30]

### 3.2.2

#### **operating stop**

Stop of the machine movements in the production process. Control functions between control system and machine drives are maintained (torque, speed of rotation, position)

### 3.2.3

#### **safe operating stop SOS**

operational stop with additional control system measures preventing dangerous machine movements due to control system faults

### 3.2.4

#### **safe stop 1 SS1**

Stop with defined motor braking as part of the safety function, which corresponds to a category 1 stop according to IEC 60204-1:2016, 9.2.2. STO function is triggered when the motor is in a standstill

### 3.2.5

#### **safe stop 2 SS2**

Stop with defined motor braking as part of the safety function, which corresponds to a category 2 stop according to IEC 60204-1:2016. In contrast to safe stop 1 (SS1) the motor in standstill is in closed loop operation. When the motor is in standstill a safe operating stop (SOS) is triggered. In this case the standstill position is kept precisely, due to the active control loop

Note 1 to entry: The function SS2 brakes the motor, monitors the magnitude of the motor deceleration, and after a delay time, initiates the SOS function, see also IEC 61800-5-2:2007, 4.2.4.2.

### 3.2.6

#### **safe torque off STO**

function to prevent energy being supplied to the motor

Note 1 to entry: The STO function prevents energy being supplied to the motor, which can generate a torque, see also IEC 61800-5-2:2016.

## 3.3 Parts of turning machines

### 3.3.1

#### **vision panel**

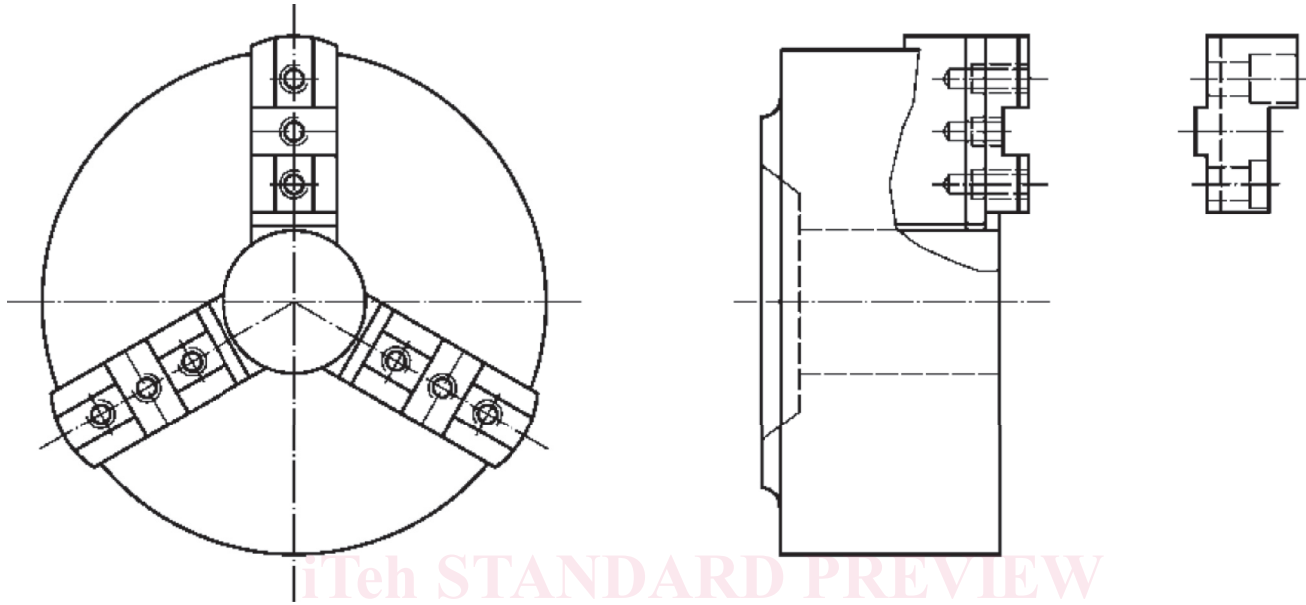
window provided in a guard through which the operator can view the *work zone* or other areas of the machine

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### 3.3.2 chuck

clamping device in which workpieces are clamped with the aid of either manual energy or pneumatic, hydraulic or electric energy

Note 1 to entry: See [Figure 1](#)



NOTE The chuck with 3 jaws is an example only, a chuck can have more than two jaws.

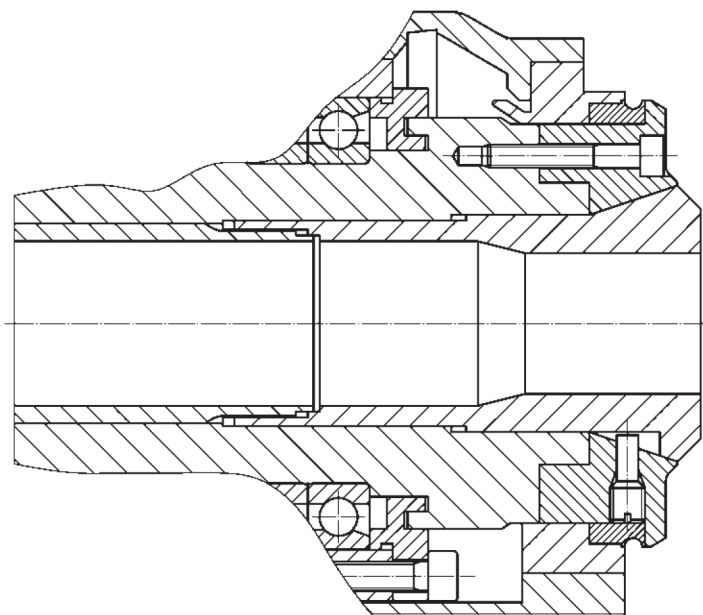
**Figure 1 — Chuck**

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### 3.3.3 collet

device designed to hold the bar into the turning spindle, e.g. by pressure bar or draw bar

Note 1 to entry: See [Figure 2](#).



**Figure 2 — Collet**



**3.3.4****tool spindle**

Rotating spindle which receives the cutting tool

**3.3.5****workpiece spindle**

Rotating spindle which receives the workpiece

**3.3.6****counter spindle**

workpiece spindle opposite to another workpiece spindle which the workpiece is transferred from

**3.3.7****electronic handwheel**

a manually operated control device which initiates an axis- or spindle movement e.g. by pulse generation during its rotation

**3.3.8****outside diameter of workpiece clamping device(D)**

outer position of work holding clamping device (e.g. chuck) when the biggest workpiece diameter is clamped.

**3.3.9****distance between centres (BC)**

maximum distance between workpiece spindle clamping device and tailstock quill or work piece clamping device of the counter spindle.

**3.4 Modes of operation****3.4.1****mode of operation MO**

Mode of operation to supply a defined amount of machine functions under predefined safety measures

Note 1 to entry: For specifications on safety facilities and security measures relating to different modes of operation, are defined in [clause 5](#)

**3.4.2****mode of operation selection device**

facility consisting of an access-, selection- and activation system for manual selection of the machine mode of operation, to which only a restricted group of persons have access

Note 1 to entry: See also ISO 12100:2010, 6.2.11.10

**3.4.3****MO 0: manual mode**

operation of the machine under manual control by the operator without use of preprogrammed operations

**3.4.4****MO 1: automatic mode**

automatic, programmed operation of the machine until stopped by program or operator

Note 1 to entry: The automatic mode can include an operational interruption for loading/unloading of workpieces and tools.