



**SLOVENSKI STANDARD**  
**SIST EN 13788:2003**

**01-september-2003**

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Machine tools - Safety - Multi-spindle automatic turning machines

Werkzeugmaschinen - Sicherheit - Mehrspindel-Drehautomaten

Machines-outils - Sécurité - Machines de tournage automatiques multibroches

**Ta slovenski standard je istoveten z: EN 13788:2001**

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EUROPEAN STANDARD

EN 13788

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2001

ICS

English version

## Machine tools - Safety - Multi-spindle automatic turning machines

Machines-outils - Sécurité - Machines de tournage  
automatiques multibroches

Werkzeugmaschinen - Sicherheit - Mehrspindle-  
Drehautomaten

This European Standard was approved by CEN on 5 October 2001.

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 Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## EN 13788:2001 (E)

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## Foreword

This European standard has been prepared by 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of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest by June 2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this document.

The European standards produced by CEN/TC 143 are particular to machine-tools and complement the relevant A and B standards on the subject of general safety (see introduction of EN 292-1:1991 for a description of A, B and C standards).

Annexes B and D are normative, annexes A, C and E are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

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**EN 13788:2001 (E)****0 Introduction**

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

This European Standard is a type C standard as defined in EN 292:1991 and EN 1070:1998.

The machinery concerned and the extent to which hazards, hazardous situation and events are covered is indicated in the scope of this standard. In addition multi-spindle automatic turning machines shall comply as appropriate with EN 292-1:1991 and EN 292-2 for hazards which are not covered by this standard. When provisions of this C type standard are different from those which are stated in type A or B standards, the provision of this C type standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this C type standard.

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

This standard also includes information to be provided by the manufacturer to the user.

**1 Scope**

This European Standard specifies the requirements and/or measures to remove the hazards and limit the risks on general purpose horizontal multi-spindle and vertical multi-spindle automatic turning machines which are designed primarily to work cold metal as defined in 3.1 and hereafter referred to as "machines".

NOTE Hazards arising from other metal processes (e.g. grinding, laser processing) are covered by other standards (see Bibliography).

Horizontal single spindle and vertical single spindle automatic turning machines are covered by EN 12415:2000.

This standard covers the significant hazards, listed in clause 4.

— This standard applies to numerically and/or mechanically controlled multi-spindle automatic turning machines;

The standard also applies to ancillary devices, e.g. collets, power operated chucks, bar/workpiece handling devices and swarf handling equipment which are integral to the machine.

This 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 European Standard is not applicable to NC turning machines with machining facilities under manual control which are dealt with in EN 12840:2001.

This standard applies to machines which are manufactured after the date of issue of this standard.

**2 Normative references**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

- EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications*
- EN 292-2:1991/A1:1995, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications*
- EN 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs.*
- EN 349, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body*
- EN 418:1992, *Safety of machinery - Emergency stop equipment, functional aspects - Principles for design.*
- EN 547-1, *Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery.*
- EN 547-2, *Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings.*
- EN 563:1994, *Safety of machinery – Temperatures of touchable surfaces – Ergonomic data to establish temperature limit values for hot surfaces*
- EN 574:1996, *Safety of machinery - Two hand control devices – Functional aspects – Principles for design.*
- EN 614-1, *Safety of machinery - Ergonomic design principle*
- EN 894-1:1997, *Safety of machinery - Ergonomic requirements for the design of displays and control actuators – Part 1: General principles for human interactions with displays and control actuators.*
- EN 894-2:1997, *Safety of machinery - Ergonomic requirements for the design of displays and control actuators – Part 2: Displays.*
- EN 894-3:2000, *Safety of machinery - Ergonomic requirements for the design of displays and control actuators – Part 3: Control actuators.*
- EN 953:1997, *Safety of machinery – Guards-General requirements for the design and construction of fixed and movable guards.*
- EN 954-1:1996, *Safety of machinery - Safety related parts of control systems - Part 1: General principles for design.*
- EN 982:1996, *Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics.*
- EN 983:1996, *Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics.*
- EN 999, *Safety of machinery – The positioning of protective equipment in respect of approach speeds of parts of the human body*
- EN 1005-1, *Safety of machinery - Human physical performance - Part 1: Terms and definitions*
- prEN 1005-2, *Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery*
- EN 1005-3, *Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation*
- prEN 1005-4, *Safety of machinery - Human physical performance - Part 4: Evaluation of working postures in relation to machinery*
- EN 1037:1995, *Safety of machinery - Prevention of unexpected start up.*

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EN 1050:1996, *Safety of machinery - Principles for risk assessment.*

EN 1070:1998, *Safety of machinery - Terminology.*

EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards – Principles for design and selection.*

EN 1550:1997, *Machine tools safety - Safety requirements for the design and construction of work holding chucks.*

EN 1760-2, *Safety of machinery - Pressure sensitive protective devices - Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars.*

EN 1837:1999, *Safety of machinery - Integral lighting of machines.*

ENV 26385, *Ergonomic principles of the design of work systems (ISO 6385:1981).*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997).*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN ISO 3744:1995, *Acoustics - Determination of sound power level of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 3746:1995, *Acoustics - Determination of sound power level of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995).*

EN ISO 4871:1996, *Acoustics – Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996).*

EN ISO 9614-1:1995, *Acoustics - Determination of sound power level of noise sources using sound intensity – Part 1: Measurement at discrete points (ISO 9614-1:1993).*

EN ISO 11202:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station and at other specified positions - Survey method in situ (ISO 11202:1995).*

EN ISO 11204: 1995, *Acoustics - Noise emitted by machinery and equipment - Method requiring environmental corrections (ISO 11204:1995).*

EN ISO 11688-1:1998, *Acoustics – Recommended practice for the design of low-noise machinery and equipment- Part 1: Planning (ISO/TR 11688-1:1995)*

### 3 Terms and definitions

For the purposes of this European Standard, in addition to the terms and definitions given in EN 292:1991, EN 418:1992 and EN 1070:1998, the following terms and definitions apply:

#### 3.1

##### **multi spindle automatic turning machine**

horizontal spindle or vertical spindle turning machine, designed for batch production of parts according to an NC and/or mechanical (e.g. by cam or template) preset program with fixed sequence of operation. Machining under manual control is not possible



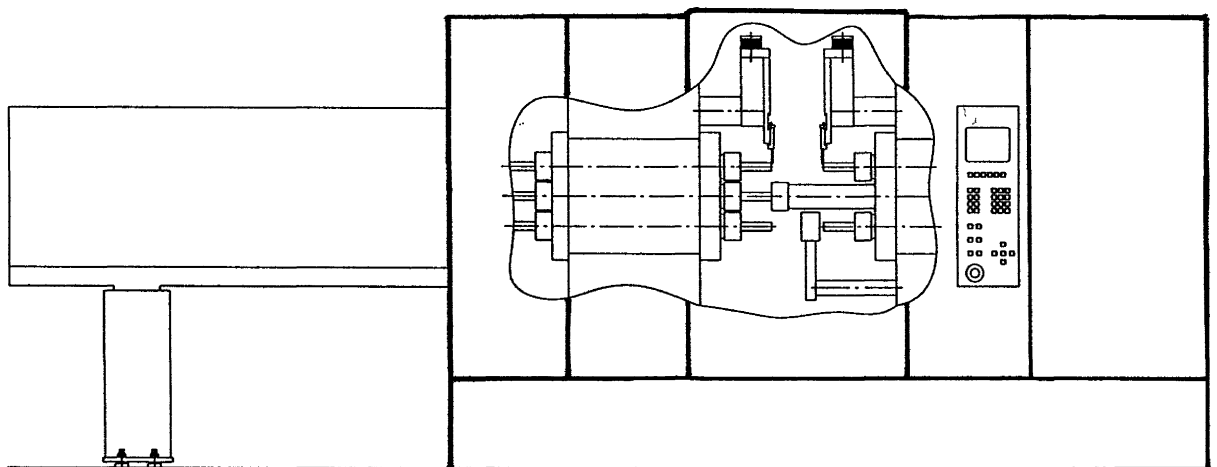


Figure 1 a) — Multi spindle NC bar automatic with second carrier for counterspindles

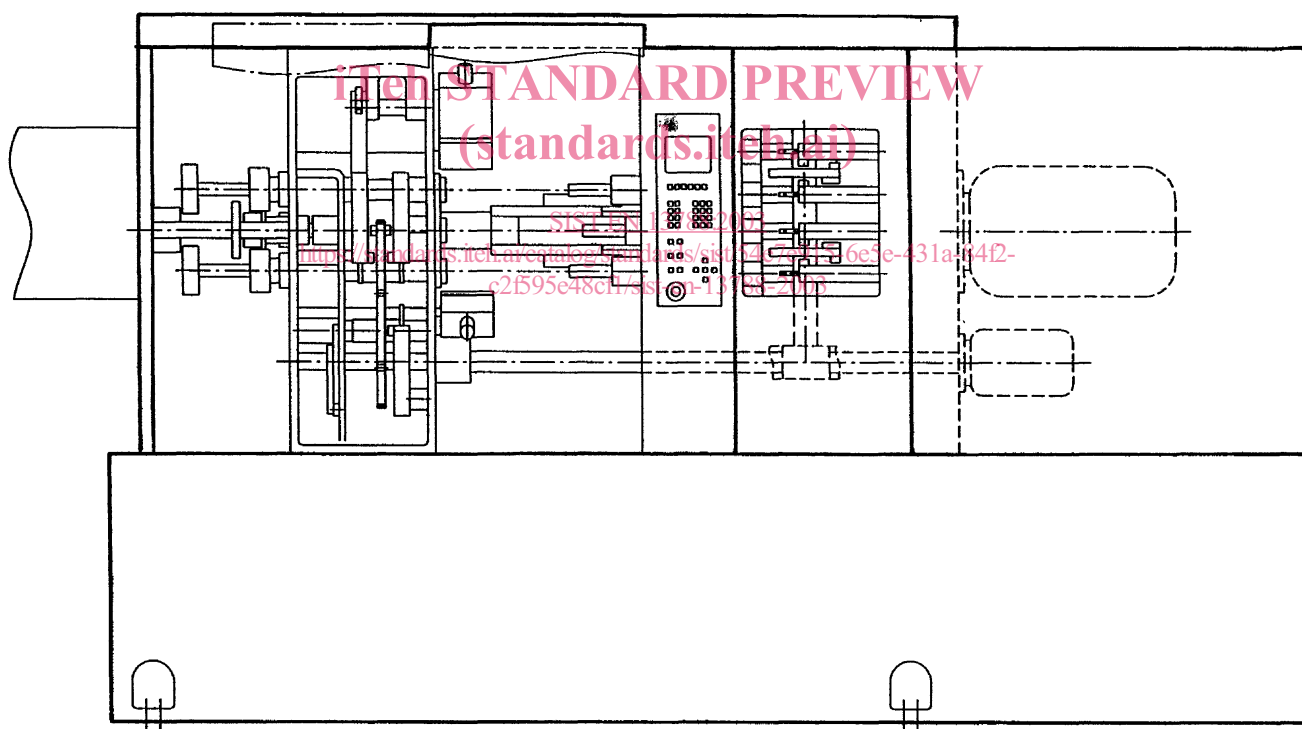


Figure 1 b) — Multi spindle cam controlled bar automatic

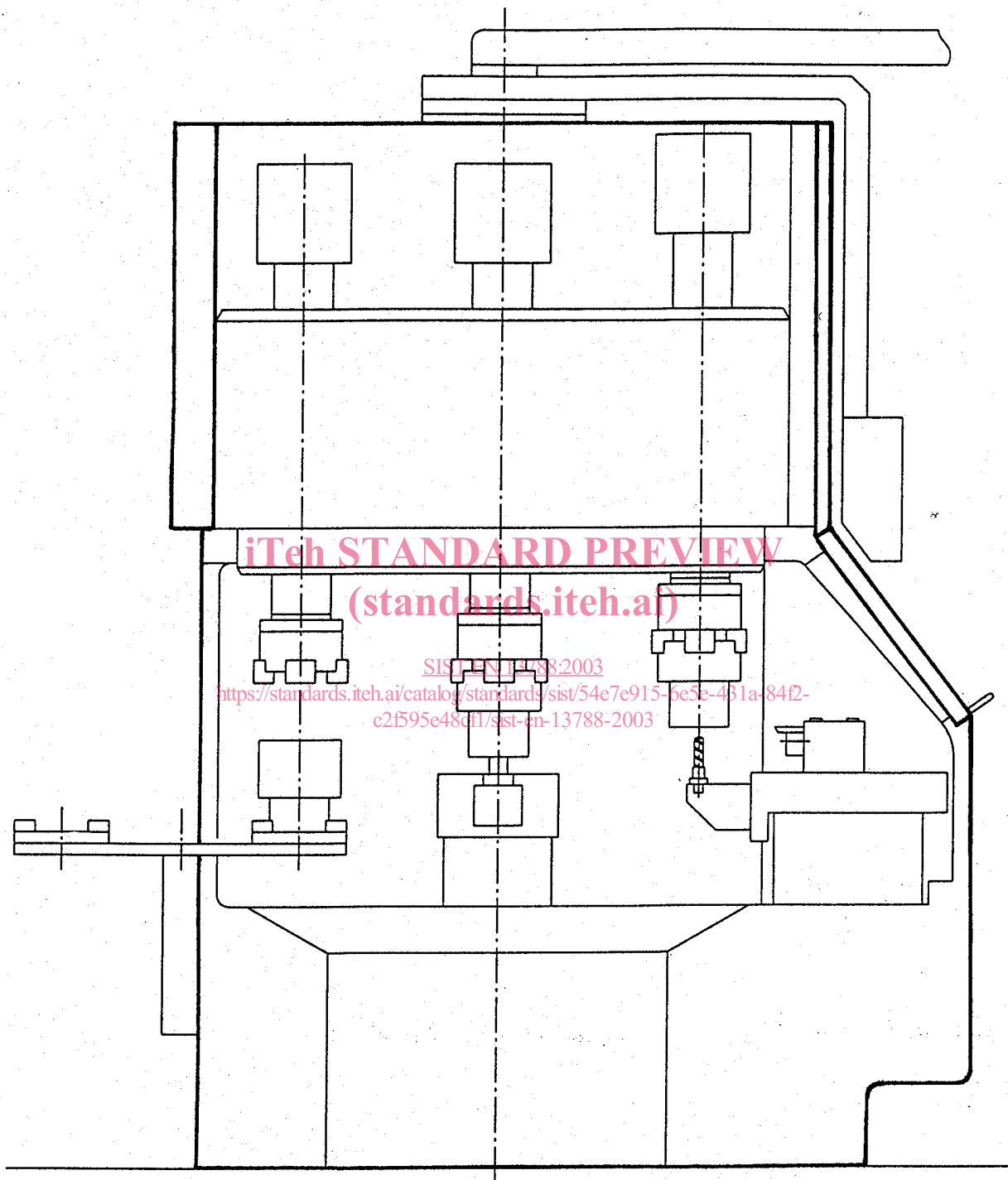


Figure 1 c) — Vertical multi spindle NC turning machine with chuck

Figure 1 — Examples of multi-spindle automatic turning machines

The machine is equipped with two or more work holding spindles held by a spindle carrier. The machine may be equipped with additional features e.g. power driven tools and one or more sub/counter spindles. The drives of the work holding spindles, tool spindles and sub/counter spindles may be by common and/or independent drives. The work holding devices are either power operated chucks or collets.

The machine is designed to perform progressive machining (as a transfer turning machine).

### 3.2

#### machine modes of operation

NOTE Definitions of modes of NC are given below:

mode of NC: A mode of operation of the NC or data entry device where entries are interpreted as functions to be executed.

- manual mode of NC: Non automatic mode of NC of a machine in which the operator controls it without the use of pre-programmed numeric data for example by push button or joystick control ;
- manual data input mode: The entry of programme data by hand at the NC ;
- single block mode: The mode of NC in which, at the initiation of the operator only one block of control data is executed ;
- automatic mode: The mode of NC in which the machine operates in accordance with the programme data until stopped by the program or the operator.

#### 3.2.1

##### machining mode

automatic, programmed, sequential operation of the machine with the facility for automatic bar feed or automatic or manual loading and/or unloading of workpieces

#### 3.2.2

##### machine setting mode

mode in which the operator performs adjustments for the subsequent machining process

The programming, testing and manual (under power) non sequential operation of the machine.

### 3.3

#### chuck

clamping device with movable jaws to hold a workpiece designated here after by chuck (see Figure 2)

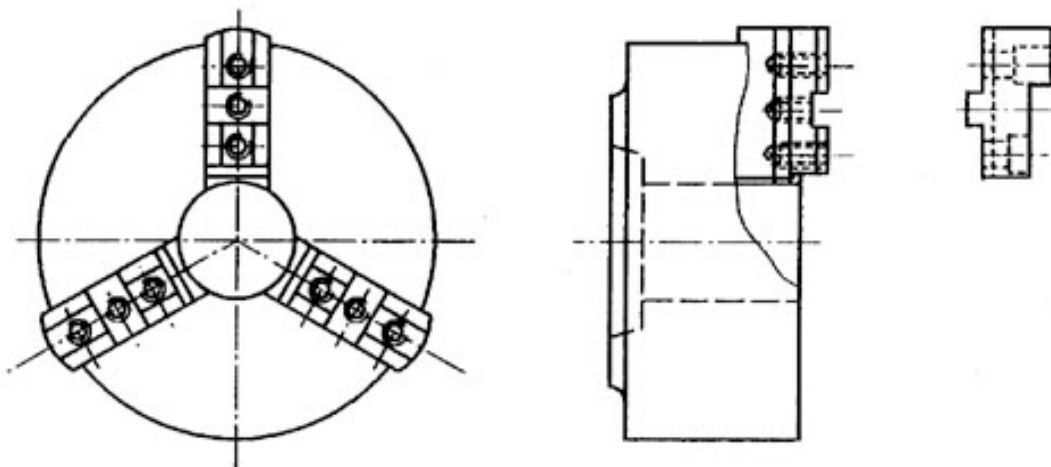
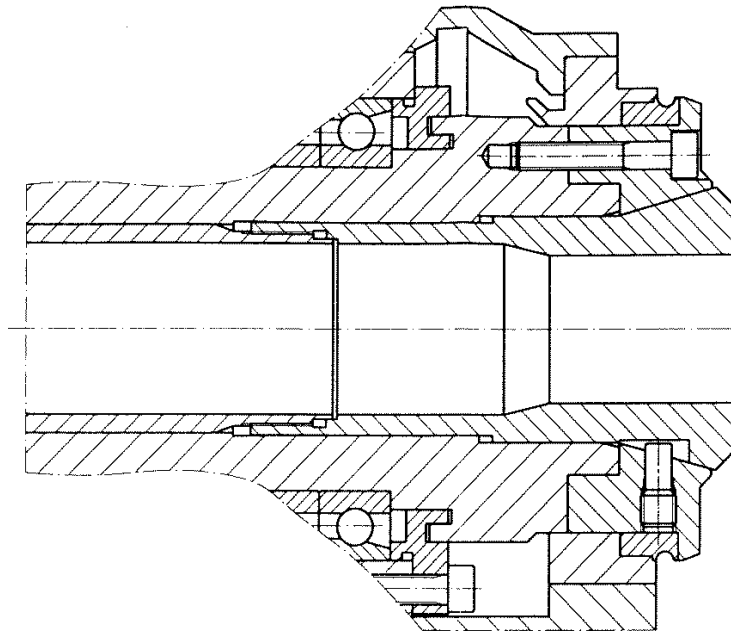


Figure 2 — Chuck

## EN 13788:2001 (E)

3.4  
collet

device designed to hold the bar into the turning spindle e.g. by pressure bar or draw bar (see Figure 3)



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Figure 3 — Collet

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#### 4 List of significant hazards

The significant hazards associated with the machine have been identified (see Table 1) in accordance with the procedures described in clause 5 of EN 292-1:1991 and EN 1050:1996.

The safety requirements and/or measures to eliminate these hazards or reduce their associated risks are laid down in clause 5 of this standard.

The significant hazards covered by this standard are listed in Table 1. Particular attention is given to hazards dealing with:

- ejection of tools, chuck jaws, workpieces or parts of them including swarf and chips (see 17 in Table 1);
- entanglement on or drawing into moving parts of the machine, particularly chucks, powered indexing spindle carrier, powered tools, and workpiece (see 1.4 and 1.5 in Table 1);
- cutting and crushing between moving and fixed/moving parts of the machine (see 1.1 and 1.3 in Table 1);
- fire (see 7.2 in Table 1).

Main danger zones are:

- working areas with moving spindle(s), work clamping components such as chuck and collet, tool carrying slide(s), indexing spindle carrier, workpiece(s), swarf handling equipment (if integrated);
- workpiece loading/unloading devices including bar feeders;
- change gears, cam mechanism area.

Table 1 — List of significant hazards

EN 1050 refer. N°	Hazards	Annex A of EN 292-2:1991/ A1:1995	EN 292		Hazardous situation	Relevant type B standard	Relevant clause in this standard
			Part 1: 1991	Part 2: 1991			
Hazards, hazardous situations and hazardous events							
1	<p><b>Mechanical hazards</b> due to:</p> <ul style="list-style-type: none"> <li>- machine parts or workpiece, e.g.:               <ul style="list-style-type: none"> <li>a) shape;</li> <li>b) relative location;</li> <li>c) mass and stability (potential energy of elements which may move under the effect of gravity);</li> <li>d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion);</li> <li>e) inadequacy of mechanical strength.</li> </ul> </li> <li>- accumulation of energy inside the machinery, e.g.:               <ul style="list-style-type: none"> <li>f) elastic elements (springs);</li> <li>g) liquids and gases under pressure;</li> <li>h) the effect of vacuum.</li> </ul> </li> </ul>	1.3	4.2	3.1, 3.2, 4			
		1.5.3, 1.6.3	4.2	3.8, 6.2.3			
1.1	Crushing hazard	1.3	4.2.1		Between fixed and moving part including work clamping (chuck or collet) tool slides, indexing spindle carrier and chip conveyor.	EN 294, EN 349, EN 574, EN 953, EN 1088	5.1.3, 5.1.7, 5.2.1, 5.2.1.4, 5.2.4.1, 5.2.4.4
1.2	Shearing hazard	1.3	4.2.1		Between fixed and moving part tool slides, indexing spindle carrier and chip conveyor.	EN 294, EN 349, EN 574, EN 953, EN 1088	5.1.7, 5.2.4.1
1.3	Cutting or severing hazard	1.3	4.2.1		During tool motion, by tools, swarf.	EN 294, EN 953	5.1.3, 5.1.7