

## **Milling cutters for high speed machining - Safety requirements**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 15641:2002 sisaldab Euroopa standardi EN ISO 15641:2001 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 14.03.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 15641:2002 consists of the English text of the European standard EN ISO 15641:2001.</p> <p>This document is endorsed on 14.03.2002 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This standard deals with the principle hazards arising from use of milling cutters, e.g. milling cutters according to ISO 3855, used for high speed machining (chip removal machining at increased peripheral speeds) on metal working machine tools and prescribes safety requirements.</p> <p>It specifies design methods, centrifugal force test procedures, operational limits and the provision of information that will lead to minimisation or elimination of these hazards.</p>	<p><b>Scope:</b></p> <p>This standard deals with the principle hazards arising from use of milling cutters, e.g. milling cutters according to ISO 3855, used for high speed machining (chip removal machining at increased peripheral speeds) on metal working machine tools and prescribes safety requirements.</p> <p>It specifies design methods, centrifugal force test procedures, operational limits and the provision of information that will lead to minimisation or elimination of these hazards.</p>
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**ICS** 25.100.20

**Võtmesõnad:** forming machines, metal working, metalworking machinery, pr, safety, safety design, safety devices, safety engineering, safety measures, safety requirements, specification (approval), specifications, tool tests, type testing, user information, workplace safety

**English version**

**Milling cutters for high-speed machining**

**Safety requirements  
(ISO 15641 : 2001)**

Fraises pour usinage à grande  
vitesse – Prescriptions de sécurité  
(ISO 15641 : 2001)

Fräswerkzeuge für die Hochgeschwin-  
digkeitsbearbeitung – Sicherheits-  
technische Anforderungen  
(ISO 15641 : 2001)

This European Standard was approved by CEN on 2001-03-07.

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.

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**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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## Foreword

The text of EN ISO 15641:2001 has been prepared by Technical Committee CEN/TC 143 "Machine tools – Safety", the secretariat of which is held by SNV, in collaboration with Technical Committee ISO/TC 29 "Small tools".

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 March 2002, and conflicting national standards shall be withdrawn at the latest by March 2002.

The annexes A and B 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.

## Introduction

This standard is intended to assist designers, manufacturers and suppliers of milling cutters to satisfy their obligations in respect of high speed machining applications. It defines requirements for design, confirmation testing and information for use that manufacturers and suppliers are to provide.

The prime objective is to ensure that milling cutters, employed for high speed machining, will be able to safely withstand the quadratic increase in centrifugal force resulting from their application at increased rotational speed.

It is based upon a collaborative German research project established to investigate the suitability of milling cutters for use in high speed machining operations.

This standard deals only with the tool and is not sufficient alone to ensure the safety. The safety of machinery is dealt with by other specific safety standards.

This standard takes account of cutting conditions only by requiring the manufacturer to provide application information.

Informative annex A provides guidance for reduction of hazards by design and informative annex B explains the scope limits.

## 1 Scope

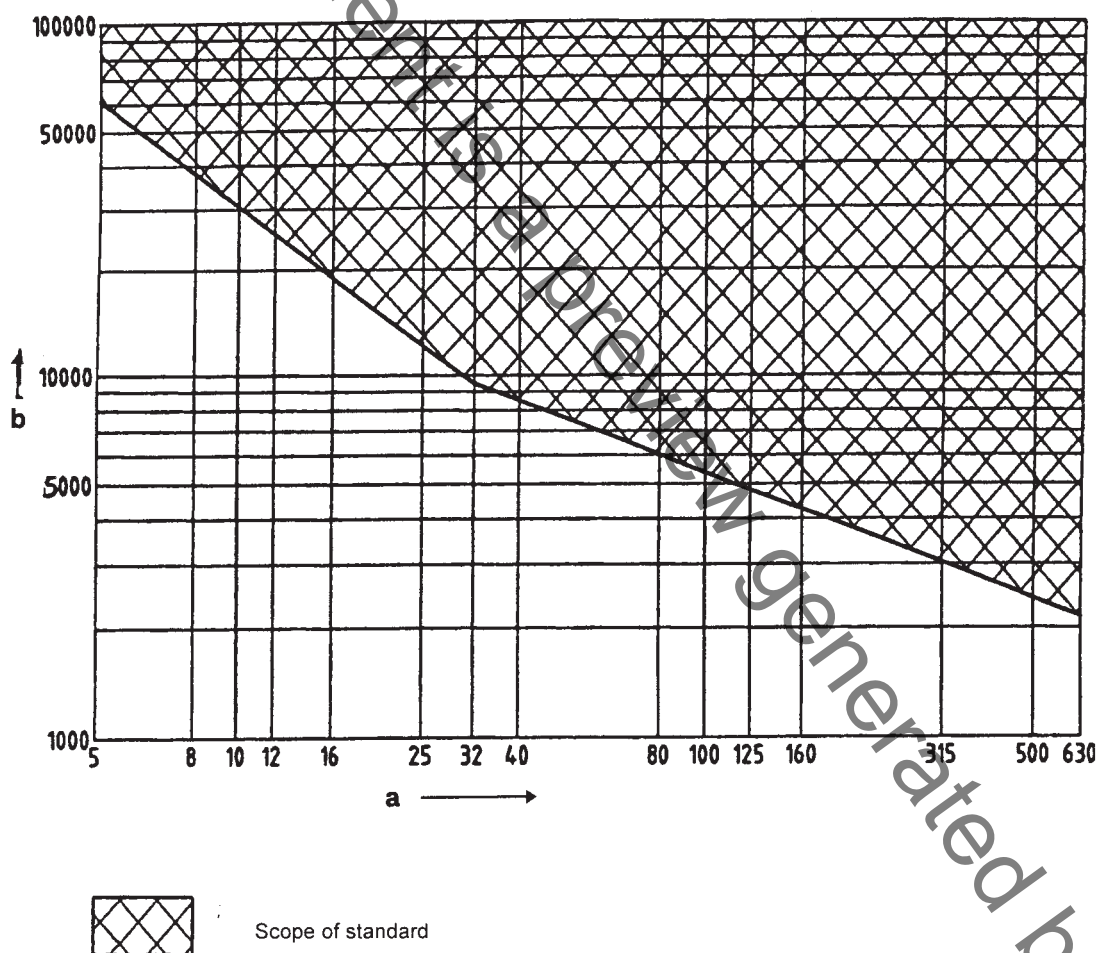
This standard deals with the principle hazards arising from use of milling cutters, e.g. milling cutters according to ISO 3855, used for high speed machining (chip removal machining at increased peripheral speeds) on metal working machine tools and prescribes safety requirements.

It specifies design methods, centrifugal force test procedures, operational limits and the provision of information that will lead to minimisation or elimination of these hazards.

The standard is applicable to milling cutters which are intended for operation at speeds in accordance with figures 1 and 2.

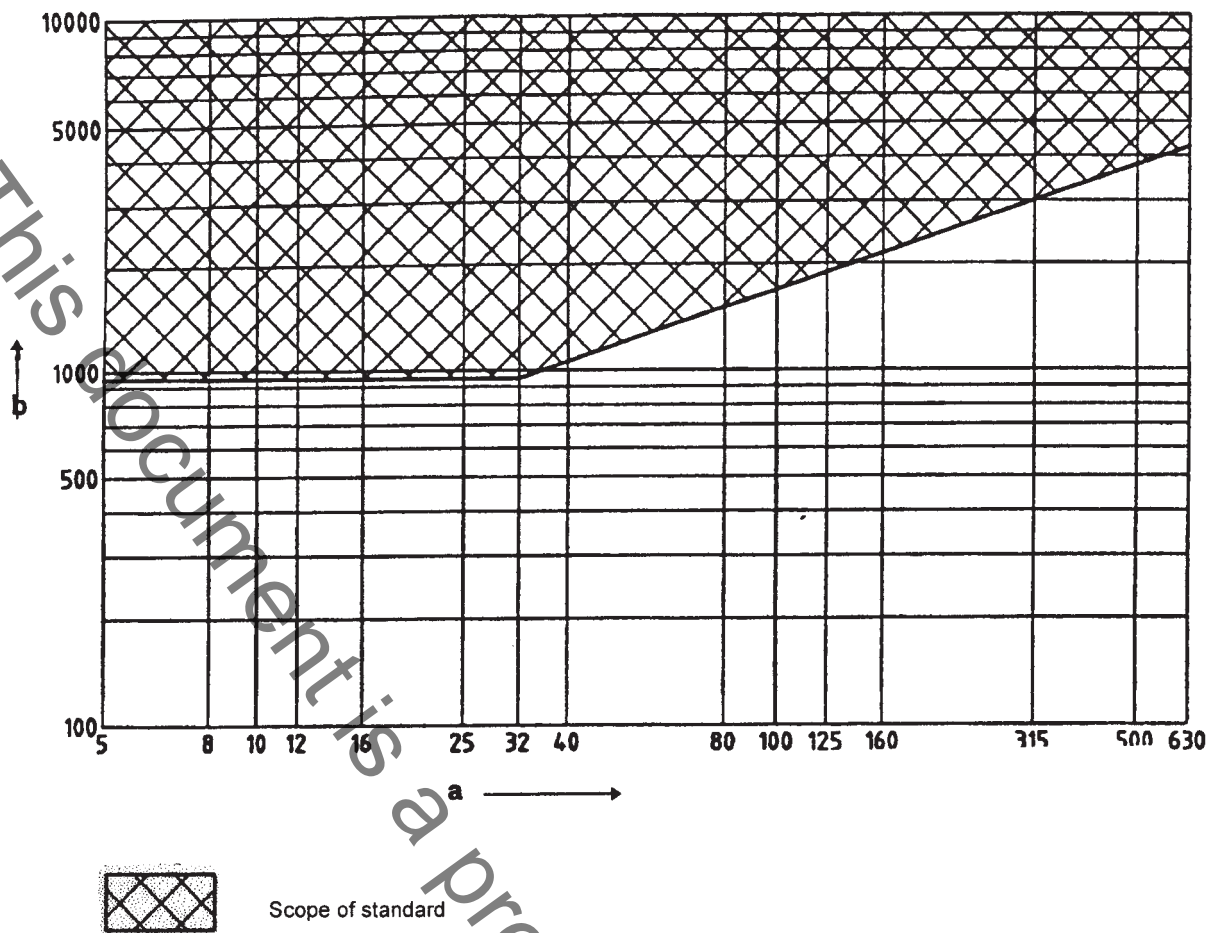
These figures respectively define the rotational speed limits and peripheral speed limits for specific cutter diameters.

NOTE A detailed explanation is provided in annex B.



- a Maximum diameter of tool  $D$  in mm  
b Rotational speed  $n$  in  $\text{min}^{-1}$

Figure 1 - Rotational speed  $n$  vs maximum diameter of tool  $D$



a Maximum diameter of tool  $D$  in mm

b Velocity at  $D$  (speed  $v_D$  at maximum diameter of tool  $D$ ) in  $\frac{\text{m}}{\text{min}}$

Figure 2 - Velocity at  $D$  (speed  $v_D$ ) vs maximum diameter of tool  $D$

## 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 1070

Safety of machinery – Terminology

ISO 1940-1:1986

Mechanical vibration – Balance quality requirements of rigid rotors – Part 1: Determination of permissible residual unbalance

ISO 3002-1

Basic quantities in cutting and grinding – Part 1: Geometry of the active part of cutting tools – General terms, reference systems, tool and working angles, chip breakers

ISO 3855

Milling cutters – Nomenclature