

---

This is a preview of "ISO 3002-2:1982". [Click here to purchase the full version from the ANSI store.](#)

# International Standard 3002/2

---

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

---

## **Basic quantities in cutting and grinding — Part 2 : Geometry of the active part of cutting tools — General conversion formulae to relate tool and working angles**

*Définitions de base pour la coupe et la rectification — Partie 2 : Géométrie de la partie active des outils coupants — Formules de conversion générales liant les angles de l'outil en main et les angles en travail*

**First edition — 1982-03-01**

---

**UDC 621.9.013**

**Ref. No. ISO 3002/2-1982 (E)**

**Descriptors :** tools, cutting tools, geometrical characteristics, cutting angle, definitions.

Price based on 35 pages

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3002/2 was developed by Technical Committee ISO/TC 29, *Small tools*, and was circulated to the member bodies in August 1977.

It has been approved by the member bodies of the following countries :

Austria	India	South Africa, Rep. of
Belgium	Ireland	Spain
Bulgaria	Israel	Turkey
Chile	Italy	United Kingdom
Czechoslovakia	Japan	USA
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	USSR
France	Mexico	Yugoslavia
Germany, F.R.	Netherlands	
Hungary	Romania	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia  
Poland

## Contents

	Page
<b>0</b> Introduction . . . . .	1
<b>1</b> Scope and field of application . . . . .	1
<b>2</b> Definitions of the coordinate axes . . . . .	2
<b>3</b> Definition of the setting and motion angles . . . . .	3
<b>4</b> List of conversion formulae – General case . . . . .	5
<b>5</b> Conversion formulae for cases where the working plane $P_{fe}$ coincides with the assumed working plane $P_f$ . . . . .	9
<b>6</b> Practical examples . . . . .	10
<b>Annexes</b>	
<b>A</b> Elaboration of the conversion formulae . . . . .	16
<b>B</b> General method for obtaining the transformation matrices for elementary rotations around the $X$ , $Y$ and $Z$ axes . . . . .	23
<b>C</b> List of equivalent terms . . . . .	24
Figures . . . . .	25

# Basic quantities in cutting and grinding — Part 2 : Geometry of the active part of cutting tools — General conversion formulae to relate tool and working angles

## 0 Introduction

This part of ISO 3002 presents formulae which can be used to convert tool angles to working angles and vice versa. The formulae are general and can be used for all possible cutting conditions. Tool angles (angles in the tool-in-hand system) and working angles (angles in the tool-in-use system) are defined in ISO 3002/1, together with the sign conventions for these angles.

The tool-in-hand reference system of planes (used to define tool angles) rotates with the cutting tool whenever the orientation of the cutting tool is changed relative to the machine tool. Similarly, the orientation of the tool-in-use reference system of planes (used to define working angles) changes with changes in the resultant cutting direction. It is therefore necessary, in order to relate the tool-in-hand and tool-in-use reference system of planes, to relate both of them to a third reference system of planes, the machine reference system of planes, which does not rotate when the tool is re-oriented or when the resultant cutting direction changes.

The relationship between the tool-in-hand and the machine reference systems of planes defines the setting of the tool in the machine. The relative position of the tool-in-use and the machine reference systems of planes is defined by the motion of the tool relative to the workpiece.

Certain general principles have been taken into consideration for the establishment of the conversion formulae :

- a) The definitions of the machine reference system of axes as defined in ISO 841 have been adopted.
- b) The origin of each coordinate system is considered to be at the "selected point" on the cutting edge and at a given moment in time.
- c) Transformation angles are defined in such a manner as to be computable readily from available workshop data.

## 1 Scope and field of application

This part of ISO 3002 deals with the establishment and application of the conversion formulae under the following headings :

- a) Definitions of the coordinate axes for the tool-in-hand and for the tool-in-use derived from the appropriate planes defined in ISO 3002/1. Definitions for the machine axes and planes are based on ISO 841.
- b) Definitions of the setting angles and motion angles.
- c) Conversion formulae.
- d) Practical examples.

NOTE — In addition to the terms given in the three official ISO languages (English, French, Russian), this part of ISO 3002 gives the equivalent terms in German and Dutch; these terms have been included at the request of Technical Committee ISO/TC 29, and are published under the responsibility of the committee members for Germany, F.R. (DIN) and the Netherlands (NNI). However, only the terms given in the official languages can be considered as ISO terms.