

Metallic materials - Conversion of hardness values (ISO 18265:2013)

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NATIONAL FOREWORD

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English Version

**Metallic materials - Conversion of hardness values (ISO
18265:2013)**

Matériaux métalliques - Conversion des valeurs de dureté
(ISO 18265:2013)

Metallische Werkstoffe - Umwertung von Härtewerten (ISO
18265:2013)

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Foreword

This document (EN ISO 18265:2013) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 101 "Test methods for steel (other than chemical analysis)" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

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Endorsement notice

The text of ISO 18265:2013 has been approved by CEN as EN ISO 18265:2013 without any modification.

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Introduction

The hardness conversion values given in [Table A.1](#) were obtained in interlaboratory tests by the *Verein Deutscher Eisenhüttenleute* (VDEh) (German Iron and Steel Institute) using verified and calibrated hardness testing machines. Statistically reliable information cannot be given on the uncertainty of these values because the test conditions were not reproducible, and the number of results used to calculate the mean hardness values is not known. The conversion values in this table are in accordance with the information presented in IC No. 3 (1980) and IC No. 4 (1982) of the European Coal and Steel Community, as well as in ISO 4964:1984 and ISO/TR 10108:1989.

[Annexes C, D and E](#) contain – in a revised format – the extensive results on the conversion of hardness values presented in TGL 43212/02 to 43212/04, standards published by the former East German standards body, the *Amt für Standardisierung, Meßwesen und Warenprüfung* (ASMW). The values presented in [Annex B](#) had also been determined by the ASMW, but were published in a report of the *Physikalisch-Technische Bundesanstalt* (PTB),^[1] the German national institute for science and technology, not in a TGL standard.

The converted hardness values in the above-mentioned TGL standards were obtained in statistically reliable hardness and tensile tests. The hardness tests were performed using ASMW normal testing machines on plane-parallel, polished specimens of various materials in different heat treatment conditions. Tensile strength was tested on machines whose force measuring and extension measuring systems had been calibrated immediately before testing. The tensile test method used is equivalent to that specified in ISO 6892-1, and the calibration procedures conform with those specified in ISO 7500-1 and ISO 9513.

[Annex G](#) contains the results on the conversion of hardness values of two tool steels with the assistance of the *Verein Deutscher Eisenhüttenleute* (VDEh) which were obtained in the year 2007.

Users of this International Standard should take note of [Clause 2](#), especially the concluding warning.

Metallic materials — Conversion of hardness values

1 Scope

This International Standard specifies the principles of the conversion of hardness values to equivalent values in other hardness scales and to estimates of tensile strength. It gives general information on the use of the conversion tables.

The conversion tables in [Annexes A to G](#) apply to

- unalloyed and low alloy steels and cast steel,
- steels for quenching and tempering,
- steels for cold working,
- high speed steels,
- tool steels,
- hardmetals, and
- non-ferrous metals and alloys.

NOTE 1 The conversion tables in [Annexes B to G](#) are based on empirical results which were evaluated by means of regression analysis. Such analysis was not possible in the case of the values given in [Annex A](#) because a sufficient number of results was not available.

NOTE 2 [Annex H](#) gives information about the effects of changes of the test procedure in the standards specifying the hardness tests.

Converted values obtained using this International Standard are only directly applicable to the exact material tested. For all other materials, they provide an indicator only. In all cases, the converted values are not intended as replacements for values obtained by the correct standard method. In particular, tensile strength estimates are the least reliable converted values in this International Standard.

Sections of this International Standard are reprinted, with permission of ASTM International, from ASTM E140 *Standard Hardness Conversion Tables for Metals Relationship among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, and Scleroscope Hardness*.

2 Principles of conversion

Hardness testing is a form of materials testing that provides information on the mechanical properties of a material with limited destruction of the specimen and within a relatively short period of time. In practice, it is often desirable to use hardness results to draw conclusions on the tensile strength of the same material if tensile testing is too involved or the piece to be examined is not to be destroyed.

Since the means of loading in hardness testing is considerably different from that in tensile testing, it is not possible to derive a reliable functional relationship between these two characteristic values on the basis of a model. Nevertheless, hardness values and tensile strength values are positively correlated, and so it is possible to draw up empirical relationships for limited applications.

Often it is necessary to check a given hardness value against a value gained by a different test method. This is especially the case if only a certain method can be used due to the particular specimen or coating thickness, the size of the object to be tested, surface quality, or the availability of hardness testing machines.