



BSI Standards Publication

Classification and application of hard cutting materials for metal removal with defined cutting edges — Designation of the main groups and groups of application

National foreword

This British Standard is the UK implementation of ISO 513:2012. It supersedes BS ISO 513:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/18, Tools tips and inserts for cutting applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2012. Published by BSI Standards Limited 2012

ISBN 978 0 580 75877 5

ICS 25.100.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2012.

Amendments issued since publication

Date	Text affected
------	---------------

INTERNATIONAL STANDARD

ISO
513

Fourth edition
2012-11-01

Classification and application of hard cutting materials for metal removal with defined cutting edges — Designation of the main groups and groups of application

*Classification et application des matériaux durs de coupe pour
enlèvement de métal avec arêtes coupantes définies — Définition des
groupes principaux et des groupes d'application*



Reference number
ISO 513:2012(E)

© ISO 2012



COPYRIGHT PROTECTED DOCUMENT

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Designation	1
3 Classification	4
3.1 Main groups of application.....	4
3.2 Groups of application.....	4
4 Important remarks	4

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 513 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 9, *Tools with cutting edges made of hard cutting materials*.

This fourth edition cancels and replaces the third edition (ISO 513:2004), which has been technically revised.

Introduction

The variety of ways in which different manufacturers produce hard cutting materials with differing characteristics makes it impossible at the time of publication to standardize hard cutting materials graded in accordance with these characteristics.

This International Standard is, therefore, limited to a classification of hard cutting materials based on their application and to a method of designation (colour marking and distinguishing symbols) for the main groups of application and the groups of application which constitute this classification.

Classification and application of hard cutting materials for metal removal with defined cutting edges — Designation of the main groups and groups of application

1 Scope

This International Standard specifies the classification and application of hard cutting materials, including hardmetals, ceramics, diamond and boron nitride, for machining by chip removal, and establishes their application.

It is not applicable to other uses (mining and other percussion tools, wire drawing dies, tools operating by deformation of the metal and comparator contact tips, etc.).

2 Designation

The designation of groups of application for hard cutting materials includes the letter symbols in accordance with Tables 1 to 4, followed by a dash and the designation of the main group of chip removal and of the group of application, as specified in Clause 4.

Table 1 — Carbides

Identification letters	Material group
HW	Uncoated carbide, main content tungsten carbide (WC) with grain size $\geq 1 \mu\text{m}$
HF	Uncoated carbide, main content tungsten carbide (WC) with grain size $< 1 \mu\text{m}$
HT^a	Uncoated carbide, main content TiC or TiN or both
HC	Carbides as above-mentioned, but coated
^a These grades are also called "Cermets".	

Table 2 — Ceramics

Identification letters	Material group
CA	Ceramic, main content Al_2O_3
CR	Ceramic, main content Al_2O_3 , reinforced
CM	Mixed ceramic, main content Al_2O_3 plus components other than oxides
CN	Silicon nitride ceramic, main content Si_3N_4
CC	Ceramics as above-mentioned, but coated

Table 3 — Diamond

Identification letters	Material group
DM	Monocrystalline diamond
DD	Polycrystalline diamond without binder
DP	Polycrystalline diamond with binder

Table 4 — Boron nitride

Identification letters	Material group
BL	Cubic crystalline boron nitride with low content of cubic boron nitride
BH	Cubic crystalline boron nitride with high content of cubic boron nitride
BC	Cubic crystalline boron nitride as above-mentioned, but coated

EXAMPLE

HW - P10

HC - K20

CA - K10

Table 5 — Application and classification of hard cutting materials

Main groups of application			Group of application			
Identifica- tion letter	Identifica- tion colour	Materials to be machined	Hard cutting materials		-	
P	blue	Steel: all kinds of steel and cast steel except stainless steel with an aus- tenitic structure.	P01 P10 P20 P30 P40 P50	P05 P15 P25 P35 P45	↑ ^a	↓ ^b
M	yellow	Stainless steel: stainless austenitic and austenitic/ ferritic steel and cast steel.	M01 M10 M20 M30 M40	M05 M15 M25 M35	↑ ^a	↓ ^b
K	red	Cast iron: grey cast iron, cast iron with spher- oidal graphite, malleable cast iron.	K01 K10 K20 K30 K40	K05 K15 K25 K35	↑ ^a	↓ ^b
N	green	Non-ferrous metals: aluminium and other non-ferrous metals, non-metallic materials.	N01 N10 N20 N30	N05 N15 N25	↑ ^a	↓ ^b
S	brown	Superalloys and titanium: heat-resistant special alloys based on iron, nickel and cobalt, titanium and titanium alloys.	S01 S10 S20 S30	S05 S15 S25	↑ ^a	↓ ^b
H	grey	Hard materials: hardened steel, hardened cast iron materials, chilled cast iron.	H01 H10 H20 H30	H05 H15 H25	↑ ^a	↓ ^b
^a Increasing speed, increasing wear resistance of cutting material (see Table 6). ^b Increasing feed, increasing toughness of cutting material (see Table 6).						

Table 6 — Area of use chart

Wear resistance ← → Toughness											
	01	05	10	15	20	25	30	35	40	45	50
P											
M										X	X
K										X	X
N								X	X	X	X
S								X	X	X	X
H								X	X	X	X

3 Classification

3.1 Main groups of application

There are six main groups of application (see Table 5). They are divided according to the different workpiece materials which are to be machined. They are identified by a capital letter and an identifying colour.

3.2 Groups of application

Each main group of application is divided into application groups. The application groups are designated by the letter for the main group and a classification number.

The manufacturers of cutting material arrange in proper order their grades into the application group system according to the relative wear resistance and toughness of the grades (see Table 6).

Table 6 shows that, according to this International Standard, only "P" grades are thought to operate under conditions sufficiently arduous as to justify wear/toughness classification numbers 45 and 50. "M" and "K" grades may have classification numbers up to 40 and the remaining groups (N, S and H) may be allocated wear/toughness classification numbers no greater than 30. Manufacturers may assign any available application code to a specified cutting tool material with qualifying composition.

4 Important remarks

A group of application is not identical to a cutting material grade. Grades from different manufacturers which are in the same application group could be different as far as application range and performance level are concerned. Within an application group, a designation (eg "P01") is not identical to a cutting material grade. Grades from different manufacturers with the same designation within an application group can be different as far as composition, properties, application range and performance level are concerned. This International Standard, consequently, does not provide data for grade comparison charts.

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services

Tel: +44 845 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 845 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com



...making excellence a habit.™