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# INTERNATIONAL STANDARD



# 525

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

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## Bonded abrasive products — General features — Designation, ranges of dimensions, and profiles

*Produits abrasifs agglomérés — Généralités — Désignation, gammes de dimensions, et profils*

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## 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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 29 has reviewed ISO Recommendation R 525 and found it technically suitable for transformation. International Standard ISO 525 therefore replaces ISO Recommendation R 525-1966 and Addendum 1 to R 525-1966 to which it is technically identical.

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ISO Recommendation R 525 was approved by the Member Bodies of the following countries :

Australia	India	Spain
Austria	Iran	Sweden
Canada	Israel	Switzerland
Chile	Italy	Turkey
Czechoslovakia	Japan	United Kingdom
Egypt, Arab Rep. of	Korea, Rep. of	U.S.A.
France	Netherlands	Yugoslavia
Germany	New Zealand	
Greece	Poland	

The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

Belgium  
U.R.S.S.

The Member Bodies of the following countries disapproved the transformation of ISO/R 525 into an International Standard :

Austria  
Sweden  
Switzerland

# Bonded abrasive products — General features — Designation, ranges of dimensions, and profiles

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard relates to bonded abrasive products in general, excluding diamond abrasive products. It comprises

- the designation of bonded abrasive products (shapes, sizes, specifications);
- the ranges of nominal dimensions (outside diameters, thicknesses, holes);
- the symbols for the profiles of plain non-cylindrical grinding-wheels.

Tolerances on other dimensions will be covered by a separate International Standard to be issued later.

The dimensions standardized for each class of product are, or will be, the subject of individual International Standards.

The letter symbols used for dimensions in this International Standard may be replaced in national standards by those in conformity with the current practice of the country in question, until an international agreement regarding a uniform symbol system is reached.

## 2 GENERAL

### 2.1 Designation and specification

The usefulness of a uniform system of designation and marking for grinding-wheels and bonded abrasive products has been recognized by manufacturers and users.

The main obstacle to a uniform marking system, however, as far as specifications are concerned, lies in the fact that similarly marked grinding-wheels produced by different manufacturers do not necessarily give the same results in use.

With regard to these specifications, therefore, it is important to emphasize that the present standardization applies solely to the marking and not to the performance of the grinding-wheel in operation; grinding-wheels with the same standard symbols, but from different sources, may therefore behave differently from one another when in use.

The symbols adopted constitute a codification of the practices most generally in force. Particular attention is

drawn to the fact that the symbols for the size of the grain are only simple conventional numbers which are valid pending some future logical standardization of the sizes of granular or powdered materials in general.

### 2.2 Dimensional ranges

The nominal dimensions have been selected to provide convenient ranges satisfying all requirements as far as possible.

Outside diameters and thicknesses are given in two columns, one in millimetres and the other in inches, which show opposite each other the values considered to be practically equivalent in the two systems of units.

The values standardized for the holes are identical, whether expressed in millimetres or in inches. In the recommended series, the inch values are conversions from the round metric values up to 40 mm, and the metric values are conversions from the round inch values above that diameter.

A supplementary table gives the values below 2 in (50,8 mm), the use of which is also recognized for a transitional period.

## 3 DESIGNATION

The complete designation of a bonded abrasive product consists of indications of the shape, dimensions and specifications of the internal nature of the product, in that order.

*Example :*

Shape	Dimensions	Specification
Type 1	300 × 40 × 32 (12 × 1 1/2 × 1.26)	51A — 36 — L — 5 — V23

### 3.1 Shapes and dimensions

#### 3.1.1 Plain wheels — Dish wheels — Depressed-centre wheels

Write the following in the order shown :

- the type, this marking remaining optional, however, for Type 1 :

Type 1 for plain wheels, without recess,

Type 5 or 7 for plain wheels with one or two recesses respectively,

Type 12 for dish wheels,

Type 27 for depressed-centre wheels.

– the three dimensions, in the following order, separated by the multiplication sign : outside diameter  $D$ , thickness  $E$  and hole  $d$ .

In addition, state the following where necessary :

– below the type number, the letter symbolizing the profile of plain non-cylindrical wheels (see clause 6);

– below the three main dimensions, for plain recessed wheels : the number, diameter and depth of the recesses.

Example :

Type 7	300 × 50 × 127
F	2 – 190 × 6
	(12 × 2 × 5
	2 – 7 1/2 × 1/4)

### 3.1.2 Cup wheels

Write the following in the order shown :

– the type :

Type 6 for straight cup wheels.

Type 11 for taper cup wheels.

– the three dimensions, outside diameter  $D$ , thickness  $E$  and hole  $d$ , in that order, separated by the multiplication sign.

For taper cup wheels, give the two diameters  $D$  and  $D_1$ , separated by an oblique line.

– below these three main dimensions and in the following order : the wall thickness and thickness through the back, each preceded by a conventional letter designating the wall and back respectively (the choice of these two letters is left to each national standards institute).

Examples :

– straight cup :

Type 6 – 125 × 50 × 22,23	(5 × 2 × 7/8
B25 E <sub>1</sub> 20	B1 E <sub>1</sub> 3/4)

– taper cup :

Type 11 – 125/100 × 50 × 22,23	(5/3 3/4 × 2 × 7/8
B25 E <sub>1</sub> 20	B1 E <sub>1</sub> 3/4)

### 3.1.3 Cylinder wheels

Write the following in the order shown :

– the type (Type 2);

– the diameter  $D$  and thickness  $E$ , in that order, separated by the multiplication sign;

– the wall thickness, preceded by a conventional letter designating the wall (see above).

Example : Type 2 – 400 × 125 B40  
(16 × 5 B 1 1/2)

### 3.1.4 Bricks and sticks

To avoid any confusion with the dimensions of wheels, write the three dimensions in the following order :

height × width × length.

For segments of wheels with trapezoidal section, give the two widths separated by an oblique line.

## 3.2 Specifications

3.2.1 The designation of specifications comprises seven symbols (three of which are optional) which should be arranged in the following order :

0 – Type of abrasive, manufacturer's own (optional).

1 – Nature of abrasive.

2 – Grain size.

3 – Grade.

4 – Structure (optional).

5 – Nature of bond.

6 – Type of bond, manufacturer's own (optional).

Symbols 1 to 5 should be selected from the standard symbols given in 3.2.2.

If the considers it worth while, each manufacturer may, in addition,

– precede the letter designating the nature of abrasive (symbol 1) with a symbol of his choice (0) indicating the type and origin of the abrasive;

– follow symbol 5 with a 6th symbol corresponding to his own type of bond identification mark.

### 3.2.2 Standard symbols

#### 3.2.2.1 NATURE OF ABRASIVE

A – for aluminium abrasives;

C – for silicon carbides.

**3.2.2.2 GRAIN SIZE**

The grain size, from the coarsest to the finest, is designated by the following numbers : 8 – 10 – 12 – 14 – 16 – 20 – 24 – 30 – 36 – 46 – 54 – 60 – 70 – 80 – 90 – 100 – 120 – 150 – 180 – 220 – 240 – 280 – 320 – 400 – 500 – 600, number 8 being the coarsest and 600 the finest.

Manufacturers may follow the grain size number with a symbol indicating combinations of different sizes.

**3.2.2.3 GRADE**

The grade, from the softest to the hardest, is designated by a letter of the alphabet from A to Z, A being the softest and Z the hardest.

**3.2.2.4 STRUCTURE**

The structure is optionally designated by a number (from 0 to 14 or higher); the higher the number, the more widely spaced the grains.

Higher numbers may be used as and when required by manufacturing developments.

**3.2.2.5 NATURE OF BOND**

V = vitrified

S = silicate

R = rubber

RF = rubber with fabric reinforcement

B = resinoid (synthetic resins)

BF = resinoid (synthetic resins) reinforced

E = shellac

Mg = magnesia

**3.2.3 Marking of grinding-wheels (specifications and operating speed)**

An example of complete marking of grinding-wheel specifications in conformity with the designation recommended above is given in the annex.

The reader is also reminded, considering the importance of this safety requirement (and although safety regulations are outside the scope of this International Standard), that the maximum operating speed should be marked either on the wheel itself or on a ticket accompanying it.

**4 RANGES OF NOMINAL DIMENSIONS**

**4.1 Outside diameters *D***

mm	in	mm	in	mm	in	mm	in
8	5/16	40	1 1/2	200	8	600	24
10	3/8	50	2	250	10	750	30
13	1/2	63	2 1/2	300	12	900	36
16	5/8	80	3	350	14	1 060	42
20	3/4	100	4	400	16	1 250	48
25	1	125	5	450	18	1 500	60
32	1 1/4	150	6	500	20		

Where diameters below 8 mm are required, they should be chosen for preference from the rounded values of the R 10 series of preferred numbers.<sup>1)</sup>

**4.2 Thickness *E***

mm	in	mm	in	mm	in	mm	in
0,6	—	4	5/32	25	1	160	6
0,8	1/32	5	3/16	32	1 1/4	200	8
1	—	6	1/4	40	1 1/2	250	10
1,25	3/64	8	5/16	50	2	315	12
1,6	1/16	10	3/8	63	2 1/2	400	16
2	5/64	13	1/2	80	3	500	20
2,5	3/32	16	5/8	100	4	—	—
3,2	1/8	20	3/4	125	5	—	—

**4.3 Holes *d***

**4.3.1 Recommended series**

mm	in	mm	in	mm	in
1,6	0.063 0	20	0.787 4	50,8	2
2,5	0.098 4	25	0.984 3	76,2	3
4	0.157 5	32	1.260 0	127	5
6	0.236 2	40	1.574 8	152,4	6
10	0.393 7	—	—	203,2	8
13	0.511 8	—	—	304,8	12
16	0.629 9	—	—	508	20

**4.3.2 Transitional series**

mm	in	mm	in	mm	in
1,59	1/16	12,70	1/2	31,75	1 1/4
2,38	3/32	15,88	5/8	38,10	1 1/2
3,97	5/32	19,05	3/4	—	—
6,35	1/4	25,40	1	—	—

1) See ISO 3, Preferred numbers – Series of preferred numbers, and ISO 17, Guide to the use of preferred numbers and of series of preferred numbers.

4.3.3 Special holes

The following special holes apply only to cup wheels and depressed-centre wheels with fabric reinforcements (see ISO 603 and ISO 2933) :

mm	in
9,53	3/8
22,23	7/8

5 HOLE TOLERANCES

The tolerances given below, chosen from ISO/R 286, *System of limits and fits – Part 1 : General, tolerances and deviations*, are to be checked with cylindrical plug gauges. These plug gauges are to be rejected when they reach the nominal size of the hole on account of wear.

5.1 Precision wheels

5.1.1 General case

Tolerance H12

5.1.2 Special cases

Tolerance H11 for the standard holes listed below:

- mm : 76,2 – 127 – 203,2 – 304,8 – 508
- in : 3 – 5 – 8 – 12 – 20

5.2 Wheels other than precision wheels (for example, fettling wheels, etc.)

Tolerance H13

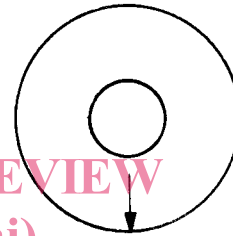
5.3 Directional wheels

Definition

A **directional wheel** is defined as a wheel marked with a sign which facilitates its assembly on the grinding-machine, in the same position as on the machine on which it was trued.

Thus, the same point of contact between the shaft (or hub) and the hole is maintained and run-out on the wheel when in use is reduced to the difference between the shaft (or hub) diameters.

The *lower part* of the wheel is indicated by an arrow, as shown below.

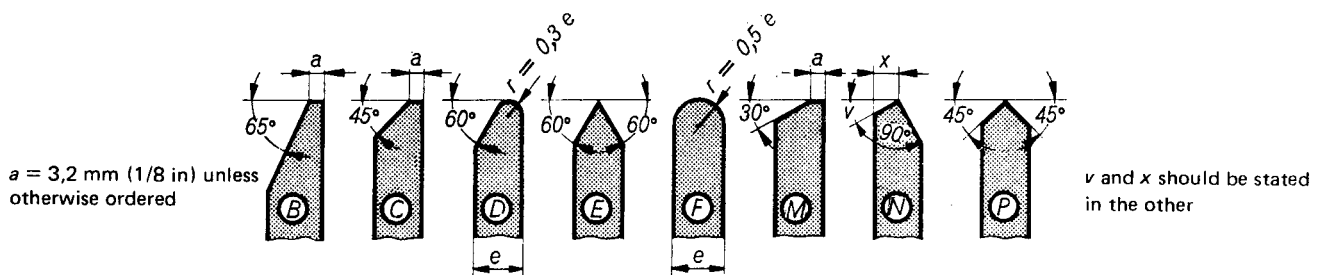


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In such conditions, the tolerances provided in 5.1 may be exceeded and no standard tolerances are specified.

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6 SPECIAL PROFILES FOR PLAIN NON-CYLINDRICAL WHEELS (see figure)



The symbols are surrounded by a circle.

ANNEX

EXAMPLE OF COMPLETE MARKING OF GRINDING-WHEEL SPECIFICATIONS

Order of marking	0	1	2	3	4	5	6
	Type of abrasive *	Nature of abrasive	Grain size	Grade	Structure*	Nature of bond	Type of bond *
Example :	51	A	36	L	5	V	23

Aluminium abrasives — **A**  
 Silicon carbides — **C**

coarse	medium	fine	very fine
8	30	70	220
10	<b>36</b>	80	240
12	46	90	280
14	54	100	320
16	60	120	400
20		150	500
24		180	600

Spacing from the closest to the most open	
0	8
1	9
2	10
3	11
4	12
<b>5</b>	13
6	14
7	etc.

<b>V</b>	vitriified
S	silicate
R	rubber
RF	rubber with fabric reinforcement
B	resinoid (synthetic resins)
BF	resinoid (synthetic resins) reinforced
E	shellac
Mg	magnesia

Soft	Medium	Hard
A B C D E F G H I J K	<b>L</b> M N O P Q R S T U V W X Y Z	

1) Optional symbols.  
 The symbols 0 and 6 are the manufacturers's own.

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