BS EN ISO 6103:2014

BSI Standards Publication

Bonded abrasive products — Permissible unbalances of grinding wheels as delivered — Static testing

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National foreword

This British Standard is the UK implementation of EN ISO 6103:2014. It supersedes BS EN ISO 6103:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/13, Grinding wheels, abrasive tools, paper and cloths, and powders.

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

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ISBN 978 0 580 81076 3

ICS 25.100.70

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 6103

October 2014

ICS 25.100.70

Supersedes EN ISO 6103:2005

English Version

Bonded abrasive products - Permissible unbalances of grinding wheels as delivered - Static testing (ISO 6103:2014)

Produits abrasifs agglomérés - Balourds admissibles des meules en état de livraison - Contrôle statique (ISO 6103:2014)

Schleifkörper aus gebundenem Schleifmittel - Zulässige Unwucht von Schleifscheiben im Lieferzustand - Statische Prüfung (ISO 6103:2014)

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Ref. No. EN ISO 6103:2014 E

Foreword

This document (EN ISO 6103:2014) has been prepared by Technical Committee ISO/TC 29 "Small tools" in collaboration with Technical Committee CEN/TC 143 “Machine tools - Safety” the secretariat of which is held by SNV.

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of an identical text or by endorsement, at the latest by April 2015, and conflicting national standards shall be withdrawn at the latest by April 2015.

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The text of ISO 6103:2014 has been approved by CEN as EN ISO 6103:2014 without any modification.

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 29, *Small tools*, Subcommittee SC 5, *Grinding wheels and abrasives*.

This fourth edition cancels and replaces the third edition (ISO 6103:2005), which has been technically revised to introduce the following significant changes:

a) the scope has been amended with respect to minimum outside diameters;

b) the normative references to ISO 603 series have been deleted;

c) types of bonded abrasive products for hand-held grinding machines in Table 1 have been amended;

d) diameter ranges in Table 1 have been corrected;

e) a bibliography has been added.

Bonded abrasive products — Permissible unbalances of grinding wheels as delivered — Static testing

1 Scope

This International Standard specifies the maximum permissible values of unbalances for bonded abrasive wheels with an outside diameter $D \geq 125$ mm and maximum operating speed $v_S \geq 16$ m/s, in the as-delivered condition.

It also specifies the method for measuring the unbalance and the practical method for testing whether a grinding wheel is acceptable or not.

This International Standard is applicable to bonded abrasive wheels in the as-delivered condition.

This International Standard is not applicable to

— diamond, cubic boron nitride or natural stone grinding wheels, or

— centreless control wheels, lapping and disc wheels, ball wheels or glass grinding wheels.

NOTE 1 The values given refer to the grinding wheel itself, independent of any unbalance which may exist in the balancing arbor or in the means of fastening it to this arbor. These various elements, together with the flanges or hub-flanges, are assumed to be balanced, homogeneous and free from geometrical defects.

NOTE 2 The effects of unbalance are basically

— additional stresses on the arbor, the machine and its mounting,

— excessive wear of the bearings,

— vibration prejudicial to the quality of machining and increased internal stresses in the grinding wheel, and increased operator fatigue.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
unbalance
product of radius and mass

Note 1 to entry: Radius is expressed in millimetres. Mass is expressed in grams. The product of radius and mass is expressed in grams multiplied by millimetres.

2.2
intrinsic unbalance of a grinding wheel
U_i
product of the mass m_1 of the grinding wheel and the distance e between its centre of mass G (centre of gravity) and the axis O of its bore

Note 1 to entry: See Figure 1.

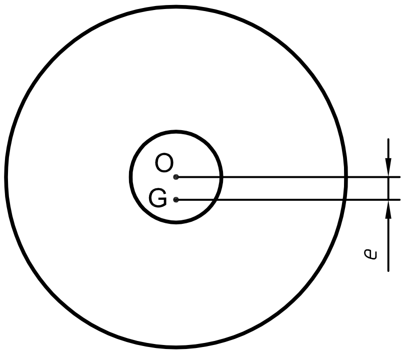
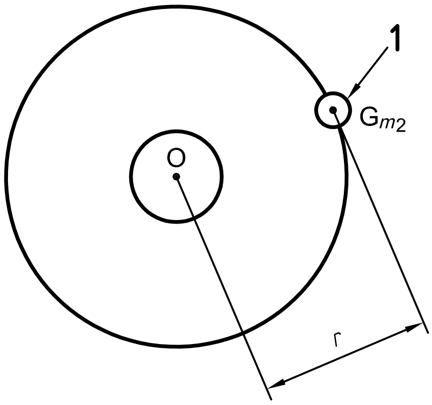


Figure 1 — Intrinsic unbalance of a grinding wheel

2.3
measured unbalance
U_c
product of a mass m_2, affixed to the grinding wheel to balance it and the distance between the centre of mass (G_{m2}) (centre of gravity) of the mass m_2 and the axis O of the grinding wheel bore

Note 1 to entry: See Figure 2.

Note 2 to entry: In practice, this distance is equal to the radius *r* of the grinding wheel.



Key
1 mass m_2

Figure 2 — Measured unbalance

3 Permissible unbalance, U_a

On the basis of experience, the maximum permissible unbalance U_a is determined using a mass $m_a = U_a/r$, such that

$$m_a = k\sqrt{m_1} \qquad (1)$$

where

- r is the radius of the grinding wheels, in millimetres;
- m_a is the mass whose centre is located on the circumference of the grinding wheel, in grams;
- m_1 is the mass of the grinding wheel, in grams;
- k is a coefficient which depends on the nature and usage of the grinding wheel.

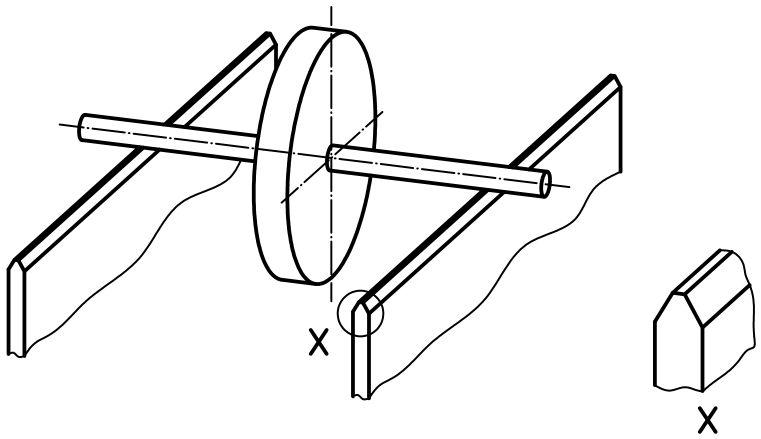
The values of k are given in Table 1 and the values of m_a, as a function of m_1 and k, are shown in Figure 5.

The values of k have been selected on the basis of experience so that the resulting unbalance allows for normal usage of the grinding wheel.

4 Measuring intrinsic unbalance

Place a balancing arbor through the bore of the grinding wheel to hold its mid-plane in a vertical position. For straight wheels or wheels of similar shape, the wheel is free-standing; wheels of other shapes may be supported using suitable flanges.

Rest the balancing arbor on two parallel horizontal bevelled guide-bars or cylindrical bars (see Figure 3), or on a balancing stand consisting of two pairs of overlapping, freely rotating, steel discs (see Figure 4), so that the grinding wheel attains an equilibrium position with minimum friction.



Alternative: The two bevelled guide-bars may be replaced by two cylindrical bars.

Figure 3 — Balancing arbor on guide bars

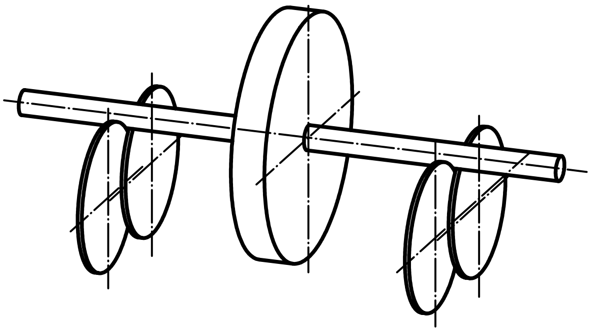


Figure 4 — Balancing arbor on steel discs

The clearance between the balancing arbor and the bore of the grinding wheel shall not exceed 0,4 mm.

The arbor and the supports (guide-bars, bars or discs) shall have an adequate surface hardness and an appropriate surface condition to minimize friction.

When the grinding wheel attains the equilibrium position, its centre of mass is then as low as possible. In this position, mark the upper peripheral point of the grinding wheel.

Rotate the grinding wheel through 90° to bring this mark into the horizontal plane for the arbor axis.

Determine the mass m_2 which, when affixed to the periphery of the grinding wheel at the mark, maintains the grinding wheel in equilibrium. The amount of unbalance thus introduced, $U_c = m_2 \cdot r$, is equal and opposite to the intrinsic unbalance of the wheel.

The value of the mass m_2 is used to determine the intrinsic unbalance of the wheel using Formula (2):

$$U_i = U_c = m_2 \cdot r \quad (2)$$

5 Checking intrinsic unbalance

5.1 Verification and acceptance

Verify the intrinsic unbalance according to the method specified in Clause 4.

A grinding wheel is only acceptable if its intrinsic unbalance U_i is less than or equal to the permissible unbalance U_a, i.e.

$$U_i \leq U_a \quad (3)$$

The testing is done with a mass

$$m_a = \frac{U_a}{r} \quad (4)$$

5.2 Determination of m_a

From Table 1, determine the coefficient k by reading off the value according to the various parameters related to the grinding wheel and its application.

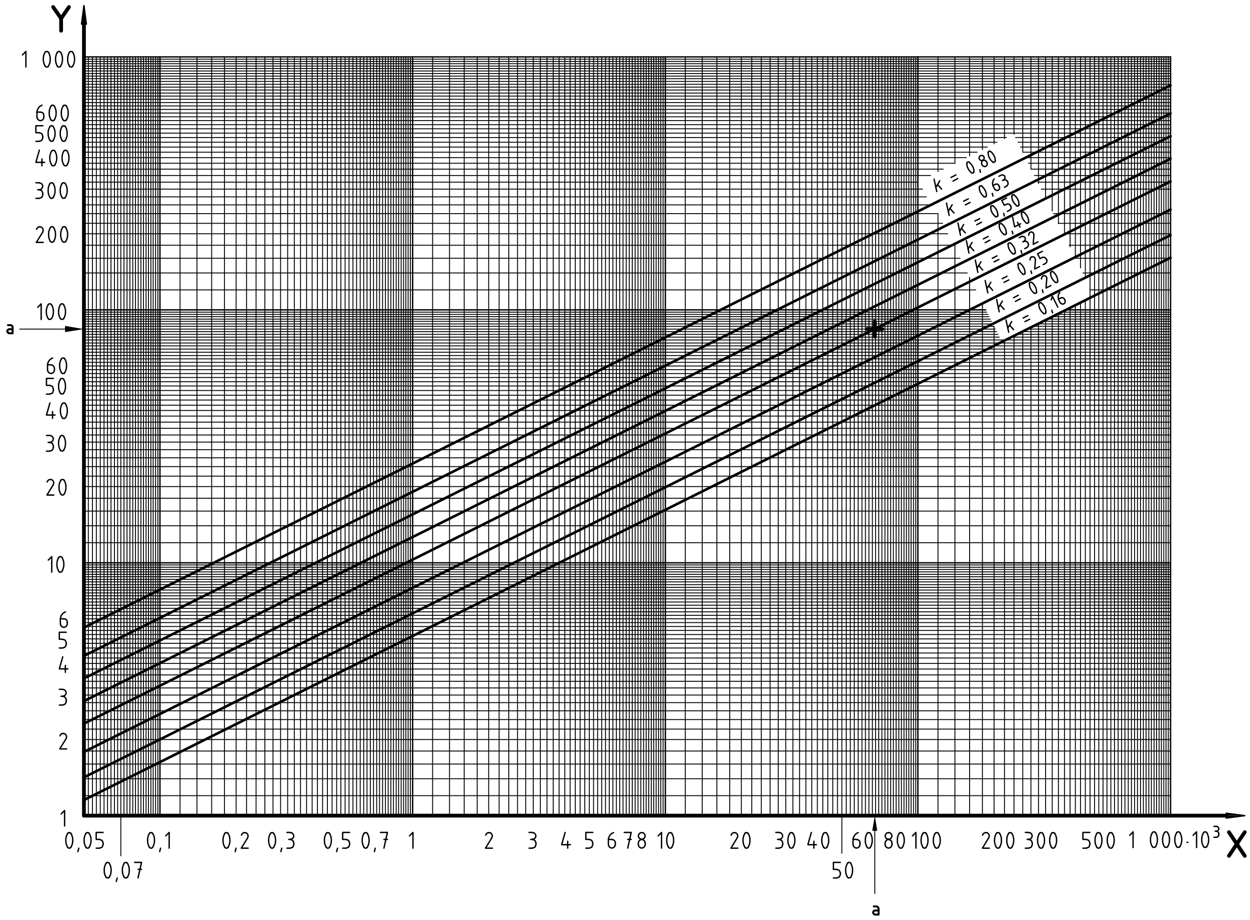
Figure 5 then gives the values of the mass m_a, in grams, as a function of the mass m_1 of the wheel, in grams, and the coefficient k.

5.3 Acceptance testing of the grinding wheel

With the grinding wheel mounted in accordance with Clause 4, place a mass m_a as determined in 5.2 on the periphery of the grinding wheel at the mark. If the wheel remains stationary or rotates so that the mark is at the bottom, the grinding wheel is accepted; otherwise, it is rejected.

Table 1 — Values of the coefficient *k* for bonded abrasive products

<table>
<tr><th rowspan="3">Grinding method</th><th rowspan="3">Type of machine</th><th rowspan="3">Type of bonded abrasive product</th><th colspan="2">Dimensions</th><th colspan="3">Coefficient k
for maximum operating speed
v_s
m/s</th></tr>
<tr><th rowspan="2">D
mm</th><th rowspan="2">T
mm</th><th colspan="3"></th></tr>
<tr><th>$16 \leq v_s \leq 40$</th><th>$40 < v_s \leq 63$</th><th>$63 < v_s \leq 125$</th></tr>
<tr><td rowspan="5">Grinding (deburring, fettling and snagging)</td><td rowspan="5">Hand-held grinding machines</td><td rowspan="4">Types 1/4/27/28/29/35 and 36</td><td>$125 \leq D \leq 150$</td><td>—</td><td>0,40</td><td>0,32</td><td>0,25</td></tr>
<tr><td>$150 < D \leq 180$</td><td>—</td><td>0,40</td><td>0,32</td><td>0,20</td></tr>
<tr><td rowspan="2">$D > 180$</td><td>$T \leq 6$</td><td>0,40</td><td>0,32</td><td>0,20</td></tr>
<tr><td>$T > 6$</td><td>0,32</td><td>0,25</td><td>0,20</td></tr>
<tr><td>Types 6 and 11</td><td colspan="2">all dimensions</td><td>0,40</td><td>0,32</td><td>—</td></tr>
<tr><td>Grinding (deburring, fettling and snagging)</td><td>Stationary grinding machines, swing frame grinding machines and other grinding machines</td><td>Types 1/2/35 and 36</td><td colspan="2">all dimensions</td><td>0,63</td><td>0,50</td><td>0,40</td></tr>
<tr><td>High-pressure grinding</td><td>Stationary grinding machines</td><td>Type 1</td><td colspan="2">all dimensions</td><td colspan="3">0,8</td></tr>
<tr><td rowspan="3">Grinding
– precision grinding
– external cylindrical grinding
– surface grinding
– sharpening</td><td rowspan="3">Stationary grinding machines</td><td rowspan="3">all types</td><td>$125 \leq D \leq 300$</td><td rowspan="3">all dimensions</td><td>0,25</td><td>0,20</td><td>0,16</td></tr>
<tr><td>$300 < D \leq 610$</td><td>0,32</td><td>0,25</td><td>0,20</td></tr>
<tr><td>$D > 610$</td><td>0,40</td><td>0,32</td><td>0,25</td></tr>
<tr><td rowspan="3">Cutting-off</td><td>Hand-held cutting-off machines</td><td>Types 41 and 42</td><td>$125 \leq D \leq 406$</td><td>—</td><td>0,40</td><td>0,32</td><td>0,20</td></tr>
<tr><td rowspan="2">Stationary cutting-off machines</td><td rowspan="2">Type 41 and 42</td><td>$D \leq 300$</td><td>—</td><td>0,50</td><td>0,40</td><td>0,32</td></tr>
<tr><td>$D > 300$</td><td>—</td><td>0,63</td><td>0,50</td><td>0,40</td></tr>
</table>



Key

Y value of m_a, in grams

X mass of the wheel m_1, in grams

a See example.

EXAMPLE For a straight grinding wheel for precision grinding, of outside diameter D = 762 mm and mass m_1 = 68 000 g used on a stationary machine at a maximum operating speed v_s = 60 m/s, the coefficient k = 0,32 (see Table 1) and the maximum permissible mass m_a = 83 g

Figure 5 — Values of the mass m_a as a function of the mass of the wheel m_1 and the coefficient k

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[13] ISO 603-15, *Bonded abrasive products — Dimensions — Part 15: Grinding wheels for cutting-off on stationary or mobile cutting-off machines*

[14] ISO 603-16, *Bonded abrasive products — Dimensions — Part 16: Grinding wheels for cutting-off on hand held power tools*

[15] ISO 603-17, *Bonded abrasive products — Dimensions — Part 17: Spindle mounted wheels*

[16] ISO 603-18, *Bonded abrasive products — Dimensions — Part 18: Grinding wheels for flat glass edge grinding machines*

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