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Second edition
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Hardmetals — Sampling and testing

Métaux-durs — Échantillonnage et essais

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 119, *Powder metallurgy*, Subcommittee SC 4, *Sampling and testing methods for hardmetals*.

This second edition cancels and replaces the first edition (ISO 4489:1978), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the title has been changed to "*Hardmetals — Sampling and testing*";

— Clause 2 has been revised;

— in Table 1, second row: the reference to ISO 3326 has been replaced;

— in Table 1, fourth row: the reference has been replaced by ISO 3738-1 and ISO 3738-2;

— in Table 1, fifth row: the reference to ISO 3878 has been replaced by ISO 6507-1, ISO 6507-2, ISO 6507-3 and ISO 6507-4;

— in Table 2, a new second row has been added;

— in Table 2, third row: the reference has been replaced by ISO 4499-1, ISO 4499-2 and ISO 4499-3;

— in Table 2, fourth row: the reference has been replaced by ISO 4499-4;

— in Table 2, a new fifth row has been added;

— the Bibliography has been added.

Hardmetals — Sampling and testing

1 Scope

This document specifies procedures for sampling and testing of hardmetals for the determination of their physical and mechanical characteristics.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3369, *Impermeable sintered metal materials and hardmetals — Determination of density*

ISO 3738-1, *Hardmetals — Rockwell hardness test (scale A) — Part 1: Test method*

ISO 3738-2, *Hardmetals — Rockwell hardness test (scale A) — Part 2: Preparation and calibration of standard test blocks*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6507-2, *Metallic materials — Vickers hardness test — Part 2: Verification and calibration of testing machines*

ISO 6507-3, *Metallic materials — Vickers hardness test — Part 3: Calibration of reference blocks*

ISO 6507-4, *Metallic materials — Vickers hardness test — Part 4: Tables of hardness values*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
lot
defined quantity of presumably uniform sintered parts of a single type, size and grade

3.2
test sample
one or more units taken from a *lot* (3.1) for the determination of characteristics

4 Sampling

Hardmetal parts are supplied in a wide range of sizes and quantities and for a wide range of applications. Also, the determination of physical and mechanical characteristics is time consuming and sometimes of a destructive nature. It is therefore neither desirable nor practical to employ a sample quantity comparable with that normally employed for checking dimensional features. The degree of consistency of a lot can therefore only be determined economically in the course of production control. For confirmation of the grade of hardmetal, it is usually sufficient to take a test sample of one unit.

5 Testing

5.1 Tests on test samples shall be carried out in accordance with the International Standards given in Table 1.

Table 1 — Tests

Type of testing	International Standard
Determination of magnetic characteristics	NOTE In addition to the referred standards, the analysis of magnetic characteristics (coercivity and magnetic saturation) of the hardmetals is common usage. These analyses are device-specific so that is is not possible to describe this within standards. ISO 3326 was therefore withdrawn.
Determination of density	ISO 3369
Determination of hardess HRA	ISO 3738-1 ISO 3738-2
Determination of hardness HV	ISO 6507-1 ISO 6507-2 ISO 6507-3 ISO 6507-4

5.2 Tests which may be carried out in special cases are given in Table 2.

Table 2 — Tests in special cases

Type of testing	International Standard
Determination of transverse rupture strength	ISO 3327
Determination of microstructure	ISO 4499-1 ISO 4499-2 ISO 4499-3
Determination of porosity, carbon defects and eta-phase content	ISO 4499-4
Determination of fracture toughness (Palmqvist toughness)	ISO 28079

6 Test report

Sintered products are frequently ordered in small quantities and taken from stock. Therefore, the identity of the lot cannot be retained and it should not be expected that a test report can be supplied with individual orders.

Bibliography

[1] ISO 3326[1)], *Hardmetals — Determination of (the magnetization) coercivity*

[2] ISO 3327, *Hardmetals — Determination of transverse rupture strength*

[3] ISO 3878[1], *Hardmetals — Vickers hardness test*

[4] ISO 4499-1, *Hardmetals — Metallographic determination of microstructure — Part 1: Photomicrographs and description*

[5] ISO 4499-2, *Hardmetals — Metallographic determination of microstructure — Part 2: Measurement of WC grain size*

[6] ISO 4499-3, *Hardmetals — Metallographic determination of microstructure — Part 3: Measurement of microstructural features in Ti (C, N) and WC/cubic carbide based hardmetals*

[7] ISO 4499-4, *Hardmetals — Metallographic determination of microstructure — Part 4: Characterisation of porosity, carbon defects and eta-phase content*

[8] ISO 28079, *Hardmetals — Palmqvist toughness test*

1) Withdrawn.

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