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## Hardmetals — Abrasion tests for hardmetals

*Métaux-durs — Essais d'abrasion des métaux-durs*



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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](http://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](http://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 of 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 [www.iso.org/iso/foreword.html](http://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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS M11, *Powder metallurgy*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 28080:2011), which has been technically revised.

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

- [Clause 2](#), the normative references have been updated;
- [Clauses 3](#) and [4](#) have been switched;
- [5.4.1](#), second sentence: "or neoprene" has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document provides new and improved methods for testing the abrasion characteristics of hardmetals using rotating-wheel systems. There are a number of abrasion test methods that have been developed that use this type of geometry, including the ASTM G65 dry sand/rubber wheel test, the ASTM G105 wet sand/rubber wheel test and the ASTM B611 steel wheel test. Other variants of these tests have also been developed for specific applications in other institutes. All of these tests use a rotating wheel pressed against a test piece, with abrasive material introduced between the wheel and the test piece. Because of this fundamental commonality, much of the methodology is the same for the different tests. However, they do differ in the details of how the abrasive is fed to the interface between the wheel and the test piece, if the test can be carried out in the presence of fluids, and if the abrasive is only used once and passes through the test system, or is reused many times.

This document provides framework that brings together the key features of these tests and gives results that show comparability. It also gives information on their reproducibility and repeatability.

The procedure complements the ASTM G65 method for dry sand/rubber wheel abrasion, the ASTM B611 method for determining the high stress abrasion of hard materials, and the ASTM G105 method for conducting wet sand/rubber wheel abrasion tests.

Abrasion wear is not a measure of the wear characteristics of hardmetals under all conditions, and should not be misinterpreted as indicating wear when hardmetals are used for tooling, such as cutting and milling. It does show the difference in resistance to abrasive use for different carbide compositions, and the methods may be used as practical tests or as research methods for material discrimination.



# Hardmetals — Abrasion tests for hardmetals

## 1 Scope

This document specifies a generic test method to determine the abrasion wear characteristics of hardmetals.

The test is appropriate for use in situations where test laboratories have a need to simulate abrasive damage. The procedure includes information which enables the test to be used in a variety of different conditions:

- a) with counterface wheels of different stiffness (for example steel and rubber);
- b) wet and dry;
- c) different abrasive sizes;
- d) different chemical environments.

## 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*

ASTM B611, *Standard Test Method for Determining the High Stress Abrasion Resistance of Hard Materials*

ASTM G65, *Standard Test Method for Measuring Abrasion Using the Dry Sand/Rubber Wheel Apparatus*

ASTM G105, *Standard Test Method for Conducting Wet Sand/Rubber Wheel Abrasion Tests*

## 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

#### abrasion volume loss

$V$

test piece's loss in volume during the test

Note 1 to entry: In ASTM B611, this is defined as the volume loss per revolution of the steel wheel.

### 3.2

#### abrasion wear

wear caused by an abrasive material on a rotating surface contacting the test-piece surface under pressure