



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 4499-1:2020

Hardmetals - Metallographic determination  
of microstructure - Part 1:  
Photomicrographs and description (ISO  
4499-1:2020)

**I.S. EN ISO 4499-1:2020**

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## National Foreword

I.S. EN ISO 4499-1:2020 is the adopted Irish version of the European Document EN ISO 4499-1:2020, Hardmetals - Metallographic determination of microstructure - Part 1: Photomicrographs and description (ISO 4499-1:2020)

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EUROPEAN STANDARD

EN ISO 4499-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2020

ICS 77.040.99; 77.160

Supersedes EN ISO 4499-1:2010

English Version

**Hardmetals - Metallographic determination of  
microstructure - Part 1: Photomicrographs and description  
(ISO 4499-1:2020)**

Métaux-durs - Détermination métallographique de la  
microstructure - Partie 1: Prises de vue  
photomicrographiques et description (ISO 4499-  
1:2020)

Hartmetalle - Metallographische Bestimmung der  
Mikrostruktur - Teil 1: Gefügebilder und Beschreibung  
(ISO 4499-1:2020)

This European Standard was approved by CEN on 1 August 2020.

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## **European foreword**

This document (EN ISO 4499-1:2020) has been prepared by Technical Committee ISO/TC 119 "Powder metallurgy" in collaboration with Technical Committee CEN/SS M11 "Powder metallurgy" the secretariat of which is held by CCMC.

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of an identical text or by endorsement, at the latest by February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 4499-1:2010.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Endorsement notice**

The text of ISO 4499-1:2020 has been approved by CEN as EN ISO 4499-1:2020 without any modification.

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**INTERNATIONAL  
STANDARD**

**ISO  
4499-1**

Second edition  
2020-07

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**Hardmetals — Metallographic  
determination of microstructure —**

**Part 1:  
Photomicrographs and description**

*Métaux-durs — Détermination métallographique de la  
microstructure —*

*Partie 1: Prises de vue photomicrographiques et description*



Reference number  
ISO 4499-1:2020(E)

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**ISO 4499-1:2020(E)**



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## ISO 4499-1:2020(E)

### 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 4499-1:2008), which has been technically revised.

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

- in [Clause 2](#) and [6.1.4](#): reference to ISO 3878 has been removed;
- an apparatus ([4.3](#)) Electron Back Scatter Diffraction (EBSD) has been added;
- [3.3](#): “TaC” corrected.

A list of all parts in the ISO 4499 series can be found on the ISO website.

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).

# Hardmetals — Metallographic determination of microstructure —

## Part 1: Photomicrographs and description

### 1 Scope

This document specifies the methods of metallographic determination of the microstructure of hardmetals using photomicrographs.

### 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 4499-2, *Hardmetals — Metallographic determination of microstructure — Part 2: Measurement of WC grain size*

### 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

##### **$\alpha$ -phase**

tungsten carbide

#### 3.2

##### **$\beta$ -phase**

binder phase (for example, based on Co, Ni, Fe)

#### 3.3

##### **$\gamma$ -phase**

carbide having a cubic lattice (for example, TiC, TaC) which may contain other carbides (for example WC) in solid solution

### 4 Apparatus

4.1 **Metallographic microscope**, permitting observations at magnifications up to 1 500 × .

4.2 **Scanning electron microscope** for magnification over 1 500 × .

4.3 **Electron back scatter diffraction (EBSD)**.

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