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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 3488.2-2025

Replacing GB/T 3488.2-2018

**Hardmetals - Metallographic determination of microstructure -
Part 2: Measurement of WC grain size**

硬质合金 显微组织的金相测定 第2部分：WC晶粒尺寸的测量

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 2 of GB/T 3488 "Metallographic Determination of Microstructure of Hard Alloys". GB/T 3488 has been published as...

Part 2.

---Part 1: Metallographic photographs and descriptions;

---Part 2: Measurement of WC grain size;

---Part 3: Metallographic determination of the microstructure of Ti(C,N) and WC cubic carbide-based cemented carbides;

---Part 4: Metallographic determination of porosity, non-combined carbon defects and decarburized phases.

This document replaces GB/T 3488.2-2018 "Metallographic determination of microstructure of cemented carbide - Part 2: Measurement of WC grain size".

Compared with GB/T 3488.2-2018, the main technical changes in the standard "Quantity" are as follows, except for structural adjustments and editorial modifications.

a) The overview has been removed (see section 3.1 of the 2018 edition);

b) Added EBSD electron backscatter diffractometer, SEM scanning electron microscope, and FESEM field emission scanning electron microscope.

Symbols for TEM (Transmission Electron Microscopy), LOM (Low Magnification), etc. (see 3.2);

c) An electron backscatter diffractometer (EBSD) has been added (see Chapter 5);

d) The product sampling reference standard has been changed (see 7.2.1, 2018 version of

7.2.1);

e) An electron backscatter diffractometer and its maximum resolution and minimum visible cutoff length were added (see Table 1).

This document is equivalent to ISO 4499-2:2020 "Metallographic determination of microstructure of cemented carbide - Part 2: WC grain size".

Measurement".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Nonferrous Metals Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Nonferrous Metals (SAC/TC243).

Introduction

Metallographic analysis of the microstructure of cemented carbide is one of the key indicators for judging the internal quality of cemented carbide. In 1983, my country's equivalent...

Adopting ISO 4499:1978 "Metallographic determination of cemented carbide microstructure", GB/T 3488-1983 "Metallographic determination of cemented carbide microstructure" was first formulated.

Metallographic Determination of Tissue Structures. With the continuous development of my country's cemented carbide industry, the requirements for metallographic analysis of cemented carbide microstructures are becoming increasingly stringent.

High. In 2014, based on new changes and demands in relevant domestic and international standards, my country adopted ISO 4499-1:2008 "Hard alloys - High performance".

Metallographic determination of microstructure - Part 1: Metallographic photographs and descriptions; GB/T 3488.1-2014 "Microstructure of cemented carbide" was established.

Metallographic determination - Part 1: Metallographic photographs and descriptions, 2018. my country adopted ISO 4499-2:2008 "Microstructure of cemented carbides".

Metallographic determination of cemented carbide, Part 2: Measurement of WC grain size, GB/T 3488.2-2018 "Metallographic determination of cemented carbide microstructure" was formulated.

Phase determination, Part 2: Measurement of WC grain size, 2020. my country adopted ISO 4499-3:2016 "Microstructure of cemented carbide".

"Metallographic Determination of Microstructures of Ti(C,N) and WC Cubic Carbide-Based

Hard Alloys, Part 3," has been developed.

GB/T 3488.3-2020 Metallographic determination of microstructure of cemented carbide - Part 3: Ti(C,N) and WC cubic carbide-based cemented carbide Metallographic determination of microstructure of cemented carbide alloys, my country adopted ISO 4499-4:2016 in 2022.

Part 4: Metallographic determination of porosity, non-combined carbon defects and decarburized phases, GB/T 3488.4-2022 "Metallographic determination of cemented carbide" was formulated.

Metallographic determination of microstructures, Part 4: Metallographic determination of porosity, non-combined carbon defects and decarburized phases.

GB/T 3488 "Metallographic determination of microstructure of cemented carbide" consists of four parts.

---Part 1: Metallographic Photographs and Descriptions. The purpose is to standardize the preparation and etching methods for metallographic samples of cemented carbide, which is essential for cemented carbide...

Basic operational standards for metallographic structure measurement and determination.

---Part 2: Measurement of WC Grain Size. The aim is to standardize a method for measuring the WC phase size in cemented carbide. Method recommendations are provided.

By using the cut-off method and defining WC grain size levels, the industry standard for cemented carbide grain size methods has been unified.

---Part 3: Metallographic determination of the microstructure of Ti(C,N) and WC cubic carbide-based cemented carbides. The aim is to standardize the determination of the microstructure of carbon...

Methods for measuring the size of the hard phase and binder phase in titanium nitride cemented carbide and cubic carbide cemented carbide. The recommended method is the section method.

Measurement is a supplement to the measurement of the microstructure of cemented carbide.

---Part 4: Metallographic determination of porosity, non-combined carbon defects, and decarburized phases. The aim is to standardize the determination of porosity and non-combined carbon defects in the metallography of cemented carbide.

The method for determining the decarburized phase was established, and detailed regulations were made for the reporting grade, thus unifying the testing standards for porosity and carbon-deficient phases within the industry.

This document will play an important guiding role in standardizing testing and judgment methods within the industry, and will contribute to improving the overall quality of cemented carbide in my country.

Positive significance.

Metallographic determination of cemented carbide microstructure Part 2: Measurement of WC Grain Size

1 Scope

This document provides a guide to measuring the grain size of cemented carbide using optical or electron microscopy techniques.

This document applies to WC/Co cemented carbide sintered bodies (also known as cemented carbides or cermets) with WC as the main hard phase, and also...

Used to measure grain size and distribution using the truncation method.

This document mainly includes the following four aspects.

- Microscope calibration to ensure measurement accuracy;
- Linear analysis method, to obtain a sufficient amount of statistically significant data;
- Analytical methods are used to calculate representative averages;
- Report to meet modern quality reporting requirements.

This document illustrates this recommended technique through a measurement case study (see Appendix A).

This document does not apply to the following.

- Determination of size distribution;
- Shape determination still requires further in-depth research before shape determination can be achieved.

Coercivity measurement can sometimes be used to measure grain size, but this method only pertains to metallographic determination. This document applies to hard alloys.

Gold is not applicable to powders. However, this document can, in principle, be used to determine the average size of inlaid and cut powders.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this