
**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*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 4499-1 was prepared by Technical Committee ISO/TC 119, *Powder metallurgy*, Subcommittee SC 4, *Sampling and testing methods for hardmetals*.

ISO 4499-1, together with ISO 4499-2, cancels and replaces ISO 4499:1978, which has been technically revised.

In ISO 4499-2, a new section has been added for the quantitative measurement of the WC grain size of hardmetals. ISO 4499-3 and ISO 4499-4 are additional parts that will deal with the microstructures of hardmetals containing cubic carbides and Ti (C, N)-based hardmetals, and miscellaneous microstructural features, such as defects and non-stoichiometric phases (e.g. carbon and eta-phase). ISO 4499-3 and ISO 4499-4 are currently in development.

In standard WC/Co hardmetals the density is generally controlled so that only two phases WC and Co are present. The Co phase is an alloy and contains some W and C in solid solution. The WC phase is stoichiometric. If the composition is either high or low in total carbon content then it is possible to see a third phase in the structure. For a high C content this is graphite; for a low C content it is eta phase (η), typically an M_6C or $M_{12}C$ carbide where M is (Co_xW_y) . Metallographic determination of these phases will be outlined in ISO 4499-3.

ISO 4499 consists of the following parts, under the general title *Hardmetals — Metallographic determination of microstructure*:

- *Part 1: Photomicrographs and description*
- *Part 2: Measurement of WC grain size*

Hardmetals — Metallographic determination of microstructure —

Part 1: Photomicrographs and description

1 Scope

This part of ISO 4499 specifies the methods of metallographic determination of the microstructure of hardmetals using photomicrographs.

2 Normative references

The following referenced documents are indispensable for the application 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 3878:1983, *Hardmetals — Vickers hardness test*

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.

3.1

α -phase

tungsten carbide

3.2

β -phase

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

3.3

γ -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 \times .

4.2 Scanning electron microscope for magnification over 1 500 \times .

4.3 Equipment for preparation of testpiece sections.