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**Metallic powders — Test method for the  
determination of non-metallic inclusions  
in metal powders using a powder-forged  
specimen**

*Poudres métalliques — Détermination de la teneur en inclusions non  
métalliques dans les poudres métalliques à l'aide d'une éprouvette  
forgée de poudre*



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## Foreword

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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 13947 was prepared by Technical Committee ISO/TC 119, *Powder metallurgy*, Subcommittee SC 2, *Sampling and testing methods for powders (including powders for hardmetals)*.

This second edition cancels and replaces the first edition (ISO 13947:2007), of which it constitutes a minor revision.



# Metallic powders — Test method for the determination of non-metallic inclusions in metal powders using a powder-forged specimen

**SAFETY PRECAUTIONS** — This International Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

## 1 Scope

This International Standard specifies a metallographic method for determining the non-metallic inclusion level in metal powders using a powder-forged specimen. The test method covers repress powder-forged test specimens in which there has been minimal lateral flow (<1 %). The core region of the powder-forged test specimen contains no porosity detectable at 100× magnification.

This test method can also be used to determine the non-metallic inclusion content of powder-forged steel parts. However, in parts where there has been a significant amount of material flow, the near-neighbour separation distance needs to be changed, or the inclusion sizes agreed between the parties need to be adjusted.

This test method is not suitable for determining the non-metallic inclusion level of parts that have been forged such that the core region contains porosity. At the magnification used for this test method, residual porosity is hard to distinguish from inclusions. Too much residual porosity makes a meaningful assessment of the inclusion population impossible.

This test method can be applied to materials that contain manganese sulfide (admixed or prealloyed), provided the near-neighbour separation distance is changed from 30 µm to 15 µm.

## 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/TR 14321:1997, *Sintered metal materials, excluding hardmetals — Metallographic preparation and examination*

ASTM B796, *Standard test method for nonmetallic inclusion content of powders intended for powder forging (P/F) applications*

ASTM E3, *Standard guide for preparation of metallographic specimens*

ASTM E768, *Standard guide for preparing and evaluating specimens for automatic inclusion assessment of steel*

## 3 Principles

A section representing the core region of the test specimen (part) is cut from the test piece (part) prior to metallographic grinding and polishing (mounting the section is optional but strongly recommended).

The polished sample is examined microscopically at a magnification of 100× and a note is made of inclusions greater than a predetermined size.