



SLOVENSKI STANDARD
oSIST prEN ISO 5842:2023
01-maj-2023

Metalurgija prahov - Vroče izostatično stiskanje - Zaznavanje argona s tehnikami plinske kromatografije in masne spektrometrije (ISO 5842:2022)

Powder metallurgy - Hot isostatic pressing - Argon detection using gas chromatography and mass spectrometry techniques (ISO 5842:2022)

Pulvermetallurgie - Heißisostatisches Pressen - Nachweis von Argon mittels Gaschromatographie und massenspektrometrischer Techniken (ISO 5842:2022)

Métallurgie des poudres - Pressage isostatique à chaud - Détection de l'argon par des techniques de chromatographie en phase gazeuse et de spectrométrie de masse (ISO 5842:2022)

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Metalurgija prahov

Powder metallurgy

oSIST prEN ISO 5842:2023

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**Powder metallurgy — Hot isostatic
pressing — Argon detection using
gas chromatography and mass
spectrometry techniques**

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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).

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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.

This document was prepared by Technical Committee ISO/TC 119 *Powder metallurgy*, Subcommittee SC 3, *Sampling and testing methods for sintered metal materials (excluding hardmetals)*.

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.

Introduction

It is essential to detect argon in powder metallurgy hot isostatic pressing (PM HIP) material in order to ensure the desired performance of the PM HIP component. Argon from the production of powder can remain in the powder grains. Argon from the powder filling processes can remain in the voids between powder grains and become trapped during consolidation. Can imperfections can result in ingress of argon from the HIP chamber and potentially introduce, or increase the level of, argon.

Argon in the resulting metal powder produced component can be detected using the techniques included in this document

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Powder metallurgy — Hot isostatic pressing — Argon detection using gas chromatography and mass spectrometry techniques

IMPORTANT — It is the responsibility of the purchaser of the PM HIP service to specify in the purchase order if an argon detection test is needed. If so, the agreed argon limit shall be specified.

1 Scope

This document specifies a gas chromatography and a mass spectrometry method of detecting the presence of argon in metal powder produced components, consolidated by hot isostatic pressing.

This document specifies the calibration and functionality test for the equipment covered. It also specifies methods for sampling, sample preparation and sample test procedure of PM HIP components to detect argon presence.

Components produced by additive manufacturing are not covered in this document.

2 Normative references

There are no normative references in this document.

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 <https://www.electropedia.org/>

3.1

blank test

test performed without sample in the same manner as, and parallel with, a test using an analytical sample

[SOURCE: ISO 11323:2010, 8.13]

3.2

calibration

operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication

Note 1 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Note 2 to entry: Calibration should not be confused with adjustment of a measuring system, often mistakenly called “self-calibration”, nor with verification of calibration

Note 3 to entry: Often, the first step alone in the above definition is perceived as being calibration.

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[SOURCE: ISO/IEC Guide 99:2007, 2.39]

3.3

**can
capsule
canister**

container used to encapsulate the powder during the pressure consolidation process

Note 1 to entry: It is partly or fully removed from the final part.

3.4

detection limit

smallest actual amount of an analyte that can be detected by a measuring method

[SOURCE: ISO 20553:2006, 3.14, modified — "measurand" has been replaced by "analyte".]

3.5

functionality test

assessment of the performance of a measuring system, based on specific parameters

[SOURCE: ISO/TS 14907-1:2015, 3.10, modified — measurand has been replaced by analyte]

3.6

gas chromatograph

device that physically separates components of a mixture in the gaseous phase and measures them individually with a detector which signal is processed

[SOURCE: ISO 14532:2014, 2.4.3]

3.7

mass spectrometer

instrument which separates ionized particles of different *mass/charge ratios* (3.8) and measures the respective ion currents

[SOURCE: ISO 3529-3:2014, 2.5.1]

3.8

mass/charge ratio

mass of a charged particle in atomic mass units divided by its elementary charge

3.9

powder metallurgy hot isostatic pressing

PM HIP

process for simultaneously heating and forming a compact in which the powder is contained in a sealed formable enclosure usually made from metal and the so-contained powder is subjected to equal pressure from all directions at a temperature high enough to permit plastic deformation and consolidation of the powder particles to take place

[SOURCE: ASTM A988/A988M – 15A]

3.10

reference sample

material or substance which property values are sufficiently homogeneous and well established to be used for the *functionality test* (3.5) of an apparatus, the assessment of a measurement method, or for assigning values to materials

3.11

solvent cleaner

liquid cleaning substance that is either ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, acetone, $(\text{CH}_3)_2\text{CO}$ or iso-propanol, $\text{CH}(\text{CH}_3)_2\text{OH}$