ICS 77.160 SLOVENSKÁ TECHNICKÁ NORMA August 2023

STN	**Kovové prášky Stanovenie obsahu kyslíka redukčnými metódami Časť 1: Všeobecné pokyny (ISO 4491-1: 2023)**	**STN EN ISO 4491-1 42 0890**

Metallic powders - Determination of oxygen content by reduction methods - Part 1: General guidelines (ISO 4491-1:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/23

Obsahuje: EN ISO 4491-1:2023, ISO 4491-1:2023

Oznámením tejto normy sa ruší
STN EN 24491-1 (42 0890) z decembra 2000

137068

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 4491-1

April 2023

ICS 77.160

Supersedes EN 24491-1:1993

English Version

Metallic powders - Determination of oxygen content by reduction methods - Part 1: General guidelines (ISO 4491-1:2023)

Poudres métalliques - Dosage de l'oxygène par les méthodes de réduction - Partie 1: Directives générales (ISO 4491-1:2023)

Metallpulver - Bestimmung des Sauerstoffgehaltes durch Reduktionsverfahren - Teil 1: Allgemeine Hinweise (ISO 4491-1:2023)

This European Standard was approved by CEN on 28 March 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Ref. No. EN ISO 4491-1:2023 E

Contents

Page

European foreword

This document (EN ISO 4491-1:2023) has been prepared by Technical Committee ISO/TC 119 "Powder metallurgy" in collaboration with 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 October 2023, and conflicting national standards shall be withdrawn at the latest by October 2023.

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 24491-1:1993.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 4491-1:2023 has been approved by CEN as EN ISO 4491-1:2023 without any modification.

INTERNATIONAL STANDARD

ISO 4491-1

Second edition
2023-03

Metallic powders — Determination of oxygen content by reduction methods —

Part 1: General guidelines

Poudres métalliques — Dosage de l'oxygène par les méthodes de réduction —

Partie 1: Directives générales

Reference number
ISO 4491-1:2023(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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).

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).

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 2, *Sampling and testing methods for powders (including powders 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 4491-1:1989), of which it constitutes a minor revision.

The main changes are as follows:

— the normative references in Clause 2 have been updated;

— Clause 6 and 7 have changed place;

— editorial corrections and updated ISO format have been applied.

A list of all parts in the ISO 4491 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.

Introduction

In powder metallurgy, the purity of the powders is an important parameter for the manufacture of sintered metals. Among the various impurities which may be present in a powder, oxygen plays a particular role as it is always present in any metal or alloy powder, and in amounts greater than those encountered in compact metals. Oxygen is mostly combined in the form of oxides which appear in the following ways:

— Oxide film coatings on particle surfaces, spontaneously formed by oxidation of the metal by air or moisture during powder preparation and during handling and storage.

— Oxide inclusions, being either oxides of the main metal remaining locally unreduced during the production process (in the case of reduced powders), or other oxide impurities originating from the raw material and/or from the equipment (e.g. refractory ceramics from melting furnace in atomization processes).

In practice, oxygen contents in metallic powders lie mostly in the range of a mass fraction of 0,1 % to a mass fraction of 1 %.

The determination of oxygen content can be made by means of many physical or chemical methods, for example:

a) specific methods, such as activation analysis or mass spectrometry, in which the element 0 is directly determined;

b) reduction methods, in which oxides present are, totally or partially, reduced by hydrogen or by carbon. Oxygen content is related, either to the loss of mass of the sample through reduction, or to the amount of water or CO/CO_2 produced by the reaction;

c) separation methods, in which:

   — either the oxide phase is selectively dissolved and determined chemically (for example in copper powder, where copper oxide is dissolved by hydrochloric acid); or

   — the metal phase is selectively dissolved, and the insoluble residue (assumed to be oxide) is evaluated (for example in aluminium powder, aluminium is dissolved in bromine-methanol reagent, leaving aluminium oxide).

The document considers only reduction methods, as these are commonly used in laboratories for analysing a great variety of metal powders.

INTERNATIONAL STANDARD ISO 4491-1:2023(E)

Metallic powders — Determination of oxygen content by reduction methods —

Part 1: General guidelines

1 Scope

This document is the first part of a series of standards dealing with the determination of oxygen content in metallic powders by reduction methods. It specifies general guidance to these methods and gives some recommendations for the correct interpretation of the results obtained.

The test methods are applicable generally to all powders of metals, alloys, carbides and mixtures thereof. The constituents of the powder shall be non-volatile under the conditions of test. The powder shall be free of lubricant or organic binder.

However, there exist certain limitations which depend upon the nature of the analysed metal. These limitations are discussed in Clause 4.

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 3954, *Powders for powder metallurgical purposes — Sampling*

ISO 4491-2, *Metallic powders - Determination of oxygen content by reduction methods - Part 2: Loss of mass on hydrogen reduction (hydrogen loss)*

ISO 4491-3, *Metallic powders — Determination of oxygen content by reduction methods — Part 3: Hydrogen-reducible oxygen*

ISO 4491-4, *Metallic powders — Determination of oxygen content by reduction methods — Part 4: Total oxygen by reduction-extraction*