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Fifth edition
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Powder metallurgy — Vocabulary

Métallurgie des poudres — Vocabulaire

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Foreword

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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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This document was prepared by Technical Committee ISO/TC 119, *Powder metallurgy*.

This fifth edition cancels and replaces the fourth edition (ISO 3252:1999), which has been technically revised.

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The main changes compared to the previous edition are as follows:

— addition of the mandatory Clause 2 (Normative references);

— addition of terms in current use.

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.

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Introduction

The terms are classified alphabetically under the following main headings:

— powders;

— forming;

— sintering and characteristics of sintered materials;

— post-sintering treatments;

— powder metallurgy materials.

NOTE Additional information on certain terms defined can be found in the standards given in Notes to entry. These are listed in the Bibliography.

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Powder metallurgy — Vocabulary

1 Scope

This document defines terms relating to powder metallurgy. Powder metallurgy is the branch of metallurgy which relates to the manufacture of metallic powders, or of articles made from such powders with or without the addition of non-metallic powders, by the application of forming and sintering processes.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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 http://www.electropedia.org/

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3.1 Terms relating to powders

3.1.1
acicular
needle-shaped

Note 1 to entry: See Figure 1.

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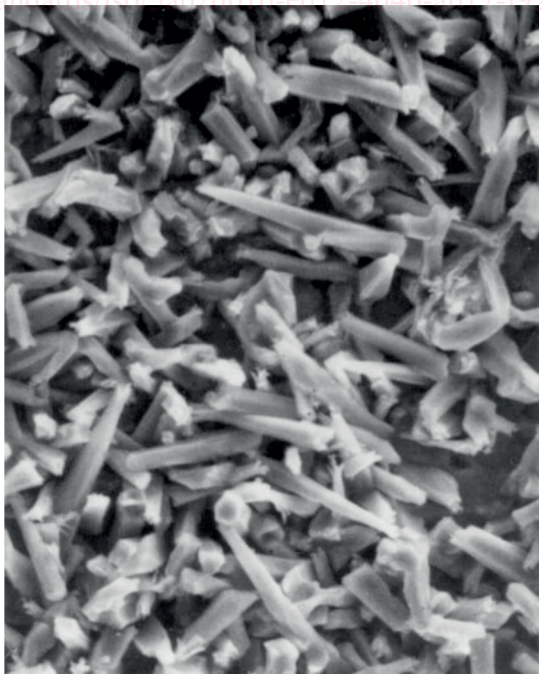

Figure 1 — Acicular

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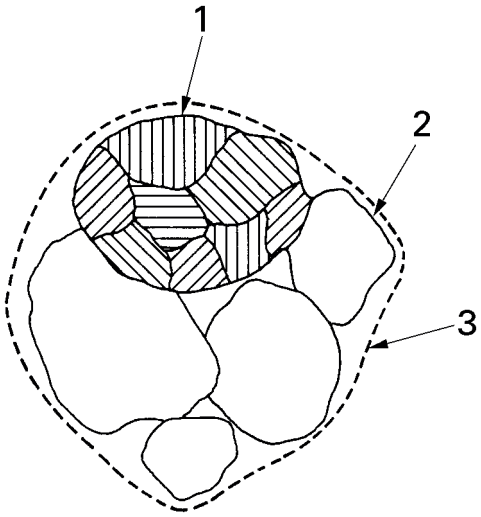
3.1.2
agglomerate
several particles adhering together

Note 1 to entry: See Figure 2.



Key
1 grain
2 particle
3 agglomerate

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Figure 2 — Diagramatic representation of grain, particle and agglomerate

3.1.3
alloyed powder
metal powder consisting of at least two constituents that are partially or completely alloyed with each other

3.1.4
angle of repose
basal angle of a pile formed by a powder when freely poured under specified conditions on to a horizontal surface

3.1.5
angular
sharp-edged or roughly polyhedral

Note 1 to entry: See Figure 3.

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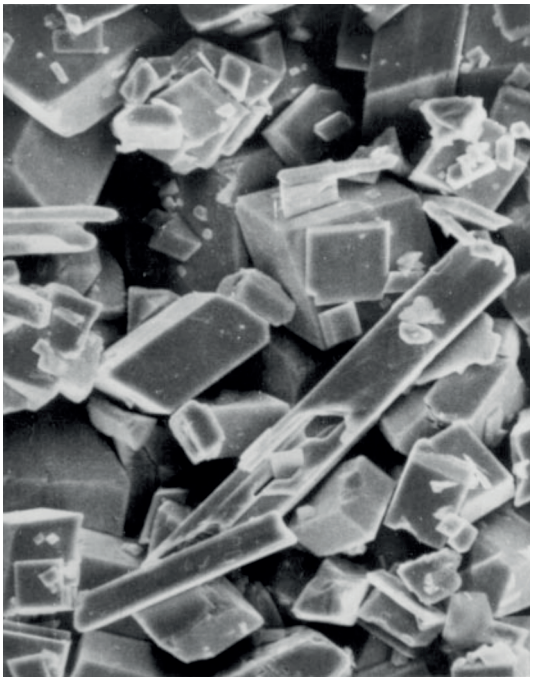

Figure 3 — Angular

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3.1.6
apparent density
mass per unit volume of a powder obtained following specific methods

Note 1 to entry: For example, ISO 3923-1 related to free-flowing powders and ISO 3923-2 related to non-free-flowing powders.

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3.1.7
atomization
dispersion of a molten metal into particles by a rapidly moving gas or liquid stream or by mechanical means

[SOURCE: ASTM B243-17]

3.1.8
atomized metal powder
metal powder produced by *atomization* (3.1.7)

3.1.9
binder
material added to the powder mix to increase the *green strength* (3.2.47) of the compact or to counteract dusting and *segregation* (3.1.75) of fine particulate mix constituents, and which is expelled during sintering

Note 1 to entry: In hard metals, it is also used for material (binder metal, usually of lower melting point) added to a powder mixture for the specific purpose of cementing together powder particles which alone would not sinter into a strong body.

Note 2 to entry: Cementing medium is also used in the field of hard metals.

3.1.10
blended powder
powder made by *blending* (3.1.11) powders

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3.1.11
blending
thorough intermingling of powders of the same nominal composition

Note 1 to entry: Not to be confused with *mixing* (3.1.53).

3.1.12
bridging
formation of arched cavities in a powder mass

3.1.13
bulk density
mass per unit volume of a powder under nonstandard conditions

3.1.14
cake
bonded mass of unpressed metal powder

EXAMPLE The condition of a powder mass as it exits an annealing furnace.

3.1.15
carbonyl powder
powder produced by the thermal decomposition of a metal carbonyl

3.1.16
chill-block cooling
process for producing rapidly solidified powders by cooling a thin layer of molten material on a solid substrate

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3.1.17
chopped powder
powder produced by chopping material such as sheet, ribbon, fibre or filament

3.1.18
classification
separation of powder into fractions according to particle size

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3.1.19
coated powder
powder consisting of particles having a surface layer of different composition

3.1.20
comminuted powder
powder produced by mechanical disintegration of solid metal

3.1.21
compactability
conceptual term, encompassing the powder characteristics of *compressibility* (3.1.24), *green strength* (3.2.47), edge retention, and lamination tendency, that relates to the ability of a powder to be consolidated into a usable *green compact* (3.2.13)

Note 1 to entry: Compactability may be a function of flowability, compressibility and green strength.

3.1.22
completely alloyed powder
alloyed powder (3.1.3) in which each powder particle has a homogeneous chemical composition being that of the entire powder

3.1.23
composite powder
powder in which each particle consists of two or more different constituents

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3.1.24
compressibility
capacity of a powder to be densified under an uniaxially applied pressure

Note 1 to entry: The pressure applied is usually a uniaxial pressure in a closed die. Compressibility may be expressed as the pressure needed to reach a required density or as the density obtained at a given pressure.

Note 2 to entry: See ISO 3927.

3.1.25
compression ratio
ratio of the volume of the loose powder to the volume of the compact made from it

3.1.26
cut
fraction of a powder nominally within stated particle size limits

3.1.27
dehydrided powder
powder made by removal of hydrogen from metal hydride

3.1.28
demixing
loss of homogeneity of a powder mix due to excessive mixing time

3.1.29
dendritic
of branched shape

Note 1 to entry: See Figure 4.

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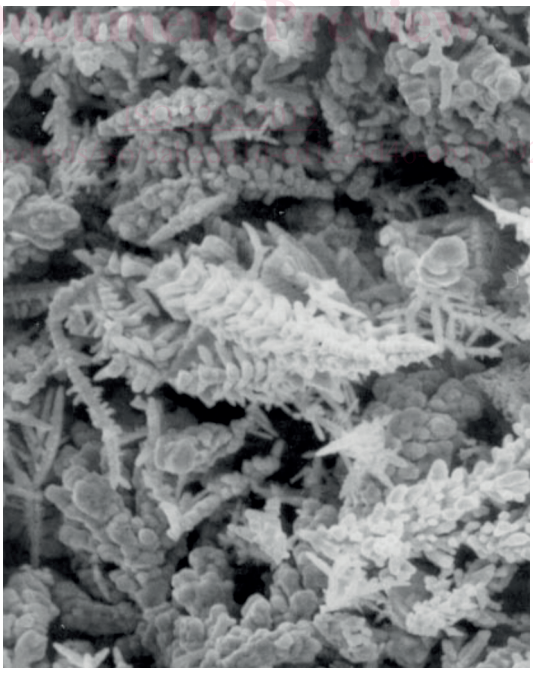

Figure 4 — Dendritic

3.1.30
diffusion-alloyed powder
partially *alloyed powder* (3.1.3) produced by means of a thermal process

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3.1.31
dopant
substance added in small quantity to a metallic powder to prevent or control recrystallization or grain growth either during *sintering* (3.3.60) or during use of the resultant sintered object

Note 1 to entry: This term is especially used in the powder metallurgy of tungsten.

3.1.32
electrolytic powder
powder produced by an electrolytic process

3.1.33
elutriation
classification (3.1.18) of a powder through movement of the particles through a fluid medium

EXAMPLE Air classification and liquid classification.

3.1.34
feedstock
moldable mixture of metal powder and *binder* (3.1.9) used for injection moulding or powder extrusion

3.1.35
fibrous
having the appearance of regularly or irregularly shaped threads

Note 1 to entry: See Figure 5.

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Figure 5 — Fibrous

3.1.36
fill factor
<uniaxial pressing> ratio of the height to which a powder fills a die to the height of the compact, measured after ejection from the die

3.1.37
fines
fraction of a powder that passes through the smallest sieve size used in the *sieve analysis* (3.1.76)

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