



SLOVENSKI STANDARD
SIST EN ISO/ASTM 52948:2026

01-maj-2026

Dodajalna izdelava kovinskih izdelkov - Spajanje prahu na podlagi (PBF) - Razvrstitev nepravilnosti (ISO/ASTM 52948:2026)

Additive manufacturing of metals - Powder bed fusion - Classification of imperfections (ISO/ASTM 52948:2026)

Additive Fertigung von Metallen - Pulverbettfusion - Klassifizierung von Fehlern (ISO/ASTM 52948:2026)

Fabrication additive de métaux - Fusion sur lit de poudre - Classification des imperfections (ISO/ASTM 52948:2026)

Ta slovenski standard je istoveten z: EN ISO/ASTM 52948:2026

ICS:

25.030 3D-tiskanje Additive manufacturing

SIST EN ISO/ASTM 52948:2026 en,fr,de

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EN ISO/ASTM 52948

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2026

ICS 19.100; 25.030

English Version

Additive manufacturing of metals - Powder bed fusion - Classification of imperfections (ISO/ASTM 52948:2026)

Fabrication additive de métaux - Fusion sur lit de
poudre - Classification des imperfections (ISO/ASTM
52948:2026)

Additive Fertigung von Metallen - Pulverbettfusion -
Klassifizierung von Fehlern (ISO/ASTM 52948:2026)

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Ref. No. EN ISO/ASTM 52948:2026 E

Contents	Page
European foreword.....	3

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European foreword

This document (EN ISO/ASTM 52948:2026) has been prepared by Technical Committee ISO/TC 261 "Additive manufacturing" in collaboration with Technical Committee CEN/TC 438 "Additive Manufacturing" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by July 2026, and conflicting national standards shall be withdrawn at the latest by July 2026.

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International Standard

ISO/ASTM 52948

Additive manufacturing of metals — Powder bed fusion — Classification of imperfections

*Fabrication additive de métaux — Fusion sur lit de poudre —
Classification des imperfections*

**First edition
2026-01**

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ISO/ASTM 52948:2026(en)

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Classification of imperfections	4
4.1 General.....	4
4.2 Designation.....	5
4.3 Detailed classification of imperfections occurring in additive manufacturing.....	5
4.3.1 General.....	5
4.3.2 Crack.....	6
4.3.3 Porosity.....	6
4.3.4 Inclusions.....	6
4.3.5 Lack of fusion.....	6
4.3.6 Shape, dimensional and surface imperfections.....	6
4.3.7 Other imperfections.....	6
Annex A (informative) Illustration of imperfections and associated visual and metallographic controls	22
Annex B (informative) Imperfections deriving from issues related to the process or to the equipment	36
Annex C (informative) Powder imperfections	40
Annex D (informative) Imperfections appearing at subsequent production steps	41
Bibliography	42

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ISO/ASTM 52948:2026(en)

Foreword

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This document was prepared by ISO/TC 261, *Additive manufacturing*, in cooperation with ASTM Committee F42, *Additive Manufacturing Technologies*, on the basis of a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on additive manufacturing, and in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 438, *Additive manufacturing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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ISO/ASTM 52948:2026(en)

Introduction

Industrial additive manufacturing (AM) with powder bed fusion (PBF) processes for metallic materials, using a laser beam (PBF-LB/M) or an electron beam (PBF-EB/M), is in full development. The principle is based on depositing layers of powder on a build platform and selectively fusing each layer with a laser or an electron beam. It is thus possible to produce parts of high geometric complexity.

The control of this process is the subject of numerous studies to attain the best possible quality. It is essential to supplement the approaches addressed by these studies with a standard describing observable imperfections to serve as a basis for non-destructive testing (NDT) and destructive testing (DT).

Knowledge of the imperfections generated by the manufacturing process and their standardised classification are preliminary and essential steps in defining and determining acceptance criteria.

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Additive manufacturing of metals — Powder bed fusion — Classification of imperfections

1 Scope

This document specifies the classification of imperfections possibly generated during an additive manufacturing process by PBF-LB (laser beam powder bed fusion) or PBF-EB (electron beam powder bed fusion) for metallic parts.

This document also indicates the most probable causes of the formation of imperfections and includes illustrations.

This can be extended to other additive manufacturing process categories, nevertheless, the indication of probable causes is process specific.

Acceptance criteria and dimensional description or scale for imperfections are not included in this document.

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 version cited applies. For undated references, the latest version of the referenced document (including any amendments) applies.

ISO 3252, *Powder metallurgy — Vocabulary*

ISO/ASTM 52900, *Additive manufacturing — General principles — Fundamentals and vocabulary*

ASTM B243, *Standard Terminology of Powder Metallurgy*

3 Terms and definitions

For the purposes of this document, the terms and definitions of ISO 3252, ISO/ASTM 52900, ASTM B243 and the following apply.

ISO and IEC maintain terminology databases for use in standardisation 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

bead

continuous line of fused metal

3.2

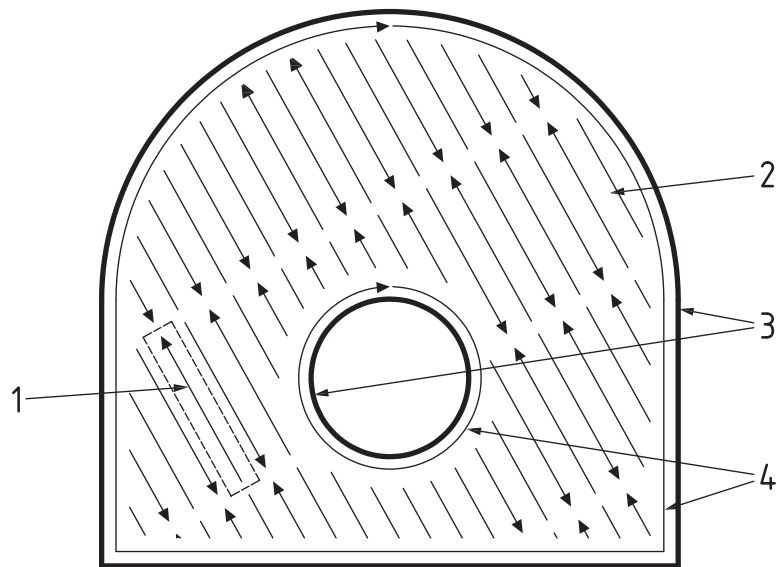
contour

one or a set of scan trajectories following the edges of a part on a layer

Note 1 to entry: Among scanning strategies (see 3.8), it is very common to use one or more contours, which consist of paths that follow the edges of a part on a layer.

Note 2 to entry: See [Figure 1](#).

ISO/ASTM 52948:2026(en)

**Key**

- | | |
|---|------------------------|
| 1 | bead |
| 2 | core scanning strategy |
| 3 | geometric edge |
| 4 | contour |

Figure 1 — Example of a manufacturing strategy using a contour

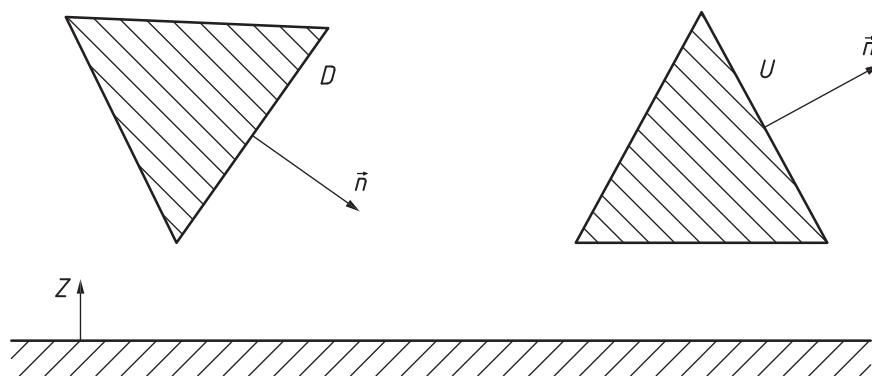
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3.3 downskin area

D
(sub-)area where the outward-pointing normal vector \vec{n} projection on the Z-axis is negative

Note 1 to entry: See [Figure 2](#).

[SOURCE: ISO/ASTM 52911-1:2019, 3.2, modified — Inclusion of "outward-pointing".]

**Key**

- | | |
|-----------|--|
| \vec{n} | normal vector |
| D | downskin area (left) |
| U | upskin area (right) (see 3.9) |

Figure 2 — Upskin and downskin areas U and D (extracted from Figure 1 of ISO/ASTM 52911-1:2019)

ISO/ASTM 52948:2026(en)

3.4

imperfection

departure of a quality characteristic from its intended condition

[SOURCE: ISO/TS 18173:2005, 2.13]

3.5

inclusion

foreign material, either non-metallic or metallic, incorporated into the deposited material

Note 1 to entry: Inclusions are typically oxides, nitrides, hybrids, carbides, or a combination thereof and may or may not have some coherency with the surrounding material.

[SOURCE: ASTM E3166-20]

3.6

lack of fusion

LOF

type of process-induced porosity, in which the powder is not fully melted or fused onto the previously deposited substrate

Note 1 to entry: In PBF, this type of flaw can be an empty cavity, or contain unmelted or partially fused powder, referred to as unconsolidated powder.

Note 2 to entry: Lack of fusion typically occurs in the bulk, making its detection difficult.

Note 3 to entry: Like voids, lack of fusion can occur on the build layer plane (layer/horizontal LOF) or across multiple build layers (cross layer/vertical LOF).

[SOURCE: ISO/ASTM TR 52905:2023, 3.2 modified — Deletion of "or wire".]

3.7

powder spreading device

powder supply mechanism, which distributes and evenly spreads the powder on the build surface

[SOURCE: ISO/ASTM 52941:—, 3.4]

3.8

scanning strategy

concept that describes the laser or electron beam path at each layer

Note 1 to entry: The scanning strategy is automatically generated by the machine or by upstream software. There is a wide variety of scanning strategies.

Note 2 to entry: See [Figure 3](#) where each arrow represents a bead and its direction.

Note 3 to entry: Scanning strategy can refer to both the path and process parameters along these paths such as laser power, laser speed, beam shape, etc.