

<b>STN</b>	<b>Aditívna výroba kovov Charakteristiky a výkonnosť procesu Proces na báze kovovej práškovej vrstvy na splnenie podmienok kritických aplikácií (ISO/ASTM 52904: 2024)</b>	<b>STN EN ISO/ASTM 52904</b>  18 8507
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Additive manufacturing of metals - Process characteristics and performance - Metal powder bed fusion process to meet critical applications (ISO/ASTM 52904:2024)

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. 09/24

Obsahuje: EN ISO/ASTM 52904:2024, ISO/ASTM 52904:2024

Oznámením tejto normy sa ruší  
STN EN ISO/ASTM 52904 (18 8507) z decembra 2020

**139185**

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2024  
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii v znení neskorších predpisov.

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO/ASTM 52904**

July 2024

ICS 25.030

Supersedes EN ISO/ASTM 52904:2020

English Version

**Additive manufacturing of metals - Process characteristics  
and performance - Metal powder bed fusion process to  
meet critical applications (ISO/ASTM 52904:2024)**

Fabrication additive de métaux - Caractéristiques et performances du procédé - Procédé de fusion sur lit de poudre métallique en vue de répondre aux applications critiques (ISO/ASTM 52904:2024)

Additive Fertigung von Metallen - Prozessanforderungen und Qualifizierung - Pulverbettbasiertes Schmelzen von Metallen für kritische Anwendungen (ISO/ASTM 52904:2024)

This European Standard was approved by CEN on 12 July 2024.

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**EN ISO/ASTM 52904:2024 (E)**

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## **European foreword**

This document (EN ISO/ASTM 52904:2024) 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of an identical text or by endorsement, at the latest by January 2025, and conflicting national standards shall be withdrawn at the latest by January 2025.

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.

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## **Endorsement notice**

The text of ISO/ASTM 52904:2024 has been approved by CEN as EN ISO/ASTM 52904:2024 without any modification.



# International Standard

**ISO/ASTM 52904**

## Additive manufacturing of metals — Process characteristics and performance — Metal powder bed fusion process to meet critical applications

*Fabrication additive de métaux — Caractéristiques et  
performances du procédé — Procédé de fusion sur lit de poudre  
métallique en vue de répondre aux applications critiques*

**Second edition  
2024-07**

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Published in Switzerland

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**ISO/ASTM 52904:2024(en)****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 document 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](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 261, *Additive manufacturing technologies*, based on a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on additive manufacturing, 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).

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](http://www.iso.org/members.html).

This second edition cancels and replaces the first edition (ISO/ASTM 52904:2019), which has been technically revised.

The main changes are as follows:

- The structure of the document is modified to reflect the following workflow: Personnel – Digital data – PBF equipment – Feedstock – Qualification – Manufacturing plan;
- Original [Clauses 8](#) “Control of machine operating system software”, [Clauses 9](#) “Auxiliary tools and contamination” and [Clauses 11](#) “External environmental controls” have been merged to a new [Clause 6](#) “PBF equipment requirements”;
- New structure and examples for the manufacturing plan, consistent with the new workflow;
- [9.2](#) “Documentation” is added to the manufacturing plan;
- [Figure 1](#) was updated.

**ISO/ASTM 52904:2024(en)****Introduction**

Operation and production control of machines and processes for powder bed fusion (PBF) in critical applications are described in this document. Critical applications can be subject to regulation. This is one way of meeting quality requirements. The supplier/manufacturer can also ensure quality of components through validation and verification of the AM process, as per internal procedures and requirements, and inspection of the CTQs (critical to quality) of the AM components, as per customer agreement.

# Additive manufacturing of metals — Process characteristics and performance — Metal powder bed fusion process to meet critical applications

## 1 Scope

**WARNING — This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.**

This document covers the operation and production control of metal powder bed fusion (PBF) machines and processes for areas of critical applications. A critical application is assumed once failing parts-functionality leads to immediate threats.

This document is applicable for production of parts and mechanical test specimens using powder bed fusion (PBF) with both laser and electron beams.

Specifications related to specific fields of application are provided in respective standards.

## 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 8573-1, *Compressed air — Part 1: Contaminants and purity classes*

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

ISO/ASTM 52907, *Additive manufacturing — Feedstock materials — Methods to characterize metal powders*

ISO 17295, *Additive manufacturing — General principles — Part positioning, coordinates and orientation*

ISO/ASTM 52926-1, *Additive manufacturing of metals — Qualification principles — Part 1: General qualification of operators*

ISO/ASTM/TS 52930:2021, *Additive manufacturing — Qualification principles — Installation, operation and performance (IQ/OQ/PQ) of PBF-LB equipment*

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