

<b>STN</b>	<b>Aditívna výroba kovov Vlastnosti hotového dielu Orientačná a lokalizačná závislosť mechanických vlastností kovových dielov (ISO/ASTM 52909: 2024)</b>	<b>STN EN ISO/ASTM 52909</b>  18 8520
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Additive manufacturing of metals - Finished part properties - Orientation and location dependence of mechanical properties for metal parts (ISO/ASTM 52909:2024)

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. 05/24

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EUROPEAN STANDARD

EN ISO/ASTM 52909

NORME EUROPÉENNE

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November 2022

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English Version

Additive manufacturing - Finished part properties -  
Orientation and location dependence of mechanical  
properties for metal powder bed fusion (ISO/ASTM  
52909:2022)

Fabrication additive de métaux - Propriétés des pièces  
finies - Dépendance de l'orientation et de  
l'emplacement sur les propriétés mécaniques pour la  
fusion sur lit de poudre métallique (ISO/ASTM  
52909:2022)

Additive Fertigung von Metallen - Eigenschaften von  
Fertigteilen - Orientierung und Lage in Abhängigkeit  
der mechanischen Eigenschaften für  
pulverbettbasiertes Schmelzen (ISO/ASTM  
52909:2022)

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**EN ISO/ASTM 52909:2022 (E)**

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## **European foreword**

This document (EN ISO/ASTM 52909:2022) 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of an identical text or by endorsement, at the latest by May 2023, and conflicting national standards shall be withdrawn at the latest by May 2023.

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## **Endorsement notice**

The text of ISO/ASTM 52909:2022 has been approved by CEN as EN ISO/ASTM 52909:2022 without any modification.



# International Standard

**ISO/ASTM 52909**

## **Additive manufacturing of metals — Finished part properties — Orientation and location dependence of mechanical properties for metal parts**

*Fabrication additive de métaux — Propriétés des pièces finies  
— Dépendance de l'orientation et de l'emplacement sur les  
propriétés mécaniques pour les pièces métalliques*

**Second edition  
2024-02**

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## ISO/ASTM 52909:2024(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)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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The document was prepared by Technical Committee 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).

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 52909:2022), of which it constitutes a minor revision.

The main changes are as follows:

- The third element of the title of the standard has been changed to "Orientation and location dependence of mechanical properties for metal parts";
- The title for [Figure A.6 b](#)) has been corrected;
- Reference [\[12\]](#) in bibliography has been corrected.

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).



**ISO/ASTM 52909:2024(en)****Introduction**

AM produced metallic parts are being intensively developed and used more widely today with an expected faster growth in near future. This document aims to support customers' needs to address specifics of the AM deposited parts – location and orientation dependent local properties and their variations over the part or deposition chamber.

This document provides a list of accurate terminologies and existing standards dedicated to mechanical testing of metallic materials, guidance on designation of coordinate systems and their application to AM specimens/parts designation, and recommendations on possibilities for local properties measurement.

# Additive manufacturing of metals — Finished part properties — Orientation and location dependence of mechanical properties for metal parts

## 1 Scope

This document covers supplementary guidelines for evaluation of mechanical properties including static/quasi-static and dynamic testing of metals made by additive manufacturing (AM) to provide guidance toward reporting when results from testing of as-built specimen or specimen cut out from AM parts made by this technique or both.

This document is provided to leverage already existing standards. Guidelines are provided for mechanical properties measurements and reporting for additively manufactured metallic specimen as well as those cut out from AM parts.

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 standard to establish appropriate safety, health and environmental practices and determine the applicability of regulatory limitations prior to use.

This document expands upon the nomenclature of ISO/ASTM 52900 and principles of ISO 17295 and extends them specifically to metal additive manufacturing. The application of this document is primarily intended to provide guidance on orientation designations in cases where meaningful orientation/direction for AM cannot be obtained from available test methods.

## 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 1099, *Metallic materials — Fatigue testing — Axial force-controlled method*

ISO 4506, *Hardmetals — Compression test*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 12106, *Metallic materials — Fatigue testing — Axial-strain-controlled method*

ISO 12108, *Metallic materials — Fatigue testing — Fatigue crack growth method*

ISO 12135, *Metallic materials — Unified method of test for the determination of quasistatic fracture toughness*

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

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

ASTM E8/E8M, *Standard test methods for tension testing of metallic materials*

ASTM E9, *Standard test methods of compression testing of metallic materials at room temperature*

ASTM E399, *Standard test method for linear-elastic plane-strain fracture toughness  $K_{Ic}$  of metallic materials*

ASTM E466, *Standard practice for conducting force-controlled constant amplitude axial fatigue tests of metallic materials*

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ASTM E561, *Standard test method for k-r curve determination*

ASTM E606/E606M, *Standard test method for strain-controlled fatigue testing*

ASTM E647, *Standard test method for measurement of fatigue crack growth rates*

ASTM E1820, *Standard test method for measurement of fracture toughness*

ASTM E1921, *Test Method for Determination of Reference Temperature,  $T_0$ , for Ferritic Steels in the Transition Range*

ASTM E2472, *Standard Test Method For Determination Of Resistance To Stable Crack Extension Under Low-Constraint Conditions*

ASTM E2899, *Standard test method for measurement of initiation toughness in surface cracks under tension and bending*

ASTM F2971, *Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**