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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 46623-2025

**Additive manufacturing of metals - Orientation and location
dependence of mechanical properties for finished parts**

金属增材制造 成形件机械性能与其取样方向、位置的相关性

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is modified to adopt ISO/ASTM 52909:2024 "Properties of metal additively manufactured parts and their mechanical properties".

Correlation between sampling direction and location.

This document has undergone the following structural adjustments compared to ISO/ASTM 52909:2024.

---Appendix B (normative) has been added.

The technical differences between this document and ISO/ASTM 52909:2024, and the reasons therefor, are as follows.

---ISO/ASTM 52900 and ISO 17295 have been replaced with the normatively referenced GB/T 35351 and GB/T 41507 (see GB/T 35351 and GB/T 41507).

Chapter 3 uses the commonly used definitions of terms in my country's additive manufacturing field for ease of use;

---ISO 6892-1 has been replaced with GB/T 228.1 (normative reference), and ASTM has been replaced with GB/T 228.2 (normative reference).

E8/E8M replaces ASTM E9 with normatively referenced GB/T 7314, and replaces GB/T 23370 with normatively referenced GB/T 23370.

ISO 4506 was replaced by the normatively referenced GB/T 3075, replacing ISO 1099 and ASTM E466.

GB/T 26077 replaced ISO 12106 and ASTM E606/E606M, and replaced the normatively referenced GB/T 4161.

ASTM E399 replaced ISO 12135 with the normatively referenced GB/T 21143, and with the normatively referenced GB/T 6398.

ISO 12108 and ASTM E647 (see Table 3) have been replaced to adapt to my country's testing methods for metallic materials;

---The normative reference to ASTM F2971 (see 7.2 of ISO/ASTM 52909:2024) has been removed, and a normative appendix has been added.

The "Requirements for the Format of Metal Additive Manufacturing Test Reports" (see Appendix B) are to conform to the format of metal additive manufacturing test reports in my country.

The following editorial changes have been made to this document.

---To align with existing standards, the standard title has been changed to "Mechanical Properties of Metal Additively Manufactured Parts and Their Sampling Direction and Location".

Correlation;

---Move the explanation of the purpose and significance of the standard from the "Scope" chapter to the introduction;

---ISO/ASTM 52900 has been replaced with GB/T 35351 (see 4.1), which is used for informational purposes.

---ASTM E399 has been replaced with GB/T 4161 (see 5.1), which is cited in the informational reference.

---ISO 12108 and ASTM E647 have been replaced with GB/T 6398 (informative reference), and GB/T 21143 (informative reference) has been replaced with GB/T 21143 (informative reference).

ISO 12135 has been replaced (see 5.1 and A.4);

---ISO 17295 has been replaced by GB/T 41507 (see 5.1, A.2, A.3, A.5.1) as cited in the informational reference;

---ISO 6892-1 has been replaced by GB/T 228.1 (informative reference), and ASTM has been replaced by GB/T 228.2 (informative reference).

E8/E8M replaces ASTM E9 with GB/T 7314 (informative reference), and GB/T 23370 (informative reference) replaces E9.

ISO 4506 was replaced by GB/T 3075, which is used for informational purposes. ISO 1099 and ASTM E466 were replaced by GB/T 3075, which is used for informational purposes.

GB/T 26077 replaces ISO 12106 and ASTM E606/E606M (see A.2 and A.3);

---ASTM E8/E8M (see A.6.1) has been replaced with GB/T 228.2 (see informative reference).

---ISO 26843 and ASTM E2248 have been replaced with GB/T 38769 (informative reference), and GB/T 19748 (informative reference) has been replaced with GB/T 19748.

It replaces ISO 14556 and ASTM E23 (see A.6.2).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Additive Manufacturing (SAC/TC562).

Introduction

Additive manufacturing (AM) metal parts are being developed and gradually applied, and are expected to experience rapid growth soon. This document aims to help...

Helping customers address the specific needs of AM parts, including sampling direction, location-related local properties, and their presence in the molded part or molding chamber. change.

This document provides a list of accurate terminology and reference standards for testing the mechanical properties of metallic materials, and explains how to specify coordinate systems and their...

Guidance on application in AM samples/molded parts, and suggestions on the possibilities and methods for measuring local properties.

This document provides guidelines for measuring and reporting the mechanical properties of furnace-mounted and bulk metal additive manufacturing specimens using existing standards.

This document does not address all safety issues related to use. Establishing appropriate safety, health, and environmental practices and identifying them as such are essential.

The responsibility of the document user.

This document is primarily used to provide sampling directions when a sampling direction meaningful for AM cannot be obtained from existing testing methods.

Design guidance.

Mechanical properties of metal additively manufactured parts and their Correlation between sampling direction and location

1 Scope

This document describes the significance and application of studying the correlation between the mechanical properties of additively manufactured metal forming parts and their sampling direction and location, and specifies...

The test methods and reporting requirements for mechanical performance evaluation were established.

This document applies to the evaluation of the static/quasi-static and dynamic test results of the mechanical properties of metal formed parts.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 228.1 Metallic materials-Tensile testing-Part 1: Tests at room temperature (GB/T 228.1-2021, ISO 6892-1) 2019, MOD) GB/T 228.2 Metallic materials - Tensile testing - Part 2: High temperature test method GB/T 3075 Method for controlling axial force in fatigue testing of metallic materials (GB/T 3075-2021, ISO 1099:2017, MOD) GB/T 4161 Test method for plane strain fracture toughness of metallic materials (KIC) GB/T 6398 Fatigue testing of metallic materials-Metallic materials-Methods for fatigue crack propagation (GB/T 6398-2017, ISO 12108:2012) MOD) GB/T 7314 Metallic materials - Compression test at room temperature GB/T 21143 Uniform test method for quasi-static fracture toughness of metallic materials (GB/T 21143-2014, ISO 12135.

2002, MOD)

GB/T 23370 Hard alloy compression test method (GB/T 23370-2009, ISO 4506:1979, IDT) GB/T 26077 Methods for controlling axial strain in fatigue testing of metallic materials (GB/T 26077-2021, ISO 12106:2017) MOD) GB/T 35351 Additive Manufacturing Terminology