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Additive Manufacturing for construction - Qualification principles - Structural and infrastructure elements (ISO/ASTM 52939:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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Additive Manufacturing for construction - Qualification principles - Structural and infrastructure elements (ISO/ASTM 52939:2023)

Fabrication additive pour la construction - Principes de qualification - Eléments de structure et d'infrastructure (ISO/ASTM 52939:2023)

Additive Fertigung für das Bauwesen - Grundsätze der Qualifizierung - Struktur- und Infrastrukturelemente (ISO/ASTM 52939:2023)

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EN ISO/ASTM 52939:2023 (E)

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European foreword

This document (EN ISO/ASTM 52939:2023) 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.

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Additive manufacturing for construction — Qualification principles — Structural and infrastructure elements

*Fabrication additive pour la construction — Principes de
qualification — Éléments de structure et d'infrastructure*



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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).

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This 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).

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Introduction

The construction sector is increasingly facing challenges with respect to labour shortages, project delays, increased lead times, excessive material use, large amounts of waste and adverse CO₂ footprint impacts. Furthermore, from a market perspective, the global construction demand is increasing especially as the housing crisis continues and infrastructure projects (whether new or sustaining existing structures) are on the increase. Additive construction (AC) also known as additive manufacturing for construction (AMC) and 3D construction printing (3DCP) has the potential to address these issues directly.

Of late, AC has made great strides. Printed elements could potentially prove to be more durable, more sustainable, more eco-friendly, cheaper (en masse), and faster to deliver than conventional construction approaches. However, without AC standards, approval, certification, and risk mitigation are unattainable.

The purpose of this document is to outline the requirements necessary as a basis for production and delivery of high quality additively manufactured structures (residential or infrastructure) in the construction sector.

Important steps of the AC process are specified. These steps will be controlled and monitored to ensure high quality printed structures for on-site or off-site use. This document is not intended to be technology- or material-specific, and therefore sub-processes are applicable depending on the approach used. However, it should be noted that printed element(s) should be approved by a locally certified engineer and adhere to both local and regional specifications and requirements.

Additive manufacturing for construction — Qualification principles — Structural and infrastructure elements

1 Scope

This document specifies quality assurance requirements for additive construction (AC) concerning building and construction projects in which additive manufacturing techniques are used for construction. The requirements are independent of the material(s) and process category used.

This document does not apply to metals.

This document specifies the criteria for additive construction processes, quality-relevant characteristics, and factors along AC system operations. It further specifies activities and sequences within an AC cell (additive construction site) and project.

This document applies to all additive manufacturing technologies in building and construction (load bearing and non-load bearing), structural and infrastructure building elements for residential and commercial applications and follows an approach oriented to the process.

This document does not cover environmental, health and safety aspects that apply to printing facility setup, material handling, operating of robotic equipment, and packing of equipment and/or elements for shipping but material supplier guidelines, robotic solution operating guidelines, and local and regional requirements are applicable.

This document does not cover design approvals, material properties characterization and testing.

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

ISO/ASTM 52950, *Additive manufacturing — General principles — Overview of data processing*

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