SLOVENSKI STANDARD
SIST EN ISO/ASTM 52939:2024

01-marec-2024

Aditivna proizvodnja v gradbeništvu - Kvalifikacija - Strukturni in infrastrukturni elementi (ISO/ASTM 52939:2023)

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

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

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

iTeh Standards
(https://standards.iteh.ai)
Document Preview

Ta slovenski standard je istoveten z: **EN ISO/ASTM 52939:2023**

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5ff13115-7f19-4ef8-b67a-2415e533a82/sist-en-iso-astm-52939-2024

ICS:

25.030	3D-tiskanje	Additive manufacturing

SIST EN ISO/ASTM 52939:2024 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

SIST EN ISO/ASTM 52939:2024

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO/ASTM 52939

December 2023

ICS 25.030

English Version

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)

This European Standard was approved by CEN on 1 December 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2023 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO/ASTM 52939:2023 E

SIST EN ISO/ASTM 52939:2024

Contents

Page

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

SIST EN ISO/ASTM 52939:2024

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.

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 June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO/ASTM 52939:2023 has been approved by CEN as EN ISO/ASTM 52939:2023 without any modification.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

SIST EN ISO/ASTM 52939:2024

INTERNATIONAL STANDARD

ISO/ASTM 52939

First edition
2023-12

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

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

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

Reference number
ISO/ASTM 52939:2023(E)

© ISO/ASTM International 2023

SIST EN ISO/ASTM 52939:2024

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

COPYRIGHT PROTECTED DOCUMENT

© ISO/ASTM International 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester. In the United States, such requests should be sent to ASTM International.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

Email: copyright@iso.org
Website: www.iso.org

ASTM International
100 Barr Harbor Drive, PO Box C700
West Conshohocken, PA 19428-2959, USA
Phone: +610 832 9634
Fax: +610 832 9635
Email: khooper@astm.org
Website: www.astm.org

Published in Switzerland

© ISO/ASTM International 2023 – All rights reserved

SIST EN ISO/ASTM 52939:2024

Contents

Page

iTeh Standards
(https://standards.iteh.ai)
Document Preview
SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113155-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

© ISO/ASTM International 2023 – All rights reserved

SIST EN ISO/ASTM 52939:2024

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).

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. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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).

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.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
https://standards.iteh.ai/catalog/standards/sist/en-iso-astm-52939-2024

© ISO/ASTM International 2023 – All rights reserved

SIST EN ISO/ASTM 52939:2024

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 CO_2 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.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

© ISO/ASTM International 2023 – All rights reserved

iTeh Standards
(https://standards.iteh.ai)
Document Preview

SIST EN ISO/ASTM 52939:2024
https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

SIST EN ISO/ASTM 52939:2024

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.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

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.

https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4efb-b67a-24115e533a82/sist-en-iso-astm-52939-2024

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

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

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization 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
additive manufacturing for construction
AMC
process to join materials to make structural and non-structural elements/components and systems from 3D model data usually by depositing material layer upon layer as opposed to subtractive and formative manufacturing methodologies

© ISO/ASTM International 2023 – All rights reserved

SIST EN ISO/ASTM 52939:2024

3.2
additive construction
AC
term to describe all relevant disciplines and knowledge for the construction segment using additive manufacturing process categories

Note 1 to entry: The use of the technologies covers all relevant construction sectors, for example large scale real estate projects, entire buildings and building elements, civil infrastructure, and disaster relief.

Note 2 to entry: AC describes all relevant knowledge disciplines, for example: architecture, engineering, structural engineering, materials engineering, robot operator, project management, construction management, facility management, etc.

Note 3 to entry: Other terms used interchangeably are: Digital Construction (DC), Construction 4.0, Advanced Manufacturing in Construction (AMC), Construction 3D Printing (C3DP) and 3D Construction Printing (3DCP).

Note 4 to entry: Building materials include:

— cementitious variations such as concrete and mortar, polymer modified pastes,

— composite materials.

Note 5 to entry: Intrinsic to the current definition is a high degree of robotic automation, a reduced degree of human intervention during the construction process, and minimal waste due to as-needed material delivery systems.

Note 6 to entry: As of this writing in 2023, the field of AC is rapidly evolving, and novel materials and methods are very likely to become included in this definition.

Note 7 to entry: AC is used on-site or off-site (e.g. modular factory-based production).

iTeh Standards
(https://standards.iteh.ai)
Document Preview

3.3
layer deposition
application of a single layer

3.4
AC cell
printing solution deployed on site for in-situ printing (includes material mixing and placement systems)

https://standards.iteh.ai/catalog/standards/sist/5f113115-7f19-4cfb-b67a-241f5e533a82/sist-en-iso-astm-52939-2024

3.5
material deposition device
numerically controlled assembly, including mixing and delivery mechanisms for raw materials, binders, and additives; places the mixture based on a digital simulation entered in the assembly's electronic programs, without the need for direct human intervention or for using moulds

3.6
physical production
physical totality of the build space, elements located on the build space, and production related support structures and plant in the build space of the system

3.7
virtual production run
computer/digital simulation of the *physical production* (3.7) run (print file)

EXAMPLE Printing simulation.

3.8
dry production run
process of running the build program with no materials to verify the first layer toolpath and other critical points of the program; and can be part of calibration process

© ISO/ASTM International 2023 – All rights reserved