

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

## **Additiv fremstilling – Testartefakter – Geometrisk kapabilitetsvurdering af additive fremstillingssystemer**

Additive manufacturing – Test artifacts – Geometric  
capability assessment of additive manufacturing  
systems (ISO/ASTM 52902:2019)

**DANSK STANDARD**  
Danish Standards Association

Göteborg Plads 1  
DK-2150 Nordhavn

Tel: +45 39 96 61 01

Tel: +45 39 96 61 01

[dansk.standard@ds.dk](mailto:dansk.standard@ds.dk)

[www.ds.dk](http://www.ds.dk)

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

DS projekt: M319527

ICS: 25.030

**Første del af denne publikations betegnelse er:**

**DS/EN ISO, hvilket betyder, at det er en international standard, der har status både som europæisk og dansk standard.**

**Denne publikations overensstemmelse er:**

**IDT med: ISO/ASTM 52902:2019**

**IDT med: EN ISO/ASTM 52902:2019**

**DS-publikationen er på engelsk.**

---

### **DS-publikationstyper**

Dansk Standard udgiver forskellige publikationstyper.

Typen på denne publikation fremgår af forsiden.

Der kan være tale om:

#### **Dansk standard**

- standard, der er udarbejdet på nationalt niveau, eller som er baseret på et andet lands nationale standard, eller
- standard, der er udarbejdet på internationalt og/eller europæisk niveau, og som har fået status som dansk standard

#### **DS-information**

- publikation, der er udarbejdet på nationalt niveau, og som ikke har opnået status som standard, eller
- publikation, der er udarbejdet på internationalt og/eller europæisk niveau, og som ikke har fået status som standard, fx en teknisk rapport, eller
- europæisk præstandard

#### **DS-håndbog**

- samling af standarder, eventuelt suppleret med informativt materiale

#### **DS-hæfte**

- publikation med informativt materiale

Til disse publikationstyper kan endvidere udgives

- tillæg og rettelsesblade

### **DS-publikationsform**

Publikationstyperne udgives i forskellig form som henholdsvis

- fuldtjekstpublikation (publikationen er trykt i sin helhed)
- godkendelsesblad (publikationen leveres i kopi med et trykt DS-omslag)
- elektronisk (publikationen leveres på et elektronisk medie)

### **DS-betegnelse**

Alle DS-publikationers betegnelse begynder med DS efterfulgt af et eller flere præfikser og et nr., fx **DS 383**, **DS/EN 5414** osv. Hvis der efter nr. er angivet et **A** eller **Cor**, betyder det, enten at det er et **tillæg** eller et **rettelsesblad** til hovedstandard, eller at det er indført i hovedstandard.

DS-betegnelse angives på forsiden.

### **Overensstemmelse med anden publikation:**

Overensstemmelse kan enten være IDT, EQV, NEQ eller MOD

- **IDT:** Når publikationen er identisk med en given publikation.
- **EQV:** Når publikationen teknisk er i overensstemmelse med en given publikation, men præsentationen er ændret.
- **NEQ:** Når publikationen teknisk eller præsentationsmæssigt ikke er i overensstemmelse med en given standard, men udarbejdet på baggrund af denne.
- **MOD:** Når publikationen er modificeret i forhold til en given publikation.

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

September 2019

ICS 25.030

English Version

## Additive manufacturing - Test artifacts - Geometric capability assessment of additive manufacturing systems (ISO/ASTM 52902:2019)

Fabrication additive - Pièces types d'essai -  
Évaluation de la capacité géométrique des systèmes  
de fabrication additive (ISO/ASTM 52902:2019)

Additive Fertigung - Testkörper - Allgemeine  
Leitlinie für die Bewertung der geometrischen  
Leistung additiver Fertigungssysteme (AM-  
Systeme) (ISO/ASTM 52902:2019)

This European Standard was approved by CEN on 7 July 2019.

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, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

## **Contents**

Page

<b>European foreword .....</b>	<b>3</b>
--------------------------------	----------

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

## European foreword

This document ([EN ISO/ASTM 52902:2019](#)) 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 March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

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.

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, Turkey and the United Kingdom.

### Endorsement notice

The text of [ISO/ASTM 52902:2019](#) has been approved by CEN as [EN ISO/ASTM 52902:2019](#) without any modification.

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

First edition  
2019-07-31

---

---

# Additive manufacturing — Test artifacts — Geometric capability assessment of additive manufacturing systems

*Fabrication additive — Pièces types d'essai — Évaluation de la  
capacité géométrique des systèmes de fabrication additive*



Reference number  
ISO 52902:2019(E)

© ISO 2019

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019, Published in Switzerland

All rights reserved. Unless otherwise specified, 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.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org



This is a preview of "DS/EN ISO/ASTM 52902...". Click here to purchase the full version from the ANSI store.

## Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Significance and use</b> .....	<b>2</b>
4.1 General.....	2
4.2 Comparing results from one machine.....	2
<b>5 General principles for producing artifacts</b> .....	<b>2</b>
5.1 General.....	2
5.2 Need to use feedstock conforming to a material specification.....	2
5.3 Need to undertake artifact building according to a documented process specification.....	2
5.4 File formats and preparation.....	3
5.5 Download files.....	3
5.6 Discussion of file conversion.....	3
5.7 AMF preferred (with conversion instructions/ resolutions).....	3
5.8 Need for test specification and test process.....	3
5.9 Quantity of test artifacts.....	3
5.10 Position and orientation of test artifacts.....	4
5.11 Considerations for orientation.....	4
5.12 Labelling.....	4
5.13 Coverage.....	4
5.14 Arrays.....	4
5.15 Part consolidation.....	4
5.16 Supports and post processing.....	5
<b>6 General principles for measuring artifacts</b> .....	<b>5</b>
6.1 General.....	5
6.2 Measure parts as built.....	5
6.3 Measurement strategy.....	5
6.4 Measurement uncertainty.....	6
<b>7 Artifact geometries</b> .....	<b>6</b>
7.1 General.....	6
7.2 Accuracy.....	6
7.2.1 Linear artifact.....	6
7.2.2 Circular artifact.....	8
7.3 Resolution.....	9
7.3.1 Resolution pins.....	9
7.3.2 Resolution holes.....	11
7.3.3 Resolution rib.....	13
7.3.4 Resolution slot.....	15
7.4 Surface texture.....	17
7.4.1 Purpose.....	17
7.4.2 Geometry.....	17
7.4.3 Measurement.....	18
7.4.4 Reporting.....	19
7.4.5 Considerations.....	19
7.5 Labelling.....	20
7.5.1 Purpose.....	20
7.5.2 Geometry.....	20
7.5.3 Considerations.....	21
<b>Annex A (informative) Example artifact configurations</b> .....	<b>22</b>
<b>Annex B (informative) Measurement techniques</b> .....	<b>25</b>

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

<b>Annex C (informative) Measurement procedures</b> .....	<b>28</b>
<b>Annex D (informative) List of specimen names and sizes</b> .....	<b>34</b>
<b>Bibliography</b> .....	<b>36</b>

This is a preview of "DS/EN ISO/ASTM 52902...". Click here to purchase the full version from the ANSI store.

## 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 documents 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)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

This document was prepared by 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.

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 is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "DS/EN ISO/ASTM 52902...". [Click here to purchase the full version from the ANSI store.](#)

# Additive manufacturing — Test artifacts — Geometric capability assessment of additive manufacturing systems

## 1 Scope

This document covers the general description of benchmarking test piece geometries along with quantitative and qualitative measurements to be taken on the benchmarking test piece(s) to assess the performance of additive manufacturing (AM) systems.

This performance assessment can serve the following two purposes:

- AM system capability evaluation;
- AM system calibration.

The benchmarking test piece(s) is (are) primarily used to quantitatively assess the geometric performance of an AM system. This document describes a suite of test geometries, each designed to investigate one or more specific performance metrics and several example configurations of these geometries into test piece(s). It prescribes quantities and qualities of the test geometries to be measured but does not dictate specific measurement methods. Various user applications can require various grades of performance. This document discusses examples of feature configurations, as well as measurement uncertainty requirements, to demonstrate low and high grade examination and performance. This document does not discuss a specific procedure or machine settings for manufacturing a test piece, which are covered by [ASTM F 2971](#) and other relevant process specific specifications.

## 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 52921](#), *Standard terminology for additive manufacturing — Coordinate systems and test methodologies*

[ASME B46.1](#), *Surface Texture (Surface Roughness, Waviness and Lay)*