

DRAFT INTERNATIONAL STANDARD

ISO/ASTM DIS 52903-2

ISO/TC 261

Secretariat: DIN

Voting begins on:
2018-09-07

Voting terminates on:
2018-11-30

Additive manufacturing — Standard specification for material extrusion based additive manufacturing of plastic materials —

Part 2: Process — Equipment

Fabrication additive — Spécification normalisée pour la fabrication additive de matériaux plastiques à base d'extrusion —

Partie 2: Processus — Equipement

ICS: 25.030

ITeH STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/ed0de6c1-1410-4e8-ad8b-46c3196d2952/iso-astm-dis-52903-2>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/ASTM DIS 52903-2:2018(E)

© ISO 2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/ed0de6c1-1410-4e88-ad8b-46c3196d2952/iso-astm-dis-52903-2>



COPYRIGHT PROTECTED DOCUMENT

© ISO/ASTM International 2018

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
Fax: +41 22 749 09 47
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

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Process specification	1
5 Materials	2
6 Fabrication of test specimens	2
7 Responsibility for Quality Assurance	3
8 Tolerances and Surface Roughness	3
9 Material Processing	3
9.1 Maintenance.....	3
9.2 Raw material.....	3
9.3 Process Parameters.....	4
9.4 Production builds.....	4
9.5 Post Processing.....	4
10 Qualification	4
10.1 Additive Manufacturing Equipment Qualification.....	4
10.2 Build Qualification.....	5
10.3 Additive Manufacturing Equipment Requalification.....	5
10.3.1 Operator Qualification.....	5
10.3.2 Part Digital Data Qualification.....	5
11 Report	5
Bibliography	6

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).

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).

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 F 42.

A list of all parts in the ISO/ASTM 52903- series can be found on the ISO website.

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.

Introduction

This international standard has been developed in close cooperation of ISO/TC 261 and ASTM F 42 on 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.

The values stated in either SI units or inch-pound units are to be regarded separately as standard. The value stated in each system are not necessarily exact equivalents; therefore, each system needs to be used independently of the other. Combining values from the two systems can result in non-conformance with the standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/ed0de6c1-1410-4ee8-ad8b-46c3196d2952/iso-astm-dis-52903-2>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/ed0de6c1-1410-4ee8-ad8b-46c3196d2952/iso-astm-dis-52903-2>

Additive manufacturing — Standard specification for material extrusion based additive manufacturing of plastic materials —

Part 2: Process — Equipment

1 Scope

This standard describes a method for defining requirements and assuring component integrity for plastic parts created using material extrusion based additive manufacturing processes. The present standard is concerning to the process, equipment and operational parameters. Processes include all material extrusion based additive manufacturing processes.

This specification is intended for use by AM users and for customers procuring such parts.

NOTE To better understand and use this document, it is encouraged to familiarize oneself with the terms and definitions in ISO/ASTM/DIS 52900-218.

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/DIS 52900:2018, *Additive manufacturing — General principles — Part 1: Terminology*

ISO/ASTM/DIS 52903-1, *Additive Manufacturing — Standard Specification for Material Extrusion Based Additive Manufacturing of Plastic Materials — Part 1: Feedstock materials*

ISO/ASTM 52921:2013, *Standard terminology for additive manufacturing — Coordinate systems and test methodologies*

ASTM D638, *Standard Test Method for Tensile Properties of Plastics*

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/ASTM/DIS 52900:2018 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Process specification

According with the final quality of the part, the process may be classified under the following classes:

4.1 Class I Process Specification: Most rigorous process specification intended for use in producing the highest quality parts with the highest degree of confidence through detailed traceability required in quality documents.

4.2 Class II Process Specification: A rigorous process specification intended for use in producing high quality parts with less traceability than Class I.

4.3 Class III Process Specification: A general process specification intended for use as a guideline in processing quality parts using best practices with minimum traceability.

5 Materials

Refer to standard ISO/ASTM/DIS 52903-1.

6 Fabrication of test specimens

6.1 Unless otherwise specified by the customer, all test specimens shall be additive manufactured parts which are not post-processed, with the exception of removing support material.

6.1.1 Since post-processing could affect some final Part properties, the customer should consider evaluating test specimens with the same post processing that the final parts have or are expected to have.

6.2 Direction-Independent Properties — Test specimens used to assess direction-independent properties may be built with associated parts anywhere in the build envelope at the Part manufacturer's discretion. Unless otherwise specified by the customer or the specific test method to be employed, a minimum of three test specimens per build will be evaluated. The specimen may be aligned to any directional axis (X, Y, or Z) chosen by part manufacturer.

6.3 Non-Mechanical Direction-Dependent Properties — Unless otherwise specified by the customer, test specimens used to assess non-mechanical, potentially direction-dependent properties such as electrical resistance shall be built in a location and direction deemed by the Part manufacturer to be the least favourable orientation within the master bounding box (ISO/ASTM 52921:2013,) for measurement of the property in question. Unless otherwise specified by the customer or the specific test method to be employed, a minimum of three test specimens per build will be evaluated.

6.4 Mechanical Direction-Dependent Properties

6.4.1 All Mechanical Property Testing Except Tension Testing. Unless otherwise specified by the customer, test specimens other than tension testing specimens used to assess mechanical properties such as flexural modulus, impact strength and shear modulus shall be built in a location and direction deemed by the Part manufacturer to be the least favourable orientation within the master bounding box (ISO/ASTM 52921:2013) for measurement of the property in question. Unless otherwise specified by the customer or the specific test method to be employed, three test specimens per build will be evaluated.

6.4.2 Tension Testing — Unless otherwise specified by the customer, the number, orientation and location of test specimens for evaluation of tensile mechanical properties are tabulated in Table I.

Table 1 — Specifications for Mechanical Testing of Material Extrusion Based Additive for plastics

Specification ^{a, b}	Class I	Class II	Class III
Build Certification	A minimum of three XY or YX tension specimens, and a minimum of three ZX or ZY tension specimens	A minimum of three XY or YX tension specimens	No tension specimens needed unless requested by customer
<p>^a For Part orientation notation, see ISO/ASTM 52921:2013.</p> <p>^b For ASTM D638 or ISO 527-1, subsized tension specimens may be used for ZX or ZY samples for build heights less than 57 mm (2,25 in).</p>			

7 Responsibility for Quality Assurance

Responsibilities for Inspection and Test. Unless otherwise specified in the contract or purchase order, the Part manufacturer is responsible for the execution of all inspection and testing specified herein. Unless otherwise directed by the customer in the order, the Part manufacturer may use their own or any other suitable facilities for the performance of the inspection and test requirements specified herein. The customer shall have the right to perform any inspection and testing set forth in the specification where such inspections are deemed necessary to assure that material conforms to prescribed requirements.

8 Tolerances and Surface Roughness

Tolerances, given in absolute or relative format, and surface roughness shall be defined by the customer in consultation with the part manufacturer.

9 Material Processing

9.1 Maintenance

9.1.1 The additive manufacturing equipment shall be cleaned per the original equipment manufacturer's instructions and/or recommendations along with Part manufacturer's best practices prior to each build.

9.1.2 Special consideration shall be given to cleaning and maintaining the extrusion nozzle tip according to the manufacturer's specifications.

9.1.3 Mechanical and electronic adjustments shall be made to the extrusion based equipment according to equipment manufacturers' specifications.

9.1.4 Building platform shall be clean and flat, per OEM requirements, prior to each build

9.2 Raw material

Raw material shall be conditioned per material manufacturer's specifications and in accordance with material specification ISO/ASTM/DIS 52903-1.