INTERNATIONAL STANDARD

ISO/ASTM 52901

First edition
2017-08

Additive manufacturing — General principles — Requirements for purchased AM parts

Fabrication additive — Principes généraux — Exigences pour l'achat de pièces

Reference number
ISO/ASTM 52901:2017(E)

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

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

Contents

Page

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 on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 261, *Additive manufacturing* in cooperation with ASTM 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.

Introduction

This document covers the definition and communication of requirements for purchased parts made by additive manufacturing. It is intended to enable efficient and unambiguous communication between the part providers and the customers of parts made by additive manufacturing to ensure that the resulting part meets the customer's requirements. It is intended that the document is used by the part providers and/or the customers of parts made by additive manufacturing.

This document is a top-level standard in the hierarchy of additive manufacturing standards in that it is intended to apply to parts made by any additive manufacturing process and any material type. The document allows for different requirements based on the classification of the criticality and expected end use of the parts made by additive manufacturing.

Additive manufacturing — General principles — Requirements for purchased AM parts

1 Scope

This document defines and specifies requirements for purchased parts made by additive manufacturing.

It gives guidelines for the elements to be exchanged between the customer and the part provider at the time of the order, including the customer order information, part definition data, feedstock requirements, final part characteristics and properties, inspection requirements and part acceptance methods.

It is applicable for use as a basis to obtain parts made by additive manufacturing that meet minimum acceptance requirements. More stringent part requirements can be specified through the addition of one or more supplementary requirements at the time of the order.

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 17296-3, *Additive manufacturing — General principles — Part 3: Main characteristics and corresponding test methods*

ISO/ASTM 52900, *Additive manufacturing — General principles — Terminology*

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

ASTM F 3122, *Standard Guide for Evaluating Mechanical Properties of Metal Materials Made via Additive Manufacturing Processes*

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 terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
pre-shipment inspection
inspection carried out by the part producer on the parts to be supplied according to the part definition or on the test units in order to verify that these parts are in compliance with the order requirements

3.2
qualification part
part fabricated prior to commencing production which is used to qualify specific aspects of the manufacturing process or part characteristics in order to use as a basis to initiate production

3.3
first production part
part with the same geometry (and with the same tolerances), same material and same properties as the one requested by the order that allows verification by the *customer* (3.8) that the production processes are capable of producing parts that meet the requirements

3.4
reference part
part with characteristics similar to the desired final parts but with different geometry or scale or features that can be easily measured or characterized

Note 1 to entry: Reference parts are typically sacrificial parts with simple geometries that are used to verify build properties and reduce measurement effort.

3.5
acceptance
agreement between the *customer* (3.8) and the *part provider* (3.7) that the delivered part(s) meet the purchase order requirements

3.6
inspection plan
set of instructions specifying the process of verification including appropriate resources and sequence of inspections to be referenced by the manufacturing plan

3.7
part provider
manufacturer or distributer of parts produced by an additive manufacturing process

3.8
customer
person or group ordering and receiving parts manufactured by additive manufacturing equipment

4 Requirements

4.1 General

The elements described in 4.2 to 4.5 shall be included in the purchase order subject to agreement between the customer and the part provider. Annex A provides a typical content of a purchase order.

4.2 Part ordering information

The part order shall include the following elements:

a) customer organization and contact information (preferably with points of contact for ordering, payment and delivery);

b) definition of the part(s) to be manufactured;

c) associated conditions of delivery to the customer;

d) other purchase requirements;

e) a reference identification of this document, i.e. ISO/ASTM 52901 and other relevant national/international regulations;

f) customer part order identification (requisition number, requisition date, etc.);

g) designation or description of the part(s) desired (part number/identification, revision index, etc.);

h) quantity of parts desired;

i) required delivery date, if single order;

j) required delivery quantity, frequency and time duration of the order, if ongoing or multiple orders;

k) required marking or tagging of the parts, including, for example, labels, serial number, lot number, feedstock type, part provider's reference, inspection identifier, traceability reference, etc.;

l) part packaging requirements for delivery to customer;

m) customer shipping address;

The specific values of the elements are subject to agreement between the customer and the part provider.

4.3 Definition of the part to be manufactured

4.3.1 General

The part definition shall include the following elements:

— part geometry;

— tolerances;

— surface texture;

— build orientation, if necessary to meet the customer requirements;

— feedstock for the part to be manufactured, if necessary to meet the customer requirements;

— repair methods (taking into account the testing categories defined in ISO 17296-3);

— acceptable imperfections or deviations;

— process control information.

NOTE Disclosure of proprietary information is subject to agreement between the customer and the part provider.

4.3.2 Part geometry

The part definition shall include the following elements:

a) the engineering drawing reference (number, index and version), if applicable;

b) the digital file reference (name, format, version), if applicable;

c) the geometry description by

1) an engineering drawing that fully defines the part, or

2) a digital file containing the 3D model or the part geometry information; for electronic data exchanges, the customer and the part provider shall ensure that the systems used are compatible, and define

i) the method for supplying digital files, including level of confidentiality and methods for data protection,

ii) the format of the electronic data, and

iii) the procedures for creating the digital file (including source of the electronic data and conversion requirements necessary to produce the digital file).