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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

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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 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).

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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.

The committee responsible for this document is 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.

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Additive manufacturing of metals — Powder bed fusion — Material properties of stainless steel alloys

1 Scope

This document covers properties of additively manufactured components of austenitic stainless steels X2CrNiMo17-12-2 (1.4404), 316L (S31603), 316L (S31673), X2CrNiMo18-14-3 (1.4435) using full-melt powder bed fusion such as electron beam melting and laser melting. The components produced by these processes are used typically in applications that require mechanical properties similar to wrought products. Components manufactured to this specification are often, but not necessarily, post processed via machining, grinding, electrical discharge machining (EDM), polishing, and so forth to achieve desired surface finish and critical dimensions.

This document is intended to size equipment, purchasers or producers, of additively manufactured components for defining the requirements and ensuring component properties.

This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

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 52901, *Additive manufacturing — General principles — Requirements for purchased AM parts*

ISO/ASTM 52908, *Additive manufacturing of metals — Finished part properties — Post-processing, inspection and testing of parts produced by powder bed fusion*

ISO/ASTM 52927, *Additive manufacturing — General principles — Main characteristics and corresponding test methods*

ISO 17295, *Additive manufacturing — General principles — Part positioning, coordinates and orientation*[1)]

ISO 80000-1, *Quantities and units — Part 1: General*

AMS 2759, *Heat Treatment of Steel Parts General Requirements*

ASTM A1080, *Standard Practice for Hot Isostatic Pressing of Steel, Stainless Steel, and Related Alloy Castings*

ASTM A473, *Standard Specification for Stainless Steel Forgings*

ASTM B243, *Standard Terminology of Powder Metallurgy*

ASTM E29, *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

ASTM E3, *Standard Guide for Preparation of Metallographic Specimens*

1) ISO 17295 cancels and replaces ISO/ASTM 52921:2013 which is still available at https://www.astm.org/f2921-13r19.html

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ASTM E407, *Standard Practice for Microetching Metals and Alloys*

ASTM E527, *Standard Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)*

ASTM F2971, *Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing*

EN 10027-1, *Designation systems for steels - Part 1: Steel names*

EN 10027-2, *Designation systems for steels - Part 2: Numerical system*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 10088-3, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

EN 10204, *Metallic products - Types of inspection documents*

AMSQQS763, *Steel Bars, Wire, Shapes, and Forgings; Corrosion Resistant*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/ASTM 52900 and ASTM B243 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 https://www.electropedia.org/

4 Main requirements

4.1 Designation and ordering

4.1.1 Designation of steel grades

The steel names and steel numbers were formed in accordance with EN 10027-1 and EN 10027-2 respectively. The UNS Number shall be in accordance with ASTM E527.

4.1.2 Designation to be used on ordering

Components shall be ordered in accordance with ISO/ASTM 52901 to a specified material condition.

The complete designation for ordering a product according to this document shall contain the following information:

— desired quantity;

— type of material (steel);

— number of this document;

— steel designation or steel number or group;

— desired condition (see symbols in Table 2);

— any additional optional tests or inspections;

— standard designation for a test report or, if required, any other type of inspection document in accordance with EN 10204.

EXAMPLE 50 AM stainless steel parts made of steel grade ISO/ASTM 52946 - 316L+U and inspection certificate 3.1 as specified in EN 10204:50 AM Stainless steel parts - ISO/ASTM 52946 - 316L+U_EN10204 – 3.1.

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