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# **Additive manufacturing — Process characteristics and performance — Practice for metal powder bed fusion processes to meet critical applications**



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AS ISO/ASTM 52904:2021

This Australian Standard ® was prepared by MB-028, Additive Manufacturing. It was approved on behalf of the Council of Standards Australia on 3 May 2021.

This Standard was published on 21 May 2021.

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This Standard was issued in draft form for comment as DR AS ISO/ASTM 52904:2021

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ISBN 978 1 76113 306 0

# Additive manufacturing — Process characteristics and performance — Practice for metal powder bed fusion process to meet critical applications

First published as AS ISO/ASTM 52904:2021.

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## Preface

This Standard was prepared by the Standards Australia Committee MB-028, Additive Manufacturing.

The objective of this document is to describe the operation and production control of metal powder bed fusion (PBF) machines and processes to meet critical applications such as commercial aerospace components and medical implants. The requirements contained herein are applicable for production components and mechanical test specimens using powder bed fusion (PBF) with both laser and electron beams.

This document is identical with, and has been reproduced from, ISO/ASTM 52904:2019, *Additive Manufacturing — Process Characteristics and Performance: Practice for Metal Powder Bed Fusion Process to Meet Critical Applications*.

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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 (see [www.iso.org/directives](http://www.iso.org/directives)).

ASTM International is one of the world's largest voluntary standards development organizations with global participation from affected stakeholders. ASTM technical committees follow rigorous due process balloting procedures.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and ASTM International 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 ASTM Committee F42, *Additive Manufacturing Technologies* (as ASTM F3303-2018), and drafted in accordance with its editorial rules. It was assigned to Technical Committee ISO/TC 261, *Additive manufacturing*, and adopted under the "fast-track procedure".

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).

# Australian Standard<sup>®</sup>

## Additive manufacturing — Process characteristics and performance — Practice for metal powder bed fusion process to meet critical applications

### 1 Scope

**1.1** This practice describes the operation and production control of metal powder bed fusion (PBF) machines and processes to meet critical applications such as commercial aerospace components and medical implants. The requirements contained herein are applicable for production components and mechanical test specimens using powder bed fusion (PBF) with both laser and electron beams.

**1.2** *This standard 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 standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

**1.3** *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 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.

ASTM E8/E8M, *Test Methods for Tension Testing of Metallic Materials*

ASTM E11, *Specification for Woven Wire Test Sieve Cloth and Test Sieves*

ASTM E2910, *Guide for Preferred Methods for Acceptance of Product*

ASTM F2924, *Specification for Additive Manufacturing Titanium-6 Aluminum-4 Vanadium with Powder Bed Fusion*

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

ASTM F3049, *Guide for Characterizing Properties of Metal Powders Used for Additive Manufacturing Processes*

ASTM F3122, *Guide for Evaluating Mechanical Properties of Metal Materials Made via Additive Manufacturing Processes*

ISO/ASTM 52900, *Standard Terminology for Additive Manufacturing — General Principles — Terminology*

ISO/ASTM 52921, *Terminology for Additive Manufacturing — Coordinate Systems and Test Methodologies*

ISO 4407, *Metallic powders — Determination of particle size by dry sieving*

ISO D6892-1, *Metallic materials — Tensile testing at ambient temperature*

ISO D6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature*

ISO 8573-1, *Compressed air — Part 1: Contaminants and purity classes*

ISO 9001, *Quality management systems — Requirements*

ISO 9044, *Industrial Woven Wire Cloth — Technical Requirements and Testing*