International Standard

ISO/ASTM 52948

Additive manufacturing of metals — Powder bed fusion — Classification of imperfections

Fabrication additive de métaux — Fusion sur lit de poudre — Classification des imperfections

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Foreword

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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, and in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 438, *Additive manufacturing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Industrial additive manufacturing (AM) with powder bed fusion (PBF) processes for metallic materials, using a laser beam (PBF-LB/M) or an electron beam (PBF-EB/M), is in full development. The principle is based on depositing layers of powder on a build platform and selectively fusing each layer with a laser or an electron beam. It is thus possible to produce parts of high geometric complexity.

The control of this process is the subject of numerous studies to attain the best possible quality. It is essential to supplement the approaches addressed by these studies with a standard describing observable imperfections to serve as a basis for non-destructive testing (NDT) and destructive testing (DT).

Knowledge of the imperfections generated by the manufacturing process and their standardised classification are preliminary and essential steps in defining and determining acceptance criteria.

Additive manufacturing of metals — Powder bed fusion — Classification of imperfections

1 Scope

This document specifies the classification of imperfections possibly generated during an additive manufacturing process by PBF-LB (laser beam powder bed fusion) or PBF-EB (electron beam powder bed fusion) for metallic parts.

This document also indicates the most probable causes of the formation of imperfections and includes illustrations.

This can be extended to other additive manufacturing process categories, nevertheless, the indication of probable causes is process specific.

Acceptance criteria and dimensional description or scale for imperfections are not included in this document.

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 version cited applies. For undated references, the latest version of the referenced document (including any amendments) applies.

ISO 3252, *Powder metallurgy — Vocabulary*

ISO/ASTM 52900, *Additive manufacturing — General principles — Fundamentals and vocabulary*

ASTM B243, *Standard Terminology of Powder Metallurgy*

3 Terms and definitions

For the purposes of this document, the terms and definitions of ISO 3252, ISO/ASTM 52900, ASTM B243 and the following apply.

ISO and IEC maintain terminology databases for use in standardisation at the following addresses:

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

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

3.1
bead
continuous line of fused metal

3.2
contour
one or a set of scan trajectories following the edges of a part on a layer

Note 1 to entry: Among scanning strategies (see 3.8), it is very common to use one or more contours, which consist of paths that follow the edges of a part on a layer.

Note 2 to entry: See Figure 1.