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Additive manufacturing — Non-destructive testing — Intentionally seeding flaws in metallic parts

Fabrication additive — Essais non destructifs — Implantation intentionnelle de défauts dans les pièces métalliques



Reference number
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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

Published in Switzerland

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

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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.

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Introduction

This document provides information for intentionally seeding flaws in additively manufactured parts and complements ISO/ASTM TR 52905¹⁾.

The different AM building descriptions can be found readily in published standards (see ISO 17296-2) and scientific papers.

Jargon commonly used in the literature describing AM metal process defects includes “balling”, “fireworks”, “smoke” and often are not specific to the morphology of the defect and often result from widely differing mechanisms of formation.

When defining terms specific to AM metal flaws it may be useful to review some examples related to welding technology.

This document is for the creation of seeded replicas supports the user’s understanding not only for the characterization of actual flaws with respect to physical morphology but also for the materials and mechanisms of formation, location, and orientation. In addition, the fundamentals of the processes creating the replica (e.g. PBF or DED with regard to the heat sources electron beam (EB), laser beam (LB) or AP (arc processes) also need to be considered). The intentional seeding to produce flaw replicas can match the character of the actual flaw as closely as possible.

The reference photomicrographs or non-destructive testing images included in this document are in no way to be construed as specifications. These reference photomicrographs and non-destructive testing images are offered primarily to permit examples of “flaws” or replicate images thereof. They can be used for comparison of reports. Flaw seeding will be discussed without context to a specific part, location, or dimension. The material alloy will be provided as known. With some flaws the material alloy may not be as important, for example, a pore may reside in any number of alloys. It can be noted that there is currently no proven method for controlled and replicable seeding of intimate disbonds (sometimes known as “kissing bonds”) – where two surfaces are in intimate or close contact, but with compromised adhesion – in AM parts so this feature is, therefore, currently out of scope.

This document will not go into the fundamentals of each process but rather identify the parameters within each process that can lead to the intentional seeding of AM structures.

1) In preparation. Stage at the time of publication ISO/ASTM DTR 52905:2022.