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TNI	**Aditívna výroba Nedeštruktívne skúšanie Zámerné rozosiatie chýb v kovových častiach (ISO/ASTM/TR 52906: 2022)**	**TNI CEN ISO/ASTM/ TR 52906** 18 8512

Additive manufacturing - Non-destructive testing - Intentionally seeding flaws in metallic parts (ISO/ASTM/TR 52906:2022)

Táto technická normalizačná informácia obsahuje anglickú verziu CEN ISO/ASTM/TR 52906:2022, ISO/ASTM TR 52906:2022.
This Technical standard information includes the English version of CEN ISO/ASTM/TR 52906:2022, ISO/ASTM TR 52906:2022.

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CEN ISO/ASTM/TR 52906

May 2022

ICS

English Version

Additive manufacturing - Non-destructive testing - Intentionally seeding flaws in metallic parts (ISO/ASTM/TR 52906:2022)

Fabrication additive - Essais non destructifs - Implantation intentionnelle de défauts dans les pièces métalliques (ISO/ASTM/TR 52906:2022)

Additive Fertigung - Zerstörungsfreie Prüfung und Bewertung - Bewusstes Einbringen von Fehlern in Bauteilen (ISO/ASTM/TR 52906:2022)

This Technical Report was approved by CEN on 28 April 2022. It has been drawn up by the Technical Committee CEN/TC 438.

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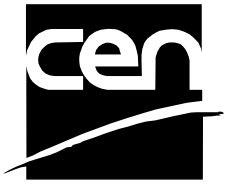

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European foreword

This document (CEN ISO/ASTM/TR 52906:2022) has been prepared by Technical Committee ISO/TC 261 "Additive manufacturing" in collaboration with Technical Committee CEN/TC 438 “Additive Manufacturing” the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO/ASTM TR 52906:2022 has been approved by CEN as CEN ISO/ASTM/TR 52906:2022 without any modification.

TECHNICAL REPORT

ISO/ASTM TR 52906

First edition
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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

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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 can be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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.

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

This document provides information for intentionally seeding flaws in additively manufactured parts and complements ISO/ASTM TR 52905[1)].

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.

TECHNICAL REPORT **ISO/ASTM TR 52906:2022(E)**

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

1 Scope

This document is intended to serve as a best practice for the identification and "seeding" of nondestructively detectable flaw replicas of metal alloy PBF and DED processes. Three seeding categories are described:

a) process flaws through CAD design;

b) build parameter manipulation;

c) subtractive manufacturing.

These include flaws present within as-deposited materials, post heat-treated or HIP processed material, and those flaws made detectable because of post-processing operations. Geometrical aspects or measurement are not the subjects of this document.

WARNING — 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 and health 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, *Standard Terminology for Additive Manufacturing — General Principles —Terminology*

ASTM B243, *Standard Terminology of Powder Metallurgy*

ASTM E7, *Standard Terminology Relating to Metallography*

ASTM E1316, *Standard Terminology for Nondestructive Examinations*