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GB/T 44524-2024

Additive manufacturing - Porosity of metal parts - Industrial computed tomography (CT) testing method

增材制造 金属制件孔隙率 工业计算机层析成像（CT）检测方法

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Table of Contents

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Additive Manufacturing Standardization Technical Committee (SAC/TC562). This document was drafted by: Wuxi Inspection, Testing and Certification Institute, AVIC Matt Additive Technology (Beijing) Co., Ltd., State-owned Wuhu Machinery Factory, Beijing Yuding Additive Manufacturing Research Institute Co., Ltd., Zhejiang Flashcast Group Co., Ltd., Nanjing University of Aeronautics and Astronautics Wuxi Research Institute, AVIC Commercial Aircraft Engine Co., Ltd., China Machinery Research Institute of Standards and Technology (Beijing) Co., Ltd., Nanjing University of Aeronautics and Astronautics, Beijing Power Machinery Research Institute, China Nuclear Power Research Institute, Taihang National Laboratory, China Food and Drug Inspection Institute, China Classification Society, Jiangsu Mingya Technology Co., Ltd., and Beijing Chunlizhengda Medical Equipment Co., Ltd. The main drafters of this document are. Gao Yintao, Bao Jun, Gao Zhengjiang, Ci Shiwei, Qian Tingting, Qu Yuhui, Hu Juan, Shen Lida, Lei Liming, Song Yanyan, Xue Lian, Yan Lei, Xie Deqiao, Zhang Hong, Hu Yu, Shi Lei, Wang Jian, Zhou Hansen, Li Yucheng, Liu Yisheng, Xu Kuixue. Porosity of Additively Manufactured Metal Parts Industrial Computer Tomography (CT) Inspection Methods

1 Scope

GB/T 44524-2024 gives the industrial CT method for measuring porosity in additively manufactured metal parts. Porosity is the characteristic defect of powder bed fusion - lack of fusion between tracks, gas trapped from the powder, keyhole collapse - and it is what limits the fatigue life of a printed part, so the qualification of an AM process is largely an argument about pore population. CT is the only method that finds internal pores in a finished part without cutting it, but the number it reports depends on the voxel size, the beam energy, the reconstruction and the threshold chosen, which is what the standard exists to pin down. It sets the testing agreement between the parties, the general requirements on personnel and environment, the system requirements covering the CT system, the detector and the computer, the system maintenance, the test preparation including fixtures, comparison samples and the parts themselves, then the scanning, the reconstruction, the evaluation of porosity and the test report. It took effect on 29 September 2024.

This document describes the conventions, general requirements, and system requirements

for industrial computed tomography (CT) testing of porosity in additively manufactured metal parts. Requirements, system maintenance, test preparation, testing, image reconstruction, processing and analysis, determination and representation of pore parameters and test records and reports, etc. This document is applicable to industrial CT detection of porosity of additively manufactured metal parts and reference for detection of porosity of additively manufactured non-metallic parts. use.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 9445 Qualification and certification of non-destructive testing personnel

GB/T 12604.12-2021 Nondestructive testing terminology Part

3 Terms and definitions

The terms and definitions defined in GB/T 12604.12-2021 and the following apply to this document.

3.1 Density resolution densityresolution The ability of CT images to resolve differences in linear attenuation coefficients. [Source: GB/T 12604.12-2021, 3.21]

3.2 Spatial resolution A measure of the ability of a CT system to identify and distinguish geometric details of an object being measured. [Source: GB/T 12604.12-2021, 3.43]

3.3 pore A discontinuity having a density lower than that of the bulk material.

Note. Usually includes pores, lack of fusion, voids and cracks.

12 Industrial X-ray computed tomography testing

GB 18871 Basic Standard for Ionizing Radiation Protection and Radiation Source Safety

GB/T 29068 Selection Guide for Industrial Computer Tomography (CT) Systems for Nondestructive Testing

GB/T 29069 Non-destructive testing industrial computer tomography (CT) system performance test method

GB/T 29070 General requirements for industrial non-destructive testing - Computerized tomography (CT) testing GBZ

98 Health requirements and monitoring standards for radiation workers