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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 43921-2024

**Non-destructive testing - Ultrasonic testing - Full matrix
capture/total focusing technique (FMC/TFM)**

无损检测 超声检测 全矩阵采集/全聚焦技术 (FMC/TFM)

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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: This document is equivalent to ISO 23865:2021 "Non-destructive testing - Ultrasonic testing - Full matrix acquisition/full focusing technology (FMC/T FM) and the overall application of related technologies: 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 is proposed and coordinated by the National Technical Committee for Standardization of Nondestructive Testing (SAC/TC56): This document was drafted by: Shanghai Institute of Materials Co., Ltd.; Wuhan Zhongke Innovation Technology Co., Ltd.; Shanghai Lanya Machinery Industry Petrochemical Equipment Testing Institute Co., Ltd.; Ningbo Special Equipment Inspection Institute, Hydraulic Metal Structure Quality Inspection and Testing Center of the Ministry of Water Resources, Guangzhou Duopule Electronic Technology Co., Ltd.; Wuhan University, Guangdong Shantou Ultrasonic Electronics Co., Ltd: Ultrasonic Instrument Branch, Beijing Xinlian China Railway Group Co., Ltd.; Changsha University of Science and Technology, Zhejiang Youerte Testing Technology Co., Ltd.; Shanghai Nuclear Power Office, East China University of Science and Technology University: The main drafters of this document are: Zhang Yifeng, Lin Guanghui, Li Jun, Wang Du, Jiang Jiansheng, Li Dongfeng, Luo Qi,

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1 Scope

GB/T 43921-2024 is the general Chinese standard for ultrasonic testing by full matrix capture and the total focusing method, the technique that has changed advanced ultrasonic inspection over the last decade. In full matrix capture the instrument records the signal from every transmitter-receiver element pair in the array, keeping the complete dataset rather than a beam-formed image; total focusing then reconstructs that dataset focused at every pixel, and because the raw matrix is retained the same data can be reprocessed along different imaging paths, direct, half-skip and full-skip, to see a flaw that one path would miss. The standard sets the technical principles, the surface condition and coupling requirements, the information required before testing, the requirements on testing personnel and on the testing equipment, the advantages and the use of the multiple imaging paths, and then the performance verification, the setting of the reconstruction grid and sensitivity, the detection and sizing of indications, and the reporting. It is the parent document to which the weld-specific TFM standard refers. It took effect on 25 April 2024.

This document specifies general principles for array ultrasonic testing using full matrix acquisition/total focusing techniques (FMC/TFM) and related technologies: Promoting FMC/T FM technology for better use in manufacturing process inspection, in-service inspection or post-repair inspection: This document presents application examples for qualitative and quantitative assessment of damage: This document applies to isotropic and homogeneous low carbon alloy steels, conventional aerospace grade aluminum alloys and titanium alloys: Austenite) also gives suggestions: This document does not give discrete levels of acceptance: For the application of FMC/T FM for testing welds, see ISO 23864:

2 Normative references

The contents of the following documents constitute the 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:

ISO 5577 Non-destructive testing - Ultrasonic testing - Vocabulary

GB/T 12604.1-2020 Non-destructive testing terminology Ultrasonic testing (

ISO 5577:2017, MOD) tion of NDT personnel)

GB/T 9445-2015 Qualification and certification of non-destructive testing personnel (ISO

9712:2012, IDT)

ISO 16810 Non-destructive testing-Ultrasonic testing-General principles

GB/T 39240-2020 Non-destructive testing - General principles for ultrasonic testing (ISO 16810:2012, MOD) ISO 18563-

1 Performance and verification of phased array ultrasonic equipment for non-destructive testing Part 1: Instruments

GB/T 42399:1-2023 Nondestructive testing instruments Performance and verification of phased array ultrasonic equipment Part 1: Instruments (ISO 18563-1: 2022, IDT) ISO 18563-

2 Performance and verification of phased array ultrasonic equipment for non-destructive testing Part 2: Probes

GB/T 42399:2-2023 Performance and inspection of phased array ultrasonic equipment for nondestructive testing Part 2: Probes (

ISO 18563-2: 2017, IDT) arrays-Vocabulary)

GB/T 12604:13-2023 Non-destructive testing terminology Part 13: Array ultrasonic testing (ISO 23243:2020, IDT)

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in ISO 5577, ISO 23243 and the following apply: