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**Low frequency electromagnetic testing method for pressure
equipment**

承压设备低频电磁检测方法

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Table of Contents

1 Scope ...	1
2 Normative references ...	1
3 Terms and Definitions ...	1
4 Method Overview ...	1
5 Personnel Qualifications ...	2
6 Low frequency electromagnetic detection instruments ...	2
7 Low frequency electromagnetic testing procedures ...	7
8 Evaluation and processing of test results ...	9
11 Appendix B (Informative) Test Records and Reports ...	13

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 is proposed and coordinated by the National Technical Committee for Standardization of Boilers and Pressure Vessels (SAC/TC 262). This document was drafted by: China Special Equipment Testing and Research Institute, Beijing University of Technology, Chongqing Special Equipment Testing and Research Institute, Nanjing Boiler and Pressure Vessel Inspection Institute, Chengdu Special Equipment Inspection and Testing Institute, Yunnan Special Equipment Safety Inspection Institute, Guizhou Province Special Equipment Inspection and Testing Institute, Guangdong Special Equipment Inspection and Research Institute Maoming Inspection Institute, Suzhou Thermal Engineering Research Institute Co., Ltd., Jiangxi Provincial Inspection Special Equipment Inspection and Testing Institute of the General Institute of Testing and Certification. The main drafters of this document are. Li Guanghai, Lu Xinyuan, Jiao Jingpin, Shao Shanshan, Chen Jie, Zhang Binbin, Peng Gang, Yuan Kun, Luo Xiong, Shi Fangjie, Shen Shuqian, Yu Yongliang, Zhao Jingyong, Zhao Peng, Nie Yin, Zhang Wei, Tang Xinwen, Guo Jingqian, and Zhang Qi. Low frequency electromagnetic detection method for pressure equipment

1 Scope

China's national low frequency electromagnetic testing method for pressure equipment. The

technique addresses a problem that conventional electromagnetic inspection cannot: finding wall loss in ferromagnetic steel through a coating or insulation, without removing it. Ordinary eddy current testing is confined to the surface by the skin effect and is defeated by a ferromagnetic material's permeability; low frequency electromagnetic methods penetrate the full wall thickness because the depth of penetration rises as frequency falls, and they respond to the total volume of steel in the field rather than to a surface condition. The trade is resolution - the method gives an average wall thickness over an area rather than a point measurement - which suits exactly the inspection it is used for: screening vessels, tanks and pipes for corrosion under insulation and for general wall loss, where the object is to find the thin areas rather than to measure any one of them precisely.

This document specifies the requirements for testing instruments, testing procedures and result evaluation methods for low-frequency electromagnetic testing of pressure-bearing equipment. This document is applicable to low-frequency electromagnetic inspection of surface and buried defects of pressure-bearing equipment made of conductive metal materials with a wall thickness of 2 mm to 20 mm. The maximum lift-off height including coating thickness during testing shall not exceed 3 mm.

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. in this document.

GB/T 5616 Nondestructive Testing Application Guidelines

GB/T 12604.6 Nondestructive testing terminology Eddy current testing NB/T 47013 (all parts) Nondestructive testing of pressure equipment

3 Terms and definitions

The terms and definitions defined in NB/T 47013.1, GB/T 12604.6 and the following apply to this document.

3.1 low frequency electromagnetic excitation frequency low frequency electromagnetic excitation frequency Nominal frequency of low frequency electromagnetic field excitation current.

3.2 low frequency electromagnetic field The eddy current generated on the surface and inside of the object being tested is excited by low-frequency AC current with an excitation frequency generally not higher than 300 Hz. The coupling field of the leakage magnetic field.

3.3 Defect equivalent The defect value is given according to the obtained signal characteristics.

3.4 Orthogonal scan Scanning in directions perpendicular to each other.

4 Method Overview

4.1 The basic principle of low-frequency electromagnetic detection method is shown in Figure

1. The coil with low-frequency alternating current excites low-frequency electromagnetic radiation on the surface and inside of the object being detected. The low-frequency electromagnetic field will be distorted at the defect. The detection element picks up the signal change of the low-frequency electromagnetic field and performs Analyze and process to realize the detection of surface, near-surface and buried defects of the inspected object.