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

GB/T 34644-2017

**Eddy current testing method for zirconium and zirconium alloy
tubes**

锆及锆合金管材涡流检测方法

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by China Nonferrous Metals Industry Association. This standard by the National Non-ferrous Metal Standardization Technical Committee (SAC/TC243) centralized. This standard was drafted unit. Nuclear Bao Zirconium Industry Co., Ltd., Bao Titanium Group Co., Ltd., Western Metal Co., Ltd., the new zirconium core Materials Science and Technology Co., Ltd., non-ferrous metal technology and Economy Institute. The main drafters of this standard. Li Heng Yu, Lu Hui, Ma Xiaohuai, Li Xiaoning, Yu Haihui, Feng Hui, Wang Chenyang, Yang Junhong, Ling Haijun, Zhangjiang Feng. Eddy current testing of zirconium and zirconium alloy pipes

1 Scope

China's national method for eddy current testing of zirconium and zirconium alloy tube. It specifies the method and applies to tube of 5 to 16 mm outside diameter, with other sizes able to refer to it. That diameter range is not arbitrary - it is the size of nuclear fuel cladding. Zirconium alloy is the cladding material for water-cooled reactors because it is nearly transparent to neutrons, which is a property no other structural metal offers, and the tube it is drawn into is the first barrier between the fuel and the coolant. Every one of the hundreds of thousands of tubes in a reactor core is inspected over its whole length before it is loaded, and eddy current testing is how: a coil excites currents in the tube wall and reads the field they produce back, and a crack, an inclusion or a wall thinning disturbs that field. It is fast, it needs no couplant, and it can be run inline at production speed, which for a component made in these quantities is what makes hundred per cent inspection possible at all.

This standard specifies the zirconium and zirconium alloy pipe eddy current testing methods. This standard applies to the outer diameter 5mm ~ 16mm zirconium and zirconium alloy tube eddy current testing, other specifications of zirconium and zirconium alloy pipe can refer to use.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 9445 non-destructive testing personnel qualification and certification

3 Detection principle

Eddy current testing is the use of electromagnetic induction in the conductive specimen surface and near the surface of the eddy current to detect the existence of defects in the specimen method. Zirconium and zirconium alloy pipe, the general adoption of the detection method through the probe can be used single or multi-frequency detection. If necessary, can also be used to put Set the detection method of the probe, placing the probe test, the probe pipe relative to the helical scan to ensure that the seized pipe 100% testing.

4 General requirements

4.1 staff Personnel engaged in eddy current testing should be issued by the competent authorities in line with GB/T 9445 or other certification requirements of the qualification certificate book. People at all levels can only work in line with the qualifications of certificates.

4.2 pipe The inner and outer surfaces of the pipe to be inspected shall be clean and free from fouling, grease, metal debris and other foreign substances which may hinder the test, glitch. The pipe cleaning methods and surface preparation before testing, should not damage the pipe surface. Pipe straightness and dimensional tolerance should be Meet the technical requirements.

4.3 Environment The testing environment should be clean and there should be no magnetic field, vibration, dust, corrosive gas and other interference that may affect the normal operation of the equipment.

4.4 equipment identification Equipment should be based on the use of periodic identification.

5 Comparative sample

5.1 Comparative samples are processed with artificial defects of the pipe, used to debug and calibration testing equipment and to judge whether the natural defects meet the standards