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

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**Metallic materials - Residual stress - Ultrasonic impact
treatment method**

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by China Iron and Steel Industry Association. This standard is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183). The drafting of this standard unit. Tianjin University, Wuhan Iron and Steel (Group) Company. The main drafters of this standard. Wang Dongpo, Wu Liangchen, Li Rongfeng, Liu Yongchang, Li Ganhong, Zhang Hai.

Ultrasonic impact treatment is a kind of needle impact to eliminate the residual stress method, it is the ultrasonic generator as the excitation source, through the piezoelectric ceramic Porcelain or magnetostrictive way to convert the ultrasonic power supply into ultrasonic vibration, vibration from the impact needle to the metal surface, in the metal surface and sub-table Surface plastic deformation, and refine the grain, to eliminate the residual stress purposes. Ultrasonic impact treatment is suitable for a variety of engineering components to eliminate stress requirements, especially for the structure of complex steel structure, aluminum alloy structure to And structural parts made of dissimilar welded joints or other metallic materials. In order to improve the structure of the anti-fatigue performance, generally only for the toe using ultrasonic impact treatment; such as in order to improve the structure of the stress corrosion Performance, the need for welding joints or designated areas using ultrasonic impact full coverage. Metal material residual stress ultrasonic impact treatment method

1 Scope

China's national standard for relieving residual stress in metals by ultrasonic impact treatment. It specifies the terms and definitions, the symbols, the principle, the treatment method, the evaluation of the treatment effect and the test report, with informative annexes on typical ultrasonic impact equipment, on process quality control and on the precautions and safety measures the work requires. Ultrasonic impact treatment is peening done with an ultrasonic transducer. An ultrasonic generator drives a piezoelectric or magnetostrictive converter, the vibration is transmitted to hardened needles, and the needles strike the metal

surface thousands of times a second, deforming the surface and subsurface plastically, refining the grain and replacing tensile residual stress with compressive. Its main use is on welds. A welded joint cools with tensile residual stress locked into it, and the weld toe - the line where the weld metal meets the parent plate - concentrates that stress at exactly the geometric notch where a fatigue crack wants to start. Treating the toe both removes the tensile stress and reshapes the notch, and the improvement in fatigue life is large enough that it is now a routine measure on bridges, cranes and offshore structures. The standard distinguishes two applications: toe treatment alone where the aim is fatigue strength, and full coverage of the joint or a designated area where the aim is resistance to stress corrosion. It applies to steel structures, aluminium structures and dissimilar welded joints. Issued on 13 October 2016 and in force since 1 September 2017.

This standard specifies the use of ultrasonic impact treatment to eliminate the residual stress of metal materials, terms and definitions, symbols and instructions, principles, methods And the evaluation of the effect. This standard applies to the thickness of the material is greater than 4mm, the yield strength of not more than 900MPa, after the elongation of more than 5% of the metal components Ultrasonic impact elimination residual stress treatment.

2 Normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article Pieces. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 7704 Non - destructive testing - Determination of radiometric stress Metallic materials - Determination of residual stress - Indentation strain method GB/T Metallic materials - Determination of residual stresses - Borehole strain method GB/T

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Ultrasonic shock treatment The use of ultrasonic impact equipment on the metal material according to certain parameters to eliminate residual stress processing technology.

3.2 Ultrasonic impact gun ultrasonicimpactgun A device that performs an ultrasonic impact process.

3.3 Impact needle impactneedle A needle that transmits ultrasonic vibration to a metal surface.

4 Symbols and instructions

The symbols and descriptions used in this standard are shown in Table 1. Table 1 symbols

and descriptions Symbol Unit Description a μm The amplitude of the output waveform of the ultrasonic transducer d mm impact needle diameter l mm impact needle length

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