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

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Steel cross wedge rollings - General specification

钢质楔横轧件 通用技术条件

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Foreword

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA ICS

Steel cross wedge rollings - General specification

1 Scope

China's national general specification for steel cross wedge rolled parts. It specifies the technical requirements, the test methods, the inspection rules and the delivery conditions for these parts, and it applies to hot rolled steel parts produced on cross wedge rolling mills. Cross wedge rolling is a forming process that few outside the industry have heard of and that makes a very large number of the parts in a vehicle. A heated steel bar is fed between two rolls carrying wedge-shaped dies; the rolls turn, the bar rotates between them, and the wedges plunge in and travel axially, displacing metal sideways and reducing the diameter over the length they sweep. The result is a stepped shaft - larger at some diameters, smaller at others - formed in a single revolution of the rolls, in a second or two, with no flash and almost no material lost. That makes it the process of choice for axle shafts, camshaft blanks, gearbox shafts, ball pins and the many other stepped round parts that a vehicle contains. Its advantages over the alternatives are direct: against machining from bar it saves the material that would have become swarf, which for a shaft with a large diameter step is most of it; against die forging it needs no flash land and produces no flash to be trimmed. Its characteristic defect is equally specific and it is what the standard's inspection

requirements exist for: under certain combinations of reduction and wedge geometry the material at the centre of the bar is subjected to alternating tension and can open into an internal cavity along the axis - the Mannesmann effect - which is invisible from outside. Issued on 10 December 2015 and in force since 1 July 2016.

This Standard specifies the technical requirements, test methods, inspection rules and delivery conditions of the steel cross wedge rollings. This Standard is applicable to the hot-rolled steel parts produced on the cross wedge rolling mills.

2 Normative references

The following documents are essential to the application of this document. For dated references, only the editions with the dates indicated are applicable to this document. For undated references, only the latest editions (including all the amendments) are applicable to this document.

GB/T 226 Test method for macrostructure and defect of steel by etching

GB/T 231.1 Metallic materials - Brinell hardness test - Part 1: Test method

GB/T 699 Quality carbon structural steels

GB/T 700 Carbon structural steels

GB/T 702-2008 Hot-rolled steel bars - Dimensions, shape, weight and tolerance

GB/T 1979 Grading diagrams for macrostructure and defect of structural steels

GB/T 3077 Alloy structure steels

GB/T 4162 Forged and rolled steel bars - Method for ultrasonic testing

GB/T 5216 Structural steels with specified hardenability bands

GB/T 6394 Metal-methods for estimating the average grain size

GB/T 10561-2005 Steel - Determination of content of nonmetallic inclusions - Micrographic method using standards diagrams

3.2.8 Besides the requirements of Sections

3.2.1 to 3.2.7, the steels in use can also be determined after consultation between supplier and demander.

3.3.1 Surface defects

3.3.1.1 The depths of the surface defects on the cross wedge rollings shall not exceed 1/3 of the actual machining allowance. However, the creases and cracks on the non-machined surfaces shall be cleaned away. The surfaces to be cleaned shall be conducted with smooth

transition. The grinding width shall not be less than 6 times the depth. The length shall be 3mm above the defect length at both ends. The grinding depth shall not exceed 1/3 of the actual deviation.

3.3.1.2 The flaw detection of the surface cracks shall be conducted according to GB/T 15822.

3.3.2.1 The ultrasonic flaw detection can be conducted according to

GB/T 4162. The quality level shall be greater than or equal to Level B.

3.3.2.2 There shall be no over-burning, macroscopic cracks and visible holes.

3.3.2.3 The center porosity shall be less than or equal to Level 3, and shall be evaluated according to GB/T 1979.

3.3.3 Heat treatment

3.3.3.1 General requirements Heat treatment shall be carried out as required by the customer. The delivery statuses of the heat treatment are as follows:

- b) isothermal normalizing;
- c) control cooling;
- d) no heat treatment.

3.3.3.2 Hardness The hardness shall be in accordance with JB/T 11761. If not specified in

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