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

HS/T 63-2019

**Orientation distinguishing of flat-rolled products of
silicon-electrical steel
(English Translation)**

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009, HS/T 1-2011 and HS/T 39-2013.

Appendix A and Appendix B of this standard are informative appendices.

This standard was proposed by the Customs Administration Department of the General Administration of Customs of the People's Republic of China.

This standard is under the jurisdiction of the Department of Policies and Regulations of the General Administration of Customs of the People's Republic of China.

This standard was drafted. Guangzhou Customs, People's Republic of China.

1 Scope

This standard specifies the inspection procedures and result judgments for the identification of the orientation of flat rolled products of silicon electric steel.

This standard is applicable to the qualitative analysis of the orientation of flat rolled products of silicon electric steel.

2 Normative references

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

GB/T 6682 Analytical laboratory water specifications and test methods JY/T 009 General rule of X-ray diffraction method

3 Terms and definitions

The following terms and definitions apply to this standard.

Silicon-electrical steel it refers to alloy steels with a silicon content of at least 0.6% but not more than 6% and a carbon content of not more than 0.08% by weight.

Non-oriented silicon-electrical steel it refers to silicon electric steel with certain electromagnetic properties, and the crystal structure does not have the magnetization characteristics of a specific direction. Micro of non-oriented silicon electric steel Obviously, the grain arrangement is non-directional, and it shows that the electromagnetic performance in all directions is more uniform.

Grain-oriented silicon-electrical steel it refers to silicon electric steel with a certain regularity and direction in the crystal structure of the steel plate. Generally refers to the non-oriented silicon electric steel, the hot-rolled, cold-rolled, and hot-worked processes obtain a single-oriented silicon electric steel with a Gaussian texture with grain orientation concentrated in the direction of easy magnetization.

4 Principle

X-ray diffractometer was used to analyze the crystal structure of the silicon electric steel sample. According to the diffraction peak intensity of the sample on the (110), (200), (211) crystal plane Distribution to determine whether the silicon electric steel sample has orientation.

5 Reagents and materials

Unless otherwise specified, the water used in this standard is Grade III water specified in GB/T 6682.

5.1

Hydrochloric acid. HCl content 36% to 38%, analytically pure.

6 Equipment

6.1

X-ray diffractometer. Cu target light tube, Ni filter.

6.2

Beaker. 150 mL.

7.1 Sample preparation

Take a silicon electric steel sample and process it into a 35 mm x 25 mm sheet (with the long side as the rolling direction), put it into a 150 mL beaker, and use about 25 mL Hydrochloric acid was immersed until the surface coating was removed, washed with water several times, and wiped dry.

7.2 Analysis conditions

Refer to Appendix A for recommended test conditions, or refer to JY/T 009 to select appropriate analysis conditions.

7.3 Sample measurement

The prepared sample is placed on the sample stand of the X-ray diffractometer, and the sample is scanned and tested according to the set conditions along the rolling direction.

8 Result judgment

Compared with Appendix B, according to the sample X-ray diffractometer test results, (110) (corresponding to 2theta angle is about 45 °), (200) (corresponding to 2theta the diffraction peak intensity distribution of the crystal plane at an angle of approximately 65 °) and (211) (corresponding to an angle of 2theta of approximately 82 °).

For orientation, samples with similar characteristics to Figure B.2 were judged as non-oriented.

Appendix A

(Informative appendix) X-ray diffractometer test parameter settings

Table A.1 X-ray diffractometer test parameter settings

Set item detection conditions Tube voltage/kV 40 Tube current/mA 30 Detector ordinary detector or array detector Goniometer parameter setting (When using an array detector) Initial angle [o2theta] 30 Ending angle [o2theta] 95 Step size [o2theta] 0.026 Scan time per step [s] 20 Appendix B (Informative appendix) Typical X-ray diffraction patterns of oriented and non-oriented silicon electrical steel

Figure B.1 Typical X-ray diffraction pattern of oriented silicon electrical steel

Figure B.2 Typical X-ray diffraction pattern of non-oriented silicon electrical steel