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# GB

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## GB/T 34215-2017

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**Cold-rolled non-oriented electrical steel strip (sheet)  
for electric vehicle driving motor**

电动汽车驱动电机用冷轧无取向

电工钢带（片）

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# Cold-rolled non-oriented electrical steel strip (sheet) for electric vehicle driving motor

## 1 Scope

This Standard specifies the terms and definitions, symbols and designations, general requirements, technical requirements, inspection and test, re-inspection and criteria, packaging, marking, quality certificate, and ordering content of cold-rolled non-oriented electrical steel strip (sheet).

This Standard applies to non-oriented electrical steel strip (sheet) of nominal thicknesses 0.20 mm, 0.27 mm, 0.30 mm and 0.35 mm for electric vehicle driving motor [hereinafter referred to as “steel strip (sheet)”].

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to This Standard.

GB/T 228.1-2010, *Metallic materials - Tensile testing - Part 1 : Method of test at room temperature*

GB/T 228.2-2015, *Metallic materials – Tensile testing – Part 2: Method of test at elevated temperature*

GB/T 247, *General rules for packaging, marking and certification of steel plates (sheets) and strips*

GB/T 2521.1-2016, *Cold-rolled electrical steel delivered in the fully-processed state – Part 1: Grain non-oriented steel strip (sheet)*

GB/T 2522, *Methods of test for the determination of coating insulation resistance and coating adhesion of electrical strip and sheet*

GB/T 2900.60, *Electrotechnical terminology - Electromagnetism*

GB/T 3655, *Methods of measurement of the magnetic properties of electrical steel sheet and strip by means of an Epstein frame*

GB/T 9637, *Electrotechnical terminology - Magnetic materials and components*

Waviness shall be measured for steel strip (sheet) of width greater than 100 mm, which shall not exceed 2.0%.

### **6.2.5 Residual curvature**

If it is required by the purchaser and stated in the contract, residual curvature can be measured for steel strip (sheet) of width greater than 100 mm; the distance from the bottom side of steel sheet tested and support plate shall not be greater than 35 mm.

### **6.2.6 Burr height**

The trimmed burr height of trimmed steel strip (sheet) shall not exceed 0.035 mm.

## **6.3 Technical characteristics**

### **6.3.1 Density**

Unless agreed otherwise, the conventional density for the calculation of magnetic properties and lamination factors shall be as specified in Table 2.

### **6.3.2 Lamination factor**

The minimum lamination factor of steel strip (sheet) shall be as specified in Table 2. In case of any dispute, lamination factor only applies to the uncoated condition.

### **6.3.3 Number of bends**

The minimum number of bends perpendicular to the rolling direction of steel strip (sheet) shall be as specified in Table 5.

### **6.3.4 Deviation of trimmed edge caused by internal stress**

Internal stress shall be reduced as much as possible for steel strip (sheet). When it is required by the purchaser and stated in the contract, the steel strip (sheet) of width greater than 150 mm shall be subjected to the test for the deviation of trimmed edge caused by internal stress; its measured value of crack shall not be greater than 2 mm.

### **6.3.5 Coating insulation resistance**

As required by the purchaser and agreed on by both sides, carry out test for coating insulation resistance and indicate in the contract the minimum value of coating surface insulation resistance and interlamination resistance.

NOTE: Coating insulation resistance includes surface insulation resistance and interlamination resistance.

### **6.3.6 Mechanical properties and technological properties**

**7.2.3.3** The samples for testing burr height are prepared from the delivered steel strip (sheet). The recommended sample length is not less than 500 mm.

## **7.2.4 Technical characteristics**

### **7.2.4.1 Lamination factor**

The samples for testing the lamination factor of steel strip (sheet) shall be those of the same dimensions, which can be laminated to at least 6 mm high. In case of any dispute, the samples shall comprise 100 pieces. The minimum width of the samples is 20 mm and the minimum surface area is 5,000 mm<sup>2</sup>. The tolerances for the width and length of the samples are respectively  $\pm 0.2$  mm and  $\pm 0.5$  mm. The samples shall be free from visible burr before testing.

### **7.2.4.2 Number of bends**

The samples for testing the number of bends of steel strip (sheet) shall be as specified in Annex A to GB/T 2521.1-2016.

### **7.2.4.3 Deviation of trimmed edge causes by internal stress**

The sample for testing the deviation of trimmed edge caused by internal stress is a steel strip (sheet) 1,000 mm long.

### **7.2.4.4 Coating insulation resistance**

The samples for testing coating insulation resistance of steel strip (sheet) shall be as specified in GB/T 2522.

### **7.2.4.5 Mechanical properties**

The use of the samples with head of type sample number P 14 as specified in GB/T 228.1-2010, is recommended for testing mechanical properties at room temperature and high temperature; the parallel length shall not be less than 60 mm. If applicable, other types of samples can also be used. The samples are prepared parallel to the rolling direction. The requirements for preparing room-temperature and high-temperature samples shall be respectively as specified in GB/T 228.1-2010 and GB/T 228.2-2015.

## **7.3 Test methods**

For each characteristic specified, each acceptance batch shall be tested. Unless specified otherwise, test shall be carried out at  $(23 \pm 5)^{\circ}\text{C}$ .

### **7.3.1 Magnetic characteristics**

The test for magnetic characteristics at room temperature of steel strip (sheet) shall be carried out using the test method specified in GB/T 3655. The magnetic characteristics test at 150°C shall be carried out as specified in Annex B.

### **7.3.3.5 Mechanical properties**

**7.3.3.5.1** The room-temperature mechanical properties of steel strip (sheet) shall be tested using Method B of GB/T 228.1-2010. Use the beam displacement control method, with the velocity in the yield stage  $0.000\ 83\ \text{s}^{-1}$  and the velocity after yield  $0.006\ 7\ \text{s}^{-1}$ .

**7.3.3.5.2** The high-temperature mechanical properties of steel strip (sheet) shall be tested using Method B of GB/T 228.2-2015. Use the beam displacement control method, with the velocity in the yield stage  $0.000\ 067\ \text{s}^{-1}$  and the velocity after yield  $0.000\ 83\ \text{s}^{-1}$ .

## **8 Re-inspection and criteria**

The re-inspection and criteria of steel strip (sheet) shall be as specified in GB/T 17505.

## **9 Packaging, marking and quality certificate**

The packaging, marking and quality certification of steel strip (sheet) shall be as specified in GB/T 247.

## **10 Ordering content**

The purchase contract or order based on this Standard shall include the following content:

- a) reference to this Standard;
- b) designation;
- c) product name;
- d) quantity;
- e) dimensions of steel strip (sheet);
- f) limit on steel roll weight;
- g) other special requirements.

## Annex B

(Normative)

### Method for measuring the magnetic properties of electrical steel strip (sheet) using an Epstein Frame at 30°C ~ 200°C

#### B.1 Scope

This method specifies the requirements for testing the magnetic properties of electrical steel strip (sheet) using an Epstein Frame at 30°C ~ 200°C.

#### B.2 Test apparatus

##### B.2.1 Epstein Frame

A 25 cm Epstein Frame shall be designed to meet the requirements for continuous operation at high temperature (normally 150°C); relevant supporting and insulation materials shall have good high temperature resistant properties ( $\geq 200^\circ\text{C}$ ).

##### B.2.2 Heating apparatus

**B.2.2.1** The heating apparatus shall be capable of heating the whole Epstein Frame containing samples to the specified temperature.

**B.2.2.2** The effective space of the heating zone of the heating apparatus shall not be less than 400 mm long, 400 mm wide and 300 mm high; the maximum allowable deviation between the specified temperature and the indicating temperature of the heating apparatus is 2°C; the temperature gradient along the sample axis direction of the corresponding temperature uniformity zone of samples shall not be greater than 2°C.

##### B.2.3 Temperature measuring system

**B.2.3.1** The minimum resolution of the temperature measuring system is 0.5°C; the allowable error shall be within 1°C.

**B.2.3.2** The temperature measuring system (including thermocouples, lead, display devices, connections and so on) shall meet the requirements for service within the test temperature range 30°C ~ 200°C; it shall be calibrated.

##### B.2.4 Temperature measurement of samples

The interior of Epstein Frame windings in contact with the surface of samples shall be fixed with a thermocouple, which is used to monitor the temperature of samples. The temperature of samples is taken as the minimum value of one or more measuring points.