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**YS**

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

**YS/T 63.3-2016**

Replacing YS/T 63.3-2006

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**Carbonaceous materials used in the production of  
aluminium--Part 3: Determination of the thermal  
conductivity--Comparative method**

铝用炭素材料检测方法 第3部分：热导率的测定 比较法  
(English Translation)

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### Foreword

YS/T 63 "aluminum carbon material detection method" is divided into the following 27 parts.

- Part 1. Determination of roasting weight loss and determination of apparent density of green specimens by cathodic paste samples;

Part 2. Determination of room temperature resistivity of cathode carbon and prebaked anode;

- Part 3. Comparison of thermal conductivity;

- Part 4. Determination of coefficient of thermal expansion;

Part 5. Determination of sodium expansion rate at the bottom of carbonaceous coal;

- Part 6. Determination of porosity - Liquid static method;

- Part 7. Determination of apparent density;

- Part 8. Determination of density in xylene - Pore method;

- Part 9. Determination of true density Helium hydrometer method;

- Part 10. Determination of air permeability;

- Part 11. Determination of air reactivity - Mass loss method;

- Part 12. Determination of reactivity of prebaked anode CO<sub>2</sub> reactivity - Mass loss method;

- Part 13. Determination of elastic modulus;

- Part 14. Determination of flexural strength - Three - point method;

- Part 15. Determination of compressive strength;

- Part 16. Determination of trace elements - X - ray fluorescence spectroscopy;

- Part 17. Determination of volatile matter;

- Part 18. Determination of moisture content;
- Part 19. Determination of ash content;
- Part 20. Determination of sulfur;
- Part 21. Determination of the expansion/contraction of the roasting of the cathode paste;
- Part 22. Determination of roasting degree - Equivalent temperature method;
- Part 23. Determination of reactivity of prebaked anode air reactivity;
- Part 24. Determination of reactivity of prebaked anode CO<sub>2</sub> reactivity - Thermogravimetric method;
- Part 25. Determination of sodium expansion rate at the bottom of carbonaceous coal;
- Part 26. Determination of penetration resistance of refractory anti - cryolite;
- Part 27. Determination of the energy of the prebaked anode.

This part is part 3 of YS/T 63.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section is a revision of YS/T 63.3-2006. Compared with YS/T 63.3-2006, the main technical changes are as follows.

--- The upper limit of the measurement range is changed to  $200W/(K \cdot m)$ ;

- 6.1 samples and 6.2 samples are modified and detailed on the size of the specimen.

This part refers to ISO 12987.:2004 "Carbon production of carbon materials anode, cathode carbon block, side carbon block and roasted paste comparison Method to determine thermal conductivity ".

This part of the National Nonferrous Metals Standardization Technical Committee (SAC/TC243) proposed and centralized.

This part of the main drafting unit. China Aluminum Zhengzhou Nonferrous Metal Research Institute Co., Ltd., nonferrous metals Technology and Economic Research Institute.

This part participates in the drafting unit. Jinan Aohai Carbon Co., Ltd., Ningxia Ningping Carbon Co., Ltd., Zhengzhou Haoyu Carbon Material Limited company, Shandong Chenyang new carbon materials Co., Ltd., cable-Development Co., Ltd., Shandong Yanzhou Carbon Products Co., Ltd., Feicheng Prosperity Special Graphite Co., Ltd.

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This part of the previous version of the standard to replace the release of the situation.

--- YS/T 63.3-2006.

Methods for the detection of carbon materials for aluminum Part 3. Comparison of thermal conductivity measurements

## 1 Scope

This part of YS/T 63 specifies the thermal conductivity between 20 ° C and 60 ° C for aluminum carbon materials.

This part is applicable to the determination of thermal conductivity of aluminum carbon materials. The measurement range is  $2W/(K \cdot m) \sim 200W/(K \cdot m)$ .

This part is also applicable to the determination of the thermal conductivity of other carbon materials such as graphite electrodes.

## 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.

Methods for sampling carbonaceous materials for aluminum - Part 1. Bottom carbon blocks GB/T 26297 Methods for sampling carbonaceous materials for aluminum - Part 2. Side carbon blocks GB/T 26297 Methods for sampling carbonaceous materials for aluminum - Part 3. Prebaked anodes GB/T 26297 Methods for sampling carbonaceous materials for aluminum - Part 4. Cathode pastes GB/T 26297 YS/T 63.1 Methods for the determination of carbonaceous materials for aluminum - Part 1. Methods for calcination of cathodic paste samples, determination of roasting weight loss, Determination of apparent density

## 3 Terms and definitions

The following terms and definitions apply to this document.

Thermal conductivity the thermal conductivity  $\lambda$  is a characteristic of the material and is measured by passing the height  $h$  and the cross-sectional area  $A$  in a given temperature range  $\Delta t$  Body heat flow  $dQ/dt$ , according to formula (1) calculation.

$$\lambda = \frac{dQ}{dt} \frac{h}{A \Delta t}$$

$\Delta t$

Where.

--- Heat flow in watts (W);

$\Delta t$  --- temperature difference (obtained by comparison with the standard sample), the unit is Kelvin (K);

$h$  - the height of the object, in meters (m);

$A$  - the cross-sectional area of the object, in square meters (m<sup>2</sup>).

## **4 Reagents and materials**

### **4.1**

Binder. including vaseline, glycerol, adhesive, etc., used to improve the sample and the two ends of the contact.

### **4.2**

Calibration samples. calibrated samples approved by the equipment manufacturer or national. Table 1 shows some of the calibrated standard samples at 20 ° C of the thermal conductivity, in the range of 20 °C ~ 100 °C, the thermal conductivity of these samples and the temperature was basically a linear relationship.