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GB 25327-2017

Replacing GB 25327-2010

The norm of energy consumption per unit product of alumina

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Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

Table of contents

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

The standard replaces GB 25327-2010 “The norm of energy consumption per unit product of alumina enterprise”. As compared with GB 25327-2010, the main changes of this standard are as follows:

- CHANGE the standard name into “The norm of energy consumption per unit product of alumina”;

- ADD the energy consumption norm level;

- DELETE the advanced value of energy consumption AND energy management and measures;

- MODIFY the energy consumption limits and energy consumption access value indicators;

- DELETE the requirements as proposed under the conditions that the energy consumption limits based on the crude ore grade aluminum to silicon ratio by Bayer method is more than 8.5 AND the crude ore grade aluminum to silicon ratio by other processes is more than 7.

This standard was proposed by the Ministry of Energy Conservation and Environmental Protection of the National Development and Reform Commission and the Energy Conservation and Comprehensive Utilization Department of the Ministry of Industry and Information Technology.

This standard shall be under the jurisdiction of the National Energy and Basic Management Standardization Technical Committee (SAC/TC 20) and the National Nonferrous Metals Standardization Technical Committee (SAC/TC 243).

The drafting organizations of this standard: China Aluminum Co., Ltd., Henan Branch, Nonferrous Metals Technology and Economic Research Institute, Shandong Nanshan Aluminum Co., Ltd., Luoyang Xiangjiang Wanji Aluminum Co., Ltd., Guangxi Huayin Aluminum Co., Ltd., China Aluminum Co., Ltd., Guizhou Branch, China Aluminum Industry Co., Ltd., Guangxi Branch, Guangxi Tiandong Jinxin Chemical Industry Co., Ltd., Yunnan Aluminum Co., Ltd.

The main drafters of this standard: Xue Ke, Sun Jianfeng, Shi Yafei, Luo Mei, Jiang Wei, Jiang Rixin, Zhang Yanguo, Huang Xijin, Zhao Zhiqiang, Zhang Hui.

This Standard replaces the standard previously issued as follows:

- GB 25327-2010.

The norm of energy consumption per unit product of alumina

1 Scope

This standard specifies the requirements, calculation principles, calculation scope and calculation method of the norm of energy consumption per unit product of alumina (hereinafter referred to as energy consumption).

This standard applies to the calculation and evaluation of the energy consumption of alumina production, as well as the energy control for the newly built, reconstructed, and extended projects.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

GB/T 2589 General principles for calculation of the comprehensive energy consumption

GB/T 12723 General principles for establishing allowance of energy consumption per unit throughput

GB 17167 General principle for equipping and managing of the measuring instrument of energy in organization of energy using

3 Terms and definitions

The terms and definitions as defined in GB/T 2589 and GB/T 12723 apply to this document.

4 Energy consumption norm level

The energy consumption norm level per unit alumina of the alumina production enterprise is as shown in Table 1, wherein the level 1 is the lowest energy consumption.

Table 1 -- Energy consumption norm level per unit alumina

Energy consumption norm level	Process classification		Energy consumption per unit alumina, kgce/t
Level 1	Bayer method	Process energy consumption	≤ 370
		Comprehensive energy	≤ 400

compressed air, etc.), and waste heat resources. It includes the loss of the energy and energy consuming medium during the storage inside the enterprise, transfer, and metered supply (including export), as well as the energy sources which are used as raw materials, BUT it excludes the energy consumption for domestic purposes AND the energy consumption for the approved infrastructure projects.

6.1.2 Enterprise production energy consumption in the reporting period

There are three calculation methods for the production energy consumption in the reporting period.

Method 1: the production energy consumption of enterprise in the reporting period = the amount of energy purchased by the enterprise + the amount of energy stocked at the beginning of the period - the amount of energy exported by the enterprise - the energy consumed by enterprise infrastructure project - the energy consumed for domestic purposes of enterprise - the amount of energy stocked at the end of the period.

Method 2: the production energy consumption of enterprise in the reporting period = the energy consumed by product processes of enterprise + the energy consumed by the supporting and auxiliary production system + the amount of internal energy conversion losses.

Method 3: the production energy consumption of enterprise in the reporting period = the sum of the comprehensive energy consumption of various enterprise products.

6.1.3 Measurement of physical energy quantity

The measurement of the physical quantity of energy shall comply with the provisions of GB 17167.

6.1.4 Conversion principles and metering units of normal energy (including the energy consumed by producing energy consuming medium)

6.1.4.1 Energy consumption per unit product is expressed in kilograms of standard coal (kgce), AND it shall use the low (order) calorific value of the as received basis equivalent to 29.3076 MJ is called as 1 kg of standard coal (kgce).

6.1.4.2 The coefficient of conversion of the purchased energy such as coal, coke, fuel oil and gas consumed by the enterprise shall be analyzed and determined in accordance with the determination and analysis method stipulated by the State, AND converted into standard coal based on the measured value; if it cannot be measured, it shall be converted in accordance with the low (order) calorific value as provided by the energy source supply department; once all of these conditions are not available, it may use the

D_3 -The unit consumption of steam in the reporting period, in ton per ton (t/t);

e_3 – The steam consumption in alumina production in the reporting period, in ton (t);

M – The physical production of alumina in the reporting period, in ton (t).

6.3.1.4 The unit consumption of coke is calculated in accordance with the formula (4):

$$D_4 = \frac{e_4}{M} \qquad \cdots\cdots(4)$$

Where:

D_4 -The unit consumption of coke in the reporting period, in kilograms per ton (kg/t);

e_4 – The coke consumption in alumina production in the reporting period, in kilogram (kg);

M – The physical production of alumina in the reporting period, in ton (t).

6.3.1.5 The unit consumption of electricity is calculated in accordance with the formula (5):

$$D_5 = \frac{e_5}{M} \qquad \cdots\cdots(5)$$

Where:

D_5 -The unit consumption of electricity in the reporting period, in kilowatt hour per ton (kW • h/t);

e_5 – The electricity consumption in alumina production in the reporting period, in kilowatt hour (kW • h);

M – The physical production of alumina in the reporting period, in ton (t).

6.3.1.6 The unit consumption of fuel oil (gas, natural gas) for calcination is calculated in accordance with the formula (6):

$$D_6 = \frac{e_6}{M'} \qquad \cdots\cdots(6)$$

Where:

D_6 - Unit consumption of fuel oil (gas, natural gas) for calcination in the reporting period, in kilogram per ton OR cubic meter per ton (kg/t, m^3/t);

e_6 - Actual consumption of fuel oil (gas, natural gas) for calcination in the reporting period, in kilogram OR cubic meter (kg, m^3);

E_1 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

M_1 – The raw pulp (raw pulp and pipeline pulp) produced in this procedure in the reporting period, in cubic meters (m^3).

6.3.2.2 Lime calcination procedure

It includes the whole process from limestone breaking to the completion of lime and carbon dioxide. The procedure energy consumption is calculated in accordance with the formula (13):

$$E_{D2} = \frac{E_2}{M_2} \qquad \cdots\cdots(13)$$

Where:

E_{D2} – The procedure energy consumption per unit product, in kilogram of standard coal per ton (kgce/t);

E_2 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

M_2 - The amount of limestone feeding into this procedure in the reporting period, in ton (t).

6.3.2.3 Clinker sintering procedure

It includes the whole process of clinker sintering, AND the procedure energy consumption is calculated in accordance with the formula (14):

$$E_{D3} = \frac{E_3}{M_3} \qquad \cdots\cdots(14)$$

Where:

E_{D3} – The procedure energy consumption per unit product, in kilogram of standard coal per ton (kgce/t);

E_3 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

M_3 - The clinker production in this procedure in the reporting period, in ton (t).

6.3.2.4 Dissolution procedure

6.3.2.4.1 Dissolution procedure by Bayer method

It includes the whole process from the raw pulp feeding to the production of dissolved concentrate. This procedure produces qualified steam condensate,

Where:

E_{D5} – The procedure energy consumption per unit product, in kilogram of standard coal per ton (kgce/t);

E_5 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

M_6 - The aluminum hydroxide production in this procedure in the reporting period, in ton (t).

6.3.2.6 Evaporation procedure

It includes the whole process from the mother liquid to the evaporation of the mother liquid. AND its procedure energy consumption per unit product is respectively calculated based on type ratio and carbon ratio. The qualified steam condensate return back into the boiler in this procedure is deducted from this procedure energy consumption by converting its enthalpy into standard coal. AND procedure energy consumption is calculated in accordance with the formula (18):

$$E_{D7} = \frac{E_7}{M_7} \qquad \cdots\cdots (18)$$

Where:

E_{D7} – The procedure energy consumption per unit product, in kilogram of standard coal per ton (kgce/t);

E_7 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

M_7 - The steam evaporation in this procedure in the reporting period, in ton (t).

6.3.2.7 Calcination procedure

It includes the whole process from aluminum hydroxide to alumina calcination and packaging. The procedure energy consumption is calculated in accordance with the formula (19):

$$E_{D8} = \frac{E_8}{M_8} \qquad \cdots\cdots (19)$$

Where:

E_{D8} – The procedure energy consumption per unit product, in kilogram of standard coal per ton (kgce/t);

E_8 - The amount of energy consumed by this procedure in the reporting period, in kilograms of standard coal (kgce);

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