

ICS 27.010
CCS F 01



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

GB 31337-2014

**The norm of the energy consumption per unit ore of iron ore
dressing**

铁矿选矿单位产品能源消耗限额

Issued on: December 31, 2014

Implemented on: January 1, 2016

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 Technical requirements
 - 4.1 Limiting values of energy consumption per unit product of existing iron ore dressing operations
 - 4.2 Access values of energy consumption per unit product of newly built, rebuilt or extended iron ore dressing operations
 - 4.3 Advanced values of energy consumption per unit product of iron ore dressing
- 5 Statistical scope and calculation method
 - 5.1 Statistical scope
 - 5.2 Calculation method
 - 5.2.1 Calculation of the comprehensive energy consumption per unit product of iron ore dressing
 - 5.2.2 Calculation of the comparable comprehensive energy consumption per unit product of iron ore dressing
- 6 Energy-saving management and measures
 - 6.1 Energy-saving management
 - 6.2 Energy-saving measures

1 Scope

This standard lays down the technical requirements, the statistical scope and calculation method, and the energy-saving management and measures for the norm of the energy consumption per unit product of iron ore dressing (called energy consumption below).

This standard applies to the calculation and assessment of the energy consumption per unit product of iron ore dressing and to the control of energy consumption of newly built projects.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition, including all amendments, applies.

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

GB/T 12723 General principles for compiling the norm of energy consumption per unit product

GB 17167 General principles for equipping and managing of the measuring instruments of energy in organizations using energy

GB/T 23331 Energy management systems - Requirements

3 Terms and definitions

The terms and definitions given in GB/T 12723 and the following apply to this document.

3.1 multiple-concentration: the process in which two or more separate concentration processes (low-intensity magnetic separation, high-intensity magnetic separation, gravity concentration, flotation and the like) are combined to achieve the separation of the minerals.

3.2 roasting and concentration: the process in which magnetizing roasting and concentration are combined to achieve the separation of the minerals.

3.3 comprehensive energy consumption per unit ore of iron ore dressing: within the statistical period, the total quantity of the various forms of energy actually consumed by the iron ore dressing operation for each tonne of run-of-mine ore treated.

3.4 comparable comprehensive energy consumption per unit ore of iron ore dressing: the comprehensive energy consumption per unit product calculated after correcting the various factors that influence the comprehensive energy consumption per unit product of iron ore dressing, so that the energy consumption per unit product (run-of-mine ore treated) can be compared across the iron ore dressing industry.

4 Technical requirements

4.1 The limiting values of the energy consumption per unit product of existing iron ore dressing operations shall meet the requirements of Table 1.

Table 1 has two columns: the type of dressing process, and the comparable comprehensive energy consumption per unit product in kgce/t. The limiting values it fixes are: low-intensity magnetic separation, not more than 4.1; multiple-concentration, not more than 5.7; roasting and concentration, not more than 48.5 with a shaft furnace and not more than 54.3 with a rotary kiln.

4.2 The access values of the energy consumption per unit product of newly built, rebuilt or extended iron ore dressing operations shall meet the requirements of Table 2.

Table 2 is laid out like Table 1. The access values it fixes are: low-intensity magnetic separation, not more than 3.3; multiple-concentration, not more than 4.2; roasting and concentration, not more than 45.6 with a shaft furnace and not more than 51.8 with a rotary

kiln.

4.3 Iron ore dressing undertakings are encouraged to reach the advanced values of the energy consumption per unit product of iron ore dressing given in Table 3 through energy-saving technical upgrading and stronger energy-saving management.

Table 3 is laid out like Table 1. The advanced values it fixes are: low-intensity magnetic separation, not more than 2.4; multiple-concentration, not more than 3.3; roasting and concentration, not more than 42.4 with a shaft furnace and not more than 49.7 with a rotary kiln.

5 Statistical scope and calculation method

5.1 The comprehensive energy consumption of iron ore dressing covers the whole route from the entry of the run-of-mine ore into the plant to the entry of qualified iron ore concentrate into the bin or pond and of the tailings into the store or dump. It covers the physical quantities of the various forms of energy consumed by the main production system of the dressing operation (pre-concentration, crushing, screening, grinding, classification, concentration, dewatering, tailings disposal and the production dispatching system), by the auxiliary production system (mechanical repair, vehicle repair, electrical repair, power supply, water supply including water treatment, heat supply, chemical assay, testing, metering, environmental protection, power supply and reagent supply) and by the ancillary production system serving production directly (office buildings, canteens and bathrooms), converted into standard coal as laid down in GB/T 2589. The equivalent value 0.122 9 kgce/(kW.h) is used as the coefficient for converting electricity into standard coal.

5.2.1 The comprehensive energy consumption per unit product of iron ore dressing is calculated by formula (1). In the formula, $e_{\text{sub } xk}$ is the comprehensive energy consumption per unit product of iron ore dressing, in kilograms of standard coal per tonne (kgce/t); $E_{\text{sub } sj}$ is the sum of the various forms of energy actually consumed by the iron ore dressing operation within the statistical period converted into standard coal, in kilograms of standard coal (kgce); $P_{\text{sub } yk}$ is the quantity of run-of-mine ore treated by the iron ore dressing operation within the statistical period, in tonnes (t).

5.2.2.1 The comparable comprehensive energy consumption per unit product for low-intensity magnetic separation and for multiple-concentration is calculated by formula (2). In the formula, $e_{\text{sub } kb}$ is the comparable comprehensive energy consumption per unit product of iron ore dressing, in kilograms of standard coal per tonne (kgce/t), and K is the adjustment coefficient. To make the comprehensive energy consumption per unit product of iron ore dressing comparable, an adjustment coefficient is used that takes account of the main factors influencing dressing energy consumption. The adjustment coefficient for iron ore dressing energy consumption is calculated by formula (3), in which $K_{\text{sub } 1}$ is the crushing and grinding coefficient, given in Table A.1; $K_{\text{sub } 2}$ is the flotation heating coefficient, given in Table A.2; $K_{\text{sub } 3}$ is the space-heating coefficient, given in Table A.3; K

sub 4 is the plateau coefficient, given in Table A.4.

5.2.2.2 The comparable comprehensive energy consumption per unit product for roasting and concentration is calculated by formula (4). In the formula, e_{bx} is the comparable comprehensive energy consumption per unit product for roasting and concentration, in kilograms of standard coal per tonne (kgce/t), and e_{bs} is the energy actually consumed by the roasting process converted to unit product (quantity of run-of-mine ore treated), in kilograms of standard coal per tonne (kgce/t).

6 Energy-saving management and measures

6.1.1 Energy measuring instruments shall be provided in accordance with GB 17167 and an energy metering management system shall be set up and improved, so that the accuracy and completeness of the basic energy data are ensured.

6.1.2 An energy management system shall be set up in accordance with GB/T 23331, energy management shall be standardised and the efficiency of energy use continuously raised.

6.1.3 The main energy-consuming equipment, such as crushing, grinding, concentration and dewatering equipment, shall be assessed at regular intervals.

6.2.1 The idle running time and the waiting time of the equipment shall be strictly controlled, the operating conditions optimised and the energy efficiency of the equipment raised.

6.2.2 According to the trend in the properties of the run-of-mine ore, magnetic pulleys, gravity concentration equipment or other methods shall be used before grinding to reject tailings in advance and to remove the wall rock and gangue mixed into the ore, so that grinding energy is saved.

6.2.3 New techniques, new processes, new equipment and new materials of high efficiency and low energy consumption shall be developed and used.

6.2.4 Solar energy and potential (gravity) energy shall be used to the full. Attention shall be paid to recovering and using the cooling water and the waste heat of the high-temperature flue gas of shaft furnaces and rotary kilns, and to recovering and using the circulating water of the concentration, dewatering and tailings thickening processes.

6.2.5 Processes and equipment of high energy consumption, high pollution and low efficiency shall be phased out in good time.

Mandatory and recommended provisions

The foreword states that 4.1 and 4.2 of this standard are mandatory and that the remaining provisions are recommended.

The standard was drafted according to the rules given in GB/T 1.1-2009, was proposed by