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

GB 31336-2014

**The norm of energy consumption per unit product of iron ore
underground mining**

铁矿地下开采单位产品能源消耗限额

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1 Scope

The standard lays down the technical requirements, the statistical scope and calculation method, and the energy-saving management and measures for the norm of energy consumption per unit product of iron ore underground mining (energy consumption for short).

It applies to the calculation and appraisal of unit product energy consumption in iron ore underground mining and to the control of energy consumption in newly built projects.

2 Normative references

The following documents are indispensable for the application of the 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 the 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 instrument of energy in organization of energy consumption; GB/T 23331 Energy management systems - Requirements; GB 50830 Code for design of mining engineering of metal and non-metal mines.

3 Terms and definitions

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

3.1 comprehensive energy consumption per unit product of iron ore underground mining: the total quantity of the various forms of energy actually consumed for each tonne of run-of-mine ore extracted by underground iron ore mining within the statistical period. The English term is the one printed in the document.

3.2 comparable comprehensive energy consumption for unit product of iron ore underground mining: the unit product comprehensive energy consumption obtained by correcting, for the various factors that affect the comprehensive energy consumption per unit product of iron ore underground mining, so that the energy consumption of the same final product can be compared within the same industry.

4 Technical requirements

4.1 Scale classification of underground iron ore mines. According to the provisions of GB 50830, the scale of underground iron ore mines is given in Table 1.

Table 1, 'Scale of underground mines', is expressed in units of ten thousand tonnes per year and has five columns: the row label and four scale classes. Its single data row, run-of-mine ore output, reads: extra-large, not less than 500; large, 500~200; medium, 200~60; small, less than 60. A note to the table states that, apart from the values marked as greater than or less than, the upper value of each range is excluded and the lower value is included.

4.2 Limit values of energy consumption per unit product for existing iron ore underground mining. These limit values are to comply with the requirements of Table 2. Table 2 has two columns, mine scale and comparable comprehensive energy consumption per unit product in kgce/t, and two rows: medium and above (medium included), not more than 3.60; small, not more than 4.68.

4.3 Access values of energy consumption per unit product for new, rebuilt or extended iron ore underground mining. These access values are to comply with the requirements of Table 3, which is built like Table 2 and reads: medium and above (medium included), not more than 2.60; small, not more than 3.38.

4.4 Advanced values of energy consumption per unit product for iron ore underground mining. Iron ore enterprises are encouraged to reach, through energy-saving technical upgrading and stronger energy-saving management, the advanced values of Table 4, which reads: medium and above, not more than 2.05; small, not more than 2.67. Table 4 writes the first row as 'medium and above' without the parenthesis '(medium included)' used in Tables 2 and 3.

5 Statistical scope and calculation method

5.1 Statistical scope. The comprehensive energy consumption of iron ore underground mining includes the physical quantities of the various forms of energy consumed by the main production systems of the mining process (extraction and driving, underground crushing, haulage, hoisting, compressed air, ventilation, water supply and drainage, lighting, production dispatching and command systems), by the auxiliary production systems (machine repair, vehicle repair, electrical repair, explosives plant or store, assay,

testing, metering, environmental protection, power supply) and by the ancillary production systems that serve mining production directly (office building, canteen, bath house); these quantities are converted into standard coal according to GB/T 2589, the equivalent value 0.1229 kgce/(kW.h) being used as the coefficient for converting electricity into standard coal.

5.2 Statistical requirements. Within the statistical boundary, output energy that has not been used is not counted as energy output.

5.3 Calculation method. Clause 5.3.1 gives formula (1) for the comprehensive energy consumption per unit product of iron ore underground mining, whose symbols are: e with subscript dc , the comprehensive energy consumption per unit product of iron ore underground mining, in kilograms of standard coal per tonne (kgce/t); E with subscript sj , the total of the various forms of energy actually consumed by iron ore underground mining within the statistical period, converted into standard coal, in kilograms of standard coal (kgce); P , the run-of-mine ore output of iron ore underground mining within the statistical period, in tonnes (t). The equation itself is not reproduced here.

5.3.2 gives formula (2) for the comparable comprehensive energy consumption per unit product, whose symbols are: e with subscript kb , the comparable comprehensive energy consumption per unit product of underground mining, in kgce/t; K , the adjustment coefficient for the energy consumption of iron ore underground mining.

5.3.3 states that, in order to make the comprehensive energy consumption per unit product of iron ore underground mining comparable, the main factors that influence energy consumption are taken together and a coefficient is used to adjust the actual energy consumption. The adjustment coefficient is calculated by formula (3), whose symbols are: K_1 , hoisting coefficient, see Table A.1; K_2 , drainage coefficient, see Table A.2; K_3 , mining method coefficient, equal to 0.05 for the filling method and 0.03 for the open stoping method; K_4 , ventilation coefficient, see Table A.3; K_5 , heating coefficient, see Table A.4; K_6 , plateau coefficient, see Table A.5.

5.3.4 gives formula (4) for the comparable comprehensive energy consumption per unit product of iron ore underground mining with several mining districts, whose symbols are: e with subscripts i and kb , the comparable comprehensive energy consumption per unit product of the i -th mining district, in kgce/t; P with subscript i , the run-of-mine ore output of the i -th mining district, in tonnes (t); n , the number of mining districts.

The tables of Annex A referred to by the coefficients K_1 , K_2 , K_4 , K_5 and K_6 lie beyond the pages examined and have not been read.

6 Energy-saving management and measures

6.1 Energy-saving management. 6.1.1 Energy metering instruments are to be provided in accordance with GB 17167, and an energy metering management system is to be set up

and improved so that basic energy data are accurate and complete. 6.1.2 An energy management system is to be established in accordance with GB/T 23331, energy management is to be regulated and the efficiency of energy use continuously raised. 6.1.3 The main energy-consuming equipment, such as extraction and driving, haulage, hoisting, compressed air, ventilation and drainage equipment, is to be appraised periodically. 6.1.4 Maintenance and management of the various pipe networks is to be strengthened so as to prevent leakage, overflow, dripping and seepage; blocking, intercepting, diverting and draining by gravity are to be carried out properly in order to reduce the mechanical drainage volume of the mine.

6.2 Energy-saving measures. 6.2.1 Optimise the development layout and the operating management of equipment, so that the equipment in production operation is reasonably matched and efficiency is raised. 6.2.2 Develop and use new energy-saving technologies, processes, equipment and materials of high efficiency. 6.2.3 Make full use of solar energy, geothermal energy, potential energy (gravity) and similar sources for main production and for the life of the plant area. 6.2.4 Make full use of mine pit water, purifying it where necessary, so as to reduce the consumption of fresh water. 6.2.5 Pay attention to the recovery and use of waste heat, waste gas and wastewater. 6.2.6 Eliminate in good time processes and equipment of high energy consumption, high pollution and low efficiency.

Note Note on mandatory and recommended provisions

The foreword states that 4.2 and 4.3 of the standard are mandatory and that the remainder is recommended, although the document is published in the mandatory GB series.

The foreword also states that the standard was drafted according to the rules given in GB/T 1.1-2009, that it was proposed by the Department of Resource Conservation and Environmental Protection of the National Development and Reform Commission, and that it is under the jurisdiction of the National Technical Committee on Energy Fundamentals and Management of Standardization Administration (SAC/TC 20).