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**The norm of energy consumption per unit product of
cement**

水泥单位产品能源消耗限额

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The norm of energy consumption per unit product of cement

1 Scope

This document specifies the norm grade, technical requirements, statistical scope and calculation method of energy consumption per unit product of cement (hereinafter referred to as energy consumption).

This document applies to the calculation and assessment of energy consumption of energy consumption units of manufacturing enterprises of common portland cement, as well as the energy consumption control of newly-built, rebuilt and expanded projects.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB 175, Common Portland Cements

GB/T 213, Determination of calorific value of coal

GB/T 384, Determination of calorific value of petroleum products

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

GB/T 21372, Portland cement clinker

GB/T 27977, Test and calculation methods of electricity efficiency of cement production

GB/T 30727, Determination of calorific value in solid biofuels

GB/T 33652, Technical regulation of energy consumption test for cement manufacturing

GB/T 35461, Specification for equipping and managing of the measuring instrument of energy in the cement production enterprise

3 Terms and definitions

Terms and definitions determined by GB 175, GB/T 2589, GB/T 12723, GB/T 21372, and the following ones are applicable to this document.

3.1

Energy consumption per unit product of clinker

During the period of statistical report, the various energy consumed by energy consumption units in the production of cement clinker, which is equivalent to the energy consumed by 1 t of cement clinker.

3.2

Energy consumption per unit product of cement

During the period of statistical report, the various energy consumed by energy consumption units in the production of cement, which is equivalent to the energy consumed by 1 t of cement.

3.3

Fuel consumption per unit product of clinker

During the period of statistical report, the fuel quantity such as coal and diesel consumed by energy consumption units in the production of cement clinker, which is equivalent to the standard coal quantity consumed by 1 t of cement clinker.

3.4

Electricity consumption per unit product of clinker

During the period of statistical report, the electricity consumed by energy consumption units in the production of cement clinker, which is equivalent to the electricity consumed by 1 t of cement clinker.

3.5

Electricity consumption per unit product of cement

6 Statistical range and calculation method

6.1 Statistical range

6.1.1 Statistical range of energy consumption per unit product of clinker

Within the scope of energy consumption management of cement clinker product manufacturing enterprises, various energy sources consumed in the main production process and auxiliary production process from the entry of raw fuel into the production plant to the output of cement clinker, excluding the energy consumed during the project construction period like infrastructure, technological transformation. If co-processing or alternative fuels are used, the amount of energy consumed and the amount of alternative fuels shall be counted separately. When the waste gas from the burning system is used for power generation in a waste heat power station, the power generation of the waste heat power station and the self-consumption power of the waste heat power station shall be counted. The calorific value of solid fuel shall be determined in accordance with the requirements of GB/T 213 and GB/T 30727; the calorific value of liquid fuel shall be determined in accordance with the requirements of GB/T 384. The statistics of electricity consumption shall meet the requirements of GB/T 27977.

6.1.2 Statistical range of energy consumption per unit product of cement

Within the scope of energy consumption management of cement product manufacturing enterprises, various energy sources consumed in the main production process and auxiliary production process from the entry of raw fuel into the production plant to the delivery of cement products, excluding the energy consumed during the project construction period like infrastructure, technological transformation. If co-processing or alternative fuels are used, the amount of energy consumed and the amount of alternative fuels shall be counted separately. When the waste gas from the burning system is used for power generation in a waste heat power station, the power generation of the waste heat power station and the self-consumption power of the waste heat power station shall be counted. The calorific value of solid fuel shall be determined in accordance with the requirements of GB/T 213 and GB/T 30727; the calorific value of liquid fuel shall be determined in accordance with the requirements of GB/T 384. The statistics of power consumption shall meet the requirements of GB/T 27977.

6.1.3 Statistical range of electricity consumption of the cement preparation section

Within the scope of energy consumption management of cement product manufacturing enterprises, the electricity consumed within the statistical range

$$W_s = \frac{\tau_{ws}}{P_s} \dots\dots\dots (6)$$

Where:

W_s – electricity consumption per unit product of cement, in kilowatt-hours per ton (kWh/t);

P_s – the total output of cement products that meets the requirements of GB/T 175 during the period of statistical report, in tons (t);

τ_{ws} – the total electricity consumption within the statistical range of electricity consumption of cement products, in kilowatt-hours (kW·h), which is calculated according to Formula (7):

$$\tau_{ws} = \tau_{w_{fm}} + W_{sh} \times P_{shx} + \tau_{w_m} + \tau_{w_g} + \tau_{w_{fz}} \dots\dots\dots (7)$$

Where:

w_g – the electricity consumption during the cement grinding and packaging process within the period of statistical report, in kilowatt-hours (kWh);

P_{shx} – the consumption of clinker for the production of cement within the period of statistical report, in tons (t);

w_m – the electrical energy consumed by the pretreatment of admixture within the period of statistical report, in kilowatt-hours (kWh);

w_{fm} – the electrical energy consumed by the pretreatment of gypsum within the period of statistical report, in kilowatt-hours (kWh);

w_{fz} – the auxiliary production electricity consumption that shall be apportioned within the period of statistical report, in kilowatt-hours (kW·h).

When the enterprise uses all purchased clinker to produce cement, W_{sh} in Formula (7) is calculated as zero; when the enterprise purchases part of the clinker to produce cement, W_{sh} in Formula (7) shall be the electricity consumption per unit product of clinker of the enterprise.

6.2.5 Energy consumption per unit product of cement

The energy consumption per unit product of cement shall be calculated according to Formula (8):

$$E_s = e_{sh} \times g + \frac{e_h}{P_s} + 0.1229 \times W_s \dots\dots\dots (8)$$

Where:

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