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

GB/T 9934-2026

Replacing GB/T 9934-1988

**Determination and calculation procedure for the heat balance of
lime kilns**

石灰窑热平衡测定与计算方法

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Foreword

GB/T 9934-2026 | Determination and calculation procedure of the heat balance of lime kiln

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01 State Administration for Market Regulation The State Administration for Standardization issued a statement.

1.Scope This document specifies the basic regulations, preparation, methods,

requirements, and material balance for heat balance determination and calculation of various types of lime kilns. Balance calculation, heat balance calculation, lime kiln heat balance determination and calculation report. This document applies to the following types of kilns used for lime calcination. mechanized vertical kilns (including double-chamber vertical kilns, annular sleeve kilns, and beam vertical kilns) and rotary kilns. Suspension kilns, etc.

4 Basic provisions for heat balance determination and calculation

- 4.1 The symbols used in this document and their meanings are given in Appendix A.
- 4.2 Thermal balance shall be calculated in accordance with GB/T 2587.
- 4.3 The equipment of the lime kiln being tested should conform to the requirements of GB/T 41333.
- 4.4 The quality of lime products shall meet the requirements of relevant standards.
- 4.5 The base temperature for heat balance calculations is 0°C. Unless otherwise specified in this document, gas volume refers to a temperature of 0°C and a pressure of 101325 Pa. The volume is expressed in cubic meters. Material balance calculations are based on 1 kg of finished lime.
- 4.6 Other expenditure items Q'_{10} in the heat balance should not exceed 3%. If Q'_{10} exceeds 3%, supplementary measurement should be performed.

5 Preparation for Measurement

- 5.1 Develop a test plan based on the production process of lime kilns.
- 5.2 Define the measurement boundaries. The heat balance measurement range includes the ash discharge machine at the bottom of the furnace, the air inlet pipe, the outer surface of the furnace body, and the charging device at the top of the furnace. And the measurement points for the exhaust ducts. The measurement team can refer to Appendix B to record the main equipment conditions of the lime kiln. A schematic diagram of a typical lime kiln is shown below. Appendix C.
- 5.3 All measuring equipment within the measurement boundary shall comply with the provisions of GB/T 24851. The measuring instruments shall be verified or calibrated, and in accordance with relevant regulations. Within the validity period.
- 5.4 Project testing should be carried out under the condition of ensuring the accuracy and representativeness of the measurement data.

6 Determination Methods

- 6.1 Measurement Time and Frequency The total testing time shall not be less than 72

hours. For continuous production lime kilns, the testing frequency shall be 4 times every 24 hours during the testing period. For non-continuous production lime kilns... For lime kilns in continuous production, the testing frequency is 3 times every 24 hours during the measurement period, and the feeding and discharging quantities of the tested kiln are recorded simultaneously. During this period, measurements of related parameters should be performed simultaneously.

6.2 Measurement Items and Instruments

6.2.1 The items and instruments for measuring the heat balance of lime kilns are shown in Table 1.

6.2.2 The instruments used for measuring the heat balance of a lime kiln and their technical requirements are shown in Table 2.

6.3 Measurement Location and Content

6.3.1 Basis for determination The measurement location and content should be determined according to the specific kiln type being measured. A schematic diagram of a typical kiln type is shown in Appendix C.

6.3.2 Mechanized Vertical Kiln The location and content of the heat balance measurement for mechanized vertical kilns should meet the requirements of Table 3.

6.3.3 Rotary Kiln The location and content of the heat balance measurement for lime rotary kilns should meet the requirements of Table 4.

7.1 Determination of material quantity

7.1.1 Limestone, fuel, finished lime product, and fly ash should preferably be metered separately using metering equipment. Where metering equipment is not installed, fixed-rate metering can be used. For continuous testing or weighing, at least three samples must be taken, and the material mass should be calculated based on the average value. If the deviation of the average value is greater than 5%, the test should be repeated.

7.1.2 The fly ash amount is calculated according to formula (1) based on the gas dust concentration measurement results, accurate to one decimal place.

7.2 Determination of material composition and fuel calorific value

7.2.1 Composition of lime, limestone and fly ash The compositional analysis of lime, limestone and fly ash was carried out in accordance with the requirements of GB/T 5762.

7.2.2 Fuel

7.2.2.1 The fuel composition shall specify the corresponding reference, and the conversion

between references shall be carried out in accordance with Appendix E.

7.2.2.2 Solid fuels. Sampling shall be conducted every 8 hours, with a minimum of 2 kg each time. Samples shall be combined into a single large sample during the testing period, and then reduced to smaller samples. Coal shall be tested according to GB 474. Sample preparation. Coke samples were prepared according to GB/T 1997. Moisture (Mad), ash (Vad), volatile matter (Aad), and fixed carbon (FCad) in solid fuels were prepared according to... The analysis shall be performed according to the methods specified in GB/T 212. Carbon, hydrogen, and nitrogen in solid fuels shall be analyzed according to the standards specified in GB/T 476, GB/T 19227, or GB/T 30733. The analysis method shall be used; sulfur shall be analyzed according to the method specified in GB/T 214; total moisture shall be analyzed according to the method specified in GB/T 211.

7.2.2.3 Liquid fuels. Total water content shall be analyzed according to the method specified in GB/T 260; ash content shall be analyzed according to the method specified in GB/T 508; residual carbon content... The content of sulfur was analyzed according to the method specified in GB/T 17144; the content of nitrogen was analyzed according to the method specified in GB/T 388; and the content of nitrogen was analyzed according to the method specified in GB/T 17674. Methodological analysis.

7.2.2.4 Gaseous fuels. CO, H₂, CmHn, H₂S, O₂, N₂, CO₂, SO₂, and H₂O shall be analyzed according to the methods specified in GB/T 13610.

7.2.3 Fuel calorific value

7.2.3.1 The calorific value of coal shall be determined according to the method specified in GB/T 213, and the calorific value of coke shall be determined according to the method specified in GB/T 2001.

7.2.3.2 The calorific value of liquid fuel shall be determined according to the method specified in GB/T 384.

7.2.3.3 The calorific value of gaseous fuel shall be determined according to the method specified in GB/T 11062.

7.3 Determination of material temperature

7.3.1 The temperature of limestone, fuel, and fly ash can be determined using thermocouples.

7.3.2 Measurement of finished lime temperature. At the lime discharge port, take out more than 10 kg of lime from the middle of the lime discharge period and quickly collect it in an insulated container. Use a precise measuring tool... Insert a thermometer with an accuracy of

1.0 and read the temperature when it stops rising. During measurement, the insulated