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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 15335-2019

Replacing GB/T 15335-2006

Determination of leakage rate and specific resistance for air duct

风筒漏风率和风阻的测定方法

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009. This Standard replaces GB/T 15335-2006 "Determination of leakage rate and specific resistance for air duct". Compared with GB/T 15335-2006, in addition to editorial changes, the main technical changes are as follows: - "The length of the air duct under test shall not be less than 100 m" is changed to "The distance between the air measuring cross-sections (Venturi nozzle) at the front and rear ends of the air duct is not less than 100 m" (see 5.1.1;

5.3 of 2006 edition); - "Adjust the relative static pressure of the measuring cross-section A of positive-pressure air duct or of the measuring cross-section B of negative- pressure air duct to (1200~5000)Pa" is changed to "Adjust the relative static pressure of the measuring

cross-section A of positive-pressure air duct or of the measuring cross-section B of negative-pressure air duct to 300 Pa~4000 Pa" (see 5.1.5;

6.2 of 2006 edition); - Delete "USE a 90° arc inlet nozzle to measure the flow" (

7.2.1 of 2006 edition); - Delete "USE a conical inlet to measure the flow" (

7.2.2 of 2006 edition). Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The issuing authority of this document shall not be held responsible for identifying any or all such patent rights. This Standard was proposed by and shall be under the jurisdiction of China National Coal Association. Drafting organizations of this Standard: China Coal Technology Engineering Group Chongqing Research Institute, Chongqing AnBiao Testing Research Institute, Mining Products Safety Approval and Certification Center Co., Ltd. Main drafters of this Standard: Zhou Zhipeng, Li Shaohui, Kong Linggang, Ju Guanggang, Lu Ning, Wang Fanshu, Li Bingjing, Yang Huayun, Yang Liang, Wang Wei, Li Pan, Zhang Xulei, Lian Bo, Shi Faqiang. The previous editions of the standard replaced by this Standard were released as follows: - GB/T 15335-1994, GB/T 15335-2006. Determination of leakage rate and specific resistance for air duct

1 Scope

GB/T 15335-2019 is the Chinese national standard on determination of leakage rate and specific resistance for air duct, in the field of mining and minerals. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 4 June 2019 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 January 2020. Classification: ICS 73.100.99, CCS D90. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Standard specifies the determination system, determination procedure, and determination result calculation of leakage rate and specific resistance for air duct. This Standard applies to the measurement of leakage rate and specific resistance for positive-pressure and negative-pressure air ducts.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 1236 Industrial fan - Performance testing using standardized airways

GB/T 2624.3 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 3: Nozzles and Venturi nozzles MT/T 222 Technical specification for contrarotating auxiliary fans

3 Terms and definitions, symbols, subscripts

3.1 Terms and definitions The terms and definitions defined in GB/T 1236 and GB/T 2624.3 and the following ones apply to this document.

3.1.1 Leakage rate per 100 m of air duct The percentage of the average leakage flow per 100 m of positive (negative)- pressure air duct in the inlet (outlet) flow of the air duct under the specified air pressure conditions.

3.1.2 Specific resistance per 100 m of air duct R100 - Specific resistance per 100 m of air duct, N - s2/m8; RAB - The specific resistance between measuring cross-sections A and B of air duct, N - s2/m8; RS - Reference specific resistance per 100 m of air duct, N - s2/m8; Rw - Gas constant of wet air or gas, J/(kg - K); td - Temperature of dry-bulb thermometer, °C; tw - Temperature of wet-bulb thermometer, °C; tX - Temperature of measuring cross-section X, °C; VmX - Average gas velocity on cross-section X, m/s; alpha - The flow coefficient of the flow meter in the pipeline; beta - The ratio of the inner diameter of nozzle to the diameter of the upstream section of air duct, d/D; DeltapX - The differential pressure of measuring cross-section X, Pa; Deltaqm - The leakage flow of air duct, kg/s; epsilon - Expansion coefficient; thetaX - Static temperature of measuring cross-section X, K; kappa - Isentropic index, for the atmosphere, kappa=1.4; rhoX - Average gas density of measuring cross-section X, kg/m3.

3.3 Subscripts The following subscripts apply to this document. 6-X - No. of the measuring cross-section of the inlet side of Venturi nozzle; 8-X - No. of the measuring cross-section of the throat of Venturi nozzle; A - No. of the measuring cross-section of the inlet side of air duct; B - No. of the measuring cross-section of the outlet side of air duct. the measuring cross-section A of positive-pressure air duct or of the measuring cross-section B of negative-pressure air duct to 300 Pa~4000 Pa.

5.2 Length measurement

5.2.1 MEASURE the distance LAB of the two measuring cross-sections A and B of the air duct under test determined according to 4.2.4.1.

5.2.2 MEASURE the length L of the air duct under test.

5.3 Measurement of atmospheric environmental parameters

5.3.1 At the center height of the test system, MEASURE the ambient atmospheric pressure

pa.

5.3.2 MEASURE the test ambient temperature, wet-bulb temperature or relative air humidity. MEASURE the temperature, wet-bulb temperature or relative air humidity of each measuring cross-section.

5.4 Pressure measurement

5.4.1 INSERT the pitot tube perpendicular to the airflow direction into the two measuring cross-sections A and B of the air duct under test determined by 4.2.4.1. Connect the pressure gauge to the static pressure port of the pitot tube through the pressure measuring pipeline. MEASURE the relative static pressure peA and peB at the cross-sections A and B respectively.

5.4.2 MEASURE the pressure pe6-X on the air inlet side of Venturi nozzle and the pressure pe8-X on the air outlet side respectively. According to the formula (1), calculate the differential pressure Deltap8-X. Deltap8-X may also be directly measured using a differential pressure gauge.

6.1 Calculation of atmospheric environmental parameters

6.1.1 Calculation of gas constant The gas constant of the humid air in the test environment is calculated according to formula (2):

6.2.4 The flow coefficient alpha is calculated according to formula (11):

6.2.5 The static temperature theta6-X of the measuring cross-section 6-X is calculated according to the formula (12), where cp=1008. The cross-sectional area of the measuring cross-section 6-X is calculated according to the formula (13). The air density of the measuring cross-section 6-X is calculated according to the formula (14):

6.2.6 The mass flow of the airflow of measuring cross-section 6-X is calculated according to formula (15):

6.2.7 MEASURE the flow of each Venturi nozzle separately. If there are pipelines in parallel, the calculation results of the air inlet side and the air outlet side are added up respectively, to obtain the airflow mass flow qminlet of the air inlet side and the airflow mass flow qmoutlet of the air outlet side.

6.3 Calculation of leakage rate of air duct

6.3.1 The leakage rate of air duct is calculated according to formula (16):