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Test method for the evaluation of permeability and filtration efficiency distribution of bag filter medium

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Test method for the evaluation of permeability and filtration efficiency distribution of bag filter medium

Méthode d'essai pour l'évaluation de la perméabilité et de la distribution de l'efficacité de filtration d'un média filtrant à poches

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Phone: +41 22 749 01 11
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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Determination of sampling ... **2**
4.1 General ... 2
4.2 Collection position, size and shape of representative sample sheets ... 2
4.3 Number of representative sample sheets ... 2
5 Preparation of specimen strips ... **3**
5.1 General ... 3
5.2 Standard atmosphere for conditioning and testing ... 3
5.3 Conditioning of specimen strips ... 3
5.4 Size of specimen strips ... 3
6 Measurement method - Thickness ... **4**
6.1 General ... 4
6.2 Apparatus ... 4
6.2.1 Thickness tester ... 4
6.2.2 Thickness gauge ... 4
6.3 Procedure ... 4
7 Measurement method - Area mass ... **4**
7.1 General ... 4
7.2 Apparatus ... 4
7.2.1 Precision balance ... 4
7.2.2 Calibrated rule ... 5
7.3 Procedure ... 5
8 Measurement method - Gas permeability ... **5**
8.1 General ... 5
8.2 Apparatus ... 5
8.2.1 Circular specimen holder ... 5
8.2.2 Clamping device ... 5
8.2.3 Guard ring device ... 5
8.2.4 Pressure gauge or manometer ... 5
8.2.5 Blower, fan or pump ... 5
8.2.6 Flowmeter, volumetric counter or measuring aperture ... 5
8.3 Procedure ... 5
9 Measurement method – Filtration efficiency (option) ... **6**
10 Order of measurement sequence ... **6**
11 Expression of distribution of each measurement item ... **6**
12 Test report ... **7**
Annex A (normative) **Sampling survey theory based on normal distribution** ... **8**
Annex B (informative) **Analysis example of measurement results** ... **9**
Annex C (informative) **Example of relationship between exerting pressure and thickness distribution** ... **13**
Annex D (informative) **Example of a test report** ... **14**
Annex E (informative) **Example of a test report with measurement results** ... **16**
Bibliography ... **18**

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Foreword

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This document was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases.*

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Introduction

The main purpose of using dust collector systems is to separate dust particles from dirty gases. The dry type filtering dust collectors, bag filter systems are one of the most widely used industrial dust collectors such as municipal garbage incinerators, coal fired boilers, iron makings, cement factories, power plants, etc. They are also used to improve the local working environment where dust is emitted. For the bag filter systems, the operations to collect the dust particles at the surface of the filter for relatively long periods, and to remove the accumulated dust on the filter away instantaneously are conducted. Therefore, the dust particles are collected inside the filter immediately after the dust removal operation until the dust layer is completely formed on the filter and particle collection on the filter surface begins. Therefore, their most important performances, filtration efficiency and pressure drop depend upon the characteristics of the filter medium installed in them.

Such as non-woven filter medium for bag filter systems packs densely with relatively large fibres. Although fibre size and its orientation are different slightly in the entire filter medium, packing structure of the medium (packing density and area mass of fibres, thickness of the medium, etc.) can vary depending on the position of the filter medium due to the manufacturing method.

The non-uniformity (variation by the position) in the packing structure of the-medium affects its pressure drop, gas permeability and filtration efficiency. As a result, the local values of the pressure drop, gas permeability and filtration efficiency in small domains in the medium are also distributed unevenly. However, the non-uniformity of these performances has been ignored. In many cases of commercial filters, their thickness, area mass, fibre packing density, and gas permeability are only indicated as the average specifications.

The non-uniformity of these properties of the filter medium can cause various troubles in operation and reducing the collection performance of the bag filter system. The part with relatively lower packing density of fibres in the filter medium allows higher gas flow rate, but the densely packed part provides lower gas flow rate. Thus, the gas and dust flows concentrate in areas with low packing density, causing clogging in those areas. Since the dust particles are collected inside the filter immediately after the cleaning operation of accumulated dust on the medium until the dust layer is completely formed on the filter (transition to the cake filtration process), the area with a relatively higher gas permeability can give the lower filtration efficiency, and the dust easily leak from there. These phenomena finally can accelerate the further deterioration of the filter medium.

Accordingly, in order to accurately evaluate the performance of the filter medium, it is preferable to measure not only the average value of each property but also its distribution based on globally consistent methods and standards.

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Test method for the evaluation of permeability and filtration efficiency distribution of bag filter medium

1 Scope

This document specifies a measuring method for the distribution of thickness, area mass, gas permeability and collection efficiency in the filter medium, and applies to both woven and non-woven filter medium.

This document provides a method for sampling specimen (position, size and number) from the filter medium required to obtain its performance distribution accurately.

The purpose of this document is to provide more accurate information about the morphology of the filter medium for users, and not to compare grade the performance of the filter medium.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

ISO 5084, *Textiles — Determination of thickness of textiles and textile products*

ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
lot
minimum unit for the manufacture of a product with the same specification

3.2
roll
minimum unit for filter shipping from the manufacturer

3.3
area mass
mass per unit area for a two-dimensional object

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