Field testing of general ventilation filtration devices and systems for in situ removal efficiency by particle size and resistance to airflow (ISO 29462:2013)

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NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 29462:2013 sisaldab Euroopa standardi EN ISO 29462:2013 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 29462:2013 consists of the English text of the European standard EN ISO 29462:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 20.03.2013.	Date of Availability of the European standard is 20.03.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Field testing of general ventilation filtration devices and systems for in situ removal efficiency by particle size and resistance to airflow (ISO 29462:2013)

Essais in situ de filtres et systèmes de ventilation générale pour la mesure de l'efficacité en fonction de la taille des particules et de la perte de charge (ISO 29462:2013)

Betriebserprobung von Filtereinrichtungen und -systemen für die allgemeine Lüftung hinsichtlich ihrer Abscheideeffizienz im eingebautem Zustand bezogen auf die Partikelgröße und den Druckverlust (ISO 29462:2013)

This European Standard was approved by CEN on 1 March 2013.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 29462:2013) has been prepared by Technical Committee ISO/TC 142 "Cleaning equipment for air and other gases" in collaboration with Technical Committee CEN/TC 195 “Air filters for general air cleaning” the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 29462:2013 has been approved by CEN as EN ISO 29462:2013 without any modification.

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Introduction

The purpose of this International Standard is to provide a test procedure for evaluating the in-situ performances of general ventilation filtration devices and systems. Although any filter with a filtration efficiency at or above 99% or at or below 30% when measured at 0,4 µm could theoretically be tested using this International Standard, it may be difficult to achieve statically acceptable results for these type of filtration devices.

Supply air to the Heating, Ventilation and Air-Conditioning (HVAC) system contains viable and non-viable particles of a broad size range. Over time these particles will cause problems for fans, heat exchangers and other system parts, decreasing their function and increasing energy consumption and maintenance. For health issues, the fine particles (<2,5 µm) are the most detrimental.

Particles in the 0,3 µm to 5,0 µm size range are typically measured by particle counters that can determine the concentration of particles in specific size ranges. These instruments are commercially available and will determine particle size along with the concentration level by several techniques (e.g., light scattering, electrical mobility separation, or aerodynamic drag). Devices based on light scattering are currently the most convenient and commonly used instruments for this type of measurement and are therefore the type of device used within this International Standard.

Particles in the size range 1,0 µm to 5,0 µm are present in low numbers (less than 1%, by count) in outdoor and supply air and have higher sampling-system losses. Results in the range >1,0 µm will therefore have lower accuracy and so the results should be interpreted with respect to this.

During in-situ measurement conditions, the optical properties of the particles may differ from the optical properties of the particles used for calibrating the particle counter and testing it in the laboratory. Thus the particle counter could size the particles differently but count the overall number of particles correctly.

By adding an extra reference filter, the effect of varying measuring conditions can be reduced. Additionally, using this enhanced test method, the results can be used to correct the measured efficiencies in relation to the efficiency of the reference filter measured in laboratory using a standardized test aerosol.

The results from using the standard method or the enhanced method will give both users and manufacturers a better knowledge of actual filter and installation properties.

It is important to note that field measurements generally result in larger uncertainties in the results compared to laboratory measurements. Field measurements may produce uncertainty from temporal and spatial variability in particle concentrations, from limitations on sampling locations due to air handling unit configurations, and from the use of field instrumentation. These factors may result in lower accuracy and precision in the calculated fractional efficiencies compared to laboratory measurements. This International Standard is intended to provide a practical method in which the accuracy and precision of the result are maximized (and the precision of the result quantified) by recommending appropriate sampling locations, sample quantities, and instrumentation. This International Standard is not intended to serve as a filter performance rating method. The results obtained from the test method described in this International Standard do not replace those obtained through tests conducted in the laboratory.

Field testing of general ventilation filtration devices and systems for in situ removal efficiency by particle size and resistance to airflow

1 Scope

This International Standard describes a procedure for measuring the performance of general ventilation air cleaning devices in their end use installed configuration. The performance measurements include removal efficiency by particle size and the resistance to airflow. The procedures for test include the definition and reporting of the system airflow.

The procedure describes a method of counting ambient air particles of 0,3 µm to 5,0 µm upstream and downstream of the in-place air cleaner(s) in a functioning air handling system. The procedure describes the reduction of particle counter data to calculate removal efficiency by particle size.

Since filter installations vary dramatically in design and shape, a protocol for evaluating the suitability of a site for filter evaluation and for system evaluation is included. When the evaluated site conditions meet the minimum criteria established for system evaluation, the performance evaluation of the system can also be performed according to this procedure.

This International Standard also describes performance specifications for the testing equipment and defines procedures for calculating and reporting the results. This International Standard is not intended for measuring performance of portable or movable room air cleaners or for evaluation of filter installations with and expected filtration efficiency at or above 99 % or at or below 30 % when measured at 0,4 µm.

2 Normative references

The following referenced documents are indispensable for the application 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 7726, *Ergonomics of the thermal environment — Instruments for measuring physical quantities*

ISO 14644-3, *Cleanrooms and associated controlled environments — Part 3: Test methods*

ISO 21501-4, *Determination of particle size distribution — Single particle light interaction methods — Part 4: Light scattering airborne particle counter for clean spaces*

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

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

3.1.1
air filter bypass
unfiltered air that has passed through the AHU filter installation but remained unfiltered because it bypassed the installed air filters