SLOVENSKI STANDARD
oSIST prEN 15780:2008

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Prezraļevanje stavb - Kanali - Ļistoļa prezraļevalnih sistemov

Ventilation for buildings - Ductwork - Cleanliness of ventilation systems

Lüftung von Gebäuden - Luftleitungen - Sauberkeit von Lüftungsanlagen

Ventilation des bâtiments — Réseaux de conduits — Propreté des systèmes de ventilation

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Ventilation for buildings - Ductwork - Cleanliness of ventilation systems

Lüftung von Gebäuden - Luftleitungen - Sauberkeit von Lüftungsanlagen

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Foreword

This document (prEN 15780:2008) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

1 Scope

This Standard applies to ventilation and air conditioning systems and defines the initial assessment criteria of cleanliness, cleaning procedures of these systems, and the validation of the effectiveness of cleaning applies also to products, which conform to EN 1505, EN 1506, EN 13053, EN 13180 and EN 13403, used in air conditioning and ventilation systems defined in the scope of CEN/TC 156.

This standard specifies requirements and procedures necessary in assessing and maintaining the cleanliness of ventilation, including:

— how to assess the need for cleaning (visual, measurements);

— assessment frequency (general guidance);

— selection of cleaning method;

— how to assess the result of cleaning.

This standard is a parallel standard to EN 12097, which specifies requirements for dimension, shape and location for access panels for cleaning and service in ductwork systems

This standard is made as an umbrella standard with informative annexes that can be added over time with the following topics:

Air Handling Units (AHU)

Filter

Humidifiers

Ductwork

Terminal devices

The main target groups of this standard are building owners, services companies, maintenance companies, end users and consultancy and control companies.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1505, *Ventilation for buildings — Rectangular sheet metal air ducts and duct fittings — Dimensions*

EN 1506, *Ventilation for buildings — Circular sheet metal air ducts and duct fittings — Dimensions*

EN 12097, *Ventilation for buildings — Requirements for ductwork components to facilitate maintenance of ductwork systems*

EN 12792, *Ventilation for buildings — Symbols and terminology*

EN 13053, *Ventilation for buildings — Air handling units — Ratings and performance for components and sections*

EN 13180, *Ventilation for buildings — Ductwork — Dimensions and mechanical requirements for flexible ducts*

EN 13403, *Ventilation for buildings Non metallic ducts — Ductwork made from insulation ductboards*

EN 13779, *Ventilation for non-residential buildings — performance requirements for ventilation and room-conditioning systems*

EN 14239, *Ventilation for buildings —- Measurement of ductwork surface area*

3 Definitions

For the purposes of this European Standard, the definitions given in EN 12792 and the following apply.

3.1
acceptable cleaning level
the amount of dust and other impurities shall not exceed the given limit values

3.2
acceptable cleaning result visually
no loosened dust is detected visually on the duct surface after cleaning

3.3
acceptable dust accumulation
limit value of dust accumulated in an air duct, defined by one of the methods defined in this standard

3.4
cleanliness
cleanliness of the ventilation system and/or its components: the state of the ventilation system and/or the components, in which the amount or concentration of contaminants is below a specified level

3.5
cleanliness level
in the scope of this standard, there are three cleanliness levels: basic (A), intermediate (B) and advanced (C). For each level, this standard specifies certain characteristics as default values in an informative way

3.6
ductwork surface area
the surface area (m^2) of the ductwork determined according to EN 14239

3.7
total joint length
the length (m) of joints resulting from the installation of the ductwork

3.8
visually clean
no loosened dust is detected on surfaces visually

3.9
visual inspection
a subjective method to evaluate cleanliness level of surfaces

4 Symbols and units

For the purpose of this standard, the symbols and units given in EN 12792 apply.

5 Criteria for cleanliness and assessment

5.1 General

NOTE REHVA Guidebook "Criteria for the cleanliness of ventilation systems and components" specifies in detail the items mentioned in this chapter. Cleanliness classes and their applications are introduced in Annex A

The key issue is to design and build the whole ventilation system so that it can be kept clean enough during the whole lifetime of the installation. The following requirements, as well as the methodology described in Clause 5, can be also applied to air handling units (according to EN 13053) and entire systems (see EN 13779, Annex A)

Therefore it is necessary to specify the cleanliness criteria from the beginning and include in the specification both design and installation issues and means to maintain a sufficiently clean ventilation system for its whole lifetime. The design and installation aspects include (as a minimum):

Production of the system components

Delivery to site

Site storage

Installation

Protection of components after installation

NOTE Annex A presents, as a common classification, criteria of three levels of cleanliness, and application example for ductwork.

5.2 Assessment of the need for cleaning

Inspection of functionality and cleanliness of ventilation system is a part of proper maintenance of the ventilation systems. Mostly the inspection of the cleanliness may arise from two purposes:

— to check if ventilation system is dirty and need to be cleaned (exceeding of a "target level");

— to evaluate cleanliness after the cleaning work (to control cleaning work).

The assessment methodology is presented in 6.2.

NOTE Annex A gives further recommendations on assessment frequency.

5.3 Selection of cleaning method

In the handing-over documents the cleaning methods shall be specified, and guidelines for reaching the points to be cleaned shall also be given.

The cleaning method may vary according to the air distribution system. Normally dry methods are enough in supply air systems and general extract air systems. Wet methods (or a combination of dry and wet methods) may be needed for exhaust air ducts from professional kitchens and similar installations where extract air contains smoke, grease and/or other similar impurities.

The instructions of all wet methods shall include a warning of conditions and restrictions of use, for example that the method is only applicable only for ducts with high requirements of tightness and smooth duct surfaces, and that the ducts need to be sloping to prevent retention of cleaning fluids in the ducts.

A sufficient number of access doors shall be provided in the ductwork. Additionally special care shall be taken during cleaning obstacles, such as dampers, sound attenuators etc., which are mounted in the ducts. In many cases additional access doors are needed after or before such obstacle, which then can be cleaned carefully. Requirements for location of and distance between access doors are presented in EN 12097 and EN 13779.

5.4 Determination of cleaning interval

The cleaning interval shall be defined in the system documentation.

NOTE Further guidance can be found from REHVA and EVHA Guidelines and also from national guidelines, e.g. VDI 6022 or HVCA.

5.5 Assessment of the result of cleaning

Methods for assessment of the need for cleaning can be also applied for assessment of the result of cleaning.

6 Methodology

6.1 General methodology

Figure 1 presents a procedure to control and maintain cleanliness of ventilation system. It does not include the design stages or selection and specification of the system, or any of its components.

The system shall be first checked visually, both in assessing the need for cleaning and in verification of the result of cleaning. Objective measurements are needed if the visual inspection results in disagreement or uncertainty about cleanliness or need for cleaning.

NOTE REHVA Guideline and some national guidelines like VDI 6022 and FiSIAQ Guideline give more detailed guidance on product selection and specification from the hygienic point of view.

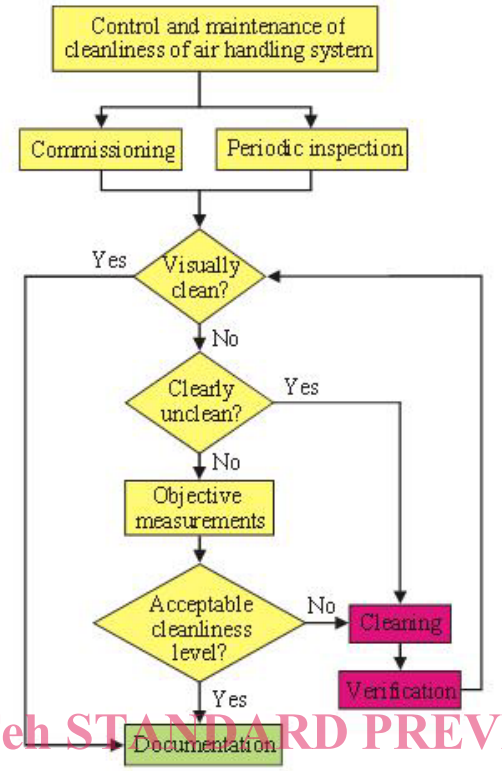

Figure 1 — Schematic flow chart for procedures to maintain cleanliness of ventilation system

If the components are certified for cleanliness or the cleanliness after production is otherwise verified, and if the cleanliness instructions are properly documented, the commissioning may be reduced to checking the documentation and spot checking of the system cleanliness (compliance with the documentation).

The methods applied for objective measurements and verification needs to be consistent so that the result of inspection is acceptable and gives reliable grounds for decision making to order cleaning work of the system when needed. Verification after cleaning is needed for quality control of the cleaning work, and to verify the cleaning result.

Objective methods are needed if any guidelines or demands on cleanliness are set in official or in voluntary documents. The methods to evaluate the cleanliness vary, and thus target values given for the cleaning action are not easy to compare. Certain visible signs like visible microbial growth are enough to reveal the need for cleaning. For systems consisting dust with less potential health risks the visible signs are not so clear and evaluation of the need by measurement may be needed to find out whether the ventilation system should be cleaned or not.

6.2 Assessment of the need for cleaning

6.2.1 General

The assessment of cleanliness level of the system is important in order to define the cleaning method to be used.

System components are considered to be polluted when visual inspection and analytic verification give evidence of dust or microbial growth inside. Assessment will be carried out through inspection. Dust accumulation, different types of pollutants, as well as “bacterial amplification”, should determine the cleaning methods to be used and the environmental required controls.

Elements to be inspected for cleaning go from outdoor air intake and should be, at least, the following:

— Air handling units (AHU’s). AHU’s assessment should include all their components and sections: fan section, filters, plenums, heating and cooling coils, condensate trays, sound attenuators, heat recovery section, and humidifier section including droplet eliminators.

— Supply air ductwork, including all types of terminal devices and terminal units, sound attenuators, duct-mounted heating and cooling coils, dampers and valves.

— Extract air ductwork, including all types of components.

6.2.2 Inspection plan

The inspection plan consists of the following information:

— review plan and reports;

— determining which systems will be inspected;

— determining where to inspect and sample (see note);

— choosing equipment and tools.

Additionally, the inspection plan describes the requirements of the specific qualification and experience for inspectors before they are authorised to inspection work. The assessment frequency shall be specified.

NOTE Recommendations for assessment frequency are given in Annex A. To obtain objective results a representative number of samples from representative parts and sites in the ventilation system should be selected for evaluation of the cleanliness of the whole system. A good rule of thumb for choosing sites or taking samples is to select areas where the dust deposits are obvious, or liable to cause reduced IAQ. For inspecting and sampling, the ventilation system can be divided in two parts, the ductwork and the rest of the system. Before inspection or sampling, the sites should be selected at random with the aid of the design documents. The sampling sites in the ductwork should be selected from the main duct starting from the AHU, main ducts, risers and side branch ducts. The sampling sites should contain direct ducts and ducts with changes of direction or terminations.

6.2.3 Evaluation methods of dust accumulation

Different methods to evaluate cleanliness of ventilation systems are applied. The simplest methods are based on more or less subjective visual observation of the cleanliness of ventilation system combined with use of some special instrumentation. The advanced techniques are able to give relatively accurate results that are comparable to given limit values. In Figure 2 the methods are presented in sequence of the reliability level of their results.