BS EN 15780:2011

BSI Standards Publication

Ventilation for buildings — Ductwork — Cleanliness of ventilation systems

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National foreword

This British Standard is the UK implementation of EN 15780:2011.

The UK participation in its preparation was entrusted to Technical Committee RHE/2, Ventilation for buildings, heating and hot water services.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Ventilation for buildings - Ductwork - Cleanliness of ventilation systems

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

Lüftung von Gebäuden - Luftleitungen - Sauberkeit von Lüftungsanlagen

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Foreword

This document (EN 15780:2011) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

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1 Scope

This European Standard applies to both new and existing ventilation and air conditioning systems and specifies the 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 for human occupancy defined in the scope of CEN/TC 156. This European Standard does not apply to installations for industrial processes.

Cleanliness of ventilation systems is considered important for human comfort and health, energy consumption, system service life and for cleanliness of operations or processes carried out in the ventilated area.

Considerations for change of component as an alternative for cleaning (e.g. in case of flexible ducts and air filters) are also included.

This European Standard specifies general requirements and procedures necessary in assessing and maintaining the cleanliness of ducted ventilation, including:

— cleanliness quality classification;

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

— assessment frequency (general guidance); guidance of system inspections in accordance with EN 15239, and EN 15240 when relevant;

— selection of cleaning method – to be in line with handing over documentation according to EN 12599;

— how to assess the result of cleaning.

This European 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 European Standard is made as an umbrella standard with informative annexes that can be revised, completed and further added in future revisions of this European Standard for specific system types, and products or applications in the system, such as:

— Air Handling Units (AHU);

— filter;

— humidifiers;

— heat recovery units;

— decentralised air treatment units such as fan-coil units, induction units;

— terminal devices;

— kitchen extract equipment.

The main target groups of this European Standard are specifiers of the cleanliness quality classes and cleaning methods primarily system designers who also specify the system of access, building owners, services companies, maintenance companies, end users and consultancy and control companies.

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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.

EN 12599, *Ventilation for buildings — Test procedures and measuring methods for handing over installed ventilation and air conditioning systems*

EN 12792:2003, *Ventilation for buildings — Symbols, terminology and graphical symbols*

EN 14799:2007, *Air filters for general air cleaning — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12792:2003 and EN 14799:2007 and the following apply.

3.1
acceptable cleanliness level
amount of dust or other impurities not to be exceeded, according to the specified measurement method

3.2
acceptable post-clean level
no loose dust is detected visually on the duct surface after cleaning and the system is capable reaching an acceptable cleanliness level according to a defined measurement method

NOTE In case of conflict (e.g. between the building owner and the user), or uncertainty objective methods are needed to assess the cleanliness/dirtiness.

3.3
acceptable dust accumulation level (new ductwork)
acceptable cleanliness level on new ductwork as handed over from builder to user

NOTE In practice this means the quantity of pollution which is deemed acceptable.

3.4
cleanliness
state or level of pollution defined as acceptable according to specification and a particular measurement method

NOTE Cleanliness is not absolute, it is defined by limit values. Dirtiness is the exceeding of such a defined limit value.

3.5
cleanliness quality class
in the scope of this standard there are three levels of cleanliness quality standards to be applied to various buildings and types of system

A. Low

B. Medium

C. High

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3.6
visual inspection
subjective method to evaluate cleanliness level of surfaces

4 Symbols and units

For the purpose of this document, the symbols and units given in EN 12792:2003 apply.

5 Criteria for cleanliness and assessment

5.1 General

The key issue is to design, build and maintain 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, applies to the ductwork but can be also applied to air handling units (according to EN 13053) and entire systems (see EN 13779:2007, Annex A) Therefore it is necessary to specify the cleanliness quality class 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 issues shall include (as a minimum):

— cleanliness quality class;

— cleanliness criteria and measurement method;

— production of the system components;

— delivery to site;

— site storage;

— installation;

— protection of components after installation;

— handing over the system according to EN 12599

NOTE Annex A presents, as a common classification, three classes of cleanliness, application examples for ductwork, and recommendations for the frequency of regular inspections in accordance with EN 15239.

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 needs to be cleaned (exceeding of a "target level" of cleanliness);

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

The assessment methodology is presented in 6.2.

For existing buildings, the inspection shall include a study of the existing documentation and recommendations to complete and update the documents.

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5.3 Design and handing over information

In the handing-over documents the cleanliness quality class, cleanliness criteria and measurement methods shall be specified, recommendations for cleaning methods and guidelines for reaching the points to be cleaned shall also be given.

The design information shall give consideration to the expected cleaning method. Where the system has been designed to be cleaned by wet cleaning methods, warning regarding conditions and restrictions of use should be given. For example wet methods are applicable only where ducts are sufficiently moisture-tight, internal surfaces are smooth, and slope and drainage arrangements have been provided so that fluid and contaminant can be evacuated.

A sufficient number of access doors shall be provided in the ductwork. Additionally special care shall be taken regarding obstacles to cleaning 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 in principle be defined by reference to the cleanliness or dirtiness of the system. Cleanliness or dirtiness shall in the first instance be assessed visually and this may be confirmed by means of measurement – see Annex A.

The inspection interval to determine the need for cleaning may be defined in the system documentation in order to assist with maintenance planning or design considerations related to cleaning methods.

NOTE Further guidance can be found from REHVA and EVHA Guidelines and also from national guidelines, e.g. VDI 6022 or HVCA TR19.

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.

The preferred method of post-clean verification is given in Annex A.

See also 7.1.

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. See Figure 1 for an explanatory flow-chart.

Objective measurements may be defined in advance as part of the cleaning or inspection plan.

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.

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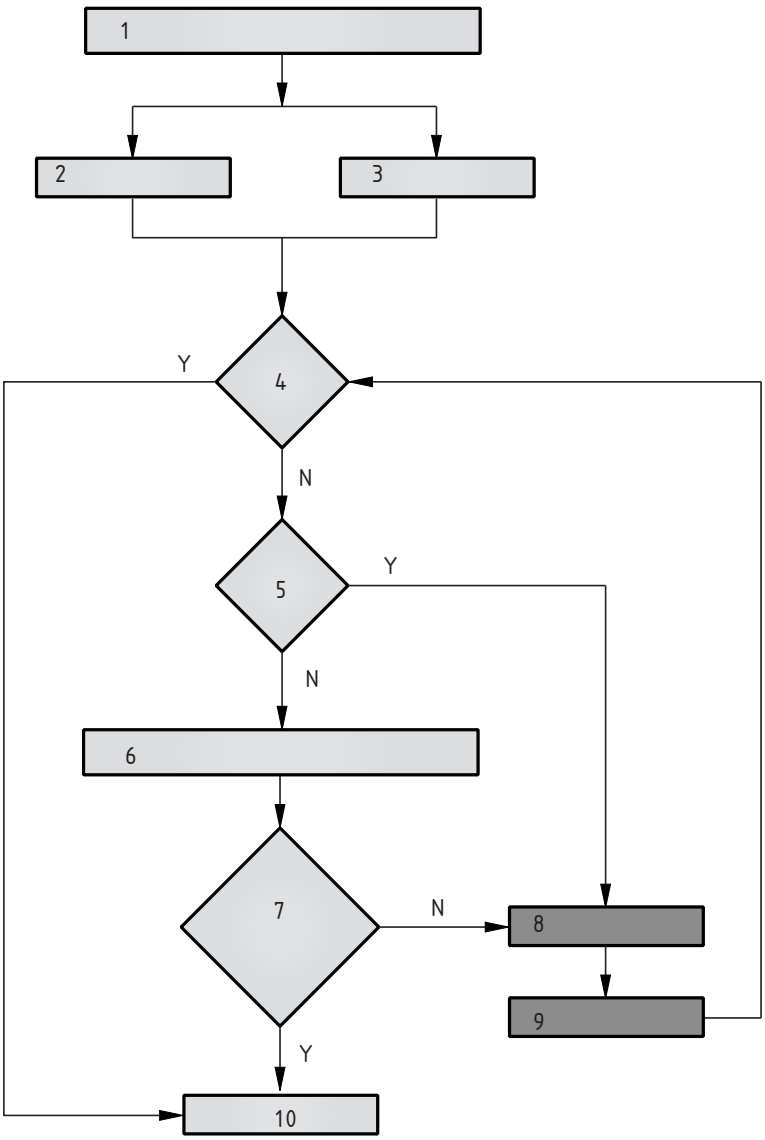

Key

1 control and maintenance of cleanliness of air handling system

2 commissioning

3 periodic inspection

4 visually clean?

5 clearly unclean?

6 objective measurements

7 acceptable cleanliness level

8 cleaning

9 verification

10 documentation

Y yes

N no

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

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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). See also 6.2.2.

The methods applied for objective measurements and verification need to be consistent so that the result of inspection is acceptable and give 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.

NOTE 1 Annex H describes the preferred method of objective measurements.

NOTE 2 An example of acceptable levels of cleanliness (or dirtiness) is explained in Annex F.

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 shall be accompanied by a description of the measurement method. Certain rare visible signs like visible microbial growth are enough to reveal the need for cleaning. For systems (consisting dust with less potential health risks) affected by dust 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. Suspected instances of hazardous dusts such as asbestos and radiological materials need specialist investigation and should be dealt with separately.

6.2 Assessment of the need for cleaning

6.2.1 General

Assessment of the characteristics of the contamination 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 analytical verification give evidence of unacceptable dust level, microbial or other contamination. Assessment will be carried out through inspection. Dust accumulation, the type of pollutants, such as “bacterial growth should determine the need for cleaning, cleaning methods to be used and the required environmental controls.

Elements to be inspected for cleanliness start from the outdoor air intake and should include at least:

— Air Handling Units (AHU’s). AHU’s assessment should include all their components and sections: outdoor air intake, any mixing 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;

— return and recirculation ductwork, including all types of components;

— fresh air intake ductwork.

6.2.2 Inspection plan

The inspection plan consists of the following information:

— review plan and reports, including cleanliness quality class and measurement methods;

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