January 1999

RECOMMENDATION

concerning

CLEANLINESS OF DUCTWORK IN VENTILATION SYSTEMS

1 - This Recommendation gives basic guidance how to design and build ventilation and air conditioning installations taking into account cleaning and other service/maintenance measures required in the installations.

2 - The purpose of air distribution system is to provide healthy, fresh and clean air into the building. However, the air distribution system may become a major odour source in the building. It is possible to eliminate nearly completely the odour emissions from the system, not only in new but also in renovated buildings.
Health aspects have also to be taken into account in design and construction. Throughout the construction process all components of the air distribution system shall be protected properly, and before handing over the entire installation shall be inspected and cleaned if necessary.
The air distribution system, especially if cleaning is completely neglected, may even become a source of health problems. Dust and moisture together will make a good base for bacteria and mould growth.
It is, therefore, necessary to build the air distribution system in such manner that it can be kept clean enough during the whole lifetime of the installation. Impurities shall be stopped by filters at all air inlets.
Benefits from a clean installation are many times higher than the additional costs needed to build easily cleanable ductwork and the cost of cleaning.

E U R O V E N T / C E C O M A F

**EUROPEAN COMMITTEE OF
AIR HANDLING, AIR CONDITIONING AND REFRIGERATION
EQUIPMENT MANUFACTURERS**

BASIC REQUIREMENTS

The air distribution system shall be designed, manufactured and installed in such a way that cleaning of all internal surfaces and components is possible.

Components such as dampers, air flow control devices etc. shall be installed so that they are easily cleanable or so that they can be removed for service and cleaning. If removal is not possible, service access shall be provided according to Table 1. Access to service openings shall not be obstructed by suspended ceilings, other ducts, pipes, electric wires etc.

Abrupt bends and area reductions shall be avoided, and sharp screws and other objects which can cause injury to maintenance persons or damage to cleaning equipment shall not be used in duct joints.

Access covers and doors shall be easy to open, and shall be constructed and installed to match the type and location of any thermal, acoustic or fire insulation.

Table 1 Requirements for access to duct-mounted components

Component	**Access opening to be located:**
Dampers	both sides
Fire dampers	one side
Coils	both sides
Heat recovery devices	both sides
Circular sound attenuators	one side
Rectangular sound attenuators	both sides
Filter sections	both sides
In-duct fans	both sides
Air flow control devices	both sides

A ductwork component which may be dismounted for cleaning can also be regarded as an access door on condition that its dimensions are in accordance with Table 2 (according to ENV 12097 and VDI 6022) or sufficient for the specified and documented cleaning method. Access to duct-mounted components shall be provided according to Table 1, unless the component is easily removable for cleaning, or can be cleaned through without obstructions.

Table 2 Openings for circular ducts, recommended minimum dimensions

	A	**B**
Duct diameter d mm :		
200<d≤315	300	100
315<d≤500	400	200
d>500	500	400
manhole	600	500

Table 2B Openings for rectangular ducts, recommended minimum dimensions

	A	**B**
Side length s mm		
s<200	300	100
200<s≤500	400	200
s>500	500	400
manhole	600	500

DESIGN ASPECTS

1 Space requirements

Sufficient space shall be arranged next to the equipment for maintenance and cleaning operations.

2 Location and distance of openings

The location of and distance between openings depends on the quality of extract air and also on the defined or available cleaning method. Unless the cleaning method is known or can be fixed at design stage, the distance between the openings should not exceed 10 metres, or not more than two $\geq 45°$ bends.

3 Special considerations

In the case of suspended ceilings, an access openable or removable without tools and dimensioned no less than 500 by 500 mm shall be provided at access doors or any other equipment which requires maintenance in the suspended ceiling. An unobstacled access to the access covers or doors shall be provided.

The HVAC designer shall go through with other designers (building, electricity...) that the basic requirements of Clause 2 can be fulfilled and that obstructions for cleaning due to other systems are prevented.

DESIGN AND CONSTRUCTION (INCL. MANUFACTURING AND INSTALLATION ASPECTS)

In manufacturing of ducts attention shall be paid on the grease or oil used in production - the duct should leave the factory as clean and dry as possible, but the remaining film may become a base for microorganism growth.

In design documentation the following aspects shall be specified:

-cleanliness level of ducts leaving the factory
-protection during transit
-protection during site storage
-protection of ductwork risers
-inspection and cleaning during installation and before handing over

The whole ductwork shall be inspected and, according to experiences, in most cases cleaned before handing over the installation In the handing-over documents the cleaning method shall be specified, and guidelines for reaching the points to be cleaned shall also be given.

See ENV 12097/ Annex C for more details.

CRITICAL COMPONENTS

Special attention has to be paid on the cleanliness of

-air filters
-sound attenuators
-humidifiers
-any components for measurement or control in the ductwork

The condition of these components is generally a good indicator of need for cleaning, so it is recommended to start inspection from these components. After cleaning, all these components shall be inspected to ensure that no damage has occurred and that the cleanliness and functioning are as intended.

CLEANING ASPECTS

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 are 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.

Checking the need for cleaning shall be done periodically according to Eurovent recommendation on IAQ. Visual inspection (e.g. video) should be combined with quantitative methods, e.g. tape method.

Checking the result of cleaning (normally visual inspection is enough) shall be combined with checking of functions of the system after cleaning, and readjustment whenever needed.

The manufacturer's instructions for cleaning of special components, e.g. fire dampers and sound attenuators, shall be fllowed carefully.

Recommendations for cleaning intervals are presented in Eurovent Recommendation concerning Indoor Air Quality.

References

ENV 12097:1996 Ventilation for buildings - Ductwork - Requirements for ductwork components to facilitate maintenance of ductwork systems

Document CEN/ TC 156/WG 7 N 79 rev 1 Ventilation for buildings - System Performance - General rules for ventilation and air-conditioning systems in non-residential buildings. Draft, September 1997

VDI 6022 Hygienic aspects for the planning, design, operation and maintenance of air-conditioning systems. Draft, March 1988 (in German and English)

Classification of indoor climate, construction, and finishing materials. Finnish Society of Indoor Air Quality and Climate, 1995 (to be revised 1998-99)

Recommendation concerning Indoor Air Quality. Eurovent Recommendation, January 1999 (*REC 08*)

Air filters for better IAQ. Eurovent Recommendation, January 1999 *(REC 06)*

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