Guidelines for inspection of ventilation and air conditioning systems

– *Revision of EN 15239 and EN 15240*

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The new pre-standard prEN 16798-17 dealing with the inspection of ventilation and air conditioning systems was launched for public enquiry in December 2014. Although it is based on previous standards EN 15239 and EN 15240, it includes substantial changes in structure form and content to support the requirements of the EPBD recast taking into account the lessons learnt from the implementation of the first EPBD.

Context and focus of the revision

The first Energy Performance of Buildings Directive (2002/91/EC) required all EU countries to take measures to inspect air conditioning systems of an effective rated output of more than 12 kW. Two standards had been developed to support this requirement: EN 15240 dealt with air conditioning systems and referred to EN 15239 for systems including ventilation. The European Concerted Action (Maldonado et al., 2013) as well as the European project of the Intelligent Energy Europe named Harmonac (Knight et al., 2010) identified issues on the first EPBD inspection schemes to be addressed in the revision of the EPBD standards in accordance with the EPBD directive recast (2010/31/EU).

The working group in charge of revising these standards inferred several key recommendations from these analyses, including:

- to focus on the primary objective of the inspection, i.e., to provide a report intelligible to non-expert building owners with advice on ways of reducing their energy consumption while maintaining acceptable indoor environmental conditions;
- to merge the inspection standards of technical systems into a single standard;
- to develop straightforward step-by-step actions with checklists; and
- to differentiate inspections aiming at identifying features of system operation wasting energy versus more detailed inspections requiring measurements.

The changes implemented in the new standard and detailed below reflect these aspects.

New pre-standard structure

The ventilation and air conditioning standards have been merged into a single pre-standard. Although we had considered merger with the heating standard revised in another group, both groups considered it was premature for this recast because of their present form and time constraints. The new ventilation

and air conditioning pre-standard includes 4 major clauses:

- A general clause that applies to ventilation and air conditioning systems. This clause gives general information about the purpose of the inspection and the methods. It details the information to be gathered prior to the inspection (pre-inspection) as well as the expected output of this pre-inspection.
- A clause specific to ventilation systems. This clause explains how the pre-inspection data should be used during the field inspection, and details the actual steps of the inspection leading to advice for improvements. The expected output data consists of the delivered air flow rates and the specific fan power demand which may be derived from the inventory of the system.
- A clause specific to air conditioning systems. This clause is similar in principle to the previous one. The expected output data include: the specific cooling load; the specific cooling capacity; the air conditioning efficiency; and the sizing compared to the cooling requirements of the building;
- A clause which consists mainly of two checklists of items to be reported in the inspection report.

Introduction of inspection levels

On key change in this pre-standard is that it introduces 3 inspection levels. The underlying idea is to allow member states to require a basic inspection level which, although based on visual checks without measurements, gives useful information on system operation features that are wasteful of energy. Therefore, it is left to the member states or the person ordering an inspection to require additional checks, in particular, measurements which are included in levels 2 and 3.

Output and follow-up of pre-inspection

Pre-inspection becomes an essential part of the inspection process. Its output shall include:

- Identification of lacking/outdated information. The standard provides a checklist;
- Advice to building manager on completing missing issues;
- Priority areas for the actual inspection for collecting missing information during inspection on site;
- Priority areas for the inspection where foreseen deviations from good practice are likely to affect the system performance.

As a follow-up, the first step of the actual inspection is to collect missing information, to check correspondence between the information gathered and the installed components, and to report any differences.

Inspection report

This pre-standard includes a summary in form two checklists of all items that shall be included in the inspection report. There is no need to issue 2 reports in case of air conditioning systems including ventilation. The checklists can be seen as a quality control tools for

Table 1. Inspection levels as defined in prEN 16798-17.

Inspection level [a]	Type of inspection	Description
Checklist 1	Pre-inspection and functional checks	This basic level of inspection has two purposes: a) to gather all relevant documentation on the system type and size, and to identify any priority inspection areas where the design, installation or operation of the system departs from good practice in a manner likely to affect its energy consumption; b) to non-intrusively identify on site (normally visually) features of system operation that are wasteful of energy. It does not include measurements.
Checklist 2	Functional measurements	This level requires, in addition to level 1, measurements to check that the system is operating as intended and to identify sources of energy wastage. These can include, for example, specified design conditions and set points.
Checklist 3	Special measurements	This level requires, in addition to level 1 and 2, additional measurements to provide more detailed assessments of system performance. Such measurements can, for example, cover extended periods of time, or technical aspects such as in-situ component performance.

[a] Level 1 is the minimum requirement and is sufficient for EPBD inspections of air conditioning systems.

Table 2. Excerpt of Table 3 in prEN 16798-17 "Information to be given in the inspection report depending on the method (1 of 2)".

Information	Method		Part
	1	2	
General			
Name, address and status of the person and organization in charge of the inspection.	X	X	—
Official designation and address of the property.	X	X	—
Name and address of the building owner.	X	X	—
Date of the inspection.	X	X	—
Pre-inspection / Compliance with design documentation			
Status of the documentation or information, see Table 4, including identification of lacking and outdated documentation	X	X	5.3.6
Priority areas for the collection of missing information during the inspection on site.	X	X	5.3.6
Priority areas for the inspection where the design installation appear to depart from good practice in a manner likely to affect its performance.	X	X	5.3.6
Any difference between documentation and actual installed components.	X	X	6.3, 7.3
Any difference between working or as-installed drawings and the actual system.	X	X	6.3, 7.3
Aspects of the inspections simplified or reduced because of clear evidence that a good practice program of maintenance is being carried out.	X	X	6.4.1.1, 7.4.2

Table 3. Excerpt of Table 4 in prEN 16798-17 "Status of the documentation or information".

Document or information	Status of the documentation			Method		Part
	Available	Not available	Outdated	1	2	
Design documents which define the relevant design criteria against the actual installation and use include every items detailed in 5.3.2.				X	X	5.3.1, 5.3.2
System manufacturer and model (type) of the ventilation system.				X	X	5.3.1, 5.3.2
Additional documentation, indicating any modifications or alterations of the building, the system or the use since the original documents.				X	X	5.3.1

the inspector as it summarises all requirements stated in the pre-standard including reference to the relevant paragraph.

Additional information in the technical report

The pre-standard comes with an accompanying technical report including important additional information. In particular, the technical report includes a number of indicative checklists for specific items to be inspected depending on the chosen inspection level. While these checklists give a solid basis for implementation in the member states, it allows them to have some flexibility in the extent of the inspection.

Conclusion

The inspection of ventilation systems and air-conditioning systems is now dealt with in a single pre-standard, with an accompanying technical report. The pre-standard defines 3 inspection levels, including one basic level with no measurements which is sufficient to comply with the EPBD requirements. The new pre-standard gives the essential steps for the inspection and clarifies the outputs of each step. It gives a number of checklists which should help for its implementation and use. Note however that significant changes may occur after the public enquiry process depending on the nature of the comments. This second phase in the new standard development is expected to start mid-2015.■

References

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