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Briefing Note for the Air Handling Unit – Construction Panels Fire Rating Assessment

VENTILATION TECHNICAL PLATFORM (VTP)- LIBRARY OF TECHNICAL GUIDANCE

Introduction

HTM 03-01 Part A chapter 9 clause 9.14 table 8 requires that ALL air handling units (AHU's) should as a minimum standard, have panels constructed and consisting of a double metal or composite skin with sandwiched insulation conforming to 'Euroclass A' fire rating. All AHU's should also be compliant to BS EN 1886:2007/09 standards as stated classes for performance. BS EN 1886:2007/2009 is the current and reference standard and all AHU's should conform with all requirements of the standard.

Scope

The purpose of this document is to provide an overview approach of how to achieve conformance to the fire requirements outlined within table 8 of chapter 9 of HTM 03-01 Part A using the conformance requirements of BS 1886: 2007/2009.

This document set out at the high-level options to address and provide assurance for suitable conformance to the standards and intentions as laid out in the HTM 03-01 Part A standard for AHU construction.

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General

Under BS 1886:2007/09 reference is made to EN 13501-1, Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests.

It is important to note that reaction to fire is different from resistance to fire tests. BS EN 13501-1:2018 states

3.1.15, Reaction to fire - response of a product in contributing by its own decomposition to a fire to which it is exposed under specified conditions.

Fire resistance is the degree to which a material resists fire from one side of it to the other measured over time and the fire performances measured will vary depending on the material use. i.e. pipes have different resisting performances to fire dampers, which have different resisting performances to non loadbearing fire resisting walls.

Where 'fire rating' is referred to in table 8 as Euroclass A it is made in reference to reaction to fire and not to resistance to fire tests.

BS 1886:2007/09 states under chapter 10 that:

10.1 General

An air handling unit has many functions, and therefore it contains many components which have to be serviced and cleaned, resulting in a complex casing with many joints and inspection doors. It is much more difficult to achieve full fire resistance in the casing of a unit than in a duct. On the other hand, the surface area of a unit in a typical application is very small compared with the area of the entire ductwork. Also, the fan, coils, dampers and other components of a unit form an obstacle to the spreading of fire.

An air handling unit is a complex sub-system which includes many functions and components. For technical and economic reasons, non-metallic materials are frequently used in its construction, which may result in a risk of increased fire load and/or generation of toxic gases in the case of fire. The latter can be critical because there is a connection to the whole or part of the building through the ductwork.

It is therefore reasonable to minimise the amount of inflammable materials.

By using suitable filter material and/or implementation of frequent cleaning actions, inflammable deposits within the unit shall be quantitatively limited in such a way that they minimize fire risk.

10.2 Material

There are two options for AHU materials:

Option 1 - Non-combustible materials (material classes A1 or A2 s1 d0 in accordance with EN 13501-1).

Option 2 - Flame resistant materials (material classes A2, B, C-s3 d2 in accordance with EN 13501-1).

Option 2 is permissible in case the AHU is separated by fire and smoke dampers. The fire and smoke damper prevents the carry-over of smoke and fire spread into the ventilated areas. It does not have to be installed directly at the AHU, or as a part of the unit, it shall be at the penetrations of the fire barrier.

The typical arrangements for all healthcare AHU's is to include automatic motorised fire dampers with low smoke leakage (these are referred to within BESA DW 145 as MFD's) into the design of the ventilation system where it passes through a fire resisting compartment wall or floor such as a plantroom and therefore either option may be considered as appropriate for a healthcare ventilation system design. It should be noted within BS 1886 that other components or sealants are allow reactions to fire that exceed class C-s3 d2.

Note Option 1 minimises the amount of inflammable materials.

Normal inflammable materials may be used for coatings with a thickness of not more than 0,5 mm in installed condition (material class E- d2 in accordance with EN 13501-1).

Inflammable materials are permissible, if no requirements exist concerning fire protection.

Inflammable materials are not suitable for applications where:

1. air temperatures exceed 85 °C or
2. excessive deposition of inflammable substances could be expected (e.g. exhaust air handling units for kitchens).

The majority of existing and new AHU's commercially available lack independent documented evidence, or do not appear to fully comply with the 'Euroclass A' test methodology if option 1 within BS1886 were to be designers' requirements.

If AHU manufacturers/suppliers can provide evidence of suitable reaction to fire evident to class A1 or A2 s1 d0 or better in accordance with EN 13501-1 for testing of all materials which make up an AHU panel section, then no issue relating to conformance will be considered to exist, whether there are automatic motorised fire dampers with low smoke leakage at the fire resisting compartments or not.

As an alternative option (option 2) based on the information outlined above if the AHU ventilation system installations are installed with suitable automatic motorised fire dampers with low smoke leakage protection at the fire resisting compartment, it is considered sufficient providing that the AHU manufacturers/suppliers can demonstrate a suitable level of reaction to fire class of A2, B, C-s3 d2 or better in accordance with EN 13501-1 for testing of all materials which make up an AHU panel section. This would be enough to demonstrate conformance to the intended 'fire rating' requirements of table 8 in chapter 9 of HTM 03-01 Part A and it would be deemed to have been satisfied.

It should be noted with both options that within BS 1886 that other components or sealants are allowed reactions to fire that exceed class C-s3 d2 of option 2.