Test Procedures for the classification of Membrane Structures regarding Fire Safety Performance
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ABSTRACT

In any subject area related to the provision of safety, failure is typically the most effective mechanism for evoking rapid reform and an introspective assessment of the accepted operating methods and standards within a professional body [1]. When it comes to fire safety, lessons can be learned from the reaction of the cladding system - the roof and/or the façade – in case of a fire inside the building.

As an example, the reaction to fire at Condor Campus, the headquarter of Condor at Frankfurt International Airport in western Germany, will be discussed. A flight simulator had caught fire in a seperated test hall of the Condor office building at Frankfurt airport. The roof of the test hall is cladded by an 3-layer ETFE foil cushion system. The specific response to fire of a membrane cladding system is not taken into account by actual classification systems, neither on national levels nor by the European classification according to EN 13 501-1 [2], even though the background information concerning the reaction to fire classification of a product given in Annex A of the EN 13 501-1 states under clause A.2.2, that the validation of the classification of products in terms of their contribution to fire growth and post flashover fires is based on a large scale scenario [2]. The reference scenario is documented in ISO 9705-1:1993 *Fire tests – Full scale room test for surface products* [3]. Thus, fire classes defined according to EN 13 501-1 [2] cannot be understood without detailed knowledge gained from a full-scale test of whole the cladding system. Unfortunately, the reference standard for a full-scale room test cited in EN 13 501-1 [2] is not suitable for membrane cladding systems. In close cooperation with RISE, the Research Institute of Sweden nearby Gothenburg, Vector Foiltec has identified ISO 13784-1 *Reaction to fire test for sandwich panel building systems – Part1: Small room test* [4] as perfect for a test of the reaction to fire performance of membrane structures.

The small room test was carried out twice on a 3-layer clear ETFE foil cushion system and on a 3-layer heavily printed system. Results as well as the consequences for an upcoming standard for membrane building cladding systems will be discussed.

REFERENCES

[1] Cowlard, Adam, Adam Bittern, Cecilia Abecassis-Empis, José Torero, “Fire safety design for tall buildings”, *The 9th Asia-Oceania Symposium on Fire Science and Technology. s.l. : Procedia Engineering* ***62***, 169-181 (2013).

[2] EN 13501-1:2010-01, “Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests”. Berlin, Germany, Beuth (2010).

[3] ISO 9705-1:2016, “Reaction to fire tests - Room corner test for wall and ceiling lining products - Part1: Test method for a small room configuration”, Berlin, Germany, Beuth (2016).

[4] ISO 13784-1:2014-02, “Reaction to fire test for sandwich panel building systems – Part1: Small room test. Berlin, Germany, Beuth (2014)