

**OPTIMAL DESIGN OF DOUBLE-SKIN ALUMINIUM FACADE SYSTEMS**

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**ABSTRACT**

This paper focuses on the structural behavior and the optimal design of the new double-skin aluminium

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ventilated façade system E2VENT, which will be connected on existing buildings in order to enhance their energy performance. The double-skin façade systems are nowadays extensively used in modern construction due to the fact that they can be manufactured as building façades to possess all those high efficiency properties prescribed by the designer; among these properties predominant role play the safety of the supporting and anchoring system, the high strength-to-self-weight ratio, and the serviceability requirements of structural members.

From a structural engineering standpoint, although usually the double-skin façade systems are considered as secondary structural systems, their structural performance has to be meticulously analyzed and designed to fulfill modern structural codes requirements because they are in most cases subjected to strong environmental actions.

The structural response of a façade systems subjected to normative load combinations is numerically investigated within the Eurocodes framework. In addition, an optimal structural design of the supporting aluminium system is carried out by applying advanced finite element analysis schemes and taking into account structural design principal criteria. The proposed optimal structural design approach leads to useful conclusive remarks for the selection of the basic structural members as well as the anchor details with reference to the dominating actions being the wind and the earthquake action. The proposed methodology is illustrated by means of a numerical application on a typical building façade case study.

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