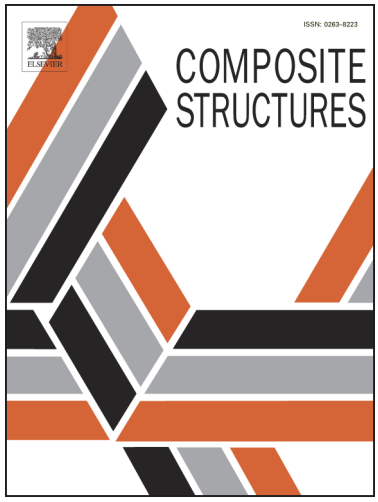

Aramid/glass fiber-reinforced thermal break – structural system performance

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Aramid/glass fiber-reinforced thermal break – structural system performance

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Abstract

Energetically critical points in thermally insulating building envelopes are caused by penetrations of building interior concrete slabs through the envelope insulation layers to create external balconies. A new highly insulating balcony thermal break element has been developed which enables both structural continuity and thermal insulation in the envelope's insulation layer. The element is composed of combined structural and thermally insulating AFRP/GFRP loop and sandwich components. The system behavior of the thermal break embedded between a building interior and an exterior balcony concrete slab has been investigated. The experimental results obtained for full-scale concrete beams showed that a statically determined truss model can be used to calculate the section forces in the thermal break components. The balcony deflections can be estimated by adding the deflections caused by a concentrated rotation in the thermal break to those of a continuous concrete slab. The failure modes are ductile due to prevailing concrete failures. The maximum balcony span of the system is approximately 2.5 m and is limited by the anchoring resistance of the AFRP loops in the adjacent concrete slabs.

Keywords

Aramid; Balcony; Sandwich; Thermal break; Thermal bridge