Structural Concept of Novel RPC Sandwich Façade Elements with GFRP Connectors

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Abstract

The SESBE research project aims to develop novel smart sandwich façade elements with high insulating capabilities while providing a reduced thickness in conjunction with superior mechanical and durability properties. The present paper mainly focuses on the verification of the mechanical performance of the glass fibre reinforced polymer (GFRP) connectors in the façade element composed of reactive powder concrete (RPC) panels with foam concrete insulation between them. Because of the reduced thickness of the large façade elements, the performance of the connectors is critical for the entire structural concept. A description of structural performance and results based on experimental methods and finite element (FE) analysis are presented.

Keywords: Sandwich façade elements, reactive powder concrete, foam concrete, glass fibre-reinforced polymer connectors, carbon fibre reinforcements, structural performance.

1 Introduction

1.1 Background

There is an extensively increasing demand for better energy efficiency of the buildings we live and work in. The European construction sector attempts to tackle this great challenge by developing and implementing energy efficient materials and processes. The FP7 project SESBE (Smart Elements for Sustainable Building Envelopes), funded by the European Commission, aims at developing sandwich façade elements with high insulating capabilities while providing a reduced thickness in conjunction with improved mechanical and durability properties.

The overall objective is to develop smart façade elements, which are lighter, thinner and more adaptive than existing solutions through the utilization of nanomaterials and nanotechnology. The use of “smart“ cost effective raw materials and cost saving technologies are expected to

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