



Politechnika Śląska

Wydział Budownictwa

Dyscyplina: Inżynieria Lądowa, Geodezja i Transport

ROZPRAWA DOKTORSKA

„Nośność i odkształcalność ściskanych murów
z betonu komórkowego skrzepowanych konstrukcją żelbetową”

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Gliwice, wrzesień 2024



1. Summary

The aim of this doctoral thesis is to present the effect of confinement composed of the system of reinforced concrete elements (reinforced concrete ties and bond beams) in masonry structures made of autoclaved aerated concrete (AAC). The performed research included material tests, both fundamental and complementary, computational analyses performed with the software based on the finite element method, analyses based on standard algorithms, and analyses based on rebar models. Laboratory testing of masonry structures without an opening and with a full-scale opening subjected to monotonous compression was a part of the fundamental tests. The wall models were confined with reinforced concrete elements made of ordinary concrete and non-shrinkable lightweight concrete. These fundamental tests were completed with material tests conducted on masonry units, thin-layer mortar, precast reinforced concrete lintel beams made of AAC, concretes, and reinforcing steel used in confining elements. Additionally to the fundamental tests, the complementary tests were conducted. They consisted in confining masonry with reinforced concrete elements and performing cast-in-place reinforced concrete lintel.

The doctoral thesis was designed to determine:

- the effect of absence of mortar in head joints,
- the effect of filling head joints with mortar,
- the effect of wall confinement,
- the effect of performing an opening,
- the effect of different types of confinement,
- the effect of using ordinary concrete to prepare confining elements,
- the effect of using lightweight concrete to prepare confining elements,
- the effect of replacing the commercial AAC lintel with reinforced concrete lintel.

Validation of computational rebar model and verification of computational methods specified in the design standard EC6 were the important part of the research.

One of aims of the doctoral thesis was also to develop methods of performing AAC masonry structures characterized by greater resistance, and the method of applying autoclaved aerated concrete in poor conditions (mining areas, flood risk areas, areas subjected to seismic actions, etc.). They can contribute to development of masonry structures made of AAC based on the interaction between the masonry structure and reinforced concrete confining elements in the masonry



Tomasz Rybarczyk. Rozprawa Doktorska. Nośność i odkształcalność ściskanych murów z betonu komórkowego skrzepowanych konstrukcją żelbetową

structure. Complementary works were performed to compare masonry structures made of system elements, including precast lintels made from AAC, with confined masonry structures with lintels made from reinforced concrete.

The above tests and the adopted designing methodology are intended to implement the results of this research work into practice. It will be achieved by preparing materials for designers and contractors, who use AAC confined wall in their construction projects.

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18.09.2024.
