

Adhesive bonding of the ceramic claddings in the facades of residential buildings

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Introduction

Recently, clinker tiles have been used more and more often for aesthetic reasons. In order for them to be used for many years, their proper adhesion to the substrate must be ensured. Most often, this substrate is an insulation layer and the bonding of the layers is to be ensured by a layer of glue between the tile and the insulation layer. The process of applying the adhesive to the insulation layer should be carried out very carefully, because if it is not taken care of, it may result in poor or even no bonding of the tile with the substrate. Failure to do so may result in the tiles falling off the wall. To assess the value of the adhesion between the layers very often pull-off method is used.



Figure 1. Exemplary buildings with ceramic claddings a) in Porto and b) in Poland

Methods

According to the standard to achieve meaningful results it was necessary to obtain the samples of the size that allows to place the edge of the disc a minimum of 50mm from the edge of the specimen. After drilling, the surface of the discs was vacuumed and cleaned with acetone without compromising the integrity of the cladding. Then the steel discs (cleaned with acetone) were glued using Poxipol two-component adhesive agent. The glue was applied to the surface of the puck and the surface of the sample. The apparatus was levelled and programmed to complete the test in a maximum of 100 seconds at a loading rate of 0.05 MPa/sec. The result of the test is recorded on the instrument along with a graph of load increase over time. After entering the relevant data into the apparatus, the pull-off strength was automatically calculated.



Figure 2. The view of: a) pull-off tests apparatus, b) steel disc glued to the surface

Results and their brief analysis

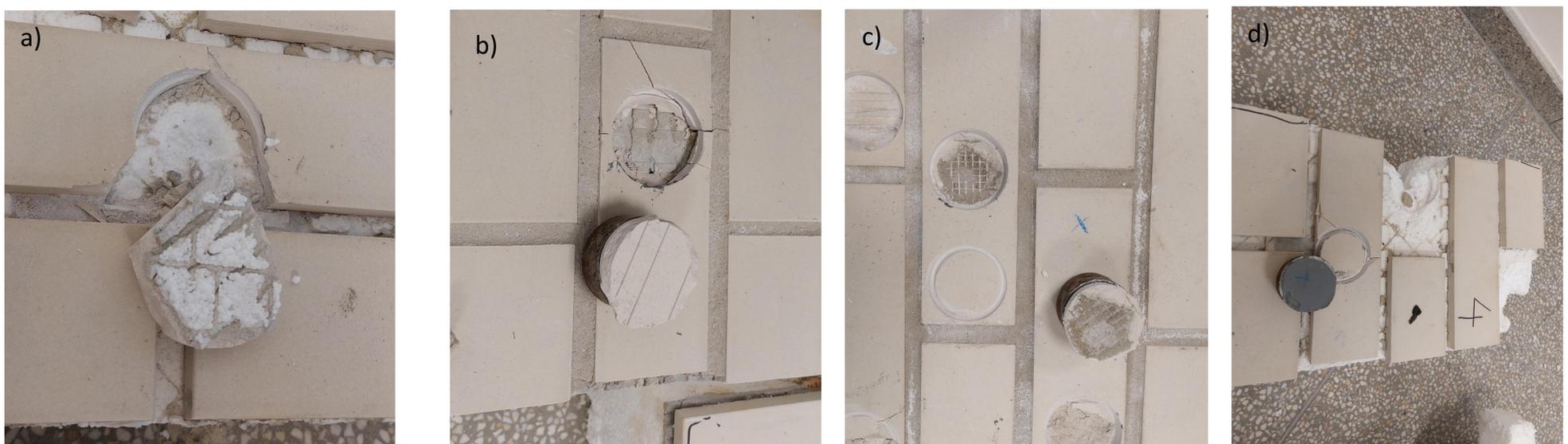


Figure 3. The view of: a) cohesive failure model in the insulation, b) adhesive failure model between the cladding and the glue, c) cohesive failure model inside the glued layer, d) adhesive failure between the steel disc and the cladding

Analysing exemplary results presented in figure 3a and 3c it can be seen that the model of failure is cohesive in „the weakest” material tested. This type of failure is the most expected and during the tests was also characterized with the highest value of pull-off strength that was approximately 0.6 MPa. In the contrary the least wanted model of failure is adhesive between the cladding and the glue, presented in figure 3b. That may be a results of not sufficient preparation or not following the all necessary guidelines of the standards. It was also proved by the lowest values obtained during pull-off tests that were lower than 0.1 MPa and are not acceptable to obtain in such structures.

References

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