

PERFORMANCE OF EXPANSION AND BONDED ANCHORS INSTALLED TO CONCRETE IN COMPARISON TO LIMESTONE AND GRANITE

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Abstract

The design method and basic design parameters of applying expansion and bonded anchors for concrete is thoroughly studied. To the contrary, there are still uncertainties related to the usage and application of anchors for rock that has an inhomogeneous nature.

Mostly, a local „in-situ” pull-out test is required before fixing into rocks or fix rocks, therefore the appropriate anchorage could be determined –including the embedment depth and load transfer type - in accordance to the current conditions. This fact indicates the importance of giving valuable results for rocks and predicting the behavior of these steel-rock connections.

In this experimental study, a torque controlled expansion anchor (*fischer* FBN II 8/50) as well as bonded anchors (*fischer* FIS V – vinyleaster, *fischer* FIS EM-epoxy) with Ø8 threaded rod were tested. The embedment depth was 50mm. Two types of freshwater limestone (*Süttő/Hungary*), granite (*RosaBeta/Hungary*) and even five different strength classes of concrete (C20/25, C25/30, C40/50, C45/55, C55/67) were investigated. 93 pull-out tests were carried out focusing on the application of tension stress, the displacement related to the punching force, and even the deformation of surface was measured near to the fixing point. The tests were implemented in two series on rocks – normal conditions and after a 50 cycle freeze-thaw test.

The relationship between the compressive-, flexural-tension strength values and the critical punching force for concrete do not show the same trend as the ones of rocks. This study calls the attention to the importance of porosity on the performance of the anchorages.

Keywords

expansion anchors, bonded anchors, pull-out test, limestone, granite, concrete, strength properties, primary porosity

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