

SUMMARY

The importance of the maintenance and rehabilitation of existing structures has grown significantly in recent years. This accompanied by a very important decrease in the investments in the new construction, again after a period of growth in the number of constructed buildings. These facts have motivated that, currently, there is a large park of buildings need to be repaired and strengthened.

The columns are the elements which failure may cause a complete collapse of the structure. In the case of reinforced concrete columns, it is possible to intervene well by means of a strengthening or a repair, whose goal will be to increase or to maintain its resistance, respectively. In fact, the repair of damages of different scope and magnitude on the outside of a column by means of repair mortars is an operation very usual in rehabilitation works. There are even European standards that prescribe the characteristics of the mortars to be used.

Despite this, there are no references to study the effectiveness of a repair in reinforced concrete columns, which gives rise to a large uncertainty in the level of security that is reached in the repaired element. This lack of experimental results, together with the importance of this type of the action is that has motivated this investigation, which has studied the effectiveness of repair, using pre-bagged concrete repair mortars, of columns subjected to axially loaded. It has been determined the influence of the different geometric, mechanical and construction variables that they affect to the repair in the compressive strength of the column repaired. In order to do so, an experimental study has been realized in laboratory, in which the three most frequent cases of repair have been tested: complete repair of 4 sides, complete repair of one side and patch repair, with the variables raised in this investigation, kind of mortar (Class R3 and R4) and use or not of bonding primer.

The final aim of this investigation will be to determine the efficacy of the repair according to the conditions in which it has been realized and to obtain a series of basic rules of design and execution of the repair.

The results are analyzed and compared with the columns pattern, undamaged section without repair. The results of the investigation carried out indicates that repairs carried out with mortar Class R3 presented excellent results, while mortar Class R4, for the tested columns, only restores partially load-carrying capacity. In the case of the repair to 4 sides, if used a mortar Class R4 the load-carrying capacity on the column repaired only reached 64% of the original. In the case of the repair to 4 sides with mortar Class R3, the use of bonding primer does not have significant influence on the recovery of the load-carrying capacity. Not this way if there uses a mortar Class R4, where the use of a bonding primer improves significantly the result. Patch repair restores practically the load-carrying capacity of the structural element for both mortars (R3 and R4). In this case the use of bonding primer only has significant influence in the repair using mortar Class R4, showing an improvement of 9% more than if bonding primer is not used. In the complete repair of one side whit mortar Class R3 restores 97% of the load-carrying capacity loss while with mortar Class R4 only reaches to 66%, and without influence of the use or not of bonding primer.

These results highlight the importance of the choice of the system, method and materials of the repair. These must be compatible with the materials and the state of the original structure.