

ABSTRACT

During the last years, the European Standards have been changing continuously, concerning punching, a fact which means that not only is there space for improvements but also uncertainty about the dealing with the corresponding problems. Recently a section of new wing of the “Charles de Gaulle” airport in Paris has collapsed a short while after its opening and the reason was the punching of the solid slab. The Concrete Code in force, compared to the new corresponding codes EC2 and DIN 1045-1, could be characterized as unsafe concerning some choices. Not to mention the fact that ambiguities are pointed out which have to be removed in the next edition. Probably, none of the 22 chapters include so many points, which cause perplexity to the users of the Code. Indicatively the following are mentioned; Arrangement of shear reinforcement, the minimum reinforcement, factor b for seismic actions, rectangular loaded areas, overlapping of adjacent basic control perimeters, support of the solid slab in walls’ external corner, static analysis of irregular cases, serviceability check etc.

The fuel of the present dissertation came from the Code’s article 9.1.7. In this article, the Greek code accepts the structures without beams under certain circumstances which mainly include the existence of appropriate walls for anti-seismic protection and also some certain indications which concern the flange width in the underdeveloped existing collaboration between columns and solid slabs. Furthermore, the chapter’s 9 comments perpetuate the equivalent frame method for the columns’ regular arrangement where you can notice that the solid slabs’ load is considered twice, in the two orthogonal dimensions x and y . Moreover, it must be mentioned that the Greek and the German edition whenever they face the problem of eccentricity, turn to the accepted values b . However, the corresponding English edition includes a detailed expression which introduces in combination with the known shear punching force, the corresponding bending moment.

The aim of this dissertation is the investigation of the seismic response of structures without beams. For this purpose a variety of buildings were examined; a) with and without basement b) one-storeyed and nine-storeyed and c) without beams and with edge beams. Shell elements and the response dynamic analysis for two seismic hazard zones were used for the modeling and the analysis of these buildings. Finally, the result was the stress of the seismic load combination. Besides that, the influence of the non-seismic load combination was also examined. The evaluation of the seismic and non-seismic stress was done according to the detailed expression, which has been adopted by the English edition of the Eurocode 2 and the correlation with the adopted values of the Greek and German code and of the initial Eurocode was attempted through this expression.