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# SEISMIC UPGRADING OF EXISTING RC STRUCTURES BY METAL PLATE SHEAR WALLS: FULL SCALE TESTS AND FEM MODELLING

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## TARGETS OF THE RESEARCH

- Implementation of different solutions of Metal Plate Shear Walls (MPSWs) for seismic upgrading of existing RC structures starting from full scale tests performed on a real case study
- Development of drilled configurations of MPSWs to reduce local strengthening interventions on existing RC members
- Parametric analysis aiming at individuating the optimal percentage and disposition of holes into the plate devices
- Setup of simplified checks criteria for the RC beam loaded by full and perforated SPSWs

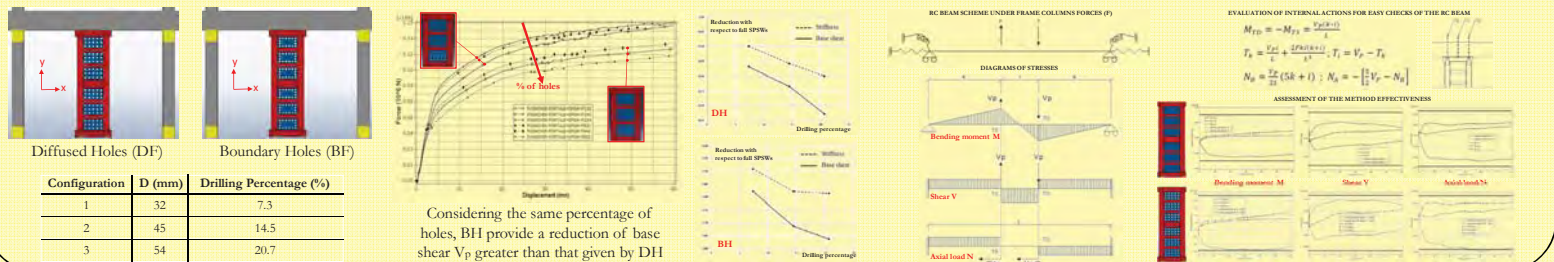
## NUMERICAL CALIBRATION OF TEST RESULTS ON FULL AND PERFORATED STEEL PLATE SHEAR WALLS (SPSWs)



## EXPERIMENTAL TESTS AND FEM MODELS ON A FULL SCALE RC STRUCTURE: A CASE STUDY WITHIN THE ILVA-IDEM PROJECT



## PARAMETRIC ANALYSIS ON PERFORATED SPSWs AND SETUP OF EASY CHECK FORMULAS FOR THE LOADED RC BEAM



## OBTAINED RESULTS

In the experimental tests steel panels (SP) and aluminium panels (AP) increase the bare RC structure strength of 10 and 11.5 times, respectively. Moreover, the stiffness of the RC structure retrofitted with SP and AP is 2.5 and 2 times, respectively, that of the original structure. Finally, AP allow the retrofitted structure to attain an ultimate displacement about 2 times greater than that of the same structure equipped with SP. Hysteretic cycles of AP are significantly larger (also more than twice) than SP ones. In the FEM analyses it is found that perforated SPSWs with BH allow to reduce much more the shear strength offered by full panels with respect to drilled SPSWs with DH. In addition, for both devices, as the drilling percentage increases, the stiffness does not reduce significantly. In conclusion, simplified relationships are derived to perform safety checks of the RC beam loaded by the SPSW frame columns. These formulas, applied to the case studies considered, are on the safe side in predicting the internal stresses acting on the beam.

## REFERENCES

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