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Resistance of roofs to tephra fall: full scale tests on obsolete technologies.

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Recent surveys (1996-2000) on roof structures carried out in Vesuvian area highlight that a small, but significant percentage (10-15 %) of such structures are built with obsolete technologies (timber, masonry vaults, steel beam with light infilled material, r.c. SAP). As a result, the estimation of the limit loads of such typologies against tephra fall plays a crucial role in any impact assessment of the buildings in the Vesuvian area under different possible eruptive scenarios. This in turn has a consequence for emergency planning. The main difficulty in the evaluation of the limit resistance of existing old structures are represented by the *estimation* of material (concrete and steel), the assessment of health (yield resistance, level of integrity) and in some cases of the resistance of infill (non structural) material. Spence et al. (2004) illustrate a semi-empirical methodology based upon “limit analysis theorem” that takes in account, by means of empirical coefficients, the reduction in strength due to material aging, the increase of resistance from the effect of non structural material (mortar, terra cotta tiles, flooring) and the extreme *restraints*.

In this work we present the results of some static tests driven to failure on timber and steel floors, with testing on beams as well as on infill materials. In particular we found that the limit load values obtained by on-site tests are in concordance with the semi-empirical methodology suggested by Spence et al. (2004).