



## Proper dimensioning of stone paving slabs

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In Europe, dimensioning of stone paving slabs is usually made according to the European product standard EN 1341: Slabs of natural stone for external paving – Requirements and test methods. An informative annex provides guidelines for determining the slab thickness depending on the flexural strength, traffic loads and surface dimensions of the slab.

The present edition of the standard has been updated with a possibility to use different safety factors depending on the type of foundation, e.g. paving over a bound construction, unbound or over a gap supported on two or four sides or four corners. In addition, the safety factors differ depending on the length of the slabs. Slabs larger than 600 mm are “punished” by larger safety factors. However, these safety factors are not uncontroversial. A project was therefore undertaken to compare the calculated thickness of paving slabs strictly according to the standard requirements and the measured breaking load of tested slabs on different foundations/supports.

The standard way of determining the thickness is based on measurement of the flexural strength of test prisms according to EN 12372: Natural stone test methods – Determination of flexural strength under concentrated load, e.g. with 50x50x300 mm sized prisms. The conversion into breaking load of the final slab and its thickness is based on a standard beam theory, also given in the annex of the standard.

The questions to be answered by the project were whether the beam theory is appropriate for slabs, if the safety factors for different foundations are realistic and if the difference in safety factors above and below 600 mm length is relevant.

The Evja granite from the SW Sweden was used for the tests on unbound and bound paving. The Offerdal schist from NW Sweden was used for testing paving over a gap with support on four corners.

A large number of granite slabs ranging from 350 x 350 x 40 mm up to 1050 x 1050 x 40 mm were tested. As regards the schist specimens, the four following, commonly used dimensions were tested: 500 x 400 x 25 mm, 500 x 400 x 30 mm, 800 x 400 x 25 mm and 800 x 400 x 30 mm.

In short, the results clearly indicated that the product standard recommendations generate very conservative thicknesses, i.e. too thick slabs. The use of the recommendations in the standard’s annex thus results in unnecessarily high consumption of natural resources, increased environmental loads due to heavy freights, handling and more expensive paving construction. All test results will be presented together with a reasoning about an improved dimensioning system.