INTERNATIONAL **AEGEAN** SYMPOSIUM ON INNOVATIVE INTERDISCIPLINARY SCIENTIFIC RESEARCHES - II

PROCEEDING BOOK

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November 1-3, 2019

Antalya/TURKEY

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EVALUATION OF ABRASION RESISTANCE OF DIFFERENT ROCK TYPES BY BÖHME ABRASION TEST

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ABSTRACT

Many different types of rocks in the earth are used as natural building stones in many engineering structures such as flooring, pavements, claddings, treads, curbs, decorations, cut stones, monument industries etc. Natural building stones are exposed to abrasion in areas where they are used, in particular under destructive agents such as friction and impact. Abrasion resistance is one of the characteristics that determine the using life of natural building stones. One of the commonly used methods for determination the resistance of rocks exposed to abrasion is Böhme abrasion resistance test.

The aim of this study is to evaluate the relationship between Böhme abrasion resistances and physico-mechanical properties of magmatic, metamorphic and sedimentary type rocks, which have been used in the construction industries, collected from different regions of the Anatolia (Turkey). For this purpose, dry density, porosity, water absorption by weight, P-wave velocity, Schmidt hammer rebound value, uniaxial compressive strength values and abrasion resistance of the rocks were determined. The relationship between physico-mechanical properties and Böhme abrasion resistances of the rocks used in this study was investigated by simple regression analysis. According to the results obtained from the simple regression analysis, strong negative relationships were determined between Böhme abrasion resistance and uniaxial compressive strength, P- wave velocity and Schmidt hammer rebound values, and weak negative relationship was detected between Böhme abrasion resistance and dry density. However, weak positive relationships were determined between Böhme abrasion resistance and porosity and water absorption by weight. With simple regression analysis, it was determined that the coefficients (R^2) of the equations developed to estimate Böhme abrasion resistance of natural building stones are ranging from about 0.40 to 0.90. Additionally, it can be said that the use of equations obtained from simple regression analysis to determine the abrasion resistance of natural building stones is more practical than comparatively difficult and long-lasting experiments performed to detect their resistance. According to the data obtained from this study, it is determined that uniaxial compressive strength, P-wave velocity and Schmidt hammer rebound values are more convenient to estimate abrasion resistance which is of great importance in determining the usage of different rocks as natural building stone.

Keywords: Böhme abrasion resistance, Simple regression, Physico-mechanical properties, Natural building stone