



## **Engineering Geological Atlas of Rocks in Slovakia – interactive database of the crushed stone**

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The contribution deals with the behaviour, properties and use of the crushed rocks in Slovakia. Due to the enormous deterioration caused by the Alpine orogenesis and younger fault tectonics (Tertiary/Quaternary) of rock masses in Slovak Carpathians, the majority of excavated solid rocks are used mostly as aggregates - crushed stones. The variety of geological structures, their exceptionally high tectonic deterioration and inhomogeneity caused, that only a few rock formations offer rocks usable as a dimension stone (travertine, marble, sandstone, rhyolite, andesite, limestone, quartzites). The tectonically weakened rock masses are subject of progressive decay, mainly due to the weathering, which is accelerated by the technical excavation in mines, road cuts etc. and by the atmospheric influences. All those aspects are decisive for the optimal use of the crushed rocks in constructions (railway fillings, highway and road embankments, stabilizing fills, rockfill dams, river levees, dam revetment, etc.), as well as for the heaping of unsuitable rock material. The main amount of crushed stone in mountainous regions of Slovakia is excavated in quarries, during the highway and railway tunnelling, at large highway or road cuts, mining activities, etc.

The investigated engineering geological characteristics and properties of crushed rocks are the subject of the comprehensive “Engineering geological atlas of the rocks in Slovakia”, which compilation is in the final phase. The investigation results of chosen excavation sites (both abandoned and under operation) are presented in the form of unified documentation sheets forms, which involve the general excavation site description, main rock mass structural characteristics (blockiness, loosening, etc.), pet-

rographical composition and properties of the crushed stone material.

Further, we present an overview of the lithological types of solid rocks providing the crushed stone in Slovakia, their structural parameters and the typological classification according to crushed stone properties and use in individual types of engineering structures. This part is based on the use of laboratory geomechanical techniques, aimed at the determination of physical and mechanical solid rock properties on regular and irregular rock samples, which reflect the stone durability. The following characteristics were estimated: rock density, porosity, water absorption, uniaxial compressive strength (dry  $\sigma_{cd}$ , saturated  $\sigma_{cw}$  and after freeze/thaw cycles samples  $\sigma_{cf}$ ), calculated softening ( $C_s = \sigma_{cw}/\sigma_{cd}$ ) and freezing coefficients ( $C_f = \sigma_{cf}/\sigma_{cd}$ ). Porosity, water sorption, strength characteristics, together with tests in  $\text{Na}_2\text{SO}_4$  solution, further micro-Deval test for the determination of the crushed rock resistance to wear), slake durability test (SDT) and laboratory freeze/thaw long - term weathering tests were regarded as most suitable indicators of the quality of the crushed stone.

The available data concerning the properties (according the EU standards) and the durability of solid rock types from main geological formations of Slovak Carpathians are decisive for their individual use in all branches of the civil engineering.

All the data obtained from the field and laboratory investigation will be stored in a relational database. The base is formed by main table, which contains the basic information about the investigated site. The main table is joined with the secondary relational tables that stores information about the rock mass structure, rock material, geomechanical laboratory tests, images, etc. The data processing has been made in a GIS environment aiming at the creation of the interactive presentation system. The main advantage of such system is the dynamical data actualization and the statistical assessment of the selected characteristics of the rock environment – especially for the rock aggregates.