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About Rock Strength Certificate

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Abstract: The stress state of rocks in the massif is modeled by testing standard cylindrical specimens on equipment according to the Karman's scheme, when the ratio between the axial compressive stress σ_1 and the principal stresses σ_2 and σ_3 from uniform lateral pressure is: $\sigma_1>\sigma_2=\sigma_3$. In this case their ratio at the time of destruction indicates the strength of rocks. Stresses σ_1 and σ_3 can take many values, and it is impossible to carry out the whole complex of experiments with different ratios of these components. Therefore, various methods of calculation are being developed, which can be used to estimate the degree of danger of the stress state by the postulated dependencies between the main stresses, i.e. to predict the strength properties of materials at the moment of destruction. The envelope of limit stress circles on the Mohr's diagram in the coordinates "normal strees - shear stress" is considered as the rock strength certificate. To construct the envelope was used the relationship between the maximum and minimum principal stresses, presented in the form of two different strength criteria. One of them is the well-known criterion of Hoek-Brown, the other is proposed recently by T.B. Duyshenaliev and K. T. Koichumanov. The applicability of these criteria was checked on A.N. Stavrogin's and K. Mogi's experimental data, which were received by testing cylindrical specimens of various rocks under triaxial compression, as well as in the case of uniaxial tension.

Keywords: Rock strength, envelope of limit stress circles, strength criterion, principal stresses, Mohr diagram