

Papers dealing with Eurocode 7 (EC7)

Practical use of the concept of Geotechnical Categories in rock engineering

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Abstract

The aim of the paper is to show how Eurocode 7: Geotechnical Design Part 1: General Rules (EC7) could be developed in order to be in accordance with practise in rock engineering and construction. A main feature is the geological uncertainties, which imply that a risk based approach should be used. The use of Geotechnical Category (GC) has therefore to be improved by 1) combining the consequences of a failure to the geological uncertainties before excavation, and 2) combining the consequences to the ground quality found after excavation. Three GC classes are needed to properly use the GC in rock construction.

The paper further describes how GC influences the design, which design method to be applied. It also outlines the types of control, inspection and supervision to be applied in the various GC classes during various stages of a project. An example is presented showing how GC can be determined at various stages of a rock construction.

On the Need for a Risk-Based Framework in Eurocode 7 to Facilitate Design of Underground Openings in Rock

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Abstract

The European design code for geotechnical engineering, EN-1997 Eurocode 7, is currently under revision. As design of underground openings in rock fundamentally differs from design of most other types of structures, the revised Eurocode 7 must be carefully formulated to be applicable to underground openings. This paper presents the authors' view of how a design code for underground openings in rock needs to be organized to ensure that new structures are both sufficiently safe and constructed cost-effectively. The authors find that the revised version of Eurocode 7 carefully must acknowledge the fundamental decision-theoretical connection between design and risk management that should permeate all geotechnical design work. Otherwise, if the revised code is not given a risk-based framework, the authors fear that, as a consequence, the observational method will not be favourable ground openings in rock. Then, cost-effective construction will be very difficult to achieve.

Principles of Risk-Based Rock Engineering Design

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Abstract

In comparison with other types of construction, the development of rock engineering design codes has been slow. Codes must, however, be developed with relevant discipline-specific characteristics in mind. This paper, therefore, presents a generic design framework for rock engineering. The framework is based on the presumption that rock engineering design must be viewed as decision-making under uncertainty, which makes the design process subject to general risk management principles, as risk is defined as "effect of uncertainties on objectives" (ISO 31000). Thus, rock engineering design codes ultimately need to facilitate design processes that target the risk, to enable design of structures that not only are sufficiently safe and durable and cost-effectively constructed, but also imply safe and healthy work conditions during construction and an acceptably low environmental impact. The presented framework satisfies this fundamental requirement and the authors find codification of its principles to be rather straightforward, as long as the level of detail in the code is governed by a strict application of ISO's general risk management principles. Further details on methods and practical recommendations can instead be supplemented in separate handbooks and application guidelines.