Geotechnical conditions of protection of a longwall-gallery intersection by bolting

Summary

The work determines the basic geotechnical conditions of a rock mass which influence effectiveness of the use of low bolting for protection of a longwall-gallery intersection. The study includes the analysis of geotechnical conditions based on *in situ* tests carried out in eighteen longwall galleries. It also presents site tests of yielding arch supports reinforced with bolting. The work consists of nine chapters, of which two chapters are devoted to *in situ* tests and one chapter to site tests.

Chapter four contains an analysis of the mechanical properties of the rock mass based on *in situ* tests carried out in fifteen longwall galleries using a hydraulic hole penetrometer.

In chapter five the research and underground measurements are extended with endoscopic research, measurements of separation of uppermost layers and convergence measurements carried out in three longwall galleries, where lining reinforcement in front of the longwall face was performed using low bolting. This chapter contains a full analysis of the observations and underground tests carried out in the aspect of using low bolting to strengthen the reinforcement of a longwall-gallery intersection and to ensure safe working conditions at the longwall-gallery intersections.

Chapter six is devoted to site 1:1 tests of susceptible arch supports reinforced with anchor bolts. The site tests mapped real working conditions of the supports with a displaced side arch in the area of the longwall-gallery intersection.

Chapter seven proposes principles for selection of bolt support in the longwall-gallery intersection with the use of the analytical and empirical method supplemented by *in situ* tests.

Chapter eight contains a risk assessment of the applied bolt parameters for strengthening the supports of a longwall-gallery intersection and calculations of the probability of the occurrence of an unsafe condition of the support of a longwall-gallery intersection.

Chapter nine contains a summary of the conducted underground and laboratory tests and final conclusions.