

Abstract

The work presents an attempt to evaluate the level of tightness of gobs and redundant excavations in hard coal mines. The research was carried out in Mysłowice - Wesola, an active mine, and involved a physical model and selected gobs closed and secured with insulating and separating dams. The underground measurements were conducted with the use of equipment commonly used in mines, pressure sensors and a barometer recording the pressure on the surface. The registration of measurements was carried out by a digital dispatching system which gave quick access to data and enabled to quickly develop the obtained data using popular computer office programs.

The evaluation of tightness degree of selected seals of excavations with insulating dams was carried out using two methods. The first method involved measuring the difference between the pressures in the insulating tape and statistical processing of results of obtained data. This solution is based on determining the index of tightness or an analysis of statistical distribution of measured quantities. Comparisons of these indexes or distributions can be carried out for the same dam in different periods of time, or they can be used to compare the tightness of excavation seals involving various insulating dams.

The second method is based on an analysis of the course of the changes in atmospheric pressure on the surface, and on changeable differences in pressure in the insulating dam in selected periods of time, when the barometric trend is either positive or negative. Such developed scatter plot of these relationships along with the regression line, the so-called insulating tightness straight line, allow to use the linear regression inclination indicator to determine the index of excavation tightness.

The values of tightness indexes of seals in the form of insulating dams are between (0, 1). The results showed that the greater tightness of a dam, the higher index values. Determined indicators provide a quick assessment of the tightness of seals and can be used to determine whether any further sealing is required. The tightness indicator for insulation of excavation also enables to compare the obtained tightness with the ideal value of tightness which equals to 1.

All assumptions presented in the work were effectively and efficiently carried out. The most significant of them are the simplicity and ease of research using available in the mines stationary measuring instruments without the need for employees to carry out measurements for several months under supervision. Therefore, it is possible to widely apply presented in the work evaluation methods for tightness and insulation of excavations to the mining industry.