

Abstract

In Poland, in recent years, a dynamic development of the construction sector can be observed. More and more stringent requirements regarding the shortening of the investment implementation time are imposed on the contractors of the works. As a result, contracts for the construction of buildings are concluded for a period of several to several months, depending on the type of investment. This forces construction works to be carried out throughout the year, which in the climatic conditions of Poland is associated with the execution of reinforced concrete elements in conditions of reduced temperature, defined in the ITB instruction [N1] as a period when the ambient temperature drops below 10°C. When analyzing meteorological yearbooks, it is assumed that this period falls in Poland from November 15 to March 15, which gives more than a quarter of a year. In order to carry out construction works continuously, without omitting significant periods of lowered temperature, it is required and necessary to apply measures aimed at protecting concrete. For this purpose, non-thermal methods can be used - without taking into account the heat supplied from the outside, thermal methods - with the supply of heat to the element or combinations of these methods. One of the types of thermal methods is electrofusion heating, also called electroheating. The aim of the doctoral dissertation was to determine the effect of the use of the electrofusion heating method on the properties of concrete cured in conditions of reduced temperature. In addition, it was assumed to verify the current practices related to the electrofusion heating method and to identify the factors that reduce the effectiveness of the electrofusion heating method. The final stage was the development of optimal rules for designing and carrying out the electrofusion heating process. An analytical and experimental approach was used to achieve the above objectives. An innovative solution was the use of the principles of thermodynamics to describe the phenomena occurring in the electroheating process. The possibility of using the maturity curve method to assess the impact of electroheating on the achievement of safe concrete strength was also verified.

Keywords: winter concreting, concrete curing methods in winter, methods of thermal treatment of concrete, electro-heating, maturity method.