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DEPENDENCE OF THE STRESSED AND DEFORMED STATE OF CONCRETE ON TEMPERATURE INFLUENCE IN EUROCODE 2

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Temperature effects did not have a significant influence on the multi-story buildings constructed some years ago, since with a large mass of external and internal structures and with practically constant internal temperatures, the problem of the difference in the elongation of the elements did not arise. The situation has become more complicated for modern multi-story buildings with statically uncertain structures of significant dimensions. In modern construction, load-bearing structures, frame elements, structures of the external enclosure of buildings usually have significant dimensions, and, at the same time, engineers use a variety of non-standard project solutions. As a result, there is a need to take temperature effects into account. When designing buildings in modern construction and, first of all, taking into account the hostilities that are ongoing in Ukraine, it is necessary to take into account climatic and operational thermal effects, which must be neutralized by insulating the sources of heat release and/or insulating adjacent structures.

The temperature difference depends on the functional purpose of the building, its location, orientation in relation to the region, internal temperature regime, surface and equipment of enclosing and supporting structures. But the most vulnerable to temperature effects are the structures used directly during the construction of buildings. These structures are exposed to changes in air temperature, with periodic fluctuations having annual and daily periods. Random fluctuations are superimposed on periodic fluctuations associated with weather changes over short periods of time (several days).

Currently, there exist enough design tools to take into account the temperature influences when designing buildings. The main difficulty in the calculations is the description of calculation situations that correspond to possible manifestations of temperature influences at all stages of construction and operation of buildings [1].

To analize the characteristics of concrete structures when heated and cooled during a fire, it is necessary that the dependence of "tension-deformation-temperature" of concrete material is understood and clearly defined. Since the 1970s, numerous studies have been conducted to understand the behavior of concrete at elevated temperatures. In the context of the latest destruction of concrete structures during fires, it is extremely important to obtain more detailed data on the dependence of "stress-deformation-temperature" for the concrete used both for the heating and cooling phase. During the fire, structures are subjected to simultaneous loading and heating, so the dependence of "stress-deformation-temperature" of concrete should take into account the interrelated effects between stress and expansion when temperature rises. However, it should be noted that the effects between the tension and the expansion of concrete have not been properly taken into account in the general deformation model used for projection in Eurocode 2 [2]. Instead, current general deformation should be defined as a combination of four major components of deformation: (i) free thermal deformation, (II) stress-deformed state, (III) creep deformation, (IV) transitional thermal deformation or thermal deformation caused by load (TDVN). In this case, TDVN should be determined by processing the results of numerical experimental data, thus limiting the use of associated models of general deformation [3]. In addition, TDVN is usually implicitly included in the calculated curve of "stress-deformation" through mechanical deformation and is given in current regulatory standards, offering the value of deformation that corresponds to the compression at target temperature modes [4].

As a consequence, the use of the curve "stress-deformation" in Eurocode 2 is limited by the data of the available tests and certain types of concrete. It is more important that the curve of "stress-deformation" in Eurocode 2 are only valid for the heating phase. Therefore, the accuracy of the mechanical behavior of the concrete remains doubtful, first of all, when the curve "stress-deformation" is used in Eurocode 2, or at temperatures above 500 ° C [5]. Generally, there is a need to further study the dependence of “stress-deformation-temperature” for concrete, which has clear connections with the physical bases of the related effects between stress and expansion of concrete.

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CLEANING METHODS OF EMISSIONS FROM WASTE INCINERATORS

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The most commonly recognized methods for the disposal of municipal solid waste is incineration. The combustion process produces emissions. The process of flue gas cleaning is one of the most important and costly steps of incineration. In the international practice various treatment equipment is employed, which should meet the requirements of the international standards on reducing the volume of contaminating substances emission into the atmosphere. The cost of investments as well as the cost of operating and disposing waste should also be considered.

The cleaning technology contains several combinations of equipment and location. The choice of the most correct (effective) gas cleaning strategy largely depends on local conditions. Waste incinerators use several process steps to neutralize pollutants, namely, fly ash collection, acid gas neutralization, halogen and dioxin isolation, and nitrogen oxide neutralization.

Analysis of the global trends in the field of gas cleaning equipment development in modern installations for thermal waste treatment leads to the identification of two main research approaches. The first step in most incinerators is removing the fly ash, which can be done using cyclones, an electrostatic precipitator or a fabric filter. The principle of operation of the cyclone is based on the action of a centrifugal inertial separation of flying ash. The gas enters the cylindrical chamber. The simplicity of the design and ease of operation of electrostatic precipitators (electrostatic precipitators) allows them to be used to remove fly ash from waste incineration. A modern electrostatic precipitator