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Olha Honchar, PhD in Technical Sciences, Associate professor
Maryna Kochevykh, PhD in Technical Sciences, Associate professor
Dmitriy Anopko, PhD in Technical Sciences, Associate professor
Liliya Kushnierova, PhD in Technical Sciences, Associate professor
Kyiv National University of Civil Engineering and Architecture, gonchar.oa@knuba.edu.ua

THE USE OF RAW MATERIALS FOR THE IMPLEMENTATION OF THE STRATEGY OF LOW CARBON DEVELOPMENT

The Paris Agreement under the UN Framework Convention on Climate Change (UNFCCC) on the regulation of measures to reduce carbon dioxide emissions by 2050 provides for the implementation of a global strategy for low-carbon development to limit the temperature rise on the planet to a level significantly lower than 2°C. On the way to the implementation of the Paris Agreement on global climate mitigation measures, Ukraine must implement a number of foundations and strategies. Among them is the acceleration of the implementation of the principles of low-carbon development, which is foreseen by the state policy in the field of climate change for the period until 2030 [1, 2]. The most effective way to reduce CO_2 emissions in the cement industry is to reduce the clinker content in Portland cement. in EU countries in 2014, the average clinker factor in cement was 80%, and by 2050, according to CEMBUREAU (the European Cement Association), it is assumed that the ratio of clinker to cement will be no more than 70%.

The expansion of the production of composite cements, the need to reduce the clinker factor (the percentage of clinker in cement) to solve the environmental problems associated with the production of Portland cement, and the need to preserve natural resources and use man-made materials for the production of binders attract attention to alkaline binding systems [3]. Fly ash, which can be used as a component of alkaline cements, has a much lower reactivity compared to slags, so ash-alkaline binding systems are characterized by relatively low strength indicators, and their special properties largely depend on the chemical and mineralogical composition of the raw materials, which varies within wide limits for the evils of thermal power plants of Ukraine [3]. The elimination of these shortcomings is possible by adjusting the composition of ash-alkaline binder systems by introducing active mineral additives, which are represented by natural or artificial zeolite phases, which affect not only the activity of ash-alkaline compositions, but also the formation of the micro-, meso- and macrostructure of composite materials.

Researches [3] studied the peculiarities of the formation of micro-, meso- and macrostructure during the modification of ash-alkali binding systems with artificial zeolites and confirmed the positive role of the crystal-chemical similarity of neoplasms and aggregate in the synthesis of the strength of artificial stone. This makes it possible to use the specified binding systems in the implementation of the concept of introducing effective low carbon (low emission) cements and concretes based on them, which are one of the five parallel directions of the road map of the cement and concrete sector in the EU low emission economy until 2050 [4].

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Roksolana Oleskiv, Candidate of Engineering Sciences (Ph. D.),
Ivano-Frankivsk National Technical University of Oil and Gas, roksolanaoleskiv@gmail.com

COMBINATION OF GEODESIC CONTROL METHODS OF MAIN GAS PIPELINES AND UNDERGROUND GAS STORAGES

Geodetic monitoring of main gas pipelines and underground gas storages is based on high-quality, high-precision measurements, which allow to prevent the detection of dangerous manifestations during the operation of strategically important elements of the fuel and energy complex. The gas transportation system of Ukraine ranks second on the European continent in terms of its technical parameters. A widely developed network of gas pipelines is closely connected with artificially created underground gas storage facilities [1]. That is why such objects should be considered as a whole, since their functioning and operation are closely interconnected. They form the basis of the gas transportation system as a whole.

The use of non-destructive testing methods, to which the geodetic method belongs, has a number of advantages [2]. First of all, this is an opportunity not to stop the operation of the gas transportation system, but to carry out geodetic measurements regardless of the technological process of the object (fig. 1).

Fig. 1 – Main gas pipeline networks on the map of Europe

For the organization of geodetic monitoring, special networks are laid in individual sections of the gas transportation system where surveying is required.

It is convenient to use the existing points of the geodetic base or to lay down new ones, relative to which the location of all other characteristic points of the terrain or equipment elements of a strategically important object will be determined. In some cases, it is possible to determine the height, plan or height-plan position of the points, depending on the tasks.

The combination of remote and ground methods of gas transportation system monitoring will improve the process of tracking and detecting changes in the position of characteristic points. World experience demonstrates the high-quality use of satellite images, with their professional processing. Interferometric Radar X-Ray Spectroscopy (InSAR), an active Earth remote sensing technology that acquires images of the Earth, is a powerful technology for modeling surface deformation and elevation mapping on the surface of the globe. The method is used for geophysical monitoring of natural hazards, such as earthquakes, volcanic eruptions, landslides, as well as in structural design, including subsidence and structural stability monitoring [3]. It is worth using experience and monitoring strategically important objects, using the latest technologies.

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