Научно-Производственный
Центр Материалов и Добавок
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GPM SPHERA-M

ADDITIVE TO PROVIDE FOR HIGH FROST RESISTANCE OF CONCRETES

GPM SPHERA-M IS AN ADDITIVE FOR CONCRETES AND MORTARS TO INCREASE THEIR FROST RESISTANCE. IT CONSISTS OF WET EXTENDED THERMOPLASTIC HOLLOW SPHERES.

SCOPE

• Providing for high frost resistance of ordinary heavy and lightweight concretes and mortars with Portland cement binder without using airentraining additives;
• Increasing frost resistance of heavy self-compacting concretes;
• Producing concretes with extremely high frost resistance ($F_1$1200 ($F_2$400) and more).

USE OF CONCRETE AND MORTARS

Structures of hydraulic power, nuclear power, water supply facilities, shipping hydrotechnical facilities, ports, bridges, oil refining and mining facilities, road, industrial and civil facilities.
Concrete and reinforced-concrete facilities operating in severe climatic conditions, including those in the Arctic, located under water, in a zone of variable water level, as well as in corrosive environments and sea water.
Concrete and reinforced-concrete structures for drinking water.

FEATURES

• Providing for high frost resistance of concrete with minimum air content (especially in self-compacting concretes);
• No reduction in compressive strength (unlike concretes with the use of air-entraining additives);
• Ability to reduce cement content without reducing strength and frost resistance (confirmed by experiments);
• Ability to dose the additive both as a powder and in suspension.

DOSING

1. In powder state

The additive shall be introduced after loading inert materials into the mixer. The dosing can be carried out manually (on a belt with inert materials, directly into the mixer or in another possible way) or automatically with the help of dosing equipment that provides for dosing error of 1% max.

2. In suspension

The additive shall be introduced simultaneously with other additives using a pump from the supply tank, and it is recommended to provide for flushing the suspension supply mainline with water to prevent possible clogging of the pipeline. It is also possible to introduce the suspension manually in any possible way before starting mixing the concrete mix components in a mixing plant.
In the supply tank, the suspension must be continuously mixed **mechanically**.
The suspension shall be prepared by mixing the **GPM Sphera-M** additive with water in a ratio of 3/1 to 1/1, respectively. Mixing is recommended to be done with a mixer in a suitable tank for 5-10 minutes.

PRECAUTIONARY MEASURES

When working with the material, use protective gloves and eye protection. In case of contact with mucous membranes or eyes, immediately flush the exposed area with plenty of water and seek medical attention if necessary. In case of contact with skin, wash it with water and soap.

TRANSPORTATION AND STORAGE

The additive shall be transported in accordance with GOST R 56592 in a sealed factory package. When transporting the additive, prevent moisture getting onto the package.

PACKAGE

GPM Sphera-M additive shall be packed in 10 kg plastic bags and in flexible containers according to GOST 24597 with a polyethylene liner.

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STORAGE TERMS AND CONDITIONS

The additive must be stored in covered warehouses, avoiding direct sunlight, at temperatures between +3°C and +30°C.

Guaranteed shelf life of the GPM Sphera-M microspheres is 1 year from the date of manufacture.

TECHNICAL PARAMETERS OF THE GPM SPHERA-M ADDITIVE

Parameter	Value
Appearance	Wet white powder
Bulk density, kg/m^3	24±3
Mass fraction of dry matter, %	15±2
Particle size of the main fraction, microns	30-60
Solubility in water	Insoluble
Specific effective activity of natural radioactive nuclides Aeff, Bq/kg, maximum	370
Main effect of the additive	Improving frost resistance of concretes and mortars
Performance indicator	Increasing frost resistance of concretes and mortars by 2 grades or more
Minimum/maximum dosage of the additive, kg per 1 m^3 of concrete mix	2.0/8.0

Estimated contents of the GPM Sphera-M additive depending on the class of heavy concrete with a density of at least 2300 kg/m^3 and the required frost resistance grade

Concrete class	Content of the additive (kg/m^3 of concrete mix) to provide for the frost resistance grade								
	$F_1$300	$F_1$400	$F_1$500	$F_1$600	$F_1$800	$F_1$1000			
				$F_2$200		$F_2$300	$F_2$400	$F_2$500	$F_2$600
B 30	3,0	3,5	4,0	4,5	5,0	5,5	-	-	-
B 40	2,5	3,0	3,5	4,0	4,5	5,0	6,0	-	-
B 50	2,0	2,5	3,0	3,5	4,0	4,5	5,5	-	-
B 60		2,0	2,5	3,0	3,5	4,0	5,0	6,0	7,0
B 80	-	-	2,0	2,5	3,0	3,5	4,5	5,5	6,5

Note:
1. The exact content of the additive is determined by experiments, taking into account the quality of initial materials;
2. The frost resistance grades indicated in the table are achieved only with a correct selection of concrete composition in compliance with the requirements of technical regulations for specific types of concretes;
3. When using the GPM Sphera-M additive, air-entraining additives should be excluded from the concrete composition.