

# NanoAer®

## Air Entraining Chemical Admixture for Concrete

### Product Definition

NanoAer is a chemical admixture entraining uniformly distributed microscopic air bubbles.

### Use

NanoAer is recommended for use in the applications below.

- Concretes exposed to freeze and thaw cycles.
- Concrete roads, airport runways and taxiways.
- To obtain the same workability with less cement in mass concrete.
- To reduce segregation and bleeding in fresh concrete.

### Advantages and Properties

- NanoAer forms uniformly dispersed microscopic air bubbles (mean diameter of 50 µm, in 20 – 250 µm diameter range and the maximum average distance between the air bubbles is around 200 µm) due to the effect of surfactants in its microstructure. These air bubbles improve the resistance of hardened concrete to freeze-thaw cycling, particularly in the presence of de-icing salts, by providing a reservoir for ice expansion.
- Improves the workability of fresh concrete because of the lubricating effect of air bubbles and increased paste content due to the micro bubble formation.
- Decreases the water demand of the mixture due to the enhanced workability.
- Increases the cohesion and segregation resistance of fresh concrete.
- Reduces the plastic shrinkage crack risk by reducing bleeding.
- Does not contain chloride or any other substances that may cause corrosion.

### Application Details, Suggestions and Warnings

- NanoAer should be used by adding to mixing water. NanoAer should be added directly to the fresh mixture if the mixing water is heated under cold weather conditions. NanoAer is not added to dry mixture.
- NanoAer can be used with all types of Portland cements in TS EN 197-1. In addition, it can be used in concrete mixtures containing mineral admixtures such as silica fume, fly ash and ground granulated blast furnace slag. However, some mineral admixtures having high loss on ignition and unburnt carbon content (i.e. some fly ashes) may increase the required dosage of NanoAer to obtain a target entrained air content.
- Fineness of cement and particularly mineral admixtures may increase the required dosage of NanoAer to obtain a target air content.
- There is no significant effect on setting time of cement in normal usage dosages. However, in high dosages NanoAer may extend the setting time of cement.
- In general, limiting the water to cement ratio of air entrained concretes as 0.50 is recommended. In addition, satisfying the recommended limiting values for concretes exposed to XF environmental exposure class (freeze/thaw attack) in EN 206 standard is highly recommended.

- It is recommended to reduce the fine aggregate content by 20 kg/m<sup>3</sup> for each 1% of entrained air.
- Avoid the prolonged vibration. Excessive vibration may cause to diminish the entrained air.
- As the dosage of the chemical admixtures is greatly influenced from cement type, properties of the concrete ingredients and mix design, it is recommended that the optimum dosage of admixture should be determined on trial batches.
- NanoAer can be used together with the superplasticizers. In case of the combined usage, the different types of chemical admixtures should not be mixed together and be used separately. Please contact R&D department of Lyksor for technical support.

**⚠** It is known that, an increase in air content of 1% upon the air content of 2% results in compressive strength loss of 4-5 MPa. This strength loss can be balanced with decreasing water to cement ratio of the mixture.

## Recommended Dosage

The recommended dosage range of NanoAer is between 0.03 % - 0.2% of the weight of cement in the mixture. Overdose results in an excessive loss of strength. The appropriate dosage of NanoAer can be determined on the trial mixtures having the recommended air contents for frost-resistant concrete (ACI 201-2R-92) given below.

Recommended air contents for frost resistant concrete (ACI 201-2R-92)

Nominal maximum aggregate size (mm)	Average air content (%)	
	Moderate exposure (Outdoor exposure in a cold climate where the concrete will be only occasionally exposed to moisture prior to freezing, and where no de-icing salts will be used)	Severe exposure (Outdoor exposure in a cold climate where the concrete may be in almost continuous contact with moisture prior to freezing, or where de-icing salts are used)
9.5	6	7.5
12.5	5.5	7
19	5	6
25	5	6
37.5	4.5	5.5

## Technical Properties

Color and form	Colorless transparent – liquid
Chemical base	Surfactants
Density (kg/l)	0.98 – 1.02 (+20 °C'de)
Chloride ion content	Max 0.1% - Chloride free acc. to TS EN 934-2
Alkali miktarı	Max 3 %
pH	5 – 9
Conformity	TS EN 934-2 Table 5

## Cleaning of Tools

Concreting tools contact with NanoAer can be easily cleaned with water.

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## Packaging

25 kg drum

200 kg tote

1000 kg IBC

Bulk delivery

## Storage and Shelf Life

Shelf life of NanoAer is 24 months when stored in its original package and recommended storage conditions. NanoAer should be stored in dry conditions between +5 °C and +35 °C. It should be protected from direct sunlight and frost.

## Security and Health

In case of contact with skin, wash with clean water. In case of contact with eye, wash with clean water. Eye contact should be medically consulted immediately. For further information please refer to Material Safety Data Sheet (MSDS) of the product.

## Legal Liability

The technical recommendations in this product data sheet are based on the experimental studies performed on reference concrete mixtures designed in the R&D laboratories of LYKSOR. The results may not be applicable to different concrete mixtures produced with different materials than the ones used in the experiments in Lyksor. All customers and users are required to determine the appropriate LYKSOR products for their intended use and to test the suitability of LYKSOR product for their application. Please contact LYKSOR for the appropriate product selection and usage details. LYKSOR is not responsible for the improper usage of the products.