

Mapeair AE 10

Air entraining admixture for concrete resistant to freeze/thaw cycles

DESCRIPTION

Surfactant admixture to entrain micro air bubbles in concrete exposed to freeze/thaw cycles.

WHERE TO USE

Mapeair AE 10 may be used to great advantage if used in the following applications:

- durable concrete exposed to thermal fluctuations around freezing point (0°C);
- lean concrete (cement content less than 250 kg/m³) with a low fine sand content for pumping;
- concrete with lightweight aggregates to improve the homogeneity, workability and application of the mix.

Some application examples

There are various application examples, including the following:

- hydraulic works (dams, water channels, swimming pools, storage tanks) exposed to cold climates;
- floors, floor slabs, tunnels and car parks exposed to rainwater and cold climates;
- lightweight structural concrete elements (panels, floor beams, etc.).

TECHNICAL CHARACTERISTICS

The main technological characteristics of cementitious mixes with aerating agents are as follows:

- resistance to freeze-thaw cycles;
- better pumping properties for lean concrete with a low fine sand content;
- lower segregation in concrete made from lightweight aggregates.

Mortar and concrete do not have the capacity to resist cyclic stresses deriving from alternating freeze/thaw cycles. The formation of ice, which leads to an increase in volume (approximately 9%), provokes high stresses in mortar and concrete saturated with water or exposed to rainwater (open-air car parks, airport runways, tunnels, etc). In these cases, the most efficient form of prevention to contrast fatigue failure due to freeze/thaw cycles is to absorb a small volume of air (3-6%) in the form of stable micro bubbles with a diameter of between 100 and 300 µm at an even pitch of between 100 and 300 µm. In such conditions, when the first ice crystals form, the increase in volume that they create pushes the water in liquid form which has not yet frozen into the adjacent micro bubbles to ease the internal stresses. In the phase after thawing, the capillary suction effect causes the water to be released by the micro bubbles and to flow towards the pores in the surrounding cementitious mix. This movement leaves the micro bubbles empty and ready to host water in the freezing state again the next time the natural thermal cycle comes around.

Unfortunately, as well as helping to reduce the effect of the stresses caused by the formation of ice, the absorbed micro air bubbles reduce the strength of the concrete by about 20%. Therefore, the water/cement

TECHNICAL DATA (typical values)

PRODUCT IDENTITY

Appearance:	liquid
Colour:	brown
Density according to ISO 758 (g/cm³):	1.01 ± 0.02
Main action:	aerating
Secondary actions:	plasticiser, pumping aid and anti-segregation product for lightweight concrete
Classification according to UNI EN 934-2:	aerating admixture according to table 5
Water-soluble chloride content according to EN 480-10 (%):	< 0.1 (absent according to UNI EN 934-2)
Alkali content (equivalent Na₂O) according to EN 480-12 (%):	< 1.0

ratio must be reduced to increase the strength of the concrete to compensate for this reduction due to the air bubbles being absorbed.

This is why the use of **Mapeair AE 10** in concrete resistant to freeze/thaw cycles must always be accompanied by a super-plasticising agent (**Dynamon** or **Chronos**) according to the performance characteristics required.

Thanks to the development of spherical micro air bubbles, **Mapeair AE 10** compensates for the lack of fine-grained material in the sand (100-300 µm) which is indispensable for pumping purposes, especially in the case of lean concrete with a low cement content. Also, by absorbing air in concrete made with expanded clay or polystyrene, there is a reduction in the tendency of the aggregates to "float" (segregation) due to the lower difference between the density of the aggregates and the cementitious mix, which is also lightened. As a result, the conglomerate is more homogenous and, therefore, the thermo-insulating characteristics are also more uniform.

RECOMMENDATIONS

Do not use **Mapeair AE 10** without checking the volume of air which develops in the concrete with a porosimeter.

Do not use **Mapeair AE 10** in mixes which are too dry (consistency class S1), it is difficult for them to develop air in such conditions. The consistency class of fresh concrete must be at least S2.

HOW TO USE

To produce concrete resistant to freeze/thaw cycles, the dose of **Mapeair AE 10** to entrain the volume of air required, and according to the maximum diameter of the aggregate, must be checked by carrying out preliminary testing at the cement mixing plant using the same ingredients (cement, sand, large aggregates, etc.) as will be used for constructing the structure.

As a general rule, the dose of **Mapeair AE 10** varies from 0.4 to 0.8 l every 100 kg of binder (cement plus fly ash or silica fume). In fact, the exact dosage to obtain the volume of air required in the concrete to be cast depends on the following parameters:

- the form of the aggregates (round or crushed);
- the grain size of the sand;
- workability;
- mixing time and efficiency;
- transport time;
- compaction method.

We recommend adding the **Mapeair AE 10** together with the mixing water and then thoroughly mixing it for a few minutes to favour development of the volume of air required. The aerating effect, which must be checked with a airmeter, is more efficient if the concrete is more fluid.

If a super-plasticising additive is used, such as **Dynamon** or **Chronos**, or fly ash or a silica fume-based product (such as **Mapefluid PZ500**), the dose of **Mapeair AE 10** must be increased slightly to get the same volume of air as normal concrete.

We recommend adding **Mapeair AE 10** separately from the other additives.

Compatibility with other products

Mapeair AE 10 is compatible with a number of additives. Its use is particularly recommended with super-plasticisers from the **Dynamon** or **Chronos** ranges.

When curing structures without formwork (such as floors), we recommend applying **Mapecure E** or **Mapecure S** curing agents immediately after casting the concrete containing **Mapeair AE 10**. In structures with formwork which is stripped off very quickly (after 1 to 3 days), the curing agent must be applied immediately after removing the formwork. We recommend using form release agent from the **Mapeform Eco** range to strip concrete with **Mapeair AE 10**.

CONSUMPTION

Mapeair AE 10 is used at a dose of from 0.4 to 0.8 litres every 100 kg of binder. Slightly higher doses may be used in concrete containing fly-ash, silica fume and super-plasticising additives.

Different dosages from those suggested must be previously tested through concrete trials, in addition to consulting MAPEI Technical Services Department.

PACKAGING

Mapeair AE 10 is available in bulk quantities, 1000 litre tanks, 200 litre drums and 25 kg cans.

STORAGE

Mapeair AE 10 may be stored for up to 12 months in sealed containers protected from freezing weather.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Mapeair AE 10 is not considered hazardous according to current norms and guidelines regarding the classification of mixtures. However, we recommend taking the usual precautions for handling chemical products. For further and complete information about the safe use of our product please refer to the latest version of our Material Safety Data Sheet.

PRODUCT FOR PROFESSIONAL USE.

WARNING

Although the technical details and recommendations contained in this product data sheet correspond to the best of our knowledge and experience, all the above information must, in every case, be taken as merely indicative and subject to confirmation after long-term practical application; for this reason, anyone who intends to use the product must ensure beforehand that it is suitable for the envisaged application. In every case, the user alone is fully responsible for any consequences deriving from the use of the product.

Please refer to the current version of the Technical Data Sheet, available from our website www.mapei.com

**All relevant references
for the product are available
upon request and from
www.mapei.com**

**Mapeair
AE 10**



BUILDING THE FUTURE

Any reproduction of texts, photos and illustrations published
here is prohibited and subject to prosecution

(GB) A.G. BETA

3338-7-2013