Functional Materials

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Plasterboard

Foaming agents plasterboard production

The UFAPORE GP products for plasterboard production are liquid surfactants used as foaming agents. The products lower the surface tension in aqueous solutions and create air bubbles.

Foaming agents play a major role in reducing the density of the board, which allows for:

- Ease of handling
- Thermal insulation
- Sound proofing
- Shorter drying time
- Reduced raw material cost

The conditions at different gypsumboard plants vary with raw materials and production methods. Due to the environmental differences in every gypsumboard plant, Unger have developed several foaming agents called UFAPORE GP. Each product has outperforming properties and are excellentfoaming agents in their own environments.

By choosing the right type of foaming agents, you are able to improve performance and production capacity and at the same time reduce consumption of aggregates at standard board, hydrophobic boards and lightweight board production.

Product name	Chemical composition	Active content	Character
UFAPORE GP 3	Fatty alcohol Ether Sulphate, Sodium Salt	~ 30%	Foam for standard board robust processing
UFAPORE GP 413	Fatty alcohol Ether Sulphate, Sodium Salt	~ 30%	Stable foam for standard board and water-resistant board. Good performance in hard water
UFAPORE GP XP	Fatty alcohol Ether Sulphate, Sodium Salt	~ 75%	Stable foam for standard board and water-resistant board
UFAPORE GP 70 HX	Fatty alcohol Ether Sulphate, Sodium Salt	~ 75%	Stable foam for standard board and water-resistant board
UFAPORE GP 103 N	Fatty alcohol Ether Sulphate, Sodium Salt	~ 32%	Unstable foam for medium air pore design
UFAPORE GP LV01	Fatty alcohol Ether Sulphate, Sodium Salt	~ 38%	Highly unstable foam for light weight board

Foam is usually produced by vigorously mixing a diluted solution of foaming aid, then introduced into a mixer together with the other ingredients. The UFAPORE GP series of products are compatible with other admixtures in wallboard production.

Application
During production it is important that the foam generated is as compact and stable as possible to avoid intolerable variations in bubble sizes. Big bubbles will create big voids in the finishing gypsumboard, thereby decreasing both surface finish and the strength of the gypsumboard. Air-Entrainers for gypsumboard manufacturing have very strict requirements both in terms of foam stability, foam ability and solubility (in water). To ensure such product quality, the development of our Air-Entrainers has been based on thorough research and product control.

Mortar / Plaster

In different types of mortar, plaster and renders, the controlled formation of air entrainment will improve the product greatly.

Besides reducing weight and costs, entrapped air with Unger surfactants will increase the workability, the compatibility, and the durability of the final product. Depending on local conditions and type of mortar or plaster, we can highly recommend functional products for different applications.

Air-Entrainers for dry mix mortar and concrete

Ufapore dry product

Product	Description	Physical form	Anionic content %	pH
UFAPORE TFA	Sodium Lauryl Sulphate	Ivory white powder	92	9.0 - 11.0
UFAPORE TCO	Alfa Olefin Sulphonate	Ivory white powder	94	7.0 – 9.0
UFAPORE TAE	Sodium Lauryl Sulphate	Ivory white agglomerate	95	9.0 – 11.0
UFAPORE TLA	Sodium Lauryl Sulphate	Ivory white agglomerate	96	9.0 – 11.0

Zero VOC emissions | Biodegradable | Light color | Low dosage

Air-entraining admixture that allows a controlled quantity of small uniformly distributed air bubbles to be incorporated in a mortar and remain after hardening.

The Air-Entrainer, when added to a mortar mix, does not have a chemical reaction with other mix constituents. The mortar's setting time and hardening are not altered, but there may be some change in the rate of water loss into the masonry units due to better control of "bleeding".

The addition of air-entraining agent into mortar can significantly improve the workability of slurry and enhance the permeability and frost resistance of hardened mortar. Air pores reduce density and better yield is achieved. By reducing water tension, Air-Entrainers help other particles to disperse faster in water, reduce mixing time and thereby save working time. They also work as a wetting agent to improve workability and pump ability.

Although the dosage of air-entraining is small, it has great impact on the performance of mortar, with main roles including:

- Improving the workability of mortar
- Enhancing the permeability, frost resistance and durability of mortar
- Reducing the strength of mortar
- Increasing the volume of mortar

Air-Entrainers react differently depending on type of mixture and therefore it is important that the most suitable Air-Entrainers are applied, depending on type of binder used. Air content depends on:

- Cement quality
- Content of pozzolans and lime in cement
- Graining of cement and fillers
- Sand particle size

Addition of lime and fly ash in the mortar will have an impact on the air content. Fly ash content will decrease the air entrapment and unstable the air content. Lime addition in the cement will increase the air content. Portland cements with content of lime and fly ash in different ratio have influence on the admixture behaviour. Ufapore Air-Entrainer are suitable for all types of cement mixes. Air-Entrainers usually plasticise, even if not formulated to be dual purposed.

It is recommended to keep the pore structure as small and uniform as possible, this improves frost and thaw resistance, the density is reduced, and strength is easier to achieve. A uniform micropore structure also has an impact on the finish and helps to prevent efflorescence or bleeding of the mortar.

Unger has been a producer of Air-Entrainers for several years. We have applied our experience and knowhow to incorporate improvements to our product range and our products consists of both powder and agglomerate. Ufapore products are compatible with other admixtures such as plasticizers, superplasticizers, retarders, cellulose fibres and other. Our agglomerates will provide more accurate dosage with free flowing and easy dosing.

Concrete Admixture

Ufapore products for concrete admixture are surfactants created to add air voids to the concrete and make the hardened concrete frost resistant. The addition of surfactants will improve several properties in the mixing process and in the hardening of concrete.

Admixture for concrete
Addition of air-entraining admixture will significantly improve the workabillity of the concrete during mixing and reduce mixing time. Air voids reduce density and better yield is achieved. Introduction of an Air-Entrainer to the concrete will reduce the density and strength of the concrete and introduce controlled quantity of small uniformly distributed air bubbles.

Although the dosage of air-entraining is small, it has great impact on the performance of concrete, with main roles including:

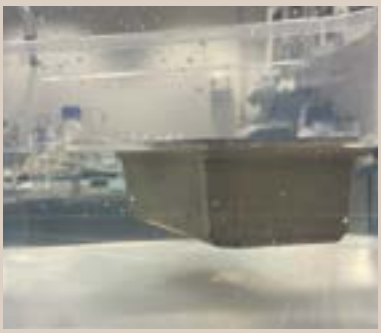
- Improving the workability of concrete
- Enhancing the permeability, frost resistance and durability of concrete
- Reducing the strength of concrete
- Increasing the volume of concrete
- Reduced raw material cost

It is important that the most suitable Air-Entrainers are applied, dependent on type of concrete:

- Cement quality
- Content of fillers in cement
- Graining of cement and fillers
- Aggregate particle size

Ufapore products are compatible with other admixtures such as dispersing agents, retarders, accelerators etc.

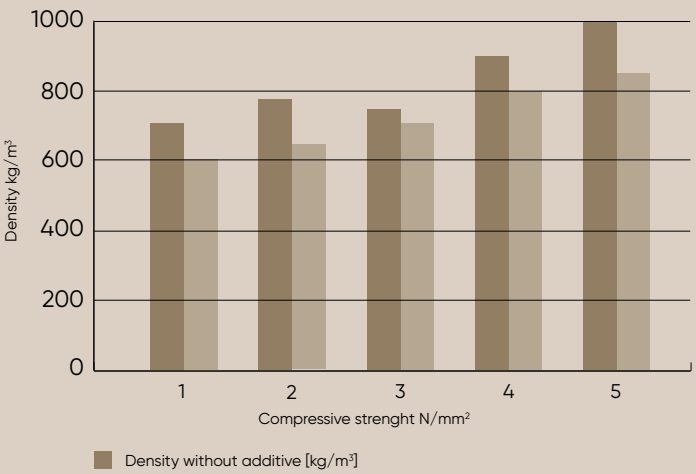
Light weight concrete
Advantages in using low-density lightweight concrete in construction are due to:



- Weight reduction, low density,
- Improve insulation values, low thermal conductivity
- Sound reduction
- Improved workability
- Low shrinkage and high heat resistance

UFAPORE LC is especially developed for improving the weight efficiency without changing the strength. It's function as an additive in the formulation, is to create homogeneous distribution of cement particles in the matrix. UFAPORE LC will also create fine distribution of air voids in the matrix.

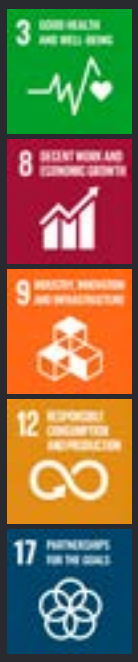
The processing of light weight concrete containing UFAPORE LC allows better weight consideration and workability but does not change the strength categorization. UFAPORE LC will rapidly dissolve when water is added and create stable air voids and improved workability during mixing. When mechanical forces cease, the mass becomes cohesive. The mass can be moulded and shaped as required.



Air-Entrainer for Concrete Admixtures

Trade name	Chemical composition	Physical form	Active matter	Application
Air-Entrainers for concrete				
UFAPORE CC	Mixture of anionic and nonionic	Clear mobile liquid	30 %	Air-Entrainer concrete/ ready mix
UFAPORE CC 1 A	Mixture of nonionic	Amber liquid	95 %	Air-Entrainer concrete/ ready mix
Air-Entrainers for ligth weigt concrete				
UFAPORE LC	Mixture of anionic surfactants	Golden Liquid	32 %	Disperse /wetting agent for light weight concrete
Drilling foam				
UFAPORE VB	Surfactant mixture with cobuilder	Golden Liquid	30%	Drilling foam

Sustainability is central in our culture, being a key element in our strategy for future development and growth.



Unger have defined three focus areas; climate footprint, respect for the human being and innovative and environmentally friendly solutions – then chosen five from the United Nations sustainable development goals to give extra attention across these focus areas. Unger pursue solutions and products that are climate-friendly, maintain biodiversity and showing a transparent value chain.

Within Functional Materials, we are naturally also striving towards this goal. Unger develops surfactants contributing to less energy consumption. For the end user, this is noticeable in light weight plaster board – which is easier to handle - giving a positive consequence of a solid reduction in carbon dioxide (CO^2) emissions as well as a decreased environmental footprint

Unger firmly believe that the successful use of a product in any application derives from a comprehensive and mutual understanding of the possibilities in the technology offered, the purpose of the end-use as well as total transparency within our sustainable efforts. Therefore, we offer a life cycle analysis (LCA) on all the products in our portfolio upon request.

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Quality

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