PETER GREVEN Your partner for building protection

LIGAPHOB
Building Protection

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Your partner for oleochemicals

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Sustainability and the demand for renewable raw materials are becoming more and more important in many areas. Peter Greven GmbH & Co. KG as middle-sized family owned company has always produced additives based on renewable raw materials and associated production technologies. This is the basis for the continuous development of new products and customized solutions for various applications. The building protection is one of our core areas.

Metallic soaps owe their outstanding position in building protection to their high specific surface area, as well as to their high water-repellent effect. During hydrophobization they coat the surface throughout the total cross section, which guarantees that the mass will be water-repellent for several years. The steam diffusion is not affected.

The effectiveness, however, depends on an intensive admixture of metallic soaps in the building materials. Here the reactive hydrophobic substances are an improvement. They are used in the form of soluble soaps. The water repellence is delayed due to the reaction with calcium from the building material.

During the last few years combination products have become more established as they guarantee a good incorporation and quick hydrophobic effect.

Peter Greven GmbH & Co. KG *has adapted the properties of soaps and metallic soaps, with respect to application technology, to the requirements of the construction industry. The result is a wide range of special products with a broad range of applications which are summarized in this brochure.*

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Figure 1: Successful reconstruction of a chapel in Gnigl (municipal district of Salzburg, AT). With special plaster systems even damp brick-work can be reconstructed in a way which makes it protected durably against further negative influences of humidity. © maxit

REACTIVE SINGLE ADDITIVES: ALKALINE SOAPS

Alkaline soaps are reactive additives and are regarded as the most effective oleochemical hydrophobing agents. They offer a high flexibility and many possible combinations with other additives.

LIGAPHOB N 90

A reactive hydrophobing agent with a wide range of applications. Besides that, it features a broad application range as it is mostly used in plastering but also in special applications such as sealing mud and concrete. The product offers an outstanding long-term protection. The dosage lies between 0.1 % and 0.6 %.

LIGAPHOB N 91

A reactive hydrophobing agent based on unsaturated fatty acids. This product's development was driven by application technology and economical aspects. It is based on the same favourable properties as LIGAPHOB N 90.

LIGAPHOB NT 90

A reactive hydrophobing agent for calcareous mortar systems. This product is particularly suitable for restoration render as it does not affect the air-entraining agents.

LIGAPHOB N 90 PLUS

This alkaline soap is used for selected areas of building protection. Due to the special fatty acid combination LIGAPHOB N 90 PLUS achieves an excellent hydrophobic effect. The dosage is 0.1 % to 0.3 %.

Advantages:

- Outstanding cold-water solubility
- Improves wetting of the building material
- No gelling effect due to high content of unsaturated fatty acids
- Excellent distribution of the alkaline soaps in the mortar
- Highly effective through reactive compound with the elements of the building material
- Many options to combine with other additives





NON-REACTIVE SINGLE ADDITIVES: METALLIC SOAPS

Metallic soaps are most suitable for hydrophobization of building materials. With this type of hydrophobization the inner surfaces – the capillaries and hollows – are coated with the hydrophobing agent. This ensures effective and long-term protection from penetrating humidity into the plasters.

LIGASTAR ZN 101

Produced by precipitation process with a high specific surface area and excellent long-term effectiveness, primarily for lime-cement render. The dosage is 0.1 % to 1 %. In order to ensure optimal effectiveness, sufficient time is necessary for mixing the dry mortar. Zinc stearates in plaster are lightly algicidal.

LIGASTAR CA 350

Another non-reactive hydrophobing agent produced by precipitation process with a high specific surface for mineral plasters. With 0.2 % to 1 % the dosage is higher than that of LIGASTAR ZN 101, but there are advantages in the preparation of dry mortar.

LIGASTAR CA 860

This calcium stearate is a standard grade with very good water-repellent properties for mineral plasters. The product has great free-flowing and dosing properties. The dosing amount is between 0.3 % and 0.5 %.

LIGAPHOB MG 700

A standard grade with very good water-repellent properties. This product is suitable for application in the most cement-bound building materials and stands out by its remarkable free-flowing and dosing properties.

LIGAPHOB MG 53

This magnesium stearate offers the same positive properties like LIGAPHOB MG 700 and is additionally characterized by a very high fineness. Therefore, a lower dosage can be used.

LIGASTAR AL D2 / LIGASTAR AL DT

Weakly reactive hydrophobing agents primarily for insulating plaster and restoration render. Aluminium stearates can be mixed well in dry mortar. The dosage is between 0.1 % and 1 %.

Advantages:

- Immediate hydrophobic effect
- Few interactions with other additives
- Metallic soaps show no significant influence on the hydration behaviour
- Highly effective and long-term type of hydrophobization
- High flexibility regarding formulation and dosage
- Many options to combine with other additives

Figure 2: Dispersion
In water at 30° C

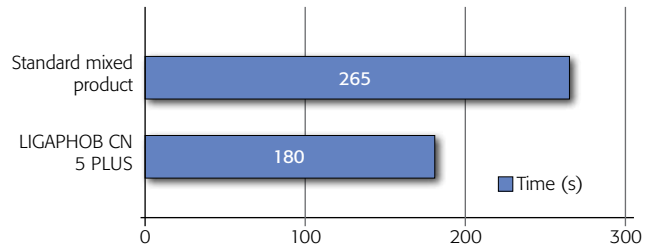
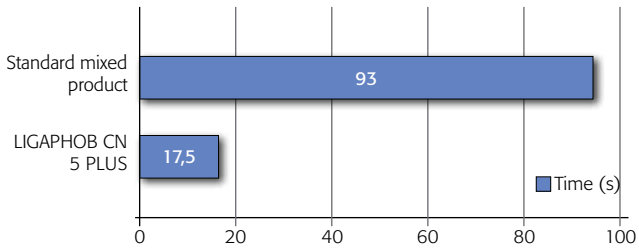


Figure 3: Free-flowing properties
Dosage of 50 g of product



COMBINATION PRODUCTS

LIGAPHOB NF 50

This mix of reactive and non-reactive hydrophobing agents is particularly appropriate for base- and precious plasters. The product is characterized by its excellent pourability.

LIGAPHOB CN 25

This combination product is based on a mixture of reactive and non-reactive hydrophobing agents. LIGAPHOB CN 25 is particularly appropriate for cement-bound building materials. The product achieves very good results at short mixing times.

LIGAPHOB CN 75

By using different ratios, the advantages of the reactive or non-reactive hydrophobing agents are intensified. This product is characterized by a greater proportion of reactive hydrophobing agents. Due to this it can not only be used in plasters but in special applications like sealing mud and concrete as well.

Advantages:

- Very good wetting of the building material
- Outstanding mode of action
- Little influence on the setting behaviour
- Formulations and dosages can be modified to meet specific customer demands
- Absolute homogeneity and uniformity
- Many options to combine with other additives

LIGAPHOB MN 20

This combination product consists of reactive and non-reactive hydrophobing agents and is characterized by its homogeneity due to its special manufacturing process. LIGAPHOB MN 20 is particularly appropriate for cement-bound building materials.

LIGAPHOB CN 5 PLUS

LIGAPHOB CN 5 PLUS is a combination of reactive and non-reactive hydrophobing agents. Both components are based on a special fatty acid mixture which guarantees a high effectiveness in dry mortar systems. Due to the manufacturing processes an improved dosing and very good dispersibility are ensured. There are no segregation tendency, even if pneumatically transported.

LIGAPHOB CN 5 PLUS fulfils the multiple requirements of modern hydrophobing agents and is characterized by the following advantages:

- improved free-flowing properties
- faster dispersibility
- very good incorporating properties
- higher effectiveness
- lower irritant effect

This has been achieved by the optimization of the recipe components and an improved manufacturing processes.

The coordinated ratio of input materials guarantees, besides good effectiveness, optimal compatibility with the recipe components of dry mix mortars. LIGAPHOB CN 5 PLUS can be applied universally. It is suitable for base- and precious plasters as well as for WDV systems.

SPECIAL PRODUCTS

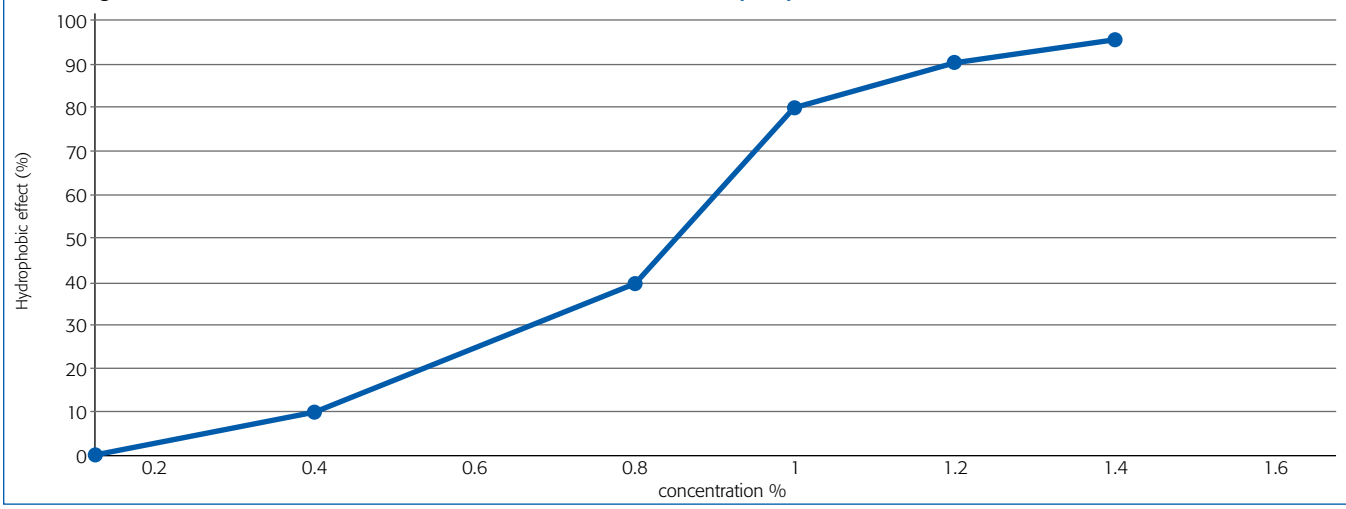
LIGAFLUID CA 50 F

Calcium dispersions are preferably used for the hydrophobization of concrete. By using a dosage of 1.2 %, with regard to the binding agent, in addition to a very good hydrophobic effect, efflorescence is inhibited, for example, in the case of concrete paving stones. Besides the known surface properties, the product has a liquefying effect.

LIGAFLUID FS 30

Based on the requirements of the building industry this aqueous dispersion of special monocarboxylic acids was developed. LIGAFLUID FS 30 demonstrates its strengths as a hydrophobing agent especially in mortar or cement mixtures.

Figure 4: Influence of calcium stearate concentration on the hydrophobic effect of concrete



QUALITY MANAGEMENT

The high quality of our products is very important to us and is the result of elaborate testing. In addition to analytical quality checks a series of application tests as well as endurance tests under weather influence are also part of our quality management system. These tests can also be performed individually tailored to our customers' needs upon request. We constantly strive to optimise the existing products and to develop new products to meet our customers' future needs.

Determination of our hydrophobing agents' performance.

To determine the performance of our products in the sector of building protection we use various test methods, inter alia

- air void content following DIN EN ISO 1015-7
- capillary water absorption following DIN EN 1062-3
- capillary water absorption following DIN EN ISO 1015-18
- flow spread following DIN EN ISO 1015-3
- bulk density following DIN EN ISO 1015-6

Trial series outdoor weathering

In a series of trials, many products were tested on a standard plaster. For this purpose, a lime-cement plaster with overall 17 % binding agent content and 10 % limestone powder was used. The mixture also contained a surfactant air-entraining agent and a methylcellulose. In an initial series of trials, reactive and non-reactive hydrophobing agents as well as combination products with an addition level of 0.3 % were tested. The results are displayed in figure 5 and 6.

The non-reactive hydrophobing agents are based on metallic soaps. Products which were produced according to the precipitated production process (LIGASTAR CA 350, LIGASTAR ZN 101) are contrasted alongside products from the direct conversion (LIGAPHOB MG 700, LIGASTAR CA 860, LIGAPHOB MG 53). It can be clearly seen that the non-reactive hydrophobing agents require a slightly higher dosage.

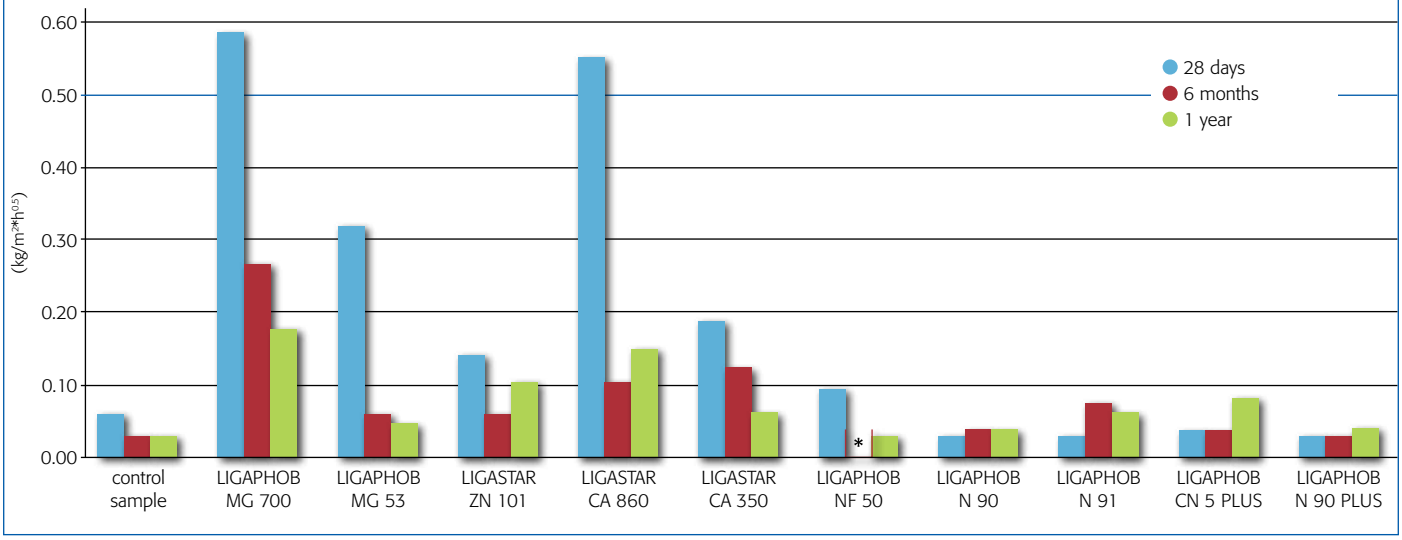
The reactive products (LIGAPHOB N 90, LIGAPHOB N 91, LIGAPHOB N 90 PLUS) as well as the combination products (LIGAPHOB CN 5 PLUS, LIGAPHOB NF 50) generally allow a slightly lower dosage.

Noticeable is the good value of the water absorption coefficient for the control sample without the hydrophobing agent. The reason for this is the very strong initial suction of the sample. The type of plaster used sucks water up within a few minutes until the capillary system is saturated. This indeed results in a slight slope of the straight line in the graphical evaluation of water absorption and hence a lower water absorption coefficient. Therefore, both the water absorption coefficient (w) and overall water absorption (W_{24}) are crucial for the assessment of a hydrophobing agent.

An important outcome of the trial remains the finding that all hydrophobing agents exhibit very good long-term stability, even under the influence of weathering. No impairment could be found either in the condition of the surface or in the measured values of the water absorption coefficient.

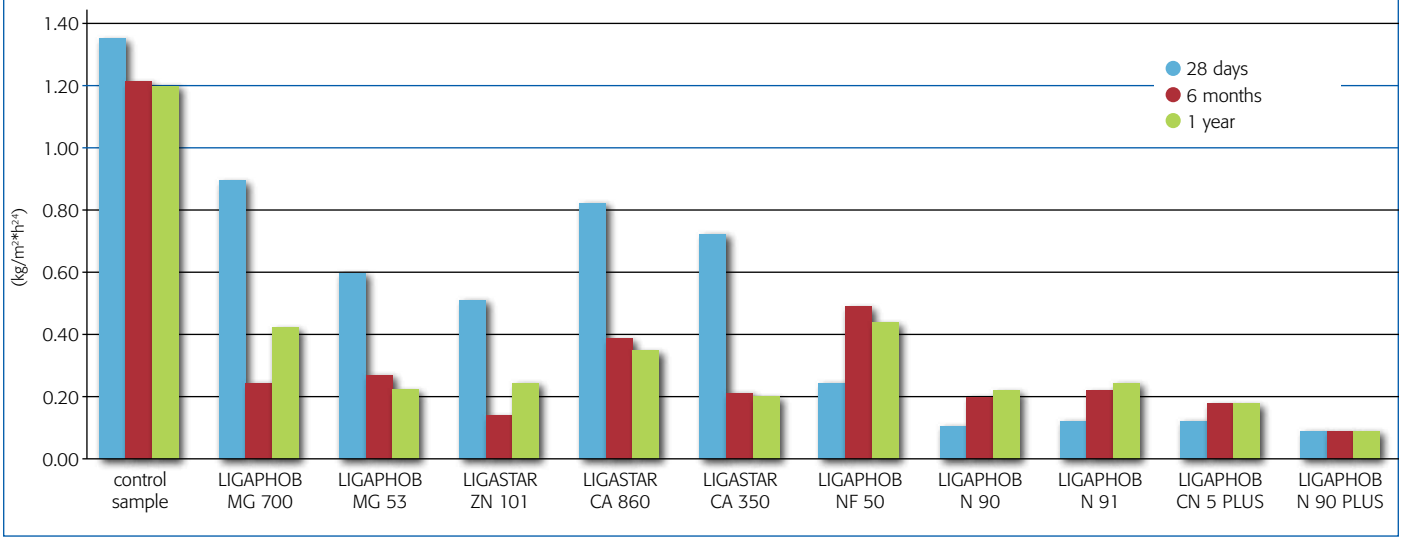
The test specimens for outdoor weathering are south-west oriented. An optical evaluation as well as the documentation of the weather data is carried out at monthly intervals. The capillary water absorption testing is done according to DIN EN 1062-3 every six months.

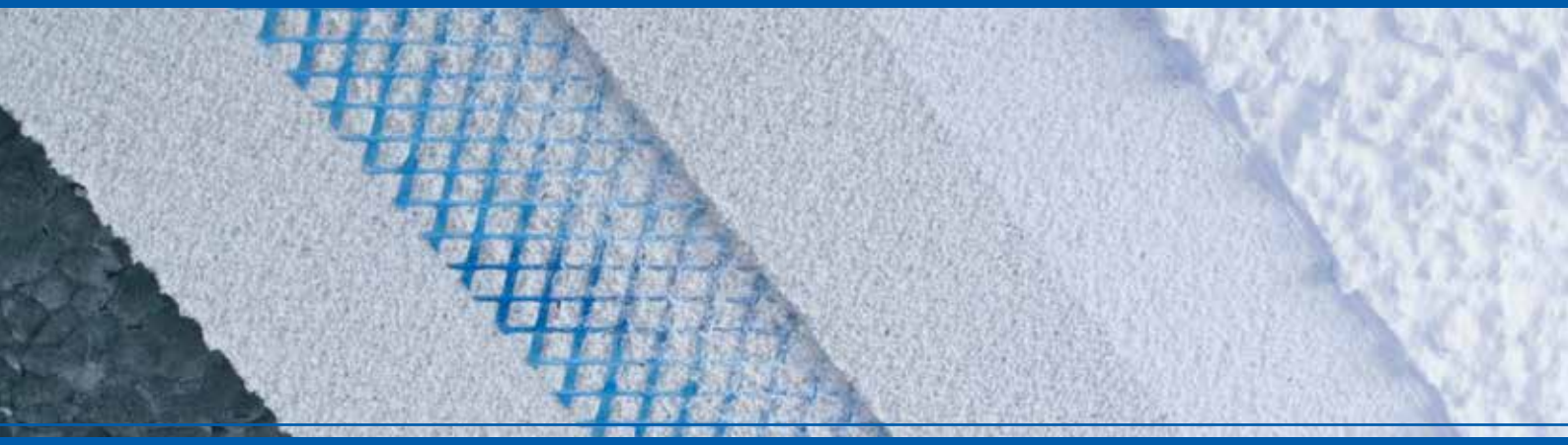
Figure 5: Water absorption/Coefficient



* Value is omitted due to measuring fluctuation

Figure 6: Total water absoption (24h)





Product	Ash (%)	Humidity (%)	FFA (%)	Free alkali (%)	Average particle (µm)	Bulk weight (g/l)
LIGAPHOB MG 700	6.8 - 8.3	max. 6.0	max. 2.0	/	max. 8.0	max. 200
LIGAPHOB MG 53	7.8 - 8.8	max. 5.0	max. 1.5	/	4.5 - 5.5	max. 250
LIGASTAR ZN 101	10.5 - 11.0	max. 0.5	max. 1.0	/	4.5 - 6.0	100 - 220
LIGASTAR CA 860	9.1 - 9.7	max. 3.0	max. 0.8	/	/	240 - 340
LGASTAR CA 350	9.2 - 9.8	max. 3.0	max. 0.8	/	2.4 - 3.6	145 - 195
LIGAPHOB N 90	/	1.0 - 4.0	/	0.20 - 0.60	/	/
LIGAPHOB N 91	/	1.0 - 4.0	/	0.20 - 0.50	/	/
LIGAPHOB N 90 PLUS	/	max. 6.0	/	0.01 - 0.30	/	/
LIGAPHOB NF 50	11.0 - 14.0	max. 2.0	/	/	/	200 - 350
LIGAPHOB CN 5 PLUS	13.0 - 15.0	max. 3.0	/	/	8.0 - 11.0	/
LIGASTAR AL D2	10.0 - 11.0	max. 2.0	3.0 - 5.0	/	/	180 - 280
LIGASTAR AL TR	7.8 - 8.5	max. 2.5	17.0 - 20.0	/	/	225 - 300
LIGAPHOB NT 90	/	max. 2.5	/	0.05 - 0.25	/	/
LIGAPHOB CN 25	6.7 - 7.3	max. 3.5	/	/	/	200 - 350
LIGAPHOB CN 75	10.0 - 15.0	max. 2.5	/	/	/	250 - 350
LIGAPHOB MN 20	7.0 - 9.5	max. 4.0	/	/	/	/

Product	Flow spread (mm)	Air void content (%)	Bulk density (g/cm^3)	w value ($kg/m^2*h^{0.5}$)	W_{24} value (kg/m^2*h^{24})
LIGAPHOB MG 700	155	21.0	1.6308	0.35	0.29
LIGAPHOB MG 53	160	20.0	1.6265	0.13	0.21
LIGASTAR ZN 101	135	16.0	1.8027	0.10	0.20
LIGASTAR CA 860	170	24.0	1.5432	0.28	0.28
LGASTAR CA 350	165	23.5	1.5539	0.13	0.18
LIGAPHOB N 90	165	12.5	1.8232	0.03	0.17
LIGAPHOB N 91	165	15.0	1.7681	0.06	0.19
LIGAPHOB N 90 PLUS	155	18.0	1.6793	0.02	0.07
LIGAPHOB NF 50	175	13.5	1.8022	0.17	0.33
LIGAPHOB CN 5 PLUS	160	19.0	1.6534	0.05	0.14

For the product performance the hydrophobing agent was processed in a mineral plaster and the listed parameters were determined.

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