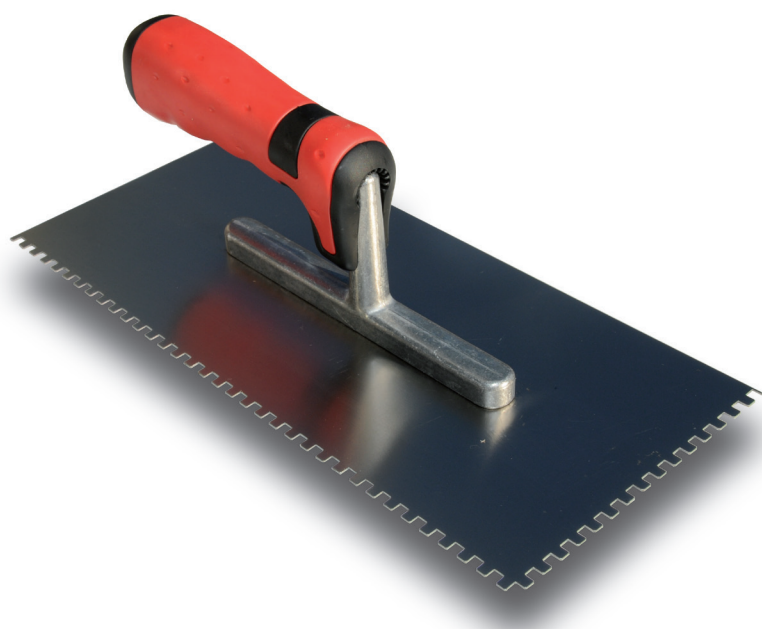




AGRANA STARCH CONSTRUCTION CHEMICALS AND ADDITIVES



AGRANA STARCH

AGRANA STARCH

is a wholly owned subsidiary of the AGRANA Holding AG, the holding company of the Austrian sugar and starch industry.

The production of starch, specially modified starch, as well as co-products, sourced from different raw material sources including

- potatoes
- maize
- and waxy maize

is the main business activity of AGRANA Starch.

AGRANA Starch division comprises four major sales channels:

- Food
- Non-Food
- Liquid Sweeteners
- Bioethanol

AGRANA Starch has a long and exceptionally successful track record in the development and marketing of modified starch products, under the brand name AMITROLIT®, for the construction and building industries. The products are the result of longstanding and intensive research and development in close cooperation with the Research Division Starch / Zuckerforschung Tulln.

PRODUCTION & SERVICE

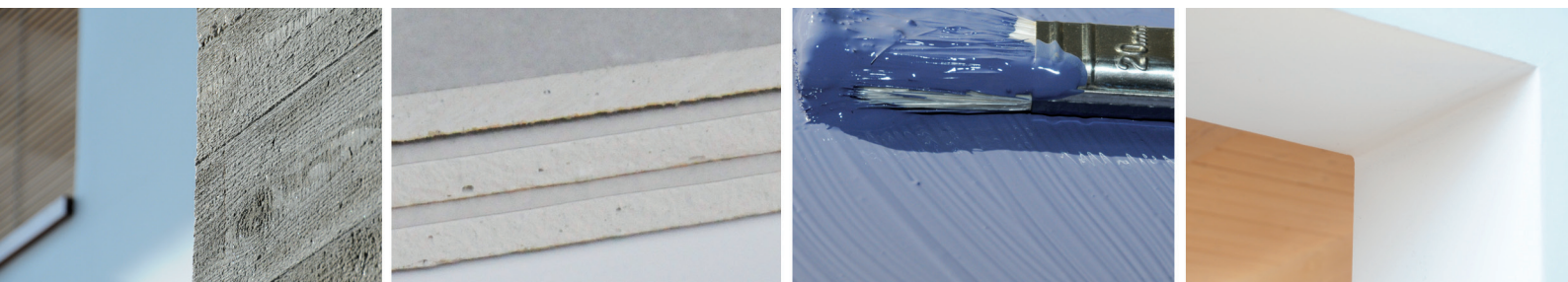
AGRANA Starch is produced at four starch processing facilities:

- Austria: Gmuend, Aschach
- Romania: Tandarei
- Hungary: Szabadegyhaza

The production in each plant is characterized by the highest technical level. Consequently, AGRANA Starch reacts instantly and with short notice to the different needs of our customers.

Striving for the best quality of AGRANA Starch products, the best possible customer satisfaction is THE top priority throughout the AGRANA group.

AGRANA's quality management system ensures the optimal and smooth process of the operating schedule combined with the highest quality assurance of our products.



In Austria, the starch factories are certified by the Lloyd's Register Quality Assurance Ltd. in 1993, the quality assurance system according to ISO-Standard 9002.



AGRANA Starch's customer focus is characterized by extensive and competent advisory services which completes the AMITROLIT® portfolio offered by AGRANA such as

- individual technical advice
- customized products
- individual service
- clean and consistent quality
- short delivery time

APPLICATIONS

AGRANA starch ethers are used in mineral-based binding systems such as gypsum and cement:

- Gypsum, slaked lime, cement and various combinations are typical applications where AMITROLIT® starches are used to immediately and reliably improve the consistency of the desired end-product properties.
- AMITROLIT® increases the efficiency of conventional water retention agents and improves the adhesive strength of combinations of building materials for difficult surfaces. They can also be used to optimize the efficacy of air-entraining admixtures.

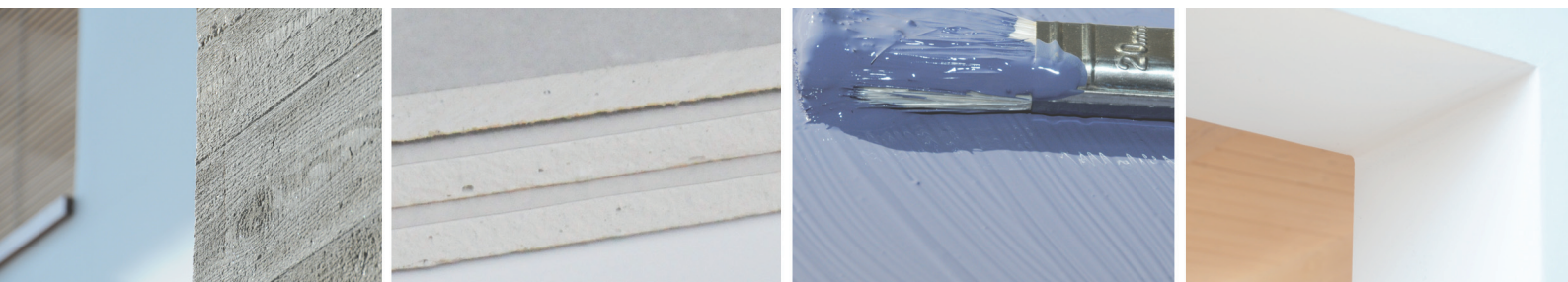
AMITROLIT® starch ethers offer a wide range of different and unique product properties specifically designed, for the needs of such industries including the drymix building industry, with versatile characteristics including

- exact adaptation to the required rheological product property for such applications as:
 - tile adhesive
 - joint compounds
 - plaster and render
 - gypsum plasterboards
 - concrete technology
 - dispersion systems
 - wallpaper glue
- high product consistency by using the latest technology in our manufacturing plants and maintaining the highest standards of our quality assurance
- excellent overall compatibility with additives used in these applications
- highest efficiency at the required dosage
- ecologically friendly and nontoxic

Beyond these applications AGRANA Starch ethers are well established in the fabrication of gypsum plasterboards (COLLAMIDON®). Under the brand name AMITROPAINT® a special series of AGRANA Starch ethers are used as alternative thickeners in combination with celluloses for dispersion systems such as wall paints and plasters.

PRODUCT SELECTION GUIDE

		AMITROLIT® 8850	AMITROLIT® 8860	AMITROLIT® 8872	AMITROLIT® 8873	AMITROLIT® 8882		AMITROLIT® 8865		AMITROPAIN® 8250	AMITROPAIN® PLUS 8270		AMITROLIT® 8400	AMITROLIT® 8410		COLLAMIDON® 8805
Cementitious systems	Masonry mortars	++	++			+										
	Plasters	++	+	++	+	+										
	Skim coats	+	+		++	++										
	Wall putties	+	+		++	++										
	Tile adhesives standard (CBTA acc. EN12004)	+	++	++	+	+										
	Tile adhesives improved (CBTA acc. EN12004)	+	++	+	++	++										
	ETICS - External Thermal Insulation Composite Systems	++	++	+	++	+										
	Screeds	++	+	+												
Gypsum systems	Plasters	++			+	++										
	Skim coats	++			+	++										
	Wall putties	++			+											
	Screeds	+														
	Gypsum plaster boards															++
Concrete	Stabilizer for Self Compacting Concrete (SCC)							++								
	Rebound reducing agent for shotcrete (dry & wet)							++								
Thickener for dispersion paints & Wallpaper glue	Thickener for Dispersion paints									++	+					
	Thickener for silicate paints										++					
	Dispersion based renders (silicate- and resin)									+	++					
	Wallpaper glues												++	++		



PROPERTIES AND CHARACTERISTICS OF AMITROLIT® STARCH ETHERS IN HYDRAULIC BINDER SUSPENSIONS

Thickening

AMITROLIT® starch ethers strengthen the consistency of materials which are based on hydraulic binders resulting from a distinctive impact on the rheological behaviour of the binding matrix in water. Particularly the flow characteristics, the yielding point as well as the water demand of the various formulations are enhanced by AMITROLIT®. With the appropriate application of the AMITROLIT® types, materials including renders or tile adhesive show significantly high non-sag properties.

Adjustment of the flow characteristics

As a result of the impact on the flow properties, the structural viscosity of the suspensions and the time dependent flow properties, such as thixotropy or rheopexy, can be adapted to the desired application as well as processing technique. With the selection of the right AMITROLIT® type and the appropriate dosage, the workability of renders and tile adhesives can be optimized.

Compatibility with other components

AMITROLIT® products are compatible with commonly used aggregates and additives. AMITROLIT® improves the efficiency of the additives and significantly reduces the required quantities. The product properties are resulting in an increase of the water retention, enhanced adhesion and optimized workability. In general, the AMITROLIT® products show low influence on the reactivity of the hydraulic binder (cement, gypsum, lime).

Calcium sensitivity of the starch ether

Akin to other technical products based on poly saccharides, which are categorized amongst Polyhydroxyl-Polymers, the AMITROLIT® starch ethers, may exhibit a certain level of sensitivity towards polyvalent cations, such as calcium, with regards to the solution rate and the peak viscosity. Such sensitivity can be related to the quantity of AMITROLIT® used, the interdependence to the type of polyvalent cations, the pH and in addition the type of AMITROLIT®. In general, AMITROLIT® products exhibit a lower sensitivity towards calcium-ions at higher pH levels in comparison to other starch products.

CEMENTITIOUS BASED CONSTRUCTION MATERIALS

A wide range of different starch ethers guarantee that we meticulously meet our customers' needs and preferences when it comes to providing optimized formulations. The AMITROLIT® series comprises different raw materials combined with diverse modifications to exceed the product properties with regards to

- rheological behaviour
- workability
- sag resistant
- water retention
- set retardation

Application areas include:

- mortars
- renders and skim coats
- tile adhesives (C1 and C2 according to EN12004)
- external wall insulation systems
- screeds and
- beyond

SUITABLE PRODUCTS ARE:

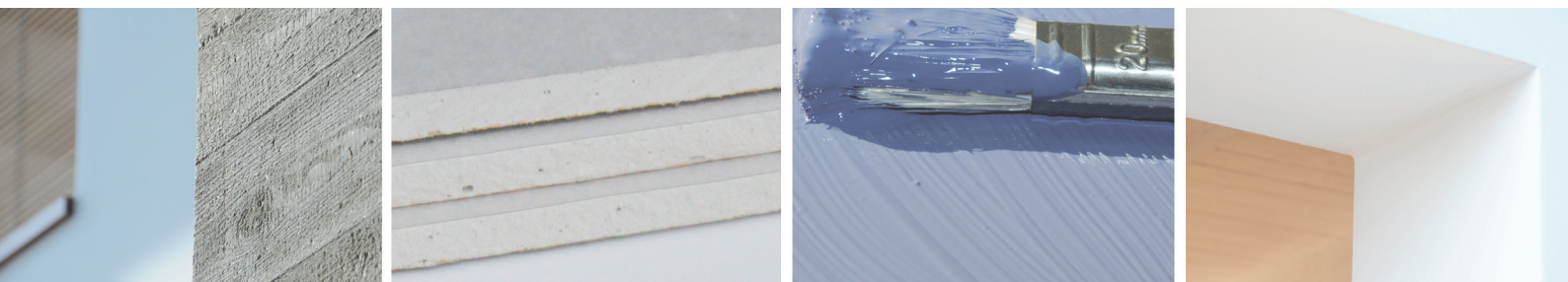
- AMITROLIT® 8850
- AMITROLIT® 8860
- AMITROLIT® 8872
- AMITROLIT® 8873
- AMITROLIT® 8882

R&D: Adhesives for tiles

Concerning adhesives for tiles, the steadiness which is described by the slip resistance is gaining importance. This special behaviour cannot be achieved by viscosity-increasing cellulose derivatives. Only by means of rheology-enhancing starch derivatives it is possible to adjust a sufficiently high yield point to ensure steadiness of tiles. This special property of these tile adhesives is determined by the slip of the tiles according to standard method EN 1308.

Viscosity properties are determined via Brookfield measurement. The open time is used as an important criterion for the workability time. This test procedure is conducted according to EN 1346. The setting performance of mortars containing starch derivatives is determined by means of an automatic Vicat® unit.

Research Division Starch, Zuckerforschung Tulln GmbH



GYPSUM BASED CONSTRUCTION MATERIALS

The demanding formulation of gypsum based materials requires specific rheological behaviour. A specific range of different starch ethers provide the exactly desired behaviour and improvement in the material performance.

The AMITROLIT® series comprises different raw materials combined with diverse modifications to exceed the product properties with regards to

- rheological behaviour
- workability
- sag resistant
- water retention
- set retardation

Application areas include:

- mortars and adhesives
- renders and skim coats
- machine processed plaster
- joint compounds
- screeds and
- beyond

SUITABLE PRODUCTS ARE:

- AMITROLIT® 8850
- AMITROLIT® 8873
- AMITROLIT® 8882

For the highly demanding mass production process of gypsum plasterboards, the COLLAMIDON® is a unique additive to optimize the adhesion between the cardboard and the gypsum base.

SUITABLE PRODUCT IS:

- COLLAMIDON® 8805

CONCRETE PRODUCTION

Throughout the last decade Self Compacting Concrete (SCC) and Easy Compacting Concrete (ECC), under the usage of Superplasticizers, became more popular due to the easy workability and fast progress during concreting. The demanding formulations, as well as balancing the variations, in the raw material properties made it necessary to include stabilizing agents in order to avoid segregation effects as well as bleeding.

The AMITROLIT® series offers a highly economic stabilizing agent to prevent the negative effects that may occur when concrete is formulated towards a more liquid phase. In addition, this particular AMITROLIT® version is suitable for dry and wet shotcreting as a highly economic rebound reducing agent without displaying the negative effect of set retardation.

Application areas include:

- Self Compacting Concrete
- Easy Compacting Concrete
- Pumping aid
- Rebound reducing agent for dry and wet shotcrete

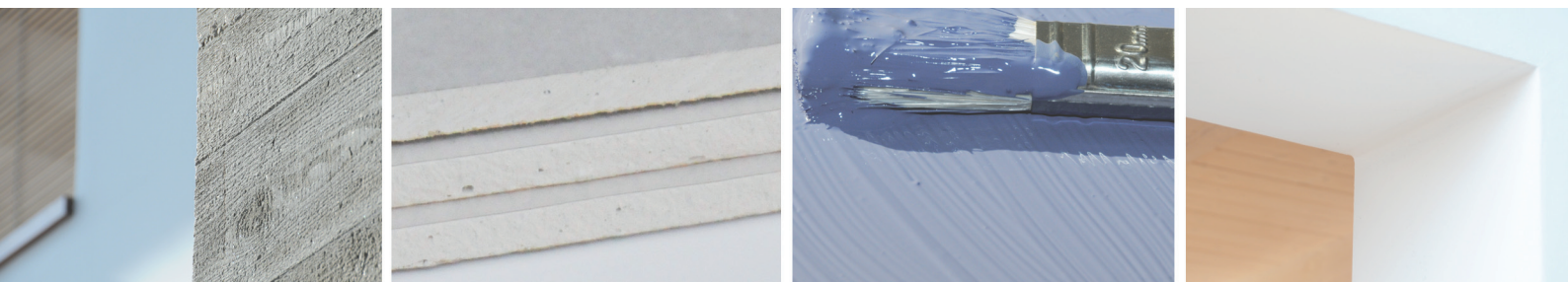
SUITABLE PRODUCT IS:

- AMITROLIT® 8865

R&D: Use of Starch in Shotcrete

Starch ethers as an additive for the reduction of the rebound were developed within a publicly funded project. The resulting product for the dry shotcrete application was named AMITROLIT® 8865. Even at very low dosages of 0,1-0,2% based on the spray cement it showed a significant reduction of the rebound of approximately 50%. The mode of operation can be explained in that way that the starch ether causes a change in the rheology of the mortar and that a "softer" concrete bed is formed. This extraordinary product shows, in contrast to other products, no negative influences on the quality of the concrete. Ecological and economical advantages are gained by reducing the rebound, because less time for the disposal of the rebounded material is necessary, lower costs for this disposal arise, less concrete is consumed altogether and the somatic stress for the workers is minimized.

An additional product for the wet shotcrete application also emerged from the development. Its potential will be investigated in a follow up project. A preliminary application test at an experimental rig showed a rebound reduction of approximately 50% based on the spray concrete reference.



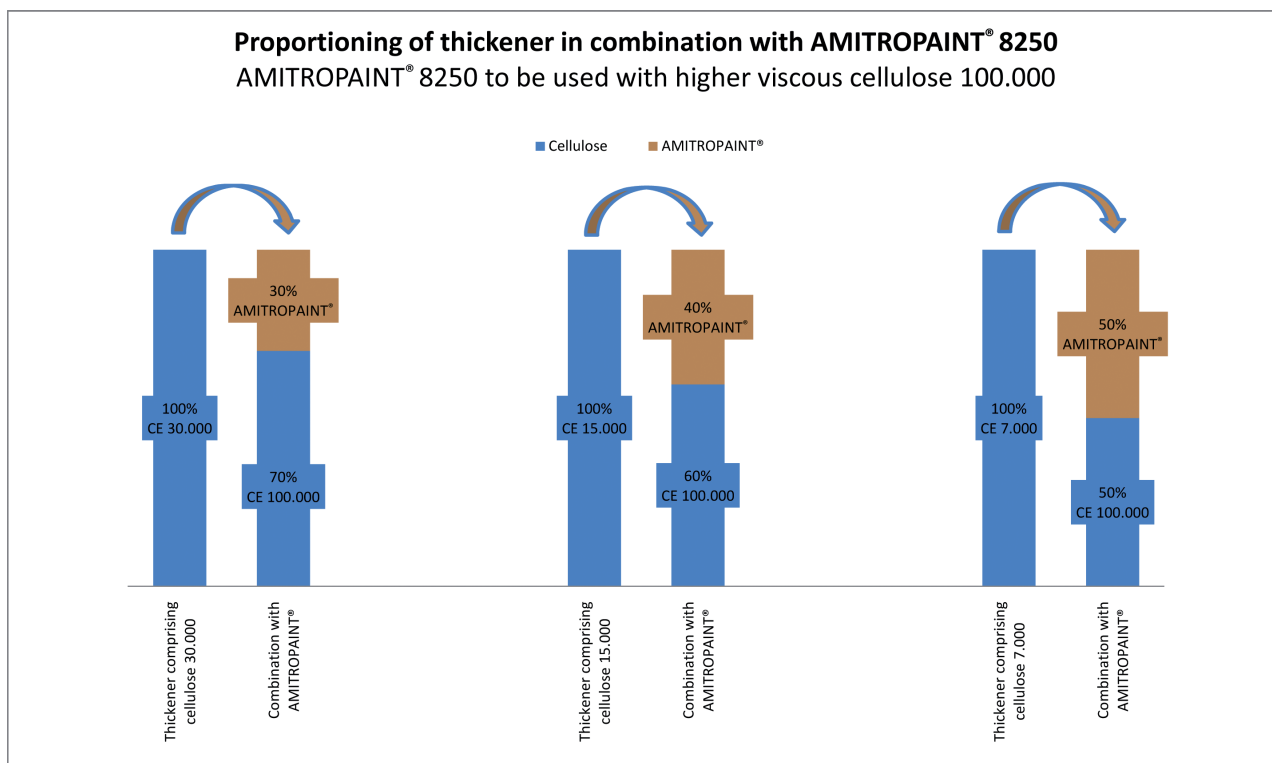
ALTERNATIVE THICKENERS FOR DISPERSION PAINTS AND RENDERS

In high quality dispersion paints, low- and medium-viscosity cellulose derivatives are used as thickeners. The combining of specially developed starch derivatives with high-viscous celluloses is advantageous for usage as thickeners in quality paints.

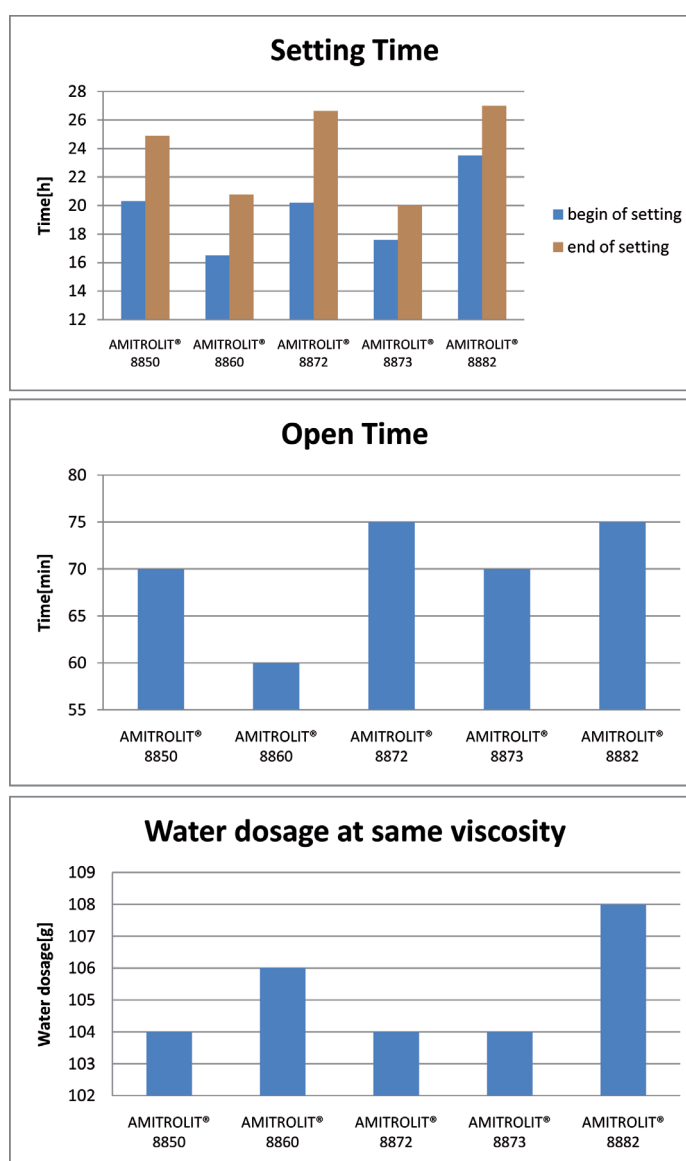
In addition, the achievable properties of paints with AMITROPAINT® are exceeding those of the conventional thickeners. Sag resistance and workability are improved whereas the opacity remains.

AMITROPAINT® 8250 is suitable for the different kinds of dispersion based paints and external renders. AMITROPAINT® 8250 has to be combined with higher viscous cellulose compared to pure cellulose based formulations.

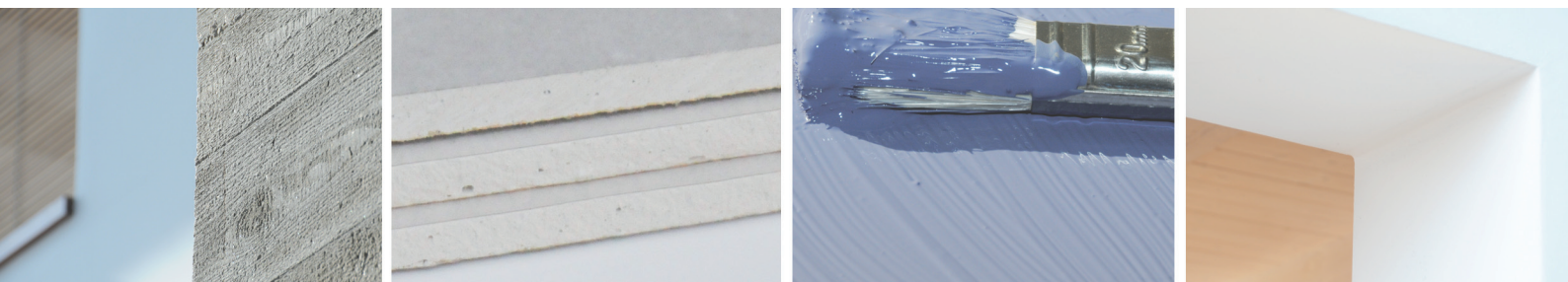
AMITROPAINT® PLUS 8270 is a special thickener which can entirely replace cellulose. Specifically concerning silicate based systems, AMITROPAINT® PLUS 8270 is recommended.



PRODUCT PROPERTIES OF SELECTED AMITROLIT® PRODUCTS (e.g. CBTA)



Disclaimer: The above graphs show the general characteristics of different AMITROLIT® products with a reference CBTA-mixture. The individual results may vary due to differing raw materials, additives as well as testing conditions.



GUIDE FORMULATION FOR SELECTED APPLICATIONS

Machine sprayed plaster	Part by weight
Gypsum-Lime binding system	
Gypsum	66
Hydrated lime	3
Lime stone sand	30
Retarder	0.2
Celluloseether	0.1
Air entraining agent	0.01
Perlite 0-1mm	0.8
AMITROLIT® 8882	0.02
Lime-Cement binding system	
CEM I	15
Hydrated lime	5
Sand	80
Celluloseether	0.1
Air entraining agent	0.03
AMITROLIT® 8850	0.03

Dispersion paint	Part by weight
Water	34.35
HEC 100.000	0.27
AMITROPAINT® 8250	0.18
Stir in at 1.000 rpm	
NaOH at 25%	0.05
Agitation at 1.500 rpm	
Wetting agent	0.30
Defoamer	0.20
Biocide	0.15
Pigment	10.00
Laminar talc filler	7.00
Calciumcarbonate filler	37.50
Stir in the pigments and fillers at 1.500 rpm Dispersion at 2.000 rpm Recommended moment for addition of AMITROPAINT®	
Dispersion	10.00
Agitation at 1.000 rpm	

Tile adhesive	Part by weight
Formulation A (EN 12004 C2)	
CEM I	40
Quartzsand 0.1 - 0.4 mm	59
Redispersionpowder	0.5
Celluloseether	0.5
AMITROLIT® 8860	0.05
Formulation B (EN 12004 C2)	
CEM I	35
Quartzsand 0.1 - 0.4mm	63
Redispersionpowder	1
Celluloseether	0.4
AMITROLIT® 8882	0.05

Stabilizer for fluid concretes	kg/m³
Flow 55-60 cm	
CEM II A-M 42,5N	230
Fly ash	60
0/4 aggregates (moist)	930
4/16 aggregates (moist)	920
Water	180
Superplasticizer	4.4
AMITROLIT® 8865	0.035

Disclaimer: The above given information is based on findings, operating experience and extensive research evolving from practical application. Due to other raw materials and supplementary chemicals being used in formulations as well as varying processing conditions we are not liable for the above given information. Please contact us for our technical support.

AGRANA. THE NATURAL UPGRADE.

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