We create chemistry

Acronal® 4000

Chemical Nature	**APEO Free Aqueous styrene-acrylate copolymer dispersion for modifying hydraulic binders**

Properties

Typical Properties	Solids content	%	~ 57.0
	pH		~ 8.0
	Apparent viscosity at 23 °C (Brookfield RVT, Spindle #3, at 100 rpm)	mPa s	~ 200 – 750
Other properties of the dispersion	Viscosity at 23 °C (shear rate, 250 s^{-1})	mPa s	140 – 200
	Density	lbs/gal	ca 8.58
		g/cm^3	ca. 1.03
	Average particle size	µm	ca. 0.2
	Film forming temperature	°F	<33 min.
		°C	<1 min.
	Dispersion type		anionic
	Plasticizer content		free from plasticizer
	Sensitivity to frost	°F	below 32
		°C	below 0
Properties of the film	Density	g/cm^3	ca. 1.08
	Glass transition temperature Tg (DSC)	°C	ca. -6
	Water absorption (After 24 hour immersion in water)	%	ca. 5 -10
	Mechanical strength*		
	Tensile strength	psi	130
	Elongation at break	%	>1200
	Appearance		clear, transparent
	Surface		tacky
	Resistance to aging		good

* The above values should not be taken as specification.

Compatible with

Polymer dispersions	Acronal 296 D and with most other nonionic and anionic dispersions
Thickeners	Rheovis ® AS 1420, Rheovis ® AS 1125, and cellulose ether
Plasticizers	Plastilit® 3060, Palatinol® types, Palamoll® types, and chlorinated paraffin waxes
Antifoams	Lumiten® E-L
Pigments and fillers	Silica flour, fine-grained sand, microdolomite, amorphous calcium carbonates. The compatibility with pigments is improved by the addition of sodium polyphosphate and Pigment Disperser N. The formulation can be tinted with mineral colors, Pigmosol® or Luconyl® pigments.
Hydraulic binders	Acronal S 4000 is compatible with hydraulic binders.

Application

Features

Acronal 4000 is used mainly for producing flexible mortars, adhesives and coatings. It blends readily with hydraulic binders and can be used to produce ceramic tile adhesives as well as flexible, water-resistant two-component mortars.

A particular application of Acronal 4000 is the production of crack-filling systems and flexible cementitious coatings for flat roofs and walls. It can also be used in combination with asphalt emulsions to produce waterproofing membranes.

Processing

It is advisable to add small amounts of a suitable preservative to products containing Acronal 4000 na in order to ensure adequate shelf life. The suitability of the preservative must be tested and monitored.

A sample two-component, cementitious, flexible waterproofing mixture based on Acronal 4000 is highlighted as follows (guiding formulation):

Dry Premix	**% by Weight**	**% by Volume**
F-110[1] - Silica sand	30.0	22.5
F-95[1] - Silica sand	27.3	20.4
Portland cement[2] (Type I/II)	19.6	12.3
Dispex® AA 4935[3]	0.2	0.7
Lumiten® E-P 3108[3] (Antifoam)	1.6	3.1

Latex mixture			
Acronal 4000[3]	0.2		0.5
Antifoam	0.5	Total	24.5 **+**
Water = Adjust to desired flow characteristics			

Formulation Parameters	
Polymer / cement ratio	0.60
Water / cement ratio	0.48 *
Sand / cement ratio	2.92

Suppliers:
[1] U. S. Silica, Ottawa, IL
[2] Lehigh Portland Cement Company, Allentown, PA
[3] BASF Corporation, Charlotte, NC

Flexible cementitious waterproofing slurries contain sand, cement, water and a high proportion, 11 - 18% by volume (16% shown above), of a polymer dispersed in the water. To apply, firstly, blend the dry premix (1) and latex mixtures together. Slurries are applied to wetted concrete in two to four coats with a total thickness of 1/8 inch (2 - 4 mm or 80 - 150 mils). The polymer particles coalesce to form a compact film. The coating remains somewhat flexible and because of its thickness, it seals most pores in the surface of the concrete. Access to moisture and water through the diurnal cycle allows hydration of the cement to continue with the result that the coat becomes somewhat denser and firmer yet still at least two magnitudes more flexible than concrete without the polymer modification. The coating is permeable to water vapor but almost impermeable to water itself. Chloride ion penetration and carbonation of concrete can also be considerably reduced or even entirely prevented under flexible cementitious membranes. The suitability of formulations for field use must be thoroughly evaluated and optimized prior to launch.

* These typical values should not be interpreted as specifications.

Safety

General

The usual safety precautions when handling chemicals must be observed. These include the measures described in Federal, State and Local health and safety regulations, thorough ventilation of the workplace, good skin care and wearing of protective goggles.

Safety Data Sheet

All safety information is provided in the Safety Data Sheet for Acronal 4000.

Storage

Please refer to the “Handling and Storage of Polymer Dispersions” brochure.

Important

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