

FILM FORMING IS KEY



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Aqueous corrosion protection still seems to be an irreconcilable contradiction for many. And for some applications there is still no solution. But in many areas, up to C5 M, 1 and 2K acrylic binders can already do a good job today.
By Nina Musche

Steel bridges, vehicles or even fences are generally outside in a moist, humid and sometimes even harsher environments and should therefore be treated to prevent rust as much as possible. Galvanising or even organic coatings can prevent oxygen, water, salts and metal from coming together at the substrate surface. Because if this is prevented, corrosion can also be delayed as long as possible. However, this requires a closed film and good adhesion to the metal. This is relatively easy to achieve with solvent-based systems from solution.

Company	Product name	Chemical basis	Solids content	MFFT	Crosslinking options	Applications
Alberdingk Boley	Alberdingk AC 2403	Multi-phase acrylic dispersion	46.0-48.0 %	~16 °C	Self-crosslinking	Anti-corrosion coatings, stain locking primers, concrete coatings, self priming paints, MDF primers, intermediate coatings in exterior joinery, oven stovin metal coatings
	Alberding AC 2420 VP	Multi-phase acrylic dispersion	45.0-47.0 %	~22 °C	Self-crosslinking	Anti-corrosion coatings, multi-purpose paint
Allnex	Setaqua 6899	Hydrophobic acrylic copolymer emulsion	41.5-44.5 %	30 °C	Thermoplastic	Direct-to-metal application
	Setaqua DTM 6850	Acrylic copolymer emulsion	41.5-44.5 %	37 °C	Self-crosslinking	Direct-to-metal application
BASF	Acronal PRO 770 X	Styrene-acrylic emulsion polymer	48.5-50.5 %	~19 °C	Thermoplastic	Direct-to-metal application, anti-corrosive primer, clear coats
	Acronal PRO 7600	Styrene-acrylic emulsion polymer	49.0-51.0 %	~22 °C	Thermoplastic	Primer, very good for dip and spray application
Covestro	Bayhydrol A 145	Hydroxyfunctional polyacrylic Dispersion	43.0-47.0 %	n/a	Polyisocyanate/ amino-resin	Clear and topcoats for vehicle repair, heavy transport finishing and industrial coatings
	Bayhydrol A 2695	Hydroxyfunctional polyacrylic dispersion	40.0-43.0 %	n/a	Polyisocyanate	Mainly for air- and forced drying systems
DSM	Neocryl XK-82	Acrylic/styrene copolymer emulsion	39.0-41.0 %	44 °C	Thermoplastic	Anti-corrosive systems; metal, wood and plastic coatings, combinations with urethanes and alkyds
	Neocryl XK-117	High solid styrene acrylic emulsion	49.0-51.0 %	28 °C	Thermoplastic	Direct-to-metal application
Lubrizol	Carbaset CR-795	Acrylic emulsion	44.0-46.0 %	24 °C	Thermoplastic	Industrial finishes, maintenance top coats and primers, DIY gloss and semi-gloss enamels, DTM gloss and semi-gloss enamels
	Carbaset CR 3100	Styrene-acrylic copolymer emulsion	43.5 %	28 °C	Thermoplastic	Transportation ACE, commercial finishes for metal buildings and structural members, industrial maintenance coatings
Synthomer	Pliotex HDT16	Hydrophobic styrene-acrylic copolymer	50 %	52 °C	Thermoplastic	Direct-to-metal, renovation paints, industrial steel and metal primers, roof coatings
	Plextol R 5530	Vinyl versatate acrylic copolymer	46 %	19 °C	Self-crosslinking	Anticorrosion coatings, metal primers, DTM clear and pigmented coatings
Synthopol	Liocryl XAS 7759	Styrene acrylic emulsion	39.0-41.0 %	~15 °C	Self-crosslinking	Pigmented and clear coats for metal and wood
	Synthalat WA-TH 2598	Hydroxyfunctional polyestermodified polyacrylic dispersion	43.0-47.0 %	n/a	Polyisocyanate/ melamin resin	Oven and air drying industrial top coats and primer

Aqueous binders with their discrete binder particles unfortunately have the problem that these must flow together after the medium has evaporated. Very careful formulation is needed here to ensure that it happens without corrosion-prone imperfections. Co-solvents have to be critically examined, because not every one suits every binder.

In 1978, an American study determined that about 40 % of the costs due to corrosion damage could be avoided; in 1995, it was only 35 %. The avoidable costs are not only generated by the coating. Also the wrong choice of metal, or not adapted to the environmental conditions, pre-treatment, or missed maintenance. Our industry has helped to reduce these costs with many developments in organic coatings. More control over the integrity of the film, higher performing active pigments and last but not least more hydrophobic binders, also in the aqueous range, have in the last 20 years again significantly increased the quality.

The possibilities for binders are manifold: epoxy resins, polyurethanes, acrylates or even the good old alkyd resin - all of which are usually available in solvent-based or water-based form. Each has its place and justification, in this overview you will find water-based acrylate copolymers that are useful in many applications to keep the costs for corrosion low. 

“At normal temperatures iron will not corrode appreciably in the absence of moisture“



TIPP: EC SHORT COURSE ANTI-CORROSION COATINGS

90 minutes of condensed basic information about corrosion and corrosion protection. Get a quick overview on this very interesting and complex subject.

<https://www.european-coatings.com/events/2021/ec-short-course-online-anti-corrosion-coatings>

PROTECTION EFFICIENCY OF POLYPYRROLE/METAL OXIDE NANO ADDITIVES IN ACRYLICS

Polypyrrole (PPy) and PPy/metal oxide nano hybrids were synthesised and its corrosion protection ability was studied by immersion test and electrochemical corrosion studies. The prepared composites were loaded in acrylic resin and coated on a mild steel surface. The characterisation of the polymer composites using FT-IR, UV-vis, XRD and FE-SEM with EDS analysis confirmed the interaction between PPy and metal oxide nanoparticles. The PPy nanoparticles were less protected on the mild steel, but the nanocomposite coating with metal oxide nanoparticles dramatically increased the corrosion resistance.

R. Rajkumar et.al., Anti-Corrosion Methods and Materials, April 2020



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Properties

Very low water and water vapour migration, adhesion to many substrates, indirect food contact

Water resistance and water vapour barrier, improved adhesion on galvanized surfaces, hard film with improved blocking resistance, adhesion to various plastics, good sandability

Good adhesion direct to metal, corrosion resistance, VOC-free, shear stable, high and stable gloss, adhesion to metals, plastics, wood and composite materials, mechanical properties, early water resistance, fast drying, suitable for high pigment load, needs hydrophobic coalescents

VOC- and ADH-free, shear stable, corrosion resistance, high and stable gloss, no need for anti-corrosion pigments or organic adhesion promoter, chemical resistant, high pigment loading, fast drying, needs hydrophobic coalescents

Corrosion protection, adhesion to metal substrates, various application options, zinc-free or low zinc content possible

Adhesion to various metals, corrosion and humidity resistance, early water resistance, shear stable, shear thinning behaviour

Good pigment wetting properties, high shear stability, high gloss, hard and flexibel films, resistance against solvents and water, 3.3 % OH-content, in combination with amino-resins for 1K baking systems

Chemical resistance, 5 % OH-content; hard but flexible films, gloss and high film build, weather stability, lightfastness

Clear, hard, humidity and corrosion resistance, adhesion to various materials, gloss in pigmented systems

Adhesion to various metals, corrosion and humidity resistance, high filmbuild

Corrosion and stain resistance, water and humidity resistance, adhesion to various metals, blend resin for alkyds, low VOC formulation possible

Adhesion to steel, aluminum and galvanized metals, corrosion resistance, low VOC formulation abilities, chemical resistance, balanced hardness and flexibility

Water and corrosion resistance, fast hardness development, adhesion on variety of substrates, blockresistance, chemical resistance

Salt-spray resistance, adhesion

Adhesion to various substrates, surfactant free, corrosion protection

Adhesion on various substrates, quick drying, high gloss, mechanical properties, flow and weather and chemical resistance, 2.0 % OH-content