

Testing of water-based high performance NASACOAT coatings

(Summary of scientific and technical investigations – more detailed reports are available upon request for each NASACOAT product)

The NASACOAT portfolio comprises a wide selection of 100% water-based paint products that exhibit exceptional and unique performance properties for use as protective coatings for most materials and surfaces in construction, engineering and housing.

All NASACOAT products are 100% water-based, made of 100% acrylic and styrene-free nano-resins. They are free of toxic surfactants, and heavy metals (lead, cadmium, etc.). Most of them exhibit remarkable mechanical properties shown by their large values of elongation and very high bonding capacity to the substrate. This enables to seal perfectly any surface, including small holes, cracks, fissures and cold joints especially in presence of normal mechanical and thermal movement of building structures. They possess high resistance against UV and infrared light, and are 100% waterproofing.

Summary of testing methods and results

Several of the NASACOAT paint products were tested by RMS Foundation and other laboratories with regard to their chemical, mechanical and water resistance properties as well as weathering behavior:

Styrene content

Fourier Transformed Infrared Analysis (FTIR) allows for determination of the paint's composition in particular health hazardous compounds, such as styrene. By searching for and identifying compound specific signatures, the presence or absence of such compounds can be verified. The analysis is performed directly on cured samples at different positions.

Volatile Organic Compounds content

Volatile Organic Compounds (VOC) are organic solvents and compounds that evaporate during application and curing. Some of the VOC compounds are health hazardous and environment pollutants. The so-called «in-can VOC» analysis according to ISO 17895 allows the determination of the concentration of these compounds in the paints.

Elongation capacity and breaking strength

Elongation and breaking strength are key parameters for resilience of the paint products. Elongation test results describe the ability of the paints to withstand their resilience, i.e. thermal expansion. According to the standard ISO 6892-1 or ASTM E8/E8M a film cut to a pre-defined shape and size («dog-bone» shape) is pulled until rupture. The displacement and the force required to rupture is recorded and used for calculation of the elongation at the breaking point and the respective breaking strength.

Bending test

Bending tests allow for determination of the resistance of a material sample against cracking and/or the detachment of the coating from the substrate when subjected to bending stresses. The standard ISO 1519 describes the procedure for testing coated panels bent around a cylindrical mandrel (2 mm diameter, chosen as worst case scenario).

Adhesion strength

Adhesion describing the bonding capacity of the paint on a substrate is a critical property for the final use and the overall quality of the paint. Measurements of the adhesion strength values are done according to the standard DIN EN ISO 4624.

A metallic cylinder is coated with the paint and then glued to a uncoated one after curing of the paint. Finally, the joined cylinders are pulled apart and the force required for separation is recorded. The adhesion strength value can then be determined. Additionally, the interface failure type of the coating is reported (substrate-paint vs. paint-glue and glue-substrate).

Waterproofing

Waterproofing according to the RILEM Test Method II.4 is a simple method for measuring the rate at which water diffuses through a material. The test is used to measure vertical or horizontal water diffusion and transport to define the water resistance and the degree of protection of the material.

Water absorption

Water absorption was studied by immersing the samples in water at 38°C and measuring the weight increase after 24h.

Product \ Test	Chemical Composition Styrene Content	Volatile Organic Compounds Content (VOC) (1)	Elongation Capacity *** Breaking Strength	Bending Capacity	Adhesion Strength	Waterproofing (2) *** Water Adsorption	Weathering Exposition (3)
Nano AcrylGP	no styrene	—	3'274 % *** 0.4 MPa (40 Ton/m ²)	—	—	—	—
Nano AcrylHT	no styrene	—	—	fulfilled	—	—	—
Power Skin 10 (wall coating)	—	VOC free	—	—	6.0 MPa (611 Ton/m ²)	—	exceeds 10 years
Elastic Cement (crack repairing)	—	VOC free	557 % *** 2.1 MPa (217 Ton/m ²)	—	3.4 MPa (343 Ton/m ²)	—	—
Sun Glare (roof coating)	—	VOC free	926 % *** 3.0 MPa (303 Ton/m ²)	—	5.6 MPa (572 Ton/m ²)	fulfilled *** + 11 wt%	exceeds 10 years
OxyBlock (oxidation/ corrosion blocker)	—	VOC free	—	fulfilled	6.3 MPa (643 Ton/m ²)	—	—
Competitor A (4) (wall coating)	—	—	400 % *** 1.0 MPa (101 Ton/m ²)	—	3.0 MPa (306 Ton/m ²)	—	—
Competitor B (4) (roof coating)	—	—	200 % *** 1.6 MPa (163 Ton/m ²)	—	—	—	—

Table: Tests results and comparison versus competitors – (1) Tests done by TÜV Rheinland; (2) and (3) Tests done by NASACOAT; (4) based on supplier information.

Weathering test

Weathering tests according to ISO 4892-03 simulate the exposure to weathering factors that may cause de-colorization, gloss and strength loss, chalking, cracking and spalling of paints.

Panels coated with the paint under investigation are subjected to alternating cycles of controlled high temperatures and UV light (night and day simulation) as well as moisture (dew and rain simulation with condensing humidity and/or water spray). This simulation allows accelerated aging – damages that might arise after months or years of outdoor use can be reproduced in a few days or weeks.

Test partners of RMS

VOC and corrosion tests have been subcontracted, under the supervision of RMS to TÜV Rheinland, Köln, Germany. Weathering tests have been done by NASACOAT in Mexico.

Information

RMS is a service laboratory and research institute. The services offered include testing, advisory services, training as well as technology transfer. Research is done in interdisciplinary cooperation with external scientific partners.

RMS does its testing works on medical and technical products including chemical and materialographic analyses as well as physical and mechanical testing of materials.

The services of RMS have been certified in line with the SN EN ISO 9001 standard. All tests are performed based on or according to international standards. The services have been accredited according to the ISO/IEC 17025 standard. Specific tests are offered according to customer specifications.

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