

Technical report

Klabex Laboratory

Project title: Water-based anticorrosive primer

Project number: K19-006

Technical responsible: Jesús Guzmán

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Purpose

To formulate water-based anticorrosive primer, based on Synthacril 7099 acrylic resin from Multiquímica.

Initial considerations

Synthacril 7099 resin is recommended for use in “DTM” coatings due to its adhesion to multiple surfaces and for primers intended for use as undercoats in light industry.

With this project we want to explore the possibility of increasing the versatility of the resin through the formulation of an anticorrosive primer, which can be applied as a primer for metals in protective systems.

Conclusion

A primer was formulated with good adhesion to the tested substrates and excellent corrosion resistance.

Tests were carried out to evaluate the adhesion of the formulation, classifying as GT0 - GT1 in all the surfaces tested, the formulation showed a very good corrosion resistance on degreased carbon steel, good storage stability and adequate viscosity for easy application.

Discussion

Based on previous developments, different products were formulated aimed to achieve anticorrosive primers that could be used as undercoats, regardless of surface to be coated and the topcoat to be applied.

Physical properties

Storage stability: storage stability tests were carried out by introducing samples, in a glass jar, in an oven at 60 Celsius degrees for 7 days.

Mechanical properties

Hardness test was carried out by Persoz pendulum.

Gloss on cardboard was measured by applying with an extender of 150 microns, both the primer and the primer mixed with universal colourants.

Adhesion to metal and primers

Primer was applied on carbon steel (SA015D), aluminium 5005 (AB015D) and galvanized steel (SG015).

Corrosion resistance

Primer was applied on SA015D carbon steel sheets and subjected to the neutral salt spray test.

Salt spray test was carried out on primer applied on SA015D carbon steel.

Compatibility with Colourants

To evaluate the compatibility, the enamels formulated were mixed by weight with the following colourant composition, homogenizing with a high-speed mixer:

- ColourFal Zero 700-030 TS Oxide yellow: 7.89%
- ColourFal Zero 700-060 YS Oxide Red: 76.12%
- ColourFal Zero 700-160 RS Blue HS: 15.99%

Results

1.1- Viscosity, Krebs-Stormer method, based on UNE 48076 standard.

Viscosity		Initial	24 hours	7 days	4 weeks
Sample	Name	KU	KU	KU	KU
K19-006 Synthacril 7099	LD 9 S-7099	87,6	102,0	107,8	103,3

1.2.- Storage stability: it is evaluated by comparing the state of a sample that was at room temperature with a sample that was aged in an oven for 7 days at 60 Celsius degrees, in a properly closed glass jar.

There were no differences in viscosity between the samples, nor the appearance of skins, lumps,

hard deposits, nor any appreciable defect in the sample subjected to aging.

2.1- Hardness, pendulum damping test, Persoz pendulum method, based on UNE-EN ISO 1522 standard.

For the hardness test with the Persoz pendulum, samples were applied on glass panels with a 150 microns extender. After the pre-established hours from the application, the samples were tested by counting the oscillations in the pendulum, using a Biuged Instruments "BGD 509 Automatic-counting pendulum hardness tester" equipment.

PERSOZ Hardness		24 hours	48 hours	7 days	14 days
Sample	Name	oscillation	oscillation	oscillation	oscillation
K19-006 Synthacril 7099	LD 9 S-7099	54	75	96	110

Based on our experience, hardness is considered adequate, and will not have effect on the paint system.

2.2.- Gloss, determination of gloss value at 20°, 60° and 85°, based on UNE-EN ISO 2813 standard.

Measurement of specular gloss on paint film applied on cardboard with an extender of 150 microns, using a "micro-TRI-gloss" equipment from CHN Spec.

Gloss		Angle		
Sample	Name	20	60	85
K19-006 Synthacril 7099	LD 9 S-7099 - White	2,2	13,6	38,8
K19-006 Synthacril 7099	LD 9 S-7099 - Tinted	1,4	12,2	39,1

3.- Adhesion, cross-cut test, based on UNE-EN ISO 2409 standard.

Film applied was cut, with a multiple blade of 1 millimetre of separation, on applications with an extender of 150 microns on metals in which it was desired to test the adhesion of the product, the test was carried out 7 and 14 days after application, with the specimens under normal laboratory conditions, using a "BGD 502/3 Cross hatch adhesion tester" equipment.

Adhesion		Surface		
Sample	Name	Steel	Galvanized steel	Aluminium
K19-006 Synthacril 7099	LD 9 S-7099 - 7 days	GT 1	GT 0	GT 0
K19-006 Synthacril 7099	LD 9 S-7099 - 14 days	GT 1	GT 0	GT 0

4.- Corrosion resistance, corrosión tests in artificial atmospheres - Salt spray tests, based on UNE-EN ISO 9227 standard.

To test corrosion resistance, primer was applied on degreased carbon steel with an approximate thickness of 50 dry microns, the paint was allowed to dry for 28 days and was subjected to testing, after making the incision.

Test duration was 240 hours, taking specimens at 72 hours to establish the evolution of corrosion as a function of time.

5.- Compatibility with universal colourants, evaluation by measuring the colour difference between rubbed area versus unrubbed area.

For the compatibility test, 0.5 grams of the mixture of colourants, previously prepared, were added to 30 grams of the white enamel to be tested, they were mixed using a high speed mixer, with IDM "IGT SimplyMix" equipment, for 60 seconds and it was applied on cardboard with a 150 micron applicator, using an automatic applicator with absorbent base "BGD 218 Automatic film applicator" from Biuged Instruments, rubbing vigorously with the finger 4 minutes after application.

To evaluate the test, the colour difference between the rubbed area and the non-rubbed area was measured with a "Datacolor 400" spectrophotometer connected to a computer using the Largo Innova "Synergy M3" software, measuring at 24 hours of sample application.

Colour difference		ΔE Lab	ΔE CMC (1:1)	ΔE Lab 2000 (1:1:1)
Sample	Name			
K19-006 Synthacril 7099	LD 9 S-7099	0,10	0,12	0,10

The colour difference obtained after the test is considered acceptable, being below 1 in the three calculation methods used, considering that the chosen dye mixture is difficult to stabilize.

Formulation

Klabex has developed and has the formulations used for this report.

For additional information, please contact us.

Klabex is able to reformulate this product according to the needs of each client, using the raw materials that the client deems appropriate, under the conditions listed in our confidentiality agreement.

The substitution of raw materials could lead to a change in the performance of the product.

Klabex Laboratory

c/ Secoya 14
28044 Madrid



Teléfono: (+34) 914 939 864
Correo electrónico: info@klabex.com
Página web: www.klabex.com

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