POLYMER COMPOSITES FOR WASHABLE WALL PLASTERS

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Lucrarea de față se referă la optimizarea performaţelor peliculogene ale unor produse structurate în dispersie apoasă aplicabile la interior/exterior, prin utilizarea de diferite compozite polimerice, precum şi stabilirea unor domenii de utilizare. Încadrarea pe domenii de utilizare s-a realizat în funcţie de o serie de criterii şi niveluri de performanţă pentru stratul suport şi pentru sistemele de protecţie.

The present work has as its main aim the optimization of several coating products; initially, these products are aqueous dispersion. Polymer composites have been used for this purpose. The domains of use have been defined according to various criteria, both for supportive layer, as well as for the protective/decorative systems.

Keywords: water borne plasters, physico-mechanical tests

1. Introduction

In a previous paper [1], we have described a new class of paints, based on composite materials. Water borne structured products have an important role in the modern technology, thanks to their use in almost all fields of activity and to their durability. These products have an important role in the protection and finishing of surfaces, having a very good resistance to weathering, scratch, impact, temperature variations, aggresive chemicals. They can be laid on mineral surfaces such us: usual lime – cement plasters, concrete, betonip, external wall thermal insulator systems.

Such coatings are heterogeneous multicomponent systems consisting in a solid phase (pigments, or/and fillers), binder and solvent. The fillers (powder) are dispersed within the system [2].

The properties of these products are specific for each system and depend on the binder type and nature, the nature of pulverous materials and their ratio; other variables are pigment/binder ratio, or binder/solvent ratio, and the types of additives known as rheological additives [3].

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Modern water borne systems are a special case of the film forming dispersions, taking into account that the polymer itself exhibits as fine particles dispersed in a continuous liquid phase which in this case is water. It is already known that the viscosity of this kind of systems differs from that of the conventional ones in which the binder is a polymer dissolved in the solvent, [1].

In the present work we describe the synthesis and properties of new washable wall paints based on plasters containing acrilic-styrene copolymers.

2. Experimental

Styrene and methyl methacrylate are easily submitted to emulsion copolymerization. Commercial lattices usually contain 40 ÷ 60 % of copolymer. In the present work, we have used two types of such products, named ORGAL PST 50, and ACRONAL 290 D, respectively.

The properties of these copolymer composites are presented in Table 1.

Table 1

Properties of acryl-styrene copolymers

PROPERTIES	ORGAL PST 50	ACRONAL 290 D
Appearance	white, viscous liquid	white, viscous liquid
Non-volatile content, %	50±1	50±1
Brookfield viscosity RVT 5/20, mPas	5000-11000	5000-14000
pH	7.5-9.5	7.5-9.0
MFFT, ^{0}C*	22	20

* minimal film formation temperature

In our work, two main formulation have been used. The formulations for the compositions named MG are presented in Table 2, while the formulation, BR are described in Table 3.

Table 2

Main formulations for MG

No.	Raw materials	Weight		
1	water	19.93	16.93	13.93
2	preservative - Preventol D6	0.2	0.2	0.2
3	dispersant - Calgon 322	0.1	0.1	0.1
4	dispersant - Lopon 890	0.2	0.2	0.2
5	defoamer - BYK 037	0.15	0.15	0.15
6	pigments and extenders: Tioxide R706, Omyacarb 5 KA	6	6	6
7	carolith 15 GU *)	20	20	20
8	carolith 130 GU *)	40	40	40
9	thickener - Walocel XM **)	0.4	0.4	0.4
10	pH buffer - NaOH 50%	0.02	0.02	0.02
11	coalescent - Dalpad	1	1	1
12	**RESIN**	**12**	**15**	**18**
	TOTAL	**100.00**	**100.00**	**100.00**

Table 3

Main formulations for BR

No.	Raw materials	Weight		
1	water	14.33	11.33	8.33
2	preservative - Preventol D6	0.2	0.2	0.2
3	dispersant - Calgon 322	0.15	0.15	0.15
4	dispersant - Lopon 890	0.3	0.3	0.3
5	defoamer - BYK 037	0.3	0.3	0.3
6	pigments and extenders: Tioxide TR 92, Omyacarb 5 KA	17	17	17
7	carolith 130 GU *)	10	10	10
8	carolith 0.5-1 *)	44	44	44
9	rheology agent - Arbocel BE 600-30 PU	0.4	0.4	0.4
10	thickener - Walocel XM **)	0.3	0.3	0.3
11	pH buffer - NaOH 50%	0.02	0.02	0.02
12	coalescent - Dalpad	1	1	1
13	**RESIN**	**12**	**15**	**18**
	TOTAL	**100.00**	**100.00**	**100.00**

*) pebbles; **) modified methyl-hydroxy-ethyl cellulose

As it can be noticed from Table 2 and 3, we have used three different resin concentration. The obtained washable wall plasters were properly characterised

and laid on different supports: concrete B 250 simple / primered, externalal wall thermal insulator system simple / primered and betonip simple / primered.

The physico-mechanical tests, performed on the obtained plasters, have been the same as those previously described [1].

3. Results and discussion

The results obtained for the performed measurements on the products are presented in Table 4. The measurements regarding physico-mecanical tests of the films obtained on different supports are listed in Table 5; alongside, we have presented the results obtained for film climacteric determinations when applied on different supports.

PRODUCTS BASED ON „MG"

The analyse of the data from Table 4 shows the following:

Viscosity, pH - all the samples have similar values, and the difference between them is very small.

More information may be gathered from the data presented in Table 5:

Pull-off test for adhesion – the products based on ORGAL PST 50 present better pull off adhesion from the scale on concrete and primered concrete, but lower for external wall thermal insulator system simple / primered and betonip simple / primered. The best formulations are these with 12% and 15% resin, respectively. Those products based on ACRONAL 290 D present the lowest pull off adhesion from the scale on concrete and primered concrete, but better performance on simple and primered external wall thermal insulator system and on betonip simple / primered from the scale. The best are those containing 15% resin.

Liquid-water transmission rate - the products based on ORGAL PST 50 present medium class, both from the point of view of entrance of the bearing and of the total coefficient, on concrete and primered concrete. Some of them, with 15% resin are noteworthy. On the whole, they present the better resistance from the scale. The products based on ACRONAL 290 D present medium class, both from the point of view of the entrance of the bearing and of the total coefficient, on primered concrete. Some of them, with 18% resin are the best. Water-vapour transmission rate – both from the product based on ORGAL PST 50 and from the product based on ACRONAL 290 D, with 12 and 15% resin, form the most permeable film to water vapours.

Impact resistance – both from the product based on ORGAL PST 50 and from the product based on ACRONAL 290 D, present the best resistance to impact resistance on concrete and primered concrete and on betonip simple /

primered, but medium resistance to impact resistance on external wall thermal insulator system simple / primered, for all resin concentration.

The analyse of the data obtained after climateric tests on the applied film shows the following:

The salt spray tests corrosion - tests in artificial atmospheres – the products based on ORGAL PST 50 present a very good resistance on all surface types, suffering just a low dipping, deficiency that disappears after what the aggressive climacteric conditions are removed.This behaviour is typical on concrete and primered concrete and on external wall thermal insulator system simple / primered. The product based on ACRONAL 290 D presents a very good resistance on concrete and primered concrete and on external wall thermal insulator system simple / primered, without film modification, and medium resistance on simple / primered betonip. The same kind of conclusions have been reached for the environmental testing (change of temperature and dampness, damp heat in steady state, low temperature testing, resistance to freezing-thawing).

PRODUCTS BASED ON „BR"

The analyse of the data from Table 4 shows the following facts:

Viscosity - the products based on ORGAL PST 50 present highest viscosity, for all resin concentration.

pH - all the samples have comparable values and the difference between them is low.

The analyse of the data from Table 5 shows the following:

Pull-off test for adhesion – the products based on ORGAL PST 50 present a little bit low value at pull off adhesion from the scale on concrete and primered concrete, and on external wall thermal insulator system simple / primered, for products with 15% resin, on betonip simple / primered, where are remarkable some of them with 18% resin. Those products based on ACRONAL 290 D present the best values on concrete B 250 simple / primered, on external wall thermal insulator system simple / primered and on betonip simple / primered from scale.

Liquid-water transmission rate - the products based on ORGAL PST 50 present the highest values from the point of view of the entrance of the bearing from the scale, however, the lower values from the point of view of the total coefficient. Samples absorb water quite fast, immediately after immersion, but on the whole, they are keeping a smaller amount of water. The products based on ACRONAL 290 D present the lower values from the point of view of the entrance of the bearing from the scale, but the highest values from the point of view of the total coefficient. The recipe with 12% content of resin, presents a very low permeability on simple concrete support and that is remarkable.

Water-vapour transmission rate – the product based on ORGAL PST 50 presents the highest values from the scale, and those products based on ACRONAL 290 D, present comparable values at water-vapour transmission rate, but a little bit lower values the other product from the scale.

Impact resistance – both from the product based on ORGAL PST 50 and from the product based on ACRONAL 290 D, present the best resistance to impact resistance on concrete and primered concrete and on betonip simple / primered, but medium resistance to impact resistance on external wall thermal insulator system simple / primered.

The analyse of the data obtained after climateric tests on the applied film exhibits the following:

The salt spray tests corrosion - tests in artificial atmospheres – the products based on ORGAL PST 50 present very good resistance on all surface types, suffering just a low dipping, deficiency that disappears after aggressive climacteric conditions stops.This behaviour is typical on concrete and primered concrete and on external wall thermal insulator system simple / primered. The product based on ACRONAL 290 D presents a very good resistance on concrete and primered concrete and on external wall thermal insulator system simple / primered, without film modification, but a medium resistance on simple / primered betonip.

The environmental testing (change of temperature and dampness, damp heat, steady state, low temperature, resistance to cycles freezing-thawing) the products based on ORGAL PST 50 present a very good resistance on all surface types, suffering just a low dipping, deficiency that disappears after aggressive climacteric conditions stops.This behaviour is typical to concrete and primered concrete and to external wall thermal insulator system simple / primered. The product based on ACRONAL 290 D present a very good resistance on concrete and primered concrete and on external wall thermal insulator system simple / primered, without film modification, and medium resistance on simple / primered betonip.

4. Conclusions

The products **„ MG and BR"** can be used for indoor and outdoor, related to the weathering class (cf. C170), in the weathering class 1b (very low weathering), 2b (low weathering) and 3b (average weathering, only aggressive gases from A group), respectively the rural climate, alpine climate, sea and city climate with certain restrictions. The products are not recommended for indoors with industrial aggressiveness, or pollutants from B and C groups. In case of the betonip surfaces, the maximum agreed class will decrease with one unit because of the low resistances on this type of surface [4].

Maximum agreed weathering class was selected in order to provide a minimum 5 years resistance for indoor/outdoor for the studied products, the normal life of the decorative products [5].

This framing was selected so that the protection applied on reinforced concrete surfaces, external wall thermal insulator system, lime cement plasters, "rigips" boards, bricks ensure in the maintenance of all the performances according with the users' requests, the quality systems and technical criterion for constructions stipulated in the Law no10/1995.

As a conclusion of the performed testes, the highest quality level has been recorded for the products based on **ACRONAL 290 D** resin**,** followed by the ones based on **ORGAL PST 50** resin. For **MG** products are remarkable some of them with 15% resin, and for **BR** products are remarkable some of them with 18% resin.

R E F E R E N C E S

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