Open time extenders for dispersion paints and plasters

Common problem with dispersion paints and plasters is their premature drying during application, which results with defects of various types, occurred on the dried surface of the coating. This phenomenon intensifies in summer time, when these systems are being applied at elevated air temperatures, in the sunlight or with windy weather.

Dispersion paints and plasters are mixtures based on the appropriately selected set of fillers with various grain sizes, polymer binder, auxiliary agents and other upgrading additives. These systems are being applied onto walls and ceilings, both indoors and outdoors, thus giving certain appearance and texture to the surface and protecting walls against destructive impact of environmental factors.

Paints and plasters, both for indoor and outdoor applications should "breath easily" and show capability for moisture exchange through its diffusion between the base material and atmosphere. This way obtaining of high quality coatings, free from defects and other imperfections, is guaranteed.

In the Figure no 1 is presented plaster coating after premature drying in high temperature. This coating will be resistant neither to weather conditions (rain, moisture) nor to mechanical damage in result of present cracks.

In order to prevent the premature drying, various techniques are applied, which are delaying water evaporation. In case of outdoor application of plasters, protective shields or spraying of surface with water can be applied or the application itself is abandoned during hot and sunny days.

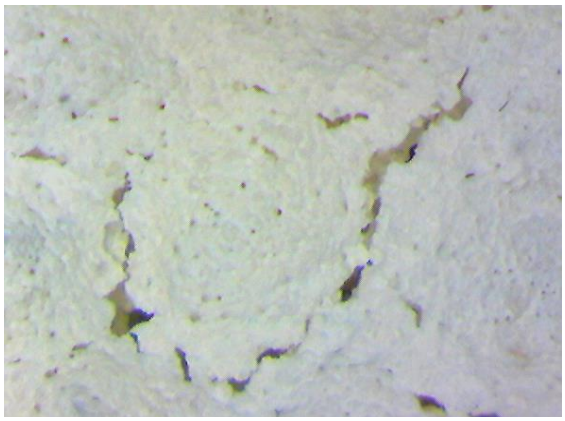


Figure 1 Plaster coating after premature drying in high temperature

Paints, however, can be added appropriate organic solvents to extend so-called *open time of paint*.

What is the open time?

Open time of paint is the period of time over which it is still possible to form paint or plaster applied onto base material, without impact on its final texture and appearance after drying.

Therefore, adequately long *open time* is a critical factor, enabling proper application of product and, in result, achieving the expected appearance of the coating and its protecting properties after drying.

It is possible to extend this time through introducing of appropriate agents into the recipe of paint or plaster, which agents retain moisture in the coating or establish on the surface a layer preventing the water evaporation.

As it was mentioned earlier, most often is used in this purpose addition of suitable organic solvents, e.g. propylene or ethylene glycol.
However, due to the fact that the mentioned substances are numbered among so-called volatile organic compounds (VOC), research is being made for their efficient substitutes, not containing VOC.

Romiksol - alternative for volatile organic compounds

Romiksol is a trade name of group of agents extending an *open time,* containing natural or synthetic waxes, particles of which form on the product surface fatty alcohol monolayer film, delaying evaporation of water from the system. In result the coating remains longer flexible and thus can be longer formed, repainted, with obtaining of surface free from defects, and owing to this resistant to adverse impact of weather conditions.

In case of acrylic plasters addition of **Romiksol MX-5030** extends *open time*, improves significantly plaster's workability (plasticity), thus facilitating the process of its application onto vertical surfaces.

Owing to introducing of Romiksol to plaster recipe, it is possible to extend its *open time* even up to 20 minutes, depending on used dose, type of system and dispersion as well as weather conditions during application.

As it is shown in Figure 2, addition of Romiksol MX-5030 has beneficial impact on appearance the coating. Plaster after drying is more "filled", and number of micro-holes and micro-cracks is clearly minimized.

without agent *+ 1% of Romiksol MX5030*

Figure 2 Impact of Romiksol MX5030 on structure of the acrylic plaster coating

Romiksol OTE-1 is designed for application in dispersion paints. This product includes minimal level of volatile organic compounds and substitutes in the paints recipes commonly used ethylene and propylene glycols.

Open time of paint is the period of time over which it is still possible to form or repaint the paint coating applied by means of either brush or roller, without impact on its appearance after drying.

Romiksol OTE-1 belong to the group of agents which form a thin wax film on the surface, constituting a blockage for water, thus extending *open time* of the paint as compared to the paint with no agent added. Depending on paint recipe, pigment volume concentration (PVC), type of polymer dispersion and weather conditions (temperature, humidity) it is possible to achieve extension of open time by a few to a dozen minutes with application of an agent

at the level of 0.5-2% of the total recipe volume.

Testing of open time in paints

In order to present the occurring phenomena, comparative tests have been performed in Rowis-System's laboratory on paint for indoor applications (PVC=78%) based on styrene-acrylic dispersion Axilat 2802A (MFFT= 4°C, Tg= 11°C), with use of Romiksol OTE-1 as agent extending the *open time* as compared to paints with propylene glycol and paints without addition of agents of such type.

The coating of the paint under testing has been applied onto photographic paper using applicator 0.3 mm thick. Immediately after application of the paint two parallel lines have been marked along its coating and timer has been turned on. Each certain time (1 or 2 minutes) paint coating was repainted crosswise by means of a brush wetted with paint under testing (10 brush moves both sides in total).

Open time of paint is a time, over which it is possible to fully paint over the lines marked along the coat, using defined number of brush moves, so that the lines are no longer visible upon paint drying. Results are presented in Figure 3.

As one can see in Figure 3, *open time* in case of paint without agents added is very short and amounts up to 3 minutes in maximum (in conditions of the test). In the same conditions, addition of Romiksol OTE-1 results in extension of open time even up to 10 minutes as compared to the paint with no agent added.

Romiksol – improved resistance of emulsion paints to water

It was noted during tests that addition of Romiksol OTE has beneficial impact on resistance of paint coating to water absorption.

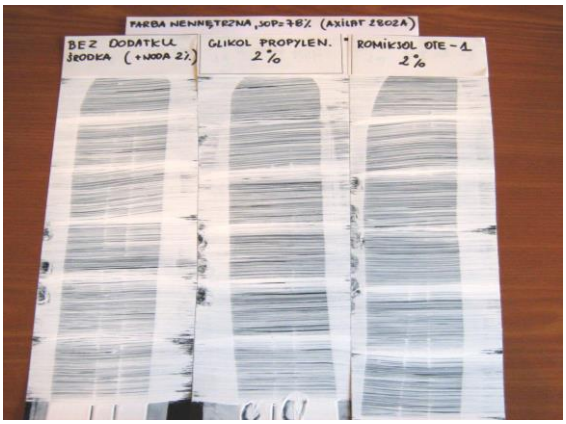


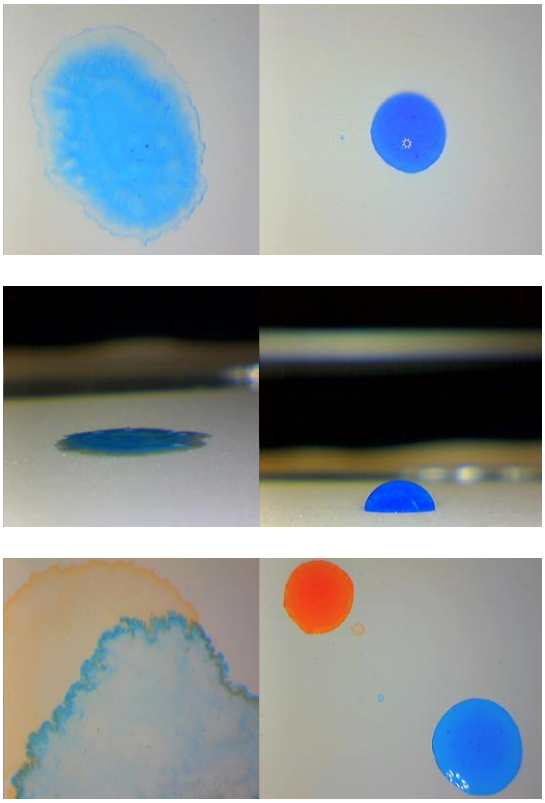
Figure 3 Testing of open time of paint with addition of propylene glycol (2%) and Romiksol OTE-1 (2%)

Simple test was performed in the laboratory, consisting in application of a few droplets of water with addition of colourant (for better visualization) on the surface of the dried coating (after 2 weeks of acclimatization in room temperature) and following observation of behaviour of the droplets over time.

It was noted, that paints with addition of Romiksol OTE-1 at the level of 1-2 % have significantly reduced water absorption as compared to coatings of paints either not containing these agents or based on propylene glycol.

Test results have been presented in the following illustrations (Fig. 3) on example of paint for indoor applications, based on dispersion Axilat 2802A (PVC = 78%). Droplet of water applied onto paint coating without addition of Romiksol OTE-1 spreads immediately across the whole surface and quickly penetrate into substrate. The coating with addition of Romiksol shows increased resistance to water absorption, which remains on its surface in form of a firm droplet until complete evaporation.

During tests performed on various paint systems for indoor and outdoor applications it was found in each single case that significant improvement of resistance to water was obtained in degree depending on the paint formulation and dose of Romiksol OTE-1. Tests were carry out on standard paints, without any additional hydrophobicity improvers.



without additive +2 % of Romiksol OTE-1

Figure 4 Paint for indoor applications based on styrene-acrylic dispersion Axilat 2802 A (PVC= 78%) – test of resistance to water.

Summary

In the face of continued tightening of legal requirements related to restriction of volatile compounds in paint recipes as well as permanently increasing customer requirements related to quality of coatings, testing of new solutions alternative to organic solvents seems to be justified. Romiksols can constitute such alternative both for dispersion paint and plaster systems.

By introducing **Romiksol OTE-1** into the paint, propylene glycol is eliminated from its ingredients and in result low content of volatile organic compounds is achieved with simultaneous retention of similar *open time*, or even its extension as compared to result obtained with application of propylene glycol. For majority of standard wall paints, improvement of coating resistance to water is obtained in addition, through reduction of its absorbability.

In turn, for dispersion plasters, application of Romiksol MX-5030 as upgrading agent gives not only the extension of *open time,* but improves workability and plasticity of plaster as well. The coating is free from defects caused by fast drying of plaster (cracks, micro-holes) and is characterized by better resistance to weather conditions.

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