EPS® 572 new modified acrylic for specialty architectural applications.

Massimo Longoni, David Greener
Engineered Polymer Solutions (EPS B.V.) Nijverheidsweg 35, Hendrik Ido Ambacht, 3341 LJ, The Netherlands

1. Introduction

EPS (Engineered Polymer Solutions) is a global manufacturer of specialty acrylic polymers for architectural and industrial coatings. Our primary focus is in applications where high value solutions are required and the technical performance of the coating is the dominant factor. With R&D centers in both the USA and Europe (H.I. Ambacht – Netherlands) EPS has a global presence: through close collaboration with customers we have gained an in depth understanding of the differing demands of local and regional markets. These insights are a key factor in our new product development. Simultaneously we are able to share and aggregate this information across regions to build a picture of the macro trends and technical requirements of the industries we serve. This serves as a basis for our fundamental R&D programmes globally.

Accounting for 70% by volume and 60% by value architectural coatings is by far the largest segment of the water-borne coatings market - and across all regions growth is forecast for these coating types. The primary binder type in this market is acrylic, with a total share of 70 – 80% of all water borne coatings and a position as the leading technology for architectural coatings[1].

In Europe high volume acrylic or styrene acrylic architectural paints are most often intended for use on mineral substrates – interior wall and façade paints represent a large share of the market. Notwithstanding this, there is still a significant demand for versatile, multipurpose architectural binders that perform equally well on a range of substrates, whether wood, mineral or metal. These are specialty applications, often niches – for example mosaic plasters or interior trim paints – for which the performance requirements of the acrylic binder are vastly different to those of the commodity binders more typically used in low end interior wall paints. However, even in such speciality applications the paint chemist is constrained by the need to formulate the maximum number of paints from the minimum number of raw materials, without compromising quality or performance. Given such constraints an acrylic binder can deliver both substrate versatility and speciality technical performance has a good chance of being successful.

EPS offers a broad range of acrylic binders that cover a range of speciality applications. EPS® 572 is a two-phase modified acrylic. It is EU Ecolabel compliant and combines good chemical & water resistance with low blushing, good block and bonding properties. EPS® 572 represents the optimal choice for applications such as trim paints or mosaic plasters.

2. Experimental part 1

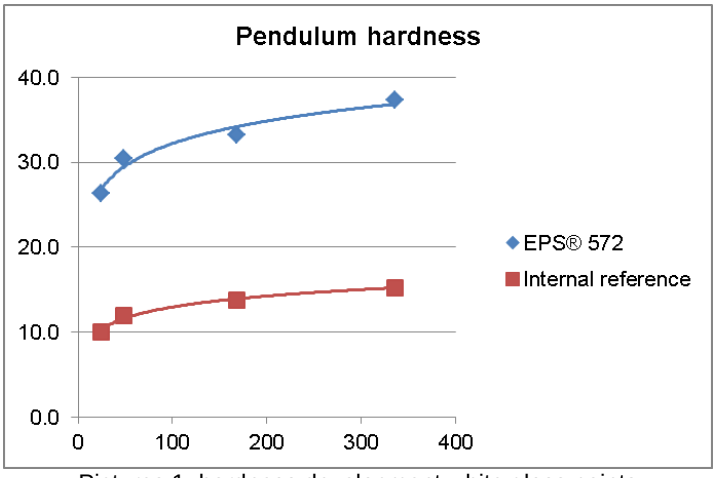
EPS® 572 in this study was evaluated in white gloss paint formulation (Table 1) versus an internal reference, single-phase acrylic. The formulations were compared in hardness development, block resistance, chemical resistances and gloss level.

König hardness results are shown in Picture 1: the paints were drawn down on glass plates at 100 micron wet film thickness (WTF) and stored in ambient conditions (23^0C, 50% relative humidity) for the duration of the test. Hardness measurements were taken on a pendulum hardness tester with oscillations measured at 3^0. To test block resistance (results in Picture 2), paints were drawn down at 100 micron WFT on black Leneta chart and cured at ambient temperature for 24 hours and a second set for 48 hours.

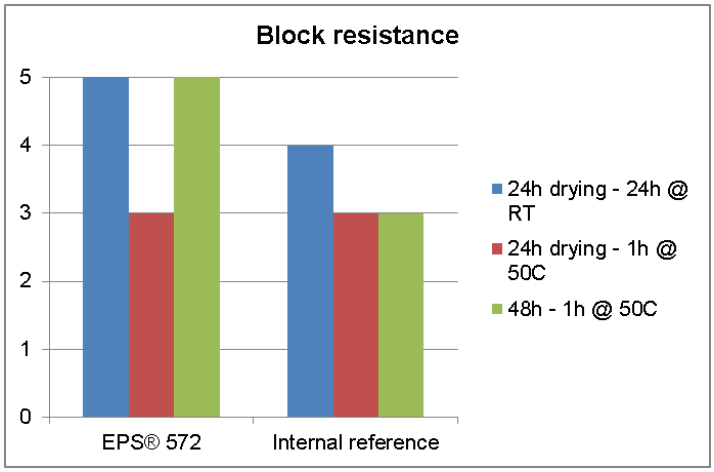
Paints films were cut into four 2.5x4 centimeters squares. Two sets of squares were stacked face to face with stopper on top and 5 kg weight over it. One set of samples was left in ambient conditions and one placed in a 50^0C oven for 1 hour. At the end of the test samples were removed from the oven and the weight removed from both sets in test. Finally all the samples were allowed to rest at ambient temperature for 30 minutes. A third set of samples – prepared as previously described - dried for 48 hours was placed in a 50^0C oven for 1 hour. At the end of the test samples were removed from oven and rested at ambient temperature for 30 minutes. All the samples were pulled apart after the 30 minutes recovery time and rated on a scale 1-5, 5 being best. A 5 rating indicates no damage or gloss change, 4 only gloss change is present and from 3 to 1 there is a difference in the percentage of paint removed.

Table 1: high gloss paint formulation

Raw Material	A	B
Water	7	7
Ammonia	0.2	0.2
Monopropylenglycol	2	2
Tego Foamex 810	0.2	0.2
Disperbyk 190	1.00	1.00
CR 828	20.00	20.00
Disperse 15-20 min		
EPS® 572 (45% solids)	**60.00**	
Internal reference (50% solids)		**54.00**
Water	3.40	9.10
MPG	3.00	3.00
Texanol	2.00	2.00
Byk024	0.30	0.30
Tego Glide 410	0.10	0.10
Mergal 721 K3	0.15	0.15
Aquaflow XLS 525	0.15	0.35
Rheolate 278	0.50	0.60
	100	100



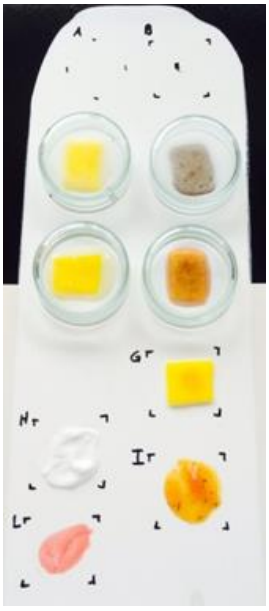
Pictures 1: hardness development white gloss paints

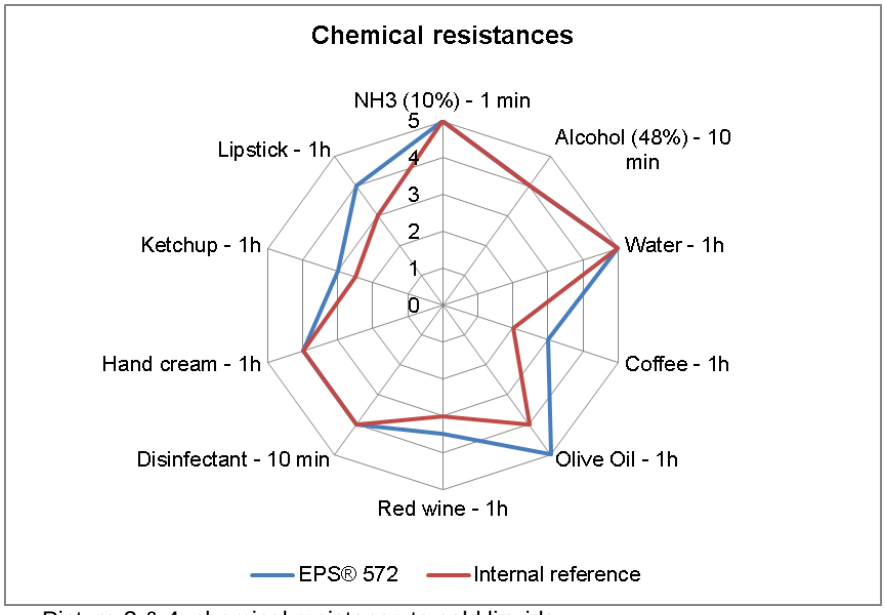


Pictures 2: block resistance white gloss paints

Chemical resistance was tested according to EN 12720. Paints were applied 100 micron WFT on Leneta chart and dried for 7 days in ambient conditions before testing resistance to cold liquids: results are reported in Pictures 3 and 4.

The final test was the gloss level of coating films applied on glass - 100 micron WFT, dried 24 hours in ambient conditions – using GL 0030 TQC gloss meter. There was an evident gap between the two formulations, the EPS® 572 formulation had a gloss level of 78/80 gloss units at 60 degree angle while the reference formulation was 76/78 gloss units.





Picture 3 & 4: chemical resistance to cold liquids

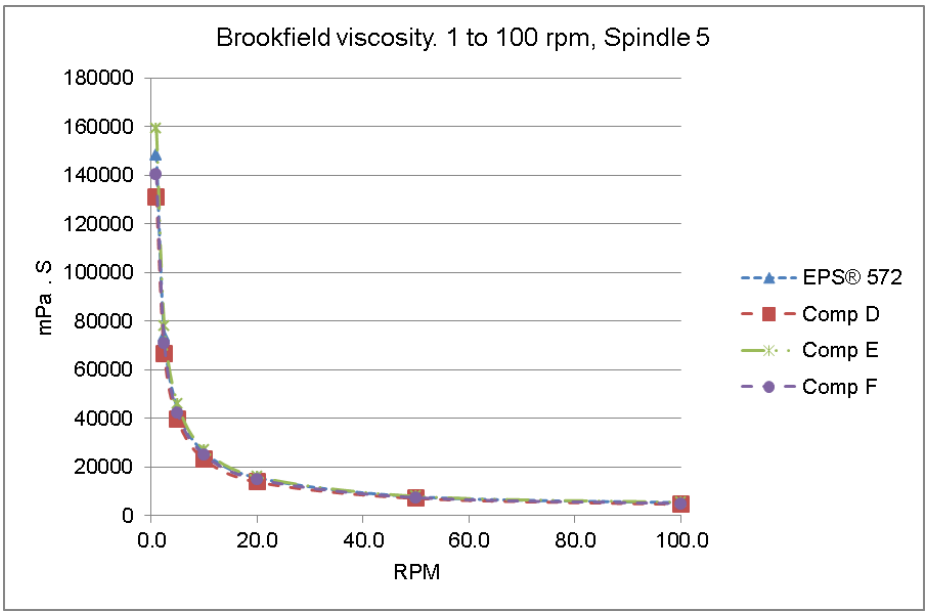
3. Experimental part 2

In the following part of the study EPS® 572 was compared to bench-mark binders – commercially available on the market – in a mosaic plaster formulation (see Table 2). The focus of this part of the study was on viscosity and blushing resistance.

Table 2: mosaic plaster formulation

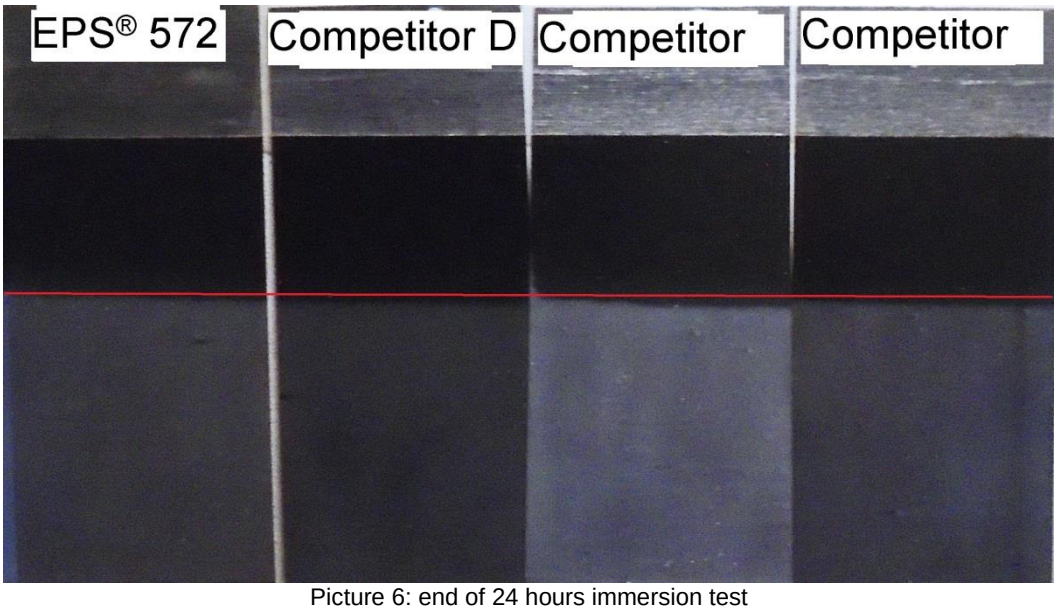
Formulation	C	D	E	F
EPS® 572 (45% solids)	**230.00**			
Competitor D (46.5% solids)		**223.00**		
Competitor E (48% solids)			**216.00**	
Competitor F (48% solids)				**216.00**
Water	111.30	118.30	125.30	125.30
Cellosize QP 100 MH (930)	2.50	2.50	2.50	2.50
Mono propylene glycol	8.00	8.00	8.00	8.00
Texanol	8.00	8.00	8.00	8.00
AMP 90	10.00	10.00	10.00	10.00
Tego Foamex 800 (1:1 in water)	30.00	30.00	30.00	30.00
Tafigel PUR 61	0.20	0.20	0.20	0.20
Aggregates	600.00	600.00	600.00	600.00
	1000.00	1000.00	1000.00	1000.00

Viscosity of the formulations was measured prior to the addition of the aggregates with a RV Brookfield in ambient conditions across a range of shear rates (expressed as r.p.m. – round per minute). The measured values in mPa*s are shown in Picture 5.

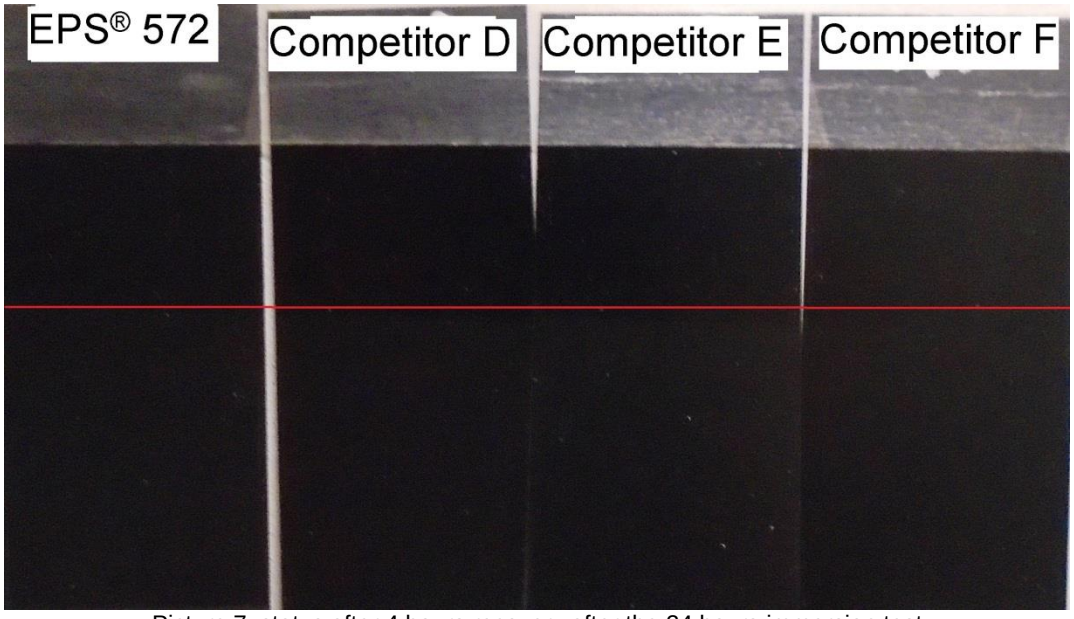


Picture 5: viscosity of mosaic plaster formulations

Mosaic plasters are used both inside & outside and are available in a wide range of colors. Blush resistance is extremely important especially for darker colours; blush was tested on formulations with and without aggregates. Three sets of samples, without aggregates, were draw down on black Leneta charts and dried for 24 hours in ambient conditions. These samples were then immersed in water for different time periods: 1 hour, 2 hours & 24 hours. Immediately after removing the samples from the water blush resistance was rated, both visually and with a spectrophotometer, DL value in CieLab color space. It was then checked again after 4 hours of recovery. The results are reported in Pictures 6, 7 and 8 and clearly show EPS® 572 performs as well or better than all other competitor products tested.

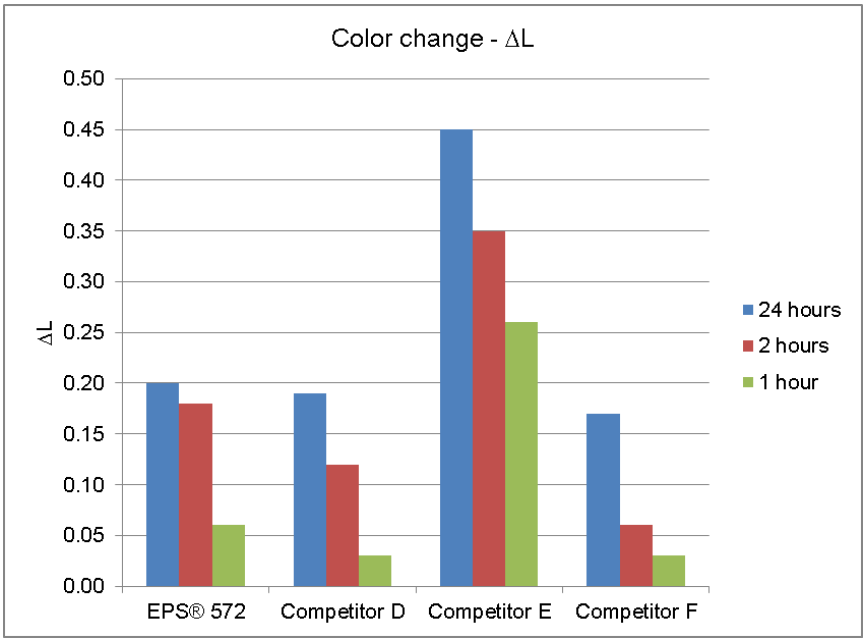


Picture 6: end of 24 hours immersion test

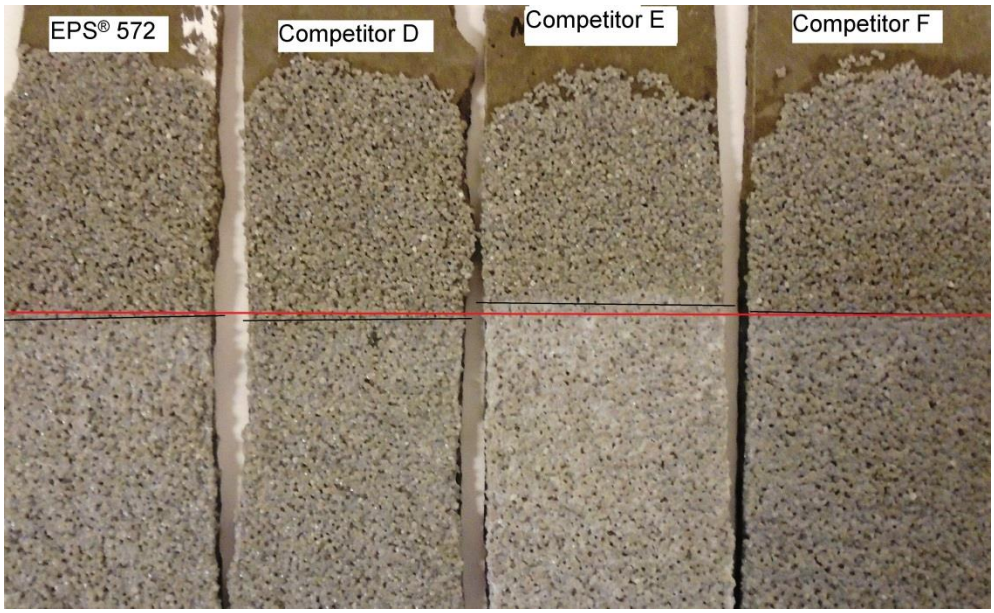


Picture 7: status after 4 hours recovery after the 24 hours immersion test

Blush resistance was also tested on complete formulations. Products were applied with a trowel on fiber cement boards and dried 24 hours in ambient condition. The samples were immersed in water for 24 hours and blush resistance was visually rated immediately after the end of the immersion test and again after 24 hours recovery. The results are shown in Pictures 9 and 10.



Picture 8: ΔL after recovery from immersion test – blush resistance



Picture 9: end of 24 hours immersion test on mosaic plaster applications

Picture 10: status after 4 hours recovery after the 24 hours immersion test of mosaic plaster applications

4. Conclusion

EPS® 572 is a two-phase modified acrylic with a good combination of properties – block resistance, blush resistance, hardness – this versatility makes it a suitable candidate for diverse specialty architectural applications such as trim paints or mosaic plasters.

Engineered Polymer Solution (EPS) produces innovative specialty polymers that address unmet needs in both architectural and industrial coatings for wood, metal and mineral substrates.

For further information about EPS and our products please contact our representative in Russia Larchfield Lsn.

Reference

1 In a good flow, Damir Gargo, European Coating Journal 10-2016.