

**ROCKWOOD CLAY ADDITIVES**  
A ROCKWOOD® SPECIALTIES, INC. COMPANY



## **Optigel® W724**

Rheology modifier for waterborne  
2K-Epoxy resin based anti-corrosion  
systems

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## 1. Objective

- Comparison of different rheology modifiers in a waterborne EP anti-corrosion primer
- Evaluation of the effect on viscosity, application properties, sag resistance and anti-corrosion property
- Optimization of the existing guideline formulation in terms of application properties and storage stability



## 2. Guideline formulation (UPPC – DOW Epoxy Systems)

<b>Comp A:</b>			
<b>Pos.</b>	<b>raw material</b>	<b>manufacturer</b>	<b>Weight-%</b>
<b>1</b>	Polypox IH 7006W	UPPC GmbH	13,4
<b>2</b>	Demin. Water		28,5
<b>3</b>	Tego Dispers 750W	Evonik	1,6
<b>4</b>	BYK 024	Byk Chemie	0,3
<b>5</b>	Omya BLR 3	Omya	17,5
<b>6</b>	Micro-Talc AT Extra	Omya	9
<b>7</b>	Micro-Talc AT 1	Mindo Minerals	8
<b>8</b>	Heucophos ZPA	Heubach	10
<b>9</b>	Kronos 2059	Kronos	10
<b>10</b>	Bayferrox 318 M	Lanxess	0,5
<b>11</b>	<b>Aerosil R 972</b> (rheology modifier)	Evonik	0,5
<b>12</b>	EFKA 3500	Ciba	0,3
<b>total</b>			<b>100</b>
<b>Comp. B:</b>	Polypox VE 01002/3	UPPC GmbH	82



### 3. Rheology modifiers tested

- |                           |                                    |
|---------------------------|------------------------------------|
| <b>0</b> – Blank:         | Guideline formulation less Pos. 11 |
| <b>1</b> – Reference: #   | 0,5% (guideline formulation)       |
| <b>2</b> – Competition: * | 0,5% in Pos 11                     |
| <b>3</b> – Optigel® W724: | 0,5% in Pos 11                     |

# hydrophobic fumed silica

\* organically modified hectorite



## 4. Tests and results

### 4.1.1 Rheology (Haake RS600)

	Viscosity [mPas]									
	upwards					downwards				
	1 / s	10 / s	100 / s	1000 / s	10000 / s	10000 / s	1000 / s	100 / s	10 / s	1 / s
<b>0 - Blank</b>	624	88,6	34,7	29	22,9	22,5	25,3	25,2	60,6	329
<b>1 – Reference</b>	340	57,5	43	32,4	21,8	21	23,6	25	31,9	73,3
<b>2 - Competition</b>	2920	1340	688	303	198	200	300	679	1400	3000
<b>3 - Optigel® W 724</b>	4660	1580	604	336	194	205	344	608	1590	4500

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## 4.1.2 Viscosity development after 1 week of storage

Viscosity [mPas] after 1 week / storage conditions at 40 °C										
	upwards					downwards				
	1 / s	10 / s	100 / s	1000 / s	10000 / s	10000 / s	1000 / s	100 / s	10 / s	1 / s
<b>1 - Reference</b>	Due to the low initial viscosity of the reference no further determination of viscosity									
<b>2 - Competition</b>	2230	1000	590	263	212	214	266	626	1230	2690
<b>3 - Optigel® W724</b>	4260	1360	532	317	179	175	288	492	1280	3620

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## 4.2 Syneresis and sedimentation



	Syneresis after 1 week in %	Visual evaluation after 24hrs
0 - Blank	50	Very strong sediment
1 - Reference	50	Very strong sediment
2 - Competition	15	No sediment
3 - Optigel® W724	5	No sediment



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### 4.3 Sag-test



	flow time sec /4mm	Sag test 50µm – 500µm
1 – Reference	34	sag at 400µm bead at 200µm
2 – Wettbewerber	60	sag at 450µm bead at 300µm
3 – Optigel® W724	60	no sag at 500µm bead at 400µm





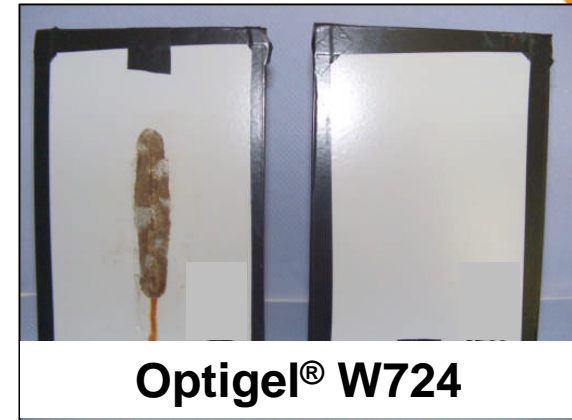
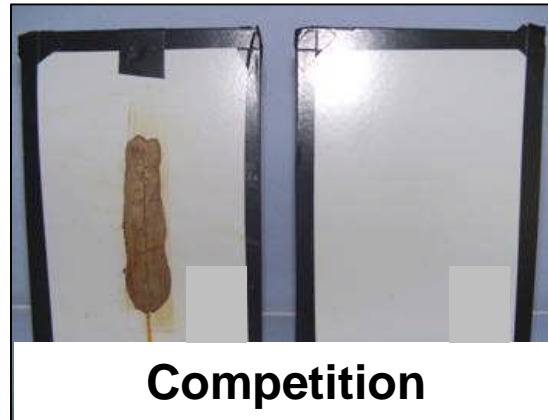
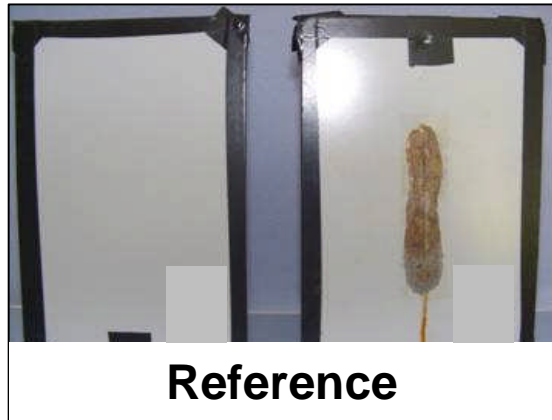
## 4.4 Spray application

	sag resistance, sagging	spray pattern (visual)
<b>1 – Reference</b>	sag at 70µm TSD	coarse particles
<b>2 – Competiton</b>	sag at 100µm TSD	coarse particles, crater
<b>3 – Optigel® W724</b>	stable up to 130µm TSD	homogeneous, slightly rippled structure

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### 4.5.1 Salt spray test - DIN EN ISO 9227 - 500hrs



	Blistering DIN EN ISO 4628-2	Rust DIN EN ISO 4628-3	Release DIN EN ISO 4682-8	Corrosion DIN EN ISO 4628-8	Cross-cut DIN EN ISO 2409
1-Reference	m0/g0	<b>Ri 0</b>	<b>&lt; 10 mm</b>	<b>&lt; 1 mm</b>	<b>Gt 0</b>
2-Competition	m0/g0	<b>Ri 0</b>	<b>&lt; 10 mm</b>	<b>&lt; 1 mm</b>	<b>Gt 0</b>
3-Optigel® W724	m0/g0	<b>Ri 0</b>	<b>&lt; 10 mm</b>	<b>&lt; 1 mm</b>	<b>Gt 0</b>



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## 4.5.2 Salt spray test - DIN EN ISO 9227



**Reference**  
after **450 hrs**



**Competition**  
after **700 hrs**



**Optigel® W724**  
after **1180 hrs**

	<b>Blistering m2/g2</b> DIN EN ISO 4628-2 after	<b>Corrosion*</b> DIN EN ISO 4628-8	<b>Cross-cut**</b> DIN EN ISO 2409
1-Reference	450 hrs	<b>2 mm</b>	<b>Gt 0</b>
2-Competition	700 hrs	<b>10 mm</b>	<b>Gt 1</b>
3-Optigel® W724	1180 hrs	<b>10 mm</b>	<b>Gt 0</b>

\* Values not comparable due to different exposure times

\*\* Measured at places with blistering Gt 5 !



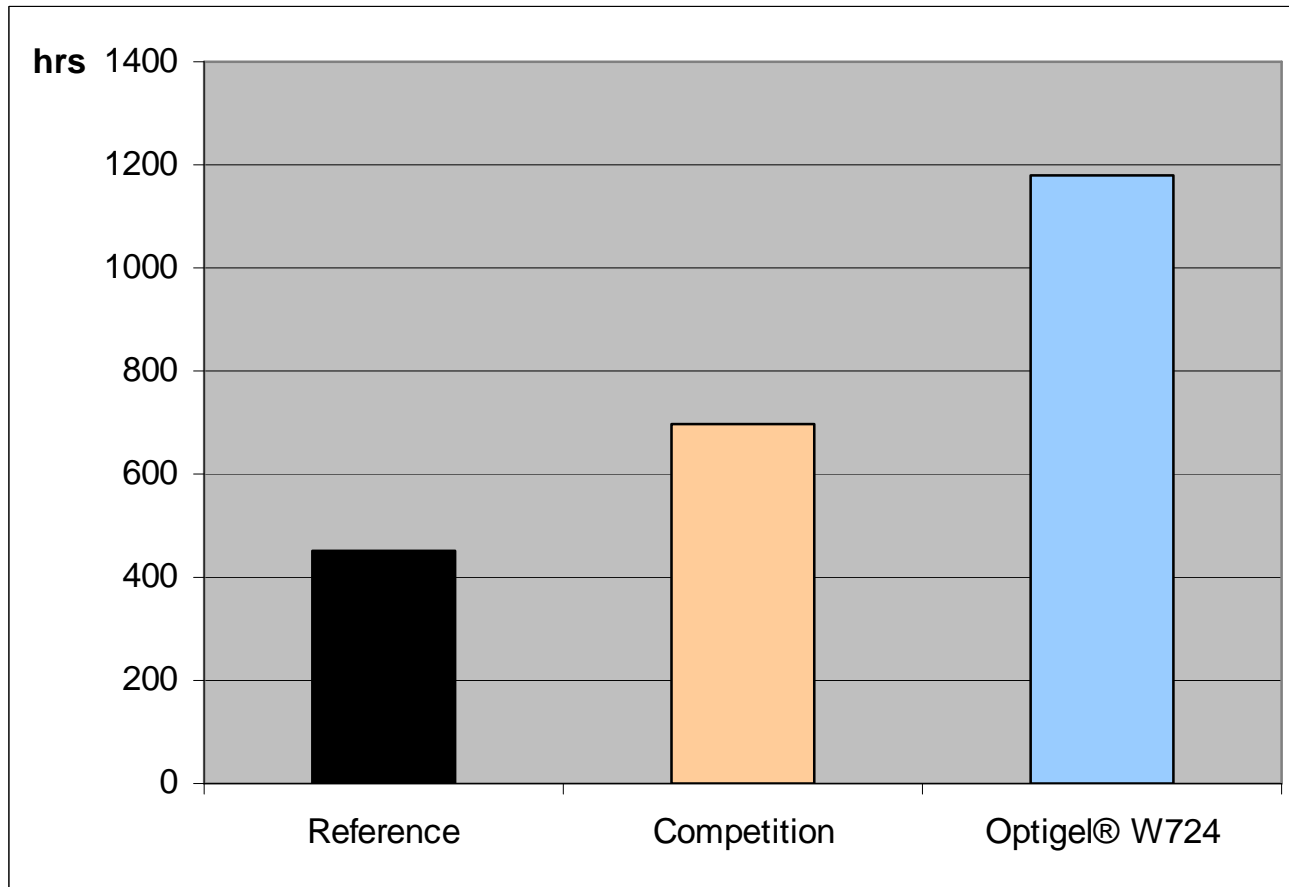
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### 4.5.2 Salt spray test - DIN EN ISO 9227

Hours survived:





## 5. Summary

- ✓ **Optigel® W724** shows improved anti-sagging and wet film thickness in comparison to the reference and competitive system.
- ✓ With **Optigel® W724** better rheological properties could be achieved in the tested 2K epoxy anti-corrosion system facilitating spray applications.
- ✓ **Optigel® W724** does significantly show higher corrosion resistance compared to reference system and competitive rheology modifier.
- ✓ A new and optimized guideline formulation with **Optigel® W724** is attached.

Optigel® W724 for waterborne 2K-Epoxy resin – anti-corrosion primer



## Guideline formulation with Optigel® W724

<b>Comp A:</b>			
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<b>2</b>	Demin. Water		28,5
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<b>10</b>	Bayferrox 318 M	Lanxess	0,5
<b>11</b>	<b>Optigel® W724</b> (rheology modifier)	<b>Rockwood Additives</b>	0,5
<b>12</b>	EFKA 3500	Ciba	0,3
<b>total</b>			<b>100</b>
<b>Comp. B:</b>	Polypox VE 01002/3	UPPC GmbH	82

