SYENSQO
ADVANCING HUMANITY

Rhodoline® HBR : Fluorosurfactant alternative for achieving excellent early hot block resistance

160 YEARS

SOLVAY

SOLVAY | SYENSQO

We are mastering the elements essential to our world.

GBU : Soda Ash, Peroxides, Silica, Coatis, Special Chem

We are explorers creating breakthroughs that advance humanity.

GBU : Specialty Polymers, Composites, Novecare, Aroma, Technology Solution, Oil & Gas

Discover more

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Syensqo - Who we are?

Powered by Innovation,
Syensqo create coating solutions that make a difference.

Syensqo is a leading **coating solutions** provider. With over 60 years of **legacy** in **scientific innovation - Rhodia and Solvay**, our journey has been one of continual reinvention, adapting to emerging **market demands** and **regulatory changes.**

We elevate formulations to meet the dynamic **needs of our customers**, delivering improvements to **key functionalities**.

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PFAS

(Perfluoroalkyl and polyfluoroalkyl substances)

Forever Chemicals

Context

Fluorosurfactants are widely used in paint and coatings thanks to their very good properties such as:

- ✔ Block resistance performances
- ✔ Oil repellency improvement
- ✔ Surface appearance improvement
- ✔ Dirt pick up resistance improvement

However

Concerns: Carbon-fluorine bonds are very resistant to degradation when used and also in the environment, accumulating in people, animals, plants and causing toxic effects.

Actions taken by authorities

Since 2020 there have been a large number of regulations on PFAS

Different environmental protection regulatory entities are continually adapting strategic roadmaps to introduce and manage more robust policies to restrict their use and safeguard ecosystems and public health.

Authorities worldwide are taking more and more actions to stop their uses

Therefore it is Urgent to replace their uses with more sustainable solutions.

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Syensqo solution to replace PFAS

As various regulations are driving formulators to eliminate Fluorocarbon Surfactants from paint formulations, **Syensqo's scientists have designed a new additive to support formulators in the fluorosurfactants replacement.**

The new additive **Rhodoline® HBR** enables formulators to work with a sustainable solution while reaching similar performances especially in terms of **hot Block resistance** without impacting other key properties .

→ Let us introduce you our new formulation additive Rhodoline® HBR

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Rhodoline®HBR

Rhodoline® HBR (Hot block resistance) is a new substrate wetting agent for waterborne coatings.

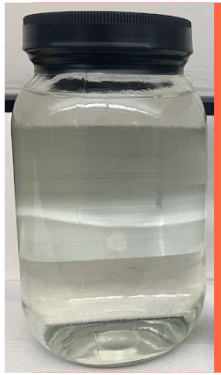
Main attribute: Rhodoline® HBR provides an excellent **early hot block resistance** in decorative paints

Typical Properties

Appearance @ 25°C	Solids %	pH, as is at 25°C	Density g/ml (25° C)	Viscosity Cps (25°C)
Clear liquid	39 - 41	7.5 - 8.5	1.0 - 1.2	<500

Key features

- APE-free
- **PFAS free**
- Low – VOC
- Very good stability



RHODOLINE® HBR 40% actives

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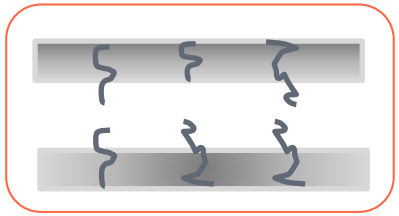
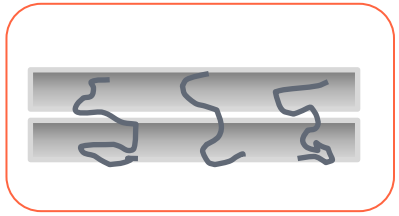
What is Block Resistance ?

Definition of Blocking: “the undesirable sticking together of two painted surfaces when pressed together under normal or under specified conditions of temperature, pressure, and relative humidity”



Polymer surface with mobile chain ends



Chain diffusion and entanglement

Poor blocking resistance
Temperature & humidity, duration of contact, amount of pressure, all impact results

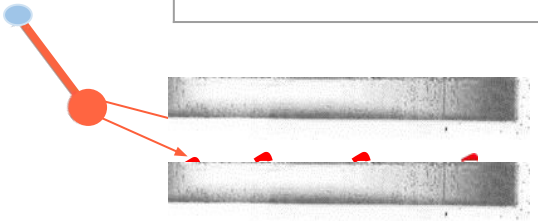
Most challenging systems to reach good block resistance

- Semi-gloss – gloss paints
- Deepbase paints
- Low VOC paints

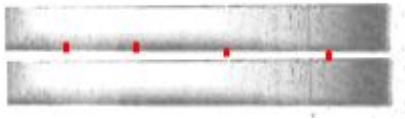
Some solutions may exist to improve block resistance

Current solutions to improve block resistance

Solution to formulators	BUT limitations
Higher Tg Latex selection	Higher VOC brought in the system
Increase PVC of the system	Lower gloss, lower durability
Use of silicone and wax additives	Intercoat adhesion and recoatability issues
Use of fluorosurfactants	High Price and Regulatory issues



Polymer Surface with Additives



No Entanglement
Good Blocking

Good blocking resistance

To improve block resistance with the additive,
Rhodoline® HBR is THE solution

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Rhodoline® HBR: Paint performance

Benchmarking Study

Additive	Chemistry	Solid content (%)	Use Level (active ingredient)	Use Level (As supplied)
Commercial non-ionic	Non-ionic ethoxylate	90	0.2%	**0.22%**
FCS (fluorosurfactant)	Phosphated fluorosurfactant NH4+	35	0.04%	**0.11%**
RHODOLINE® HBR	Anionic surfactant	40	0.2%	**0.5%**

100% acrylic Semi-gloss; 22PVC/ 36%VS; VOC ~50g/l

Testing

Surface
- Block resistance
- Stain Resistance
- Substrate wetting
- Scrub Resistance
- Water Resistance
- Adhesion
- Dirt pick up Resistance

Appearance
- Opacity
- Gloss
- Color Acceptance

Stability
- 10 days @ 60°C
- 28 days @ 50°C

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Paint Formulation #1

100% acrylic Semi-gloss; 22PVC/ 36%VS; VOC ~50g/l

Raw Material	Wt. %
100% Acrylic latex	52.5
Mineral based defoamer	0.1
While Mixing, add the following:	
Hydrophobic Copolymer	0.7
Slurry Universal Grade TiO_2	30.5
Mineral based defoamer	0.1
Water	10.2
Wetting Agent	0.22
Coalescent	1.5
Mix well, then add the following:	
Neutralizing Agent	0.1
ICI Builder	2
KU builder	0.6
Water	1.5
Total	**100**

Paint Properties	
Weight Solids %	48.7
VS %	36
PVC %	22
VOC g/l	~50
Target KU /ICI	100 / 1.0

Formulation Variables

1. Non-ionic Control (0.22% as supplied)
2. Non-ionic (0.22% as supplied) + FCS (0.11% as supplied)
3. Rhodoline® HBR (0.5% as supplied)

** Internal All acrylic latex, 10° C MFFT*

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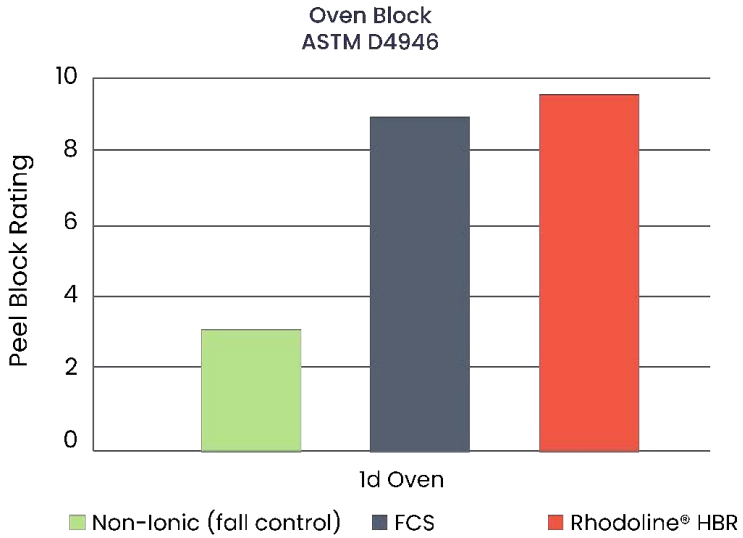
Early Hot Block Resistance

100% acrylic Semi-gloss; 22PVC/ 36%VS; VOC~ 50g/l

24 hr dry Oven (hot) Block Resistance



Method

- *Drawdowns prepared on Leneta chart with 3mil wet bird (~50µm dft) and cured **for 24 hr in CTR** (23° C/50%RH)*
- ***After 24hrs**, charts are cut into 1.5x1.5 inch squares and placed face to face **in 50°C oven** with #8 stopper and 1 KG weight on top for 30 minutes.*
- *Panels are then removed from oven and allowed to equilibrate for 30min in CTR(23C/50%RH) before evaluating peel block resistance*

Peel Block Ratings	
10	**No tack**
9	**Trace tack**
8	**Very slight tack**
7	**Very slight – slight tack**
6	**Slight tack**
5	Moderate tack
4	Very tacky, no seal
3	5-25% seal
2	25-50% seal
1	50-75% seal
0	75-100% seal

RHODOLINE® HBR
provides excellent early hot block resistance

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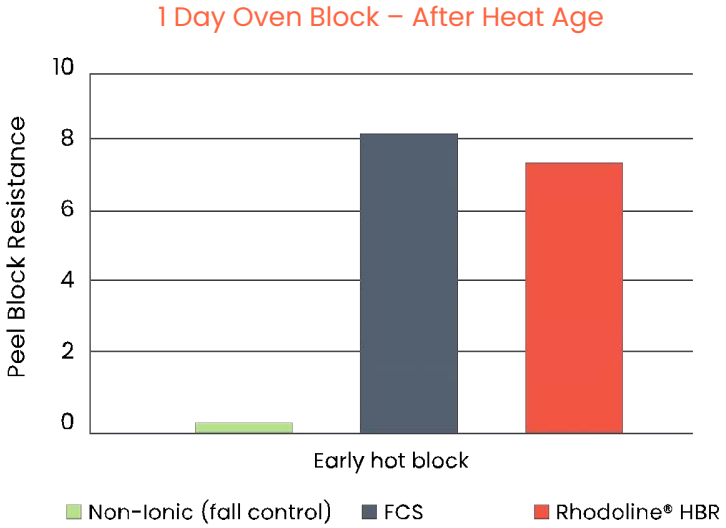
Block Resistance after Heat-aging Paints



Paints heat-aged for 10d @ 60°C, allowed to equilibrate to room temperature and then tested for early hot block resistance

Peel Block Ratings	
10	**No tack**
9	**Trace tack**
8	**Very slight tack**
7	**Very slight – slight tack**
6	Slight tack
5	Moderate tack
4	Very tacky, no seal
3	5-25% seal
2	25-50% seal
1	50-75% seal
0	75-100% seal

RHODOLINE® HBR

offers robust and persistence block resistance even after aging of paints

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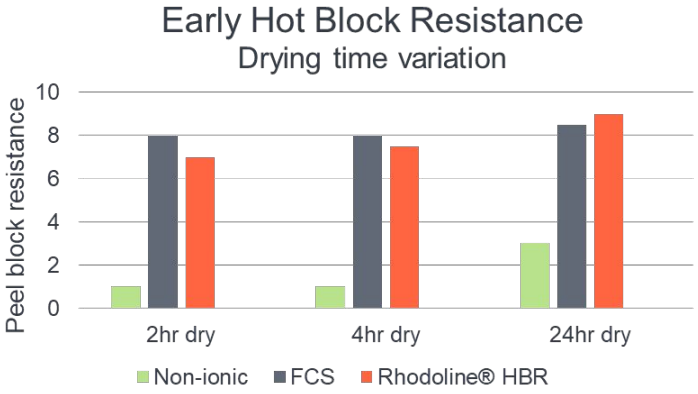
Fast Return to Service

100% acrylic Semi-gloss; 22PVC/ 36%VS; ~50g/l



Method

- *Drawdowns prepared on Leneta chart with 3mil wet bird (~50µm dft) and cured **for just 2 & 4 hrs** (23°C/50%RH)*
- ***After drying**, charts are cut into 1.5x1.5 inch squares and placed face to face **in 50°C oven** with #8 stopper and 1 KG weight on top for 30 minutes.*
- *Panels are then removed from oven and allowed to equilibrate for 30min in CTR(23C/50%RH) before evaluating peel block resistance*

Fast migration to surface for very early Hot Block resistance

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Oily Stain Removal

100% acrylic Semi-gloss; 22PVC/ 36%VS;VOC~ 50g/l

Paint Formulation 1

Non ionic	RHODOLINE® HBR	FCS
		
ΔE – 2.87	ΔE – 1.22	ΔE – 3.01

Leneta Stain: Dispersion of high jet carbon black in a blend of mineral oil and odorless mineral spirits

- Charts are prepared on black vinyl charts using 3mil wet film applicator and allowed to cure for 7 days
- Leneta Stain (mix of carbon black, mineral oil, and mineral spirits) was applied to cheese cloth and allowed to soak on paint film for 2hr
- Stain is then wiped off and rinsed
- Panels were washed 100 cycles with sponge soaked with diluted detergent solution (Spray 9 / water (10parts:25parts)

RHODOLINE® HBR
provides very good oily stain removal

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Substrate Wetting

100% acrylic Semi-gloss; 22PVC/ 36%VS; VOC~ 50g/l

Non ionic	Rhodoline®HBR	FCS
		

3mil wet bar on Leneta chart (~50um DFT)

Surface tension at CMC:
21.6 dynes/cm

RHODOLINE® HBR
provides excellent wetting

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Dirt pick up resistance

Paint Formulation 1

Non ionic	FCS	RHODOLINE® HBR
ΔL Ctrl	ΔL 5% improved	ΔL 30% Improved

Non ionic, FCS and Rhodoline® HBR addition @ their respective solids
Paint PVC ~ 22%

Test Method: Used China Accelerated Test Method

Acc. DPUR pictures after 2nd wash

RHODOLINE® HBR
improves dirt pick up resistance

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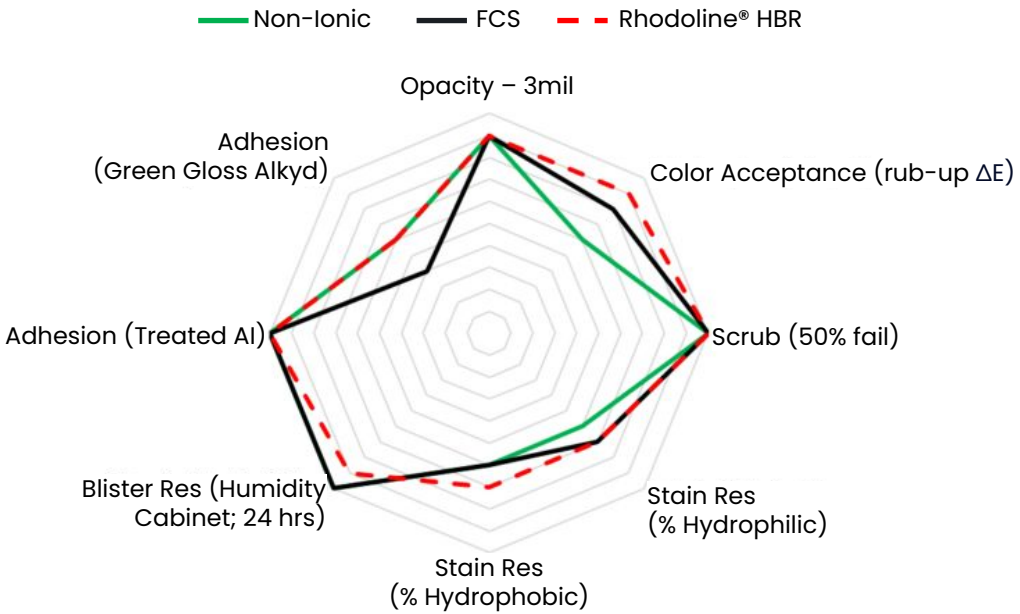
Other Key Performance Properties

100% acrylic Semi-gloss; 22PVC/ 36%VS; VOC~ 50g/l

50 g/L VOC SG – Internal Latex Paint Performance



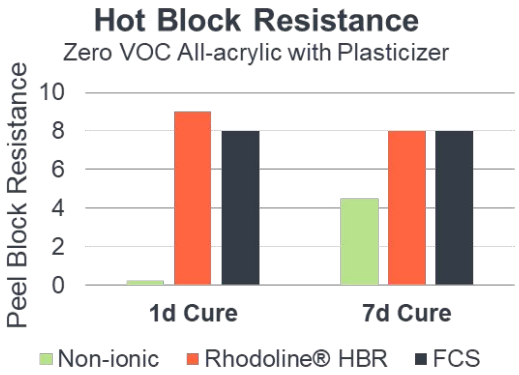
RHODOLINE® HBR has comparable performance to FCS and slightly better performance to a non-ionic wetting agent for most properties

NOTE: Alkyd adhesion was performed on a Green Gloss Alkyd Enamel > 6 months aged (Devguard 4308, Medium Green)

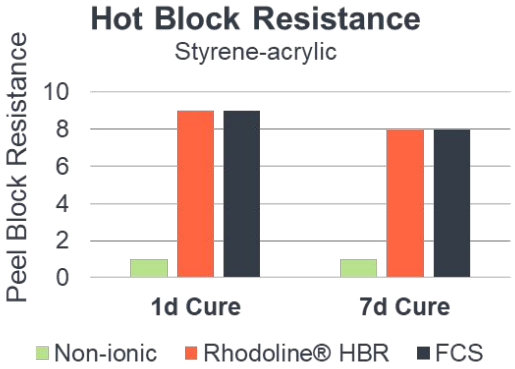
Rhodoline® HBR Block Resistance

Method :
ASTM D 4946
Cure : at 23°C, 50% RH
Hot block test : in 50°C oven *with 1 Kg weight / 30 min*
Peel block res. ratings : *10 good / 0 bad*

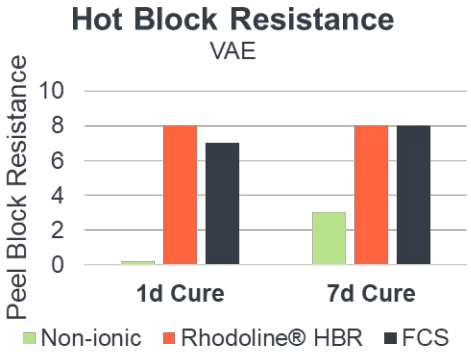
Acrylic (mfft 0°C) - zero VOC
22PVC/36%VS with Plasticizer



Styrene - Acrylic
22PVC/36%VS / <50g/l VOC



Vinyl Acetate Ethylene
22PVC/36%VS / 0 VOC



All appearance, resistance, and stability properties were comparable to the fluorosurfactant & the Non ionic control

RHODOLINE® HBR
provides excellent early hot block resistance
in a wide variety of lattices

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Rhodoline® HBR Block Resistance

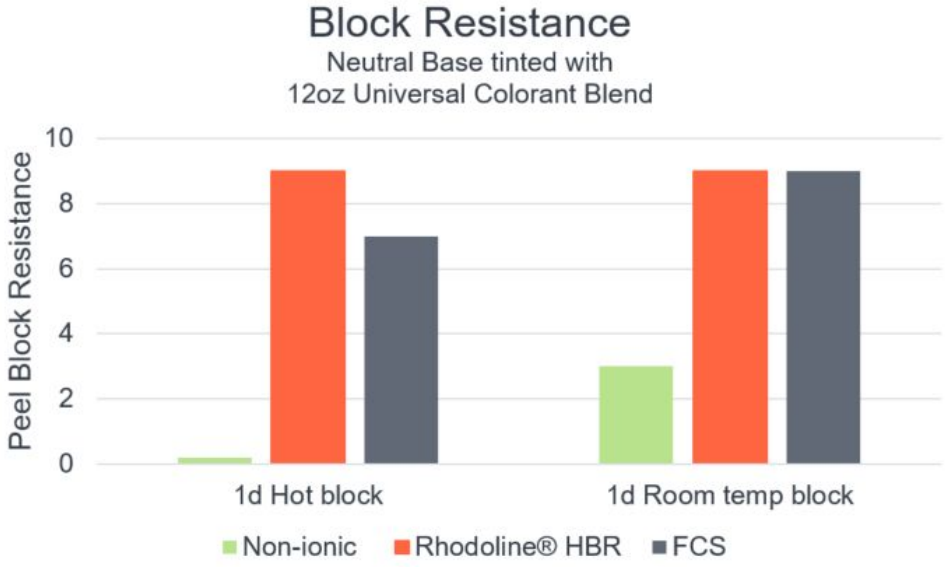
10PVC/35% VS / 50g/l VOC all-acrylic semi-gloss neutral base

Method :
ASTM D 4946
Hot block test : in 50°C oven *with 1 Kg weight / 30 min*
Peel block res. ratings : 10 good / 0 bad

*Colorant levels (% addition to paint base)
RIO - 4.0%; LB - 2.9%; YIO - 3.9%; KX - 3.8%

Tinted with 12oz./gal
Universal Colorant Blend*

- ➔ 3oz Red Iron Oxide - F
- ➔ 3oz Lamp black - B
- ➔ 3oz Yellow Iron Oxide - C
- ➔ 3oz White - KX



RHODOLINE® HBR
provides excellent early hot block resistance
in tinted neutral based paints

Why choose Rhodoline® HBR?

Key features and benefits

- New functional wetting agent for waterborne coatings
- Delivers early hot block resistance equal to PFAS based surfactants.
- Excellent compatibility and wetting
- Very good dirt pick up resistance
- Good Gloss
- Good Color Acceptance
- Good stain and scrub Resistance
- Pfas free
- APE Free
- Low VOC

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For any question or sample request - Contact us

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