

## VOC-compliant coatings. UltraHighSolid platform technologies

The conversion from solvent-based to water-borne coating systems is often linked with high investment costs. Solvent consumption can be significantly reduced with our new ultra high-solid platform technologies without having to convert coating lines.



# EFDEDUR UHS UR1937H

## Polyurethane primer with rapid recoatability

### Ultra high-solid platform technologies

The steadily growing requirements placed on surface coatings and the continuous reduction of the total VOC content in paints and coatings led FreiLacke to develop UltraHighSolid-systems, which is abbreviated to "UHS systems".

In the field of conventional coatings, completely new coating systems with a solids content of up to 80 percent by weight and a VOC value <350 g/l were developed and brought to series-production readiness for this purpose.

The new UHS systems also include two primers and a high-gloss top coat.

System	Item	Curing agents
EFDEDUR UHS primer	UR1937H	9: 1 HU0400
FREOPOX UHS primer	ER1936H	12: 1 HE0016
EFDEDUR UHS top coat	UR1409G	4.5: 1 HU0400

### EFDEDUR UHS primer UR1937H

As a classic 2C polyurethane primer, UR1937H can be used wherever rapid recoatability with a variety of top coat systems is required. UR1937H stands out thanks to its high stability and fast drying. Despite its high solids content of approx. 80 percent by weight, application by means of conventional air atomisation or air-assisted processes meets today's requirements.

The advantages of UR1937H in combination with the likewise recently developed UHS top coat UR1409G include excellent corrosion protection and a smooth surface. Adhesive strength is high, irrespective of whether the substrate is untreated or pretreated.

The need for only one curing agent for both the primer and top coat offers users easy handling and saves both time and money.

### UR1937H technical data

- 2C UltraHighSolid polyurethane primer platform technology
- Solids content 80 +-1% in mixture
- Use of standard curing agent HU0400 in MR 9:1
- Gloss level somewhat higher than that of conventional primers
- Rapid recoatability
- High stability (250 µm WFT)
- Pot life max. 2 hours
- Wide application range (high-pressure and air-assisted)
- Airless application possible to a limited extent (pre-trials for determining the coating line parameters required)
- Rapid drying

# FREOPOX UHS ER1936H

## Epoxy primer for excellent corrosion protection

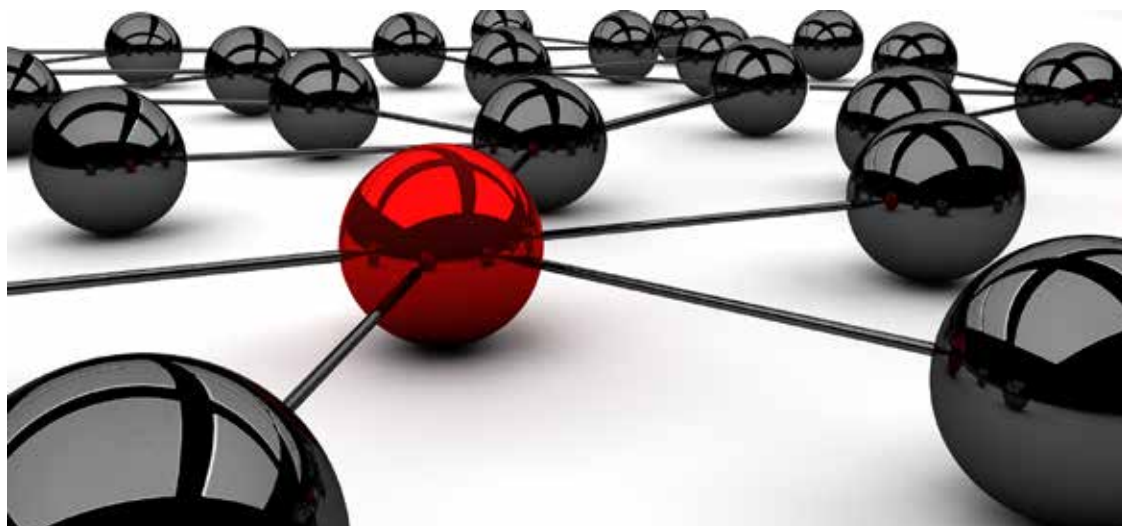
### FREOPOX UHS primer ER1936H

The recently developed 2C epoxy UHS primer ER1936H can be used for applications with high corrosion protection requirements. Particular attention was paid to the choice of raw materials during the development of this epoxy primer. By using renewable raw materials, it was possible to formulate curing agent HE0016 in such a way that the irritation caused by amine hardeners could be significantly reduced.

What is especially noteworthy is that both ER1936H and curing agent HE0016 were brought into series production without the use of any reactive thinners. Application and performance properties are in line with the state of the art. As well as rapid recoatability, the user can enjoy other benefits such as high stability and a sufficiently long pot life.

### ER1936H technical data

- 2C UltraHighSolid epoxy primer platform technology
- Curing agent made from renewable raw materials
- Free from reactive thinners
- Solids content 80 +-1% in mixture
- Gloss level somewhat higher than that of conventional primers
- High stability
- Pot life 3-4 hours depending on temperature
- Optimised for general and broad application  
(air-assisted: nozzle 13/40, material pressure 80 bar, atomiser pressure 2 bar)
- Smooth to apply
- Good overspray absorption



Coating systems with solids content of up to 80 percent by weight

# EFDEDUR UHS UR1409G

## High-gloss polyurethane top coat system

### EFDEDUR UHS top coat UR1409G

The new 2C polyurethane UHS top coat UR1409G is a high-gloss top coat system that boasts excellent flow properties and rapid drying. By using the latest generation of raw materials, it was possible to achieve outstanding characteristics in terms of surface qualities and UV and chemical resistance.

As the matching top coat system for UHS primers UR1937H and ER1936H, this structure offers the solution to a wide variety of requirements in many areas:

- reduction of emissions, short cycle times and balanced application and surface properties.

### UR1409G technical data

- High-gloss 2C UltraHighSolid polyurethane top coat platform technology
- Solids content 80 +-1% in mixture
- Use of standard curing agent HU0400 in MR 4.5:1
- High gloss >20° 70-80 GU | Average haze for different colour shades <100
- Good resistance values with UR1937H and ER1936H with respect to creepage, rusting, etc.
- High viscoelasticity with high surface hardness (accelerated drying)
- Problem-free air-assisted application and very easy to apply on smooth substrates
- Good overspray absorption
- VOC content 320-340 g/l (depending on colour shade)
- Pot life max. 2 hours at room temperature

### Comparison of technical data

	EFDEDUR UHS primer UR1937H	FREOPOX UHS primer ER1936H	EFDEDUR UHS top coat UR1409G
Mixing ratio	9:1 HU0400	12:1 HE0016	4.5: 1 HU0400
Solids content of base coat	82.0 +- 1%	81.0 +- 1%	85.0 +- 1%
Solids content in mixture	80.0 +- 1%	80.0 +- 1%	80.0 +- 1%
Density in mixture*	1.68 g/ml	1.75 g/ml	1.62 g/ml
VOC according to ASTM D 3660-01*	348 g/l	350 g/l	320 - 340 g/l
Yield*	5.1 m <sup>2</sup> /kg	4.2 m <sup>2</sup> /kg	4.7 m <sup>2</sup> /kg
Mixture volume*	593 ml/kg	570 ml/kg	620 ml/kg

# Test results for the UHS system structure Primer UR1937H and top coat UR1409G

## System structure

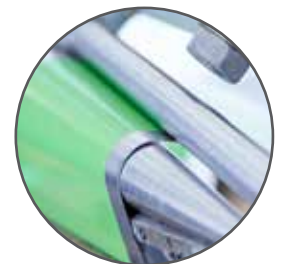
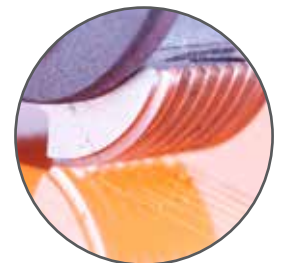
EFDEDUR UHS primer UR1937H I MR 9:1 with curing agent HU0400. Dry film thickness Ø 90µm  
EFDEDUR UHS top coat UR1409G I MR 4.5:1 with curing agent HU0400. Dry film thickness Ø 60µm

### Results of the salt spray test

Substrate	Salt spray test according to DIN EN ISO 9227 NSS				
	Load duration	Adhesive strength	Creepage from scribe	Bubble formation	Degree of rusting
Gardobond C steel, smooth	744	Gt 1	9 mm	0 S(0)	<1.5
Gardobond WHWOC, iron phosphate coating	744	Gt 0	6 mm	0 S(0)	<0.5
Steel, blasted	744	Gt 0	3 mm	0 S(0)	<0.5

### Results of mechanical tests

Test (standard)	after 16 h RT
Scratch resistance, constant test load DIN EN ISO 1518 part 1 Pointed stylus used: A	11 N
Erichsen cupping DIN EN ISO 1520	8.5 mm
Impact resistance DIN EN ISO 6272 1 kg weight dent	100 cm
Stone-chip resistance DIN EN ISO 20567-41	K2
Cylindrical mandrel bend test Mandrel 5 mm DIN EN ISO 1519, device type 2	No cracks
Conical mandrel bend test DIN EN ISO 6860, device type 2	No cracks



# Test results for the UHS system structure Primer ER1936H and top coat UR1409G

## System structure

EFDEDUR UHS primer ER1936H I MR 12:1 with curing agent HE0016. Dry film thickness Ø 80µm

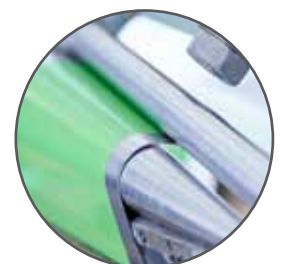
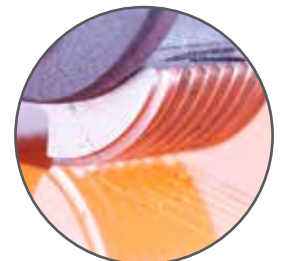
EFDEDUR UHS top coat UR1409G I MR 4.5:1 with curing agent HU0400. Dry film thickness Ø 60µm

### Results of the salt spray test

Substrate	Salt spray test according to DIN EN ISO 9227 NSS				
	Load duration	Adhesive strength	Creepage from scribe	Bubble formation	Degree of rusting
Gardobond C steel, smooth	744	Gt 0	3.5 mm	0 S(0)	2.5
Gardobond WHWOC, iron phosphate coating	744	Gt 0	5.0 mm	0 S(0)	<1.5
Steel, blasted	744	Gt 0	1.5 mm	0 S(0)	<0.5

### Results of mechanical tests

Test (standard)	after 16 h RT
Scratch resistance, constant test load DIN EN ISO 1518 part 1 Pointed stylus used: A	12 N
Erichsen cupping DIN EN ISO 1520	7.5 mm
Impact resistance DIN EN ISO 6272 1 kg weight dent	100 cm
Stone-chip resistance DIN EN ISO 20567-41	K2
Cylindrical mandrel bend test Mandrel 5 mm DIN EN ISO 1519, device type 2	No cracks
Conical mandrel bend test DIN EN ISO 6860, device type 2	No cracks



# UltraHighSolid platform technologies

## Excellent resistance levels.

Chemical tests according to DIN EN ISO 2812-3



0	No change
1	Very little change
2	Little (perceivable) change
3	Moderate change
4	Large change
5	Coating layer destroyed



Coating structure	UHS primer	UR1937H	MR 9:1 HU0400	
	UHS top coat	UR1409G	MR 4.5:1 HU0400	
Reagent		Engine oil 10W 40	Hydraulic oil HLP Synth 46	Gear oil SAE 75W-90
Test duration		7 days	7 days	7 days
Test conditions		70 °C	70 °C	70 °C
Evaluation immediately after loading				
Tests	Standard			
Softening	DIN EN ISO 4628-1 (Table 3)	0	1	0
Sources	DIN EN ISO 4628-1 (Table 3)	0	1	0
Bubbles	DIN EN ISO 4628-2	0 S(0)	0 S(0)	0 S(0)
Colour change	DIN EN ISO 4628-1 (Table 3)	0	0	0
Gloss change	DIN EN ISO 4628-1 (Table 3)	1	0	1

Coating structure	UHS primer	ER1936H	MR 12:1 HE0016	
	UHS top coat	UR1409G	MR 4.5:1 HU0400	
Reagent		Engine oil 10W 40	Hydraulic oil HLP Synth 46	Gear oil SAE 75W-90
Test duration		7 days	7 days	7 days
Test conditions		70 °C	70 °C	70 °C
Evaluation immediately after loading				
Tests	Standard			
Softening	DIN EN ISO 4628-1 (Table 3)	0	0	0
Sources	DIN EN ISO 4628-1 (Table 3)	0	0	0
Bubbles	DIN EN ISO 4628-2	0 S(0)	0 S(0)	0 S(0)
Colour change	DIN EN ISO 4628-1 (Table 3)	0	0	0
Gloss change	DIN EN ISO 4628-1 (Table 3)	1	0	1

- Wheels
- Vehicles
- Mechanical engineering
- Job coaters
- Functional furniture and storage technology
- Construction and sanitary



## Emil Frei GmbH & Co. KG

Döggingen  
Am Bahnhof 6  
78199 Bräunlingen  
Germany

Tel. +49 7707.151-0  
Fax +49 7707.151-238

[info@freilacke.de](mailto:info@freilacke.de)  
[www.freilacke.de](http://www.freilacke.de)

**Are you interested? Then get in touch with our experts.**

Emil Frei GmbH & Co. KG Döggingen Am Bahnhof 6 D-78199 Bräunlingen

Phone +49.77 07.151-0 Fax +49.77 07.151-238 [info@freilacke.de](mailto:info@freilacke.de) [www.freilacke.com](http://www.freilacke.com)