

## Product Datasheet

### Resicoat® R4-ES for Electrostatic Spray Application on Preheated Surfaces Code: HJF10R

#### Product Description

Resicoat® R4 is a high quality thermosetting epoxy powder coating for the corrosion protection of valves and fittings, manufactured from cast iron or steel. It fulfills the stringent requirements of GSK. The powder coating is applied in one layer on a preheated surface by electrostatic spray application. Typical film thickness achieved is in the range of 250 – 500 µm. The resultant thermoset epoxy has a high mechanical resistance with excellent electrical insulation properties. Drinking water approvals are available to confirm the coatings suitability, as a hygienic and environmental friendly coating. The outstanding adhesion of Resicoat R4® epoxy powders to the metal substrate provides long term protection of the coated component. It ensures a reliable conservation to the function and value of the parts for the common water and gas distribution network. The applicator of Resicoat® R4 benefits from a modern and environmentally friendly process. It is possible to overcoat Resicoat® R4 with polyester powder and liquid coatings to achieve an UV protection.

#### Powder Properties

	Typical value	Method
<b>Binder System</b>	Epoxy	
<b>Density</b>	1.30 – 1.40 g/cm <sup>3</sup>	ISO 8130-2
<b>Gel time at 200° C</b>	30 – 50 sec.	modified ISO 8130-6
<b>Particle size distribution</b>	< 32 µm = 20 – 40 % < 160 µm > 98.5 %	Malvern ISO 8130-1
<b>Storage stability</b>	6 months from date of manufacture at ≤ 23° C	

#### Application Data

<b>Preheating temperature object</b>	200 – 220° C object temperature
<b>Post cure conditions object</b>	The coating is self curing, if the wall thickness of the steel/cast iron is greater than 8 mm. If the wall thickness of the steel/cast iron is less than 8 mm, additional curing of 3 to 8 minutes at 200° C object temperature is required.

#### Coating Process

<b>1. Pre-cleaning</b>	The surface must be free of oil, grease, salt, and other impurities.
<b>2. Blasting</b>	Moulding sand, rust and sharp edges must be removed with angular steel grit. The graphite from the cast iron must be removed from the blasting material according NACE No.2 / SSPC-10 / Sa 2.5. Recommended anchor profile of ≥ 60 µm should be stored max. 4 hours before pre-heating (dust-free and dry).
<b>3. Pre-heating</b>	This form of heating produces a uniform, defined temperature in the component. Any oxidation should be avoided.
<b>4. Coating application</b>	Immediately after preheating, the coating process starts without losing any object temperature. The coating is done in the shortest possible time in a single pass with no interruption.
<b>5. Coating cure</b>	Curing is achieved by the heat contained in the object. If the heating capacity of the work piece is sufficient. To confirm fully curing, MIBK is dropped for 30 sec. on the film surface with no visible change.

	Typical value	Method
<b>Material Properties</b>		
<b>Color</b>	blue, ca. RAL 5017 GL	
<b>Recommended film thickness</b>	250 – 350 µm	
<b>Flow</b>	smooth	
<b>Gloss at 60° angle</b>	80 – 100 units	ISO 2813
<b>Cross cut</b>	Gt 0	DIN EN ISO 2409
<b>Impact resistance</b>	> 5 Joule	DIN 30677-2
	> 2.26 Joule	ASTM D 2794 20 inchpound
	> 18 Joule	ASTM G 14 modified 1/8 in (3.2 mm) steel plate
<b>Abrasion resistance</b>	< 40 mg	ASTM D 4060
	< 200 µm	CS-17, 1000 g, 1000 cycles
		EN 598
<b>Dielectric strength</b>	≥ 30 kV/mm	IEC 60243-1
<b>Volume resistivity (DC voltage)</b>	1.1 x 10 <sup>15</sup>	ASTM D 257
<b>Elongation</b>	> 3 %	DIN 30677-2
<b>Indentation resistance</b> 48 h, 70° C	< 30 %	DIN 30677-2/DIN EN 14901
24 h, 60° C	< 10 %	ASTM G 17
<b>Compressive strength</b>	> 100 MPa	ASTM D 695
<b>Shear adhesion</b>	> 35 MPa	ASTM D 1002
<b>Heat aging</b>		DIN EN 14901
in air (110° C, 90 days)	pass	
in water (70° C, 7 days)	pass	
<b>Thermal stability under heat aging</b>	pass	AS/NZS 4158:2003
<b>Weathering (Xenon test), 100 days</b>	pass	ASTM D 2596
<b>Hardness (Buchholz)</b>	≥ 80	DIN EN ISO 2815
<b>Strain polarization</b>	pass	WIS 4-52-01
<b>Cathodic disbonding, 30 days, 23° C</b>	≤ 10 mm	DIN 30677-2, GSK
<b>Hot water immersion 90 days, 70° C</b>	pass	AWWA C550
<b>Adhesion after 7 days, 90° C water</b>	≥ 16 MPa	ISO 4624, GSK
<b>Disinfectant resistance</b>	no change of surface, no chalking	after 10 test stages à 15 h
according DVGW work sheet W 291 (chlorine dioxide, sodium hypochlorite)	The following migration test with demineralised water showed no defects of the film. The concentration of the examined parameters in the tested water were below the limits of the epoxy guideline for ancillaries for pipes DN >300 mm (in main trunks).	
<b>Water condensation test (Cleveland test), 21 days</b>	no change	ASTM D 4585
<b>Salt spray resistance, 2000 h</b>	no blistering, no loss of adhesion	BS 3900:F4
<b>Salt spray test, 4000 h</b>	no under-rusting on the cut	DIN EN ISO 9227 (steel substrate)
<b>Water absorption, 100 days, 23°C ± 2</b>	pass	AS/NZS 3862
<b>Chemical resistance (pH 3 – 13, 23° C)</b>	fulfilled	EN 598

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## Conformities

- **AWWA C550**
- **DIN EN 14901**
- **ISO 12944-2, table 1** (standard does not include powder coating systems)  
Resicoat® R4-ES HJF10R meets the high atmospheric corrosivity category C4 (typically in industrial areas and coastal areas with moderate salinity) and the very high atmospheric- corrosivity -categories C5-I (industrial) and C5-M (marine) if applied as a holiday-free coating at a film thickness of >400 µm. A sufficient film thickness is highly required to ensure good edge coverage. For gloss and color stability a UV-resistant polyester topcoat has to be applied.

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## Approvals

### Drinking water:

DE: UBA-Coatings Guideline, Approval no.: K-235947-13, Hygiene Institut  
DE: DVGW directive work sheet W 270, Approval no. W-279700k-17, Hygiene Institut  
FR: DGS/VS 4 No99/217, AFNOR XP P41-250-1-3, No. de dossier: ACS 16 MAT LY 257, LSEHL  
NL: Guideline BRL-K759, Certificate no.: K 11557, KIWA  
UK: BS 6920, Approval No. 1701509, WRAS  
CZ: Regulation no. 409/2005 Statute Book; Mark 45/2008, Regional Institute of Public Health Brno  
AT: Food contact assessment, Doc. No. D-897017, AGES  
AT: ÖNORM B 5014 Teil 1, Test Report No.: 412.335, OFI  
BE: Pidpa/Hydrocheck 011, Certificat R4 Dark Blue, Belgaqua  
US: ANSI/NSF 61 Drinking Water System Components – Health Effects, NSF

### GSK:

Material approval

### WIS:

4-52-01:1992: Certificate no.: PT354/0914, WRc

### Gas:

DE: Test of resistance to gas according G 260, Report no.: 06/069/5123/3, DVGW

### Biogas:

DE: Test of resistance to biogas (gases from regenerative sources) according G 262,  
Report no.: 07/040/5110/3, DVGW

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## Recommended Repair Material

**Resicoat® RS two-component repair material**

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Disclaimer: This Product Data Sheet is based on the present state of our knowledge and on current laws. The data referring to Powder Properties, Application Data and Physical Tests is based on lab based samples. Factors such as quality or condition of the substrate may have an effect on the use and application of the product. It remains the responsibility of the user to test thoroughly if the product is applicable for the intended use. The use of the product beyond our recommendation releases us from our responsibility, unless we have recommended the specific use in writing. It is always the responsibility of the user to take all necessary steps to fulfil the demands set out in the local rules and legislation. We are not liable for any application-technological advice. The Product Data Sheet shall be updated from time to time. Please ensure you have the latest version before using the product. All products and Product Data Sheets are subject to our standard terms and conditions of sale (GCS). You can receive the latest copy of GCS via internet or our post address. Brand names mentioned in this Product Data Sheet are trademarks of or are licensed to the AkzoNobel group.

## Resistance against chemical substances of Resicoat® R4 at room temperature

Acetic acid	10 %	2 years	no change
Ammonia	10 %	2 years	no change
Ammonia	36 %	1.5 years	no change
Antifrogen L	50 %	1 year	no change
Antifrogen N	50 %	1 year	no change
Benzol		1 month	no change
Bore oil		1 year	no change
Butanol		6 months	no change
Carbon tetra chloride		1 year	no change
Caustic soda solution	10 %	2 years	no change
Caustic soda solution	50 %	2 years	no change
Chlorine cleanser and disinfectant		1.5 years	no change
Citric acid		2 years	no change
Deicer Safeway KF HOT		1 year	no change
Deicer Safeway SF (solid)		1 year	no change
Deicer Safewing MP II 1951		1 year	no change
Dichromatic potassium	10 %	1 year	no change
Diesel		2 years	no change
Engine oil SAE 20		1 year	no change
Ethanol		1 year	no change
Ethyleneglycole		1 year	no change
Formaldehyde	37 %	6 months	no change
Formic acid	5 %	2 years	no change
Formic acid	10 %	1.5 years	no change
Glycerol		1 year	no change
Glysantin		1 year	no change
Hydrochloric acid	Concentrate	1 week	no change
Hydrochloric acid	10 %	2 years	no change
Hydrochloric acid	25 %	1.5 years	no change
Hydrofluoric acid	1 %	1 day	no change
Hydrogen peroxide	3 %	1 year	no change
Hydrogen peroxide	10 %	1 year	faded
Lactic acid	10 %	1 week	no change
Methanol		1 week	no change

Methyl tert-butyl ether (MTBE)	100%	6 months	softening
Nitric acid	10 %	1.5 years	no change
Nitric acid	25 %	1 year	no change
Oxalic acid	5 %	6 months	no change
Palm oil	at 90° C	7 days	no change
Petrol		2 years	no change
Petroleum		1 year	no change
Phosphoric acid	10 %	2 years	no change
Phosphoric acid	50 %	2 years	no change
Potassium hydroxide	10 %	1 year	no change
Potassium hydroxide	25 %	1 year	no change
Potassium hydroxide	50 %	1 year	no change
Propanol		1 year	no change
Sea water		2 years	no change
Sodium acetate	10 %	1 year	no change
Sodium carbonate	20 %	1 year	no change
Sodium hypochlorite (15 % Cl <sub>2</sub> )		10 weeks	no change
Sodium chloride	2 %	1 year	no change
Sodium chloride	20 %	1 year	no change
Sodium formiate	10 %	1 year	no change
Suds	1 %	1 year	no change
Sulphuric acid	2 %	2 years	no change
Sulphuric acid	20 %	2 years	no change
Sulphuric acid	50 %	2 years	no change
Tartaric acid	5 %	1 year	no change
Toluol		1 year	no change
Turpentine oil		1 year	no change
Urea	10 %	1 year	no change
Urine		1 year	no change
Xylol		1 year	no change

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