

## **Product data sheet**

## **Resicoat<sup>®</sup> HMH09QF-F** (Corvel<sup>®</sup> 10-8158) Pipe Internal Coating

Product Description	Resicoat <sup>®</sup> HMH09QF-F (Corvel <sup>®</sup> 10-8158) is a melt-mixed, 100% solids thermosetting epoxy powder coat- ing designed for coating the internal surface of pipe for use in the secondary recovery of oil. The product displayed no swelling, no softening, no blistering, and no loss of adhesion when the coated substrate was exposed to controlled tests at temperatures of up to 230°F. * When applied to primed metal using Resicoat <sup>®</sup> 596301 primer (Corvel <sup>®</sup> EP-10 1P-0010), Resicoat <sup>®</sup> PI HMH09QF-F (Corvel <sup>®</sup> 10- 8158) provides resistance against H <sub>2</sub> S, CO <sub>2</sub> , CH <sub>2</sub> , salt water and petroleum distillates. This product is suitable for high pressure lines up to 6,500 psi, high temperature brine, water injection, and oil and gas transmission pipelines.			
		Typical value	Method	
Powder	Binder system	Epoxy resin		
Properties	Specific gravity	1.25 – 1.75 g/cm <sup>3</sup>	ISO 8130-2	
	Coverage	130 ft <sup>2</sup> /lb/mil	calculated	
	Gel time at 400 °F (205 °C)	50 – 140 sec.	ANPC-0004 (Flat Plate Stir)	
	Storage stability	6 months at ≤ 74 °F (23 °C), stored in dry conditions		
	Tg1	55 - 65°C		
	Tg2	100 - 115°C		
	ΔΗ	40 - 80 J/g		
Application Data	Surface preparation	All oil, grease, mill scale, and rust must be removed. A blast profile of $2 - 4$ mils (50 - 100 $\mu$ m) minimum NACE #1 is required.		
	Resicoat <sup>®</sup> 596301 primer, dry thickness	0.5 – 1.0 mil (13 – 25 μm)		
	Preheating	325 – 400°F (163 – 204°C) object temperature		
	Post-curing	30 min., 390 – 410°F (199 – 210°C) 20 min., 415 – 435°F (213 – 224°C)		
	Recommended film thickness	15 – 25 mils (380 – 635 μm)		
	Particle size distribution	< 32 µm = 25 - 45 % < 125 µm = 99 - 100 % > 150 µm = max. 3.0 % > 250 µm = max. 0.2 %	ISO 8130-13 ISO 8130-1 CSA Z245.20-14 12.5 CSA Z245.20-14 12.5	

\* This statement is specifically limited to the evaluation conditions specified in the Material Properties Section of this Product Datasheet. This is not a guarantee of actual performance at the operating temperature. This representation is also subject to the Disclaimer contained on Page 3 of this Product Datasheet.

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			Typical value	Method	
Material	Color	t	an		
Properties	Flow	s	smooth		
	Taber abrasion re		55 mg weight loss	ASTM D 4060 CS-17, 1000 g, 5000 cycles	
		°F (10 °C) 3	5.5° pass 3.75° pass 3.0° pass	Aramco 09-SAMSS-091 Aramco 09-SAMSS-091 Aramco 09-SAMSS-091	
	Dielectric strength		800 volts/mil	ASTM D 149, in oil	
	Abrasion resista	nce (	0.018 g loss	ASTM D 4060 CS-17, 1000g, 1000 cycles	
	Impact resistance		1.7 J at 0°C 1.7 J at 20°C	ASTM G14	
	Pull off adhesion	test (dry)	25 MPa	ASTM D 4541	
	Penetration		7.6 % at 185° F (85°C)	ASTM G 17	
Autoclave Tests	Resicoat <sup>®</sup> PI HMH09QF-F (Corvel <sup>®</sup> 10-8158) applied over Resicoat <sup>®</sup> 596301 primer has been evalu- ated under various autoclave test conditions such as those referenced below:				
	Autoclave #1			Aramco 09-SAMSS-091	
	Time:	24 hours		laboratory panels	
	Temp.:	203° F (95° C)			
	Pressure:	3000 psi		no swelling, no softening, no	
	Discharge: Immersion:	1 – 3 min. 50 % immersed in each p	hase	blistering, no loss of adhesion	
	Gas:	100% N <sub>2</sub>	511430	Pass X Scribe Adhesion	
	Liquid:	Treated seawater (ASTM	1 D1141)	1670 – 2038 psi pull off	
	Autoclave #2				
	Time:	24 hours		Aramco 09-SAMSS-091	
	Temp.:	203° F (95° C)		laboratory panels	
	Pressure:	3000 psi		no swelling, no softening, no	
	Discharge:	1 – 3 min.		blistering, no loss of adhesion	
	Immersion:	50 % immersed in each p		<u>.</u>	
	Gas:	3 % H <sub>2</sub> S, 3 % CO <sub>2</sub> , 94%		Pass X Scribe Adhesion	
	Liquid:	Formation Water Brine: 6 2.3 % Ca, 3 % Mg, 15 % SO <sub>4</sub> , 300 ppm HCO <sub>3</sub> in D	Cl, 100 ppm	528 – 1956 psi pull off	
	Autoclave #3			Aramco 09-SAMSS-091	
	Time:	24 hours		laboratory panels	
	Temp.:	203° F (95° C)			
	Pressure:	3000 psi		no swelling, no softening, no	
	Discharge: Immersion:	1 – 3 min. 50 % immersed in each p	abase	blistering, no loss of adhesion	
	Gas:	100 % CO <sub>2</sub>	011030	Deep V Sprike Adhesise	
	Gas. Liquid:	Wasia Water: Na = 2500 Mg = 120 ppm, Cl = 4000 SO <sub>4</sub> = 1000 ppm, HCO <sub>3</sub> = pH = $6.8 - 7.2$	) ppm,	Pass X Scribe Adhesion 2283 – 3181 psi pull off	

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Autoclave Tests (continued)	<u>Autoclave #4</u> Time: Temp.: Pressure: Discharge: Immersion: Gas: Liquid:	30 days 150° F (65° C) 285 psi 1 – 3 min. 50 % immersed in each phase 100 % CO <sub>2</sub> Wasia Water: Na = 2500 ppm, Ca = 600 ppm, Mg = 120 ppm, Cl = 4000 ppm, SO <sub>4</sub> = 1000 ppm, HCO <sub>3</sub> = 200 ppm, pH = $6.8 - 7.2$	Aramco 09-SAMSS-091 laboratory panels no swelling, no softening, no blistering, no loss of adhesion Pass X Scribe Adhesion 1120 psi pull off gas phase 1900 psi pull off liquid phase
	Autoclave #5 Time: Temp.: Pressure: Discharge: Immersion: Gas: Liquid:	30 days $150^{\circ}$ F (65° C) 3000 psi 1 - 3 min. 50 % immersed in each phase 100 % CO <sub>2</sub> Wasia Water: Na = 2500 ppm, Ca = 600 ppm, Mg = 120 ppm, Cl = 4000 ppm, SO <sub>4</sub> = 1000 ppm, HCO <sub>3</sub> = 200 ppm, pH = 6.8 - 7.2	Aramco 09-SAMSS-091 laboratory panels no swelling, no softening, no blistering, no loss of adhesion Pass X Scribe Adhesion 1560 psi pull off gas phase 1900 psi pull off liquid phase
	<u>Autoclave #6</u> Time: Temp.: Pressure: Liquid:	24 hours 122° F (50° C) covered vented vessel 10 Vol.% HCI	Aramco 09-SAMSS-091 laboratory panels no swelling, no softening, no blistering, no loss of adhesion Pass X Scribe Adhesion 1017 – 1730 psi pull off
	<u>Autoclave #7</u> Time: Temp.: Pressure: Immersion: Gas: Liquid:	14 days 150° F (65° C) 1800 psi 50 % immersed in each phase N2 Methanol	no swelling, no softening, no blistering, no loss of adhesion
	Autoclave #8 Time: Temp.: Pressure: Immersion: Gas: Liquid:	24 hours 230° F (110° C) 2071 psi 50 % immersed in each phase 8.5 % CO2, 2 % H <sub>2</sub> S, Bal CH <sub>4</sub> Chloride = 100000 mg/l, acetate = 500 ppm, formate = 250 ppm, pH 2.9 at 77° F (25° C)	no swelling, no softening, no blistering, no loss of adhesion

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Autoclave Tests (continued)	<u>Autoclave #9</u> Time:	24 hours	NACE TM0185-06 laboratory panels		
	Temp.: Pressure: Discharge: Immersion: Gas: Liquid:	65 °C (150 °F) 3000 psi 1.5 min. 50 % immersed in each phase 5 % H <sub>2</sub> S, 8 % CO <sub>2</sub> , 77 % CH <sub>4</sub> 20 % Diesel, 40 % MEG, 40 % Formation Water	glossy, smooth and uniform color finish, no visual defect		
	Autoclave #10	7 dava	NACE TM0185-06 laboratory panels		
	Time: Temp.: Pressure: Discharge: Immersion:	7 days 65 °C (150 °F) 3000 psi 1.5 min. 50 % immersed in each phase	no blistering, no cracking, no delamination, no visible sign of degradation. Slight color change.		
	Gas: Liquid:	5 % H <sub>2</sub> S, 8 % CO <sub>2</sub> , 77 % CH <sub>4</sub> 20 % Diesel, 40 % MEG, 40 % Formation Water	3318 psi pull off gas phase 3568 psi pull off liquid phase		
	Autoclave #11		PDO SP-2217 Appendix B1		
	Time: Temp.: Pressure:	30 days 95 °C (203 °F) 2000 psi	NACE TM0-85		
	Discharge: Immersion: Gas:	Rapid decompression, less than 2 min., after 4 hours of cooling 50 % immersed in each phase $0.05 \% H_2S$ , 2 % CO <sub>2</sub> , 97.95 % CH <sub>4</sub>	No color change, no swelling, no softening, no blistering, no cracking, no delamination or loss of adhesion i either phase.		
	Liquid:	100,000 ppm Chloride	4478 psi pull off gas phase 5184 psi pull off liquid phase		
Approval	Saudi Aramco: APCS-102B				
	December 16, 201	December 16, 2019			
Date of issue:					
Date of issue: Authorized by:	GK				

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.

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