Product data sheet

Resicoat® HMH09QF-F (Corvel® 10-8158)
Pipe Internal Coating

Product Description

Resicoat® HMH09QF-F (Corvel® 10-8158) is a melt-mixed, 100% solids thermosetting epoxy powder coating 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® 596301 primer (Corvel® EP-10 1P-0010), Resicoat® PI HMH09QF-F (Corvel® 10-8158) provides resistance against H_2S, CO_2, CH_2, 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.

Powder Properties

	Typical value	Method
Binder system	Epoxy resin	
Specific gravity	1.25 – 1.75 g/cm^3	ISO 8130-2
Coverage	130 ft^2/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	
ΔH	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 µm) minimum NACE #1 is required.	
Resicoat® 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 Properties	**Color**	tan	
	Flow	smooth	
	Taber abrasion resistance	55 mg weight loss	ASTM D 4060 CS-17, 1000 g, 5000 cycles
	Flexibility at 77 °F (25 ± 3° C) **at 50 °F (10 °C)** **at 41° F (5° C)**	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 resistance	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® PI HMH09QF-F (Corvel® 10-8158) applied over Resicoat® 596301 primer has been evaluated under various autoclave test conditions such as those referenced below:

Autoclave #1		Aramco 09-SAMSS-091 laboratory panels
Time:	24 hours	
Temp.:	203° F (95° C)	
Pressure:	3000 psi	no swelling, no softening, no blistering, no loss of adhesion
Discharge:	1 – 3 min.	
Immersion:	50 % immersed in each phase	
Gas:	100% N_2	Pass X Scribe Adhesion
Liquid:	Treated seawater (ASTM D1141)	1670 – 2038 psi pull off
Autoclave #2		Aramco 09-SAMSS-091 laboratory panels
Time:	24 hours	
Temp.:	203° F (95° C)	
Pressure:	3000 psi	no swelling, no softening, no blistering, no loss of adhesion
Discharge:	1 – 3 min.	
Immersion:	50 % immersed in each phase	
Gas:	3 % H_2S, 3 % CO_2, 94% CH_4	Pass X Scribe Adhesion
Liquid:	Formation Water Brine: 6.5 % Na, 2.3 % Ca, 3 % Mg, 15 % Cl, 100 ppm SO_4, 300 ppm HCO_3 in Dl H_2O	528 – 1956 psi pull off
Autoclave #3		Aramco 09-SAMSS-091 laboratory panels
Time:	24 hours	
Temp.:	203° F (95° C)	
Pressure:	3000 psi	no swelling, no softening, no blistering, no loss of adhesion
Discharge:	1 – 3 min.	
Immersion:	50 % immersed in each phase	
Gas:	100 % CO_2	Pass X Scribe Adhesion
Liquid:	Wasia Water: Na = 2500 ppm, Ca = 600 ppm, Mg = 120 ppm, Cl = 4000 ppm, SO_4 = 1000 ppm, HCO_3 = 200 ppm, pH = 6.8 – 7.2	2283 – 3181 psi pull off

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Autoclave Tests (continued)

Autoclave #4		
Time:	30 days	Aramco 09-SAMSS-091 laboratory panels
Temp.:	150° F (65° C)	
Pressure:	285 psi	no swelling, no softening, no blistering, no loss of adhesion
Discharge:	1 – 3 min.	
Immersion:	50 % immersed in each phase	
Gas:	100 % CO_2	Pass X Scribe Adhesion
Liquid:	Wasia Water: Na = 2500 ppm, Ca = 600 ppm, Mg = 120 ppm, Cl = 4000 ppm, SO_4 = 1000 ppm, HCO_3 = 200 ppm, pH = 6.8 – 7.2	1120 psi pull off gas phase 1900 psi pull off liquid phase
Autoclave #5		
Time:	30 days	Aramco 09-SAMSS-091 laboratory panels
Temp.:	150° F (65° C)	
Pressure:	3000 psi	no swelling, no softening, no blistering, no loss of adhesion
Discharge:	1 – 3 min.	
Immersion:	50 % immersed in each phase	
Gas:	100 % CO_2	Pass X Scribe Adhesion
Liquid:	Wasia Water: Na = 2500 ppm, Ca = 600 ppm, Mg = 120 ppm, Cl = 4000 ppm, SO_4 = 1000 ppm, HCO_3 = 200 ppm, pH = 6.8 – 7.2	1560 psi pull off gas phase 1900 psi pull off liquid phase
Autoclave #6		
Time:	24 hours	Aramco 09-SAMSS-091 laboratory panels
Temp.:	122° F (50° C)	
Pressure:	covered vented vessel	no swelling, no softening, no blistering, no loss of adhesion
Liquid:	10 Vol.% HCl	
		Pass X Scribe Adhesion 1017 – 1730 psi pull off
Autoclave #7		no swelling, no softening, no blistering, no loss of adhesion
Time:	14 days	
Temp.:	150° F (65° C)	
Pressure:	1800 psi	
Immersion:	50 % immersed in each phase	
Gas:	N2	
Liquid:	Methanol	
Autoclave #8		no swelling, no softening, no blistering, no loss of adhesion
Time:	24 hours	
Temp.:	230° F (110° C)	
Pressure:	2071 psi	
Immersion:	50 % immersed in each phase	
Gas:	8.5 % CO2, 2 % H_2S, Bal CH_4	
Liquid:	Chloride = 100000 mg/l, acetate = 500 ppm, formate = 250 ppm, pH 2.9 at 77° F (25° C)	

Autoclave Tests (continued)	Autoclave #9		
	Time:	24 hours	NACE TM0185-06 laboratory panels
	Temp.:	65 °C (150 °F)	
	Pressure:	3000 psi	
	Discharge:	1.5 min.	glossy, smooth and uniform color finish, no visual defect
	Immersion:	50 % immersed in each phase	
	Gas:	5 % H_2S, 8 % CO_2, 77 % CH_4	
	Liquid:	20 % Diesel, 40 % MEG, 40 % Formation Water	
	Autoclave #10		NACE TM0185-06 laboratory panels
	Time:	7 days	
	Temp.:	65 °C (150 °F)	no blistering, no cracking, no delamination, no visible sign of degradation. Slight color change.
	Pressure:	3000 psi	
	Discharge:	1.5 min.	
	Immersion:	50 % immersed in each phase	
	Gas:	5 % H_2S, 8 % CO_2, 77 % CH_4	3318 psi pull off gas phase
	Liquid:	20 % Diesel, 40 % MEG, 40 % Formation Water	3568 psi pull off liquid phase
	Autoclave #11		PDO SP-2217 Appendix B1
	Time:	30 days	
	Temp.:	95 °C (203 °F)	NACE TM0-85
	Pressure:	2000 psi	
	Discharge:	Rapid decompression, less than 2 min., after 4 hours of cooling	No color change, no swelling, no softening, no blistering, no cracking, no delamination or loss of adhesion in either phase.
	Immersion:	50 % immersed in each phase	
	Gas:	0.05 % H_2S, 2 % CO_2, 97.95 % CH_4	
	Liquid:	100,000 ppm Chloride	4478 psi pull off gas phase 5184 psi pull off liquid phase
Approval	Saudi Aramco: APCS-102B		
Date of issue:	**December 16, 2019**		
Authorized by:	**GK**		
Revision no.:	**1**		

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