PRODUCT BULLETIN

May 2019

DION® FR 9300 Series

Brominated Bisphenol-A Epoxy Vinyl Ester Resins

DESCRIPTION

DION® FR 9300 Series of resins are flame-retardant, brominated, bisphenol-A epoxy vinyl ester resins that also provide corrosion-resistance in a wide variety of acidic and alkaline environments. These tough, high-strength resins can be used to produce glass-reinforced laminates with excellent impact and stress-fatigue resistance. DION® FR 9300 Series is ideal for filament winding operations and applications that require resistance to corrosion, and thermal cycling.

BENEFITS & FEATURES

- Batch-to-batch consistency and uniformity from production utilizing Statistical Process Control (S.P.C) & Statistical Quality Control (S.Q.C) techniques
- Very good high-temperature stability with resistance to a wide variety of corrosive environments
- Resilient, crack and stress-fatigue resistant polymer
- ASTM E-84 Class I flame-spread with 1.5% antimony trioxide or 3.0% NYACOL® APE3040 antimony pentoxide
- Can be used for applications requiring Coast Guard approval; able to meet MIL-R-24719(SH) Grade B Class I, MIL-R-21607 Grade A, and MIL-R-7575 Grade A

PROPERTIES – LIQUID

Property[1]	Unit	9300-00	9300-10
NVM	%	58.5	54
Viscosity[2]	cps	450	230
Gel Time	minutes	20.5[3]	20.5[4]
Gel to Peak	minutes	12	12
Peak Exotherm	°C/°F	146/295	132/270
Specific Gravity	-	1.16	1.14
Flash Point (Seta Closed Cup)	°C/°F	32/89	32/89

1) All properties at 25°C/77°F unless otherwise noted
2) Brookfield Viscometer RVF Spindle #2 at 20 RPM
3) Promotion: 1.85 g of Cobalt 6% + 0.70 g of DMA per 500 g of resin; Initiator: 1.25 g of MEKP-925 per 100 g of resin
4) Promotion: 1.0 g of Cobalt 12% + 0.75 g of DMA per 500 g of resin; Initiator: 0.63 g of Norpol® 11 per 50 g of resin

PROPERTIES – PHYSICAL

Property[1]	Unit	Neat Resin Casting[2]	Test Method
Tensile Strength	psi	12,000	ASTM D 638
Tensile Modulus	psi	440,000	ASTM D 638
Tensile Elongation	%	4.5	ASTM D 638
Flexure Strength	psi	22,000	ASTM D 790
Flexure Modulus	psi	530,000	ASTM D 790
Heat Deflection Temperature	°C/°F	110/230	ASTM D 648
Hardness, Barcol Model 934-1	HB	33	ASTM D 2583

1) Physical properties were determined using internal Polynt test methods that are similar to those listed above.
2) Initiator type and ratio: 1% of Lupersol A-98 + 1% of styrene; Cure conditions: gel overnight @ 130°F; Post-cure conditions: 2 hrs. @ 180°F, 2 hrs. @ 250°F

Typical Laminate Properties[1]

Temperature (°C/°F)	Tensile Strength (psi)	Tensile Modulus (psi)	Flexural Strength (psi)	Flexural Modulus (psi)
25/77	27,000	2,160,000	32,000	1,530,000
66/150	29,000	1,940,000	31,000	1,350,000
93/200	30,000	1,820,000	31,000	1,220,000
121/250	21,000	1,620,000	5,000	230,000
149/300	14,000	1,180,000	3,000	190,000

1) Laminate Construction: V/M/M/WR/M/WR/M/M; Glass Content: 42%; Thickness: 0.25 in

PROPERTIES - OTHER

SUGGESTED TOPCOAT FORMULATION

Even fully cured resin can retain a tacky surface. Surface cure may be improved by incorporating a paraffin wax into the resin used in the final ply. Alternatively, a wax modified resin can be added as a topcoat once the laminate has hardened.

Component	Parts
DION® FR 9300-00	100.0
10% paraffin wax solution	5.0
Dimethyaniline	0.2
6% coblat naphthenate	0.4
Tween 20 or 80	0.3
Fumed silica thixotrope[1]	1.5
MEKP 925, or equivalent initiator	1.3
Approximate gel time	20 minutes

1) Use in sodium hypochlorite environments will result in decreased chemical resistance. Hydrophobic grades of fumed silica are suggested for vinyl ester resins

FLAME RETARDANCE

DION® FR vinyl ester resins will burn if provided with a sufficient amount of heat and oxygen. The degree of flame-retardancy of laminates prepared using DION® FR resins has been characterized using several standard ASTM test methods. Testing has been performed under strictly controlled conditions. The behavior of composites made using DION® FR resins may vary in an actual fire situation.

Test	Additive	Test Value
ASTM E-84 (Tunnel test)	None	30 flame spread (Class II)(1)
	1.5% antimony trioxide	20 flame spread (Class I)(2)
	3% antimony trioxide	15 flame spread (Class I)(3)
	3% antimony trioxide	15 flame spread (Class I)(4)
	3% antimony pentoxide NYACOL® APE 3040	25 flame spread (Class I)(4)
ASTM D-2863 (Oxygen index)	None	26.5 LOI(3)
	3% antimony trioxide	33 LOI(3)
	3% antimony trioxide	34 LOI(3)

1) Laminate Construction: glass content 30%, thickness 0.13 in
2) Laminate Construction: glass content 25-30%, thickness 0.118 in
3) Laminate Construction: glass content 25-30%, thickness 0.125 in
4) Laminate Construction: glass content 25-30%, thickness 0.110 in

APPLICATION

GUIDELINES FOR DION® FR 9300-00 INITIATOR AND PROMOTER ADDITIONS

Ambient Temperature (°F)	Additive (phr)	Gel Time (Minutes)				
		10	20	30	60	90
55-65	6% Cobalt*	-	0.5	0.4	0.4	0.4
	DMA	-	0.3	0.15	0.075	0.05
	MEKP†	-	2.0	2.0	1.5	2.0
70-80	6% Cobalt*	0.4	0.4	0.4	0.3	0.3
	DMA	0.3	0.15	0.1	0.05	-
	MEKP†	2.0	1.25	1.5	1.0	2.0
80-90	6% Cobalt*	0.3	0.2	0.2	0.2	0.2
	DMA	0.2	0.1	0.1	0.05	-
	MEKP†	2.0	2.0	1.25	1.0	1.5

***Caution:** Excessive cobalt can inhibit cure and degrade corrosion resistance. Do not use more than 0.5% of cobalt 6% or 0.25% of cobalt 12%. If using cobalt octoate (12%), use half of the amount indicated in the chart for cobalt 6%.

†MEKP (9% Oxygen) such as MEKP 925 or equivalent. Trigonox® 239A has been shown to reduce or eliminate foaming upon initiator addition. Other brands of MEKP have also been used successfully. A thorough evaluation of initiator characteristics is suggested prior to fabrication.

Each user must determine the suitability of this product to his/her particular mode of operation and intended end-use application. A Polynt representative will be available to assist in the proper selection of all Polynt-Reichhold products available for commercial use.

SHELF LIFE & STORAGE

The shelf life of DION® FR 9300 Series resins is 180 days from the date of manufacture from Polynt. To maximize usage life and maintain optimum properties, resins and gel coats should be stored in the original closed container at temperatures below 23°C/73°F and away from ignition sources and sunlight. Keep containers sealed to prevent moisture pick-up and monomer loss.

SAFETY & WARRANTY

To receive a copy of our safety and warranty information, please email safetyandwarranty@polynt.com.