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PRODUCT BULLETIN

Creatively connecting knowledge and application.

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DION® 6694

MODIFIED BISPHENOL FUMARATE RESINS

DESCRIPTION

The DION® 6694 series of products are corrosion-resistant resins that have been chemically modified to optimize the unique properties of bisphenol fumarate polyesters. These resins offer excellent chemical resistance, and are particularly well suited to hot alkaline environments, such as those found in caustic/chlorine production, and to oxidizing environments such as those used in pulp bleaching. In addition, fiberglass composite materials made using DION® 6694 demonstrate excellent retention of mechanical properties at elevated temperatures.

FEATURES	BENEFITS
• Chemically modified bisphenol fumarate polymer	• Extremely resistant to attack by a wide variety of alkaline, acidic and oxidizing environments • Does not foam upon addition of MEKP initiators • Can be thixed using conventional (not hydrophobic) grades of fumed silica
• High crosslink density	• Excellent retention of mechanical properties at elevated temperatures • No need for expensive multi-veil corrosion barriers
• Extended shelf life	• Shelf stable for 6 months in fully-promoted form
• Manufactured using statistical process control in ISO 9002-certified plants	• Consistent batch-to-batch performance

CORROSION HOTLINE: For more information on this and other corrosion-resistant resins, call our CORROSION HOTLINE 1-800-752-0060 at cur central laboratory In Research Triangle Park, North Carolina

The information herein is general information designed to assist customers in determining whether our products are suitable for their applications. Our products are intended for sale to industrial and commercial customers. We require customers to inspect and test our products before use and to satisfy themselves as to contents and suitability for their specific applications. We warrant that our products will meet our written specifications. **Nothing herein shall constitute any other warranty express or implied, including any warranty of merchantability or fitness for a particular purpose**, nor is any protection from any law or patent to be inferred. All patent rights are reserved. The exclusive remedy for all proven claims is limited to replacement of our materials and in no event shall we be liable for special, incidental or consequential damages.

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PROPERTIES

PHYSICAL DATA IN LIQUID STATE AT 25°C / 77°F - DION® 6694-00

Properties	Unit	Value	Test Method
Non-Volatiles, NV	%	50.5	18-001 / B070
Viscosity	Cps / mPa·s	400	18-021/ASTM D 2196-86
Specific gravity/Density	g/cm³	1.02	18-030/ISO 2811-2001
Gel time *	minutes	15	18-050
Flash point (Seta Closed Cup)	°C / °F	31.6 / 89	
Shelf life, minimum **	months	6	

*1.25 % by weight of Lupersol™ DDM-9 per 50 grams of resin
** Minimum shelf life performance refers to product i/n the original, unopened container.
Shelf life stability is affected by storage conditions.

PHYSICAL DATA IN LIQUID STATE AT 25°C / 77°F - DION® 6694-30

Properties	Unit	Value	Test Method
Non-Volatiles, NV	%	50.5	18-001 / B070
Viscosity	Cps / mPa·s	400	18-021/ASTM D 2196-86
Specific gravity/Density	g/cm³	1.02	18-030/ISO 2811-2001
Gel time *	minutes	20	18-050
Flash point (Seta Closed Cup)	°C / °F	31.6 / 89	
Shelf life, minimum **	months	6	

*1.25 % by weight of Lupersol™ DDM-9 per 50 grams of resin
** Minimum shelf life performance refers to product i/n the original, unopened container.
Shelf life stability is affected by storage conditions.

PHYSICAL DATA IN LIQUID STATE AT 25°C / 77°F - DION® 6694-10

Properties	Unit	Value	Test Method
Non-Volatiles, NV	%	50.5	18-001 / B070
Viscosity	Cps / mPa·s	400	18-021/ASTM D 2196-86
Specific gravity/Density	g/cm³	1.02	18-030/ISO 2811-2001
Gel time	minutes	unpromoted	18-050
Flash point (Seta Closed Cup)	°C / °F	31.6 / 89	
Shelf life, minimum **	months	6	

** Minimum shelf life performance refers to product i/n the original, unopened container.
Shelf life stability is affected by storage conditions.

NOTE: Some versions of DION® 6694 may have minimum order quantity restrictions. For more information, contact your Reichhold representative or approved Reichhold distributor.

CATALYST AND CURE TABLES

DION® 6694 is promoted with cobalt naphthenate and dimethyl aniline (DMA). MEK peroxide addition should be varied between 1 phr and 2 phr to control gel time and cure speed at normal ambient working temperatures. MEK peroxide levels should not be reduced below 0.9 phr. If longer gel times are required at temperatures above 80ºF, then the addition tert-butyl chatechol (TBC) inhibitor is recommended.

Fabricators preferring to select in-house catalysts systems should consider DION® 6694-10 which is the non-promoted version of DION® 6694-00

DION® 6694-00 MEKP CATALYST

Ambient		Gel Time (minutes)					
Temperature (ºF)		10-20		20-30		30-40	
		phr	cc/gal	phr	cc/gal	phr	cc/gal
60	MEKP	2.5	100	1.9	75	1.3	52
70	MEKP	1.9	75	1.25	50	0.9	36
80	MEKP	1.25	50	0.9	36	0.9	36
	TBC-10*	—	—	—	—	0.15	5.2
90	MEKP	1.25	50	0.9	36	0.9	36
	TBC-10*	0.05	1.8	0.15	5.2	0.20	7.0

DION® 6694-10 MEKP CATALYST

Add 0.5 phr Cobalt Octoate (12%) or 1.0 phr Cobalt Naphthenate (6%) 0.15 phr DMA (dimethyl aniline) to resin before catalyzing with MEKP.

	Gel Time (minutes)									
Temperature (ºF)	10-20		20-30		30-40		40-60		60-80	
	phr	cc/gal	phr	cc/gal	phr	cc/gal	phr	cc/gal	phr	cc/gal
40 MEKP	2.5	100	1.9	75	1.25	50	1.25	50	1.25	50
TBC-10	0	0	0	0	0	0	0.04	1.7	0.08	3.4
50 MEKP	1.9	75	1.25	50	1.25	50	1.25	50	1.25	50
TBC-10	0	0	0.04	1.7	0.06	2.5	0.09	3.8	0.12	5.0
60 MEKP	1.25	50	1.25	50	1.25	50	1.25	50	1.25	50
TBC-10	0	0	0.12	5.0	0.20	8.4	0.25	10.5	0.30	12.6
70 MEKP	1.25	50	1.25	50	1.25	50	1.25	50	1.25	50
TBC-10	0.12	5.0	0.25	10.5	0.32	13.5	0.39	16.4	0.46	19.3
80 MEKP	1.25	50	1.25	50	1.25	50	1.25	50	1.25	50
TBC-10	0.20	8.4	0.33	13.9	0.42	17.7	0.52	21.9	0.60	25.2
90 MEKP	0.9	36	0.9	36	0.9	36	0.9	36	0.9	36
TBC-10	0.22	9.2	0.32	13.5	0.40	16.8	0.46	19.3	0.52	21.9
100 MEKP	0.9	36	0.9	36	0.9	36	0.9	36	0.9	36
TBC-10	0.40	16.8	0.50	21	0.60	25.2	0.68	28.6	0.75	31.5

TBC-10 = 10% by weight solution of tert-butyl calechol in styrene.

WARNING: Care must be taken to avoid direct mixing of any organic peroxide with metal soaps, amine or any other polymerization accelerator or promoter, as violent decomposition will result!

PHYSICAL PROPERTIES

Physical Properties	Test Procedure	1/8" Clear Clear Castings	MIL-R-7575C(1) Laminate Vacuum Bag Molded	6 OZ. Mat(2) Laminate Press Molded	Typical Shop(3) Laminate Contact Molded
Physicals:					
Specific Gravity	—	1.12	1.71	1.60	1.54
Glass Content, %		—	63	41	45
Barcol Hardness	ASTM D-2583	35-40	65-67	58-60	44-46
Heat Distortion Temp. 264 psi, ºF	ASTM D-648	270			
Water Absorption - Percent Change in Weight:					
After 24 hrs immersion at 77ºF	ASTM D-570	0.05	0.033	0.22	0.077
After 24 hrs immersion in boiling water	ASTM D-570	0.3	0.165	0.55	0.46
Ultimate Strengths: @ 77ºF					
Izod Impact, notched, ft. lb/in.	ASTM D-256	0.7	13.8	13.3	—
Flexural Strength, psi	ASTM D-790	14,600	75,600	35,500	30,100
Flexural Modulus, x 10^6 psi	ASTM D-790	0.49	2.72	1.56	1.18
Tensile Strength, psi	ASTM D-638	8,200	51,400	24,000	22,200
Tensile Modulus, x 10^6 psi	ASTM D-638	0.34	3.57	1.66	2.31
Tensile Elongation, %	ASTM D-638	2.4			
Compressive Strength, psi	ASTM D-695	—	53,400	25,800	27,600
Strength Retention:					
Flexural Strength at 160ºF, psi	ASTM D-790	—	70,400	30,000	—
Flexural Strength Retention	—	—	93%	85%	—
Flexural Modulus, x 10^6 psi	ASTM D-790	—	3.08	0.8	—
Flexural Strength at 250ºF, psi	ASTM D790	—	61,400	26,700	—
Flexural Strength Retention	—	—	81%	75%	—
Flexural Modulus, x 10^6 psi	ASTM D-790	—	2.73	0.9	—
Flexural Strength after 2 hr. boil, psi	ASTM D-790	—	74,700	31,200	30,800
Flexural Strength Retention	—	—	98%	88%	102%
Flexural Modulus after 2 hr. boil, x 10^6	ASTM D-790	—	2.70	1.48	1.33
Flexural Strength after 24 hr. boil, psi	ASTM D-790	—	60,500	24,500	27,000
Flexural Strength Retention	—	—	80%	70%	90%
Flexural Modulus, after 24 hr. boil, x10^6 psi	ASTM D-790	—	2.77	1.39	1.17
Electrical Properties:					
Arc Resistance, Method B, sec	ASTM D-495	78	139	107	—
Dielectric Strength, S/T, v/mil	ASTM D-149	466	574	587	—
Dielectric Strength, S/S, v/mil	ASTM D-149	393	470	465	—
Dielectric Constant, Standard Condition(4)	ASTM D-150	—	4.3	—	—
Dielectric Constant, Immersion Condition(4)	ASTM D-150	—	4.4	—	—
Loss Tangent, Standard Condition(4)	ASTM D-150	—	0.010	—	—
Loss Tangent, Immersion Condition(4)	ASTM D-150	—	0.011	—	—

All data shown is for DION® 6694 resin laminates.
FTMS = Federal Test Method Standard No. 406, method number as shown.

(1) 12 ply, 1/8" thick, 181-S910 cloth laminates vacuum bagged for initial cure followed by post cure of 1 hour at 300ºF.
(2) 4 ply, 1.5 oz "E" glass laminates press molded five minutes at 260/250ºF, with 1% BZP.
(3) Resin-rich surface layer with surfacing mat backed with two layers of 1.5 oz mat, 24 oz woven roving, two layers of 1.5 oz mat and surfacing mat; cured at room temperature for 7 days before testing with **no post cure**.
(4) 75 ply, ¾" thick test laminates required for test purposes.

HEAT AGING
Strength Retention After Aging At Elevated Temperature

	Flexural Strength, psi	% Retention	Flexural M.O.E. (10^5) psi	% Retention
Room Temp.	33611		12.1	
225ºF	32266	96%	10.9	90%
275ºF	33900	100%	11.9	98%
350ºF	30922	92%	10.0	83%
400ºF(1)	21175	63%	8.6	71%
450ºF(2)	22429	67%	12.3	100%

Test Procedure: Laminate samples were aged at elevated temperature for a period of one year then tested for percent strength retention at ambient temperature according to ASTM D-790-71, Method I.

Laminate Construction: V/M/M/WR/M/WR/M
V = Standard surface veil
M = 2 oz/sq. ft. chopped mat
WR = 24 oz/sq. yd. Woven roving

Thickness: 0.25 inch
Glass Content: 40 ± 2.5%

NOTE:
(1) Samples aged 6 months.
(2) Samples aged 2 months.

Flexural Strength	psi	% Retention	Flexural MOE psi x 10^5	% Retention	Tensile Strength (psi)	% Retention	(psi x 10^5) Tensile MOE	% Retention
Room Temp.	29,700	—	12.0	—	19,000	—	11.4	
150ºF	26,500	90	10.4	87	—	—	—	
200ºF	26,100	88	9.6	80	—	—	—	
250ºF	24,300	82	8.3	70	21,100	111	12.5	110
300ºF	21,900	74	7.4	62	18,400	97	10.1	89
350ºF	14,000	47	6.0	50	15,800	84	8.9	78
400ºF	7,000	24	4.8	40	10,800	57	8.8	77

Laminate Construction: V/M/M/WR/M/WR/M
V = Standard surface veil
M = 2 ox/sq. ft. chopped mat
WM = 24 oz/sq. yd. woven roving

Thickness: inch
Glass Content: 40± 2.5%

STORAGE

This product is available as non-returnable 55-gallon metal drums (500 lb. net) or 40,000-44,000-lb. tank truck.

To ensure maximum stability and maintain optimum resin properties, resins should be stored in closed containers at temperatures below 75°F (25°C) and away from heat sources and sunlight. All storage areas and containers should conform to local fire and building codes. Drum stock should be stored away from all sources of flame or combustion. Inventory levels should be kept to a reasonable minimum with first-in, first-out stock rotation.

Additional information on handling and storing unsaturated polyesters is available in Reichhold's application bulletin "Bulk Storage and Handling of Unsaturated Polyester Resins." For information on other Reichhold resins or initiators, contact your sales representative or authorized Reichhold distributor.

SAFETY

READ AND UNDERSTAND THE MATERIAL SAFETY DATA SHEET BEFORE WORKING WITH THIS PRODUCT

Obtain a copy of the material safety data sheet on this product prior to use. Material safety data sheets are available from your Reichhold sales representative. Such information should be requested from suppliers of all products and understood prior to working with their materials.

TECHNICAL SUPPORT

Reichhold's technical support facilities are staffed by people who have extensive practical experience in polyesters and manufacturing techniques. Please do not hesitate to request our assistance through your sales representative.

Copies of test methods noted in this bulletin are available from your Reichhold sales representative or distributor.

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