



Renewable resources.
Endless possibilities.™

Resins for printing inks



Our green
tradition
drives your
green future

OUR INNOVATIVE REFINING TECHNOLOGY

With our world class manufacturing practices and the largest distillation facilities, we are able to generate the highest value from Crude Tall Oil. With increased energy efficiency and low levels of emission and waste, we have been granted various environmental certificates.

Products for the
graphic arts industry

MALEIC MODIFIED ROSIN ESTERS

Maleic Modified Rosin Esters are mid-molecular weight, light colored, aliphatically tolerant resins for use in lithographic overprint vehicles or as co-resins in lithographic varnishes.

PHENOLIC MODIFIED ROSIN ESTERS

Phenolic Modified Rosin Esters offer a wide range of viscosity, structure and aliphatic tolerance for all lithographic ink applications including heatset and sheet fed vehicle formulations, pigment wetting (flush and grind base) and cold set applications. New high molecular weight resins based on SYLVAPRINT® HSR (Heat Stable Rheology) chemistry yield inks less sensitive to variations in press temperatures. They provide reduced dot gain, wider water windows and lower oven temperatures.

TERPENE PHENOLICS

Terpene phenolics are low molecular weight oligomers designed primarily for pigment wetting and dispersion applications. Careful control of functionality and polarity allows for the production of highly stable pigment concentrates with difficult to disperse colorants. Excellent pigment wetting properties allow for use in flushes and black dispersions.

ESTER SOLVENTS

Methyl, butyl or penta esters of selected tall oil fatty acids are designed for use as co-solvents in low VOC lithographic inks, press wash formulations and as solvents in high solids sheeffed inks. Low volatility and low molecular weight allow replacement of mineral oils for fast setting times with improved solvency.

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INK POLYAMIDES

Ink polyamides are reaction products of dimerized fatty acids, diamines and chain terminators. Depending on the chemistry employed, they are useful for production of both alcohol soluble and co-solvent flexographic and packaging gravure inks. A wide range of products are available depending on the print process, color strength, gloss and film forming required. Resins with a range of FDA clearances are available.

MODIFIED ROSIN ESTERS

Alcohol Soluble

Alcohol soluble modified rosin esters are designed for use in "E" type gravure and flexographic inks. They are compatible with nitrocellulose, polyketone resins, shellac and other modifiers used in alcohol based printing inks. They are soluble in aqueous ammonia and amines making them suitable for use in waterbased flexographic and gravure inks.

Alcohol Insoluble

Alcohol insoluble modified rosin esters are designed for use in liquid ink systems. They can be formulated as dispersing resins in "C" and "T" type gravure inks, overprint varnishes, metal decorating finishes, varnishes and enamels. Some provide excellent nitro cellulose compatibility in high acetone, low VOC lacquer formulations.

LITHOGRAPHIC RESIN SOLUTIONS

Arizona Chemical offers a number of its lithographic rosin based ink resins in solution form. The benefits solution customers enjoy include more efficient handling, lower dispersion energy costs and the elimination of packaging waste. Lithographic solutions are currently available using resins based on SYLVAPRINT® HSR (Heat Stable Rheology) chemistry to yield heatset inks with reduced dot gain, wider water windows and lower oven temperatures. Custom resin solutions are available.

DIGITAL INK RESINS

Patented phase change ink resins are used for solvent free hot melt inks and in 3D profiling hardware. Their low melt viscosities, sharp melting transitions and high purity are designed for reliable use in industrial hot melt digital print heads. Additionally, recently launched resins for solvent based digital printing offer excellent pigment wetting properties in a host of environmentally friendly solvents. Contact Arizona Chemical for more details.

METAL RESINATES

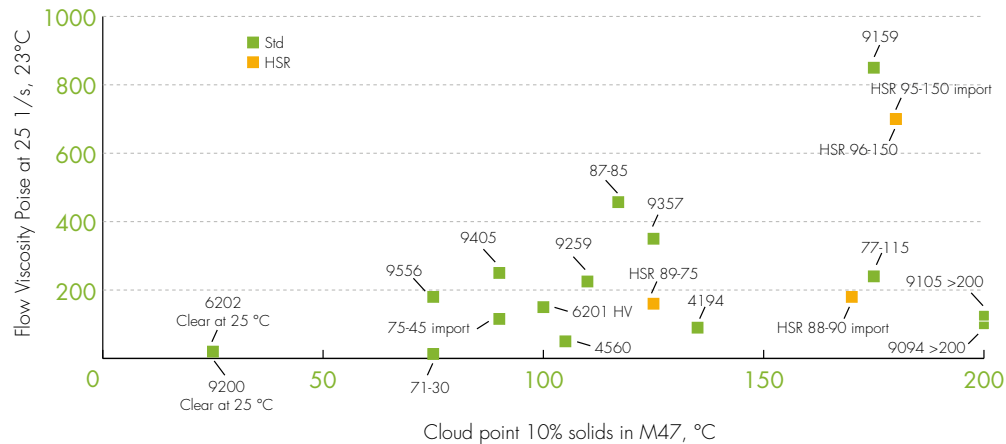
Solution and fusion metal resinates are designed for use in toluene based publication gravure printing applications. They providing high gloss, excellent blocking resistance and fast solvent release. Custom resins are available. Contact Arizona Chemical for details.



Resins for printing inks

▼ LITHOGRAPHIC INK RESIN	33% ARLO cuts AQCM 058N ACQM 063				AQCM 059	AQCM 066	Percent Biomass	BRC INDEX	FDA REF
	Flow Viscosity Poise at 25 1/s, 23°C	G' @ 23°C	G'' @ 23°C	Tan Delta @ 23°C	Cloud point 10% solids in M47, °C	MagieSol 47 Dilution,%	ASTM D6866 (percent C14)		
SYLVAPRINT® 9159	850	1700	5500	3.5	175	150	64.0	70	A, C, H, J, L
SYLVAPRINT® HSR 96-150	700	2000	3800	1.9	180	100	80.2	80	A, H, J, L
SYLVAPRINT® HSR 95-150 import	700	1900	3600	1.9	180	75	80.6	80	A, C, H, J, L
SYLVAPRINT® 87-85	457	1000	2900	2.9	117	450	74.1	70	A, C, H, J, L
SYLVAPRINT® 9357	350	450	2400	5.5	125	250	62.8	60	A, C, H, J, L
SYLVAPRINT® 9405	250	450	1600	3.5	90	350	66.9	70	A, C, H, J, L
SYLVAPRINT® 77-115	240	400	1300	3.5	175	100	83.8	80	A, C, H, J, L
SYLVAPRINT® 9259	225	200	1500	7.5	110	300	62.6	60	A, C, H, J, L
SYLVAPRINT® HSR 88-90 import	180	450	1150	2.5	170	150	81.8	80	A, C, H, J, L
SYLVAPRINT® 9556	180	175	1200	7	75	600	67.2	70	A, C, H, J, L
SYLVAPRINT® HSR 89-75	160	500	1150	2.3	125	235	79.0	80	A, H, L
SYLVAPRINT® 6201 HV	150	300	1500	5	100	250	74.3	70	A, C, H, J, L
SYLVAPRINT® 9105	125	100	800	8	>200	125	82.8	90	A, C, H, J, L
SYLVAPRINT® 75-45 import	115,6	60	770	12.5	90	600	70.0	70	No FDA Clearance
SYLVAPRINT® 9094	100	90	650	7	>200	75	89.9	90	A, C, H, J, L
SYLVAPRINT® 4194	90	55	700	13	135	200	81.9	80	A, C, H, J, L
SYLVAPRINT® 4560	50	15	325	20	105	375	87.1	80	A, C, E, F, H, J, L
SYLVAPRINT® 6202	20	1	100	>100	Clear at 25 °C	>1800	72.6	70	A, C, H, J, L
SYLVAPRINT® 71-30	13	1,5	100	67	75	600	80.7	80	A, C, H, J, L
SYLVAPRINT® 9200	8	<1	50	>100	Clear at 25 °C	>1800	83.7	80	A, C, H, J, L

SYLVAPRINT® HSR (Heat Stable Rheology) means the resin will demonstrate stable rheology over a wider range of temperatures relative to conventional rosin or hydrocarbon based resins



Resins for printing inks

▼ ESTER SOLVENT	Alcohol Type	AQCM 009 Iodine No. (WIJS)	AQCM 002 Color (Gardner)	AQCM 081 Titer point °C	EPA 24 VOC %	AQCM 042 Viscosity, 25°,cps	Percent Biomass ASTM D6866 (percent C14)	BRC INDEX	FDA REF
SYLFAT® 9012	Butyl	110	8	-2	<2	7	82.7	80	A, H, L, M
SYLFAT® 9014	Methyl	73	9	8	10	15	92.9	90	A, G, H, K, M
SYLFAT® 9039	Penta	NA	6	0	3	300	93.1	90	No FDA Clearance

▼ LIQUID INK RESIN (polyamides)	AQCM 003 Softening Point °C	Solvent	Solids %	AQCM 004 Solution Viscosity. 25°C. cps	AQCM 001 Acid Number mg KOH/g	AQCM 069 Amine Number mg KOH/g	Percent Biomass ASTM D6866 (percent C14)	BRC INDEX	FDA REF
UNI-REZ® 2291	136	N-POH	40	1800	1	6	63.0	60	A
UNI-REZ® 2646	125	N-POH	40	1000	<2	<5	83.8	80	A, D
UNI-REZ® 2228	113	N-POH	50	570	1	3	80.7	80	A
UNI-REZ® 2281	115	N-POH	50	370	3	3	80.0	80	A, C
UNI-REZ® 2209	123	N-POH	50	365	2	3	82.4	80	A, C
UNI-REZ® 2218	122	N-POH	50	290	4	3	76.8	80	No FDA Clearance
UNI-REZ® 2223	123	N-POH	50	285	3	4	77.8	80	A, C
UNI-REZ® 2229	117	N-POH	50	260	3	3	78.6	80	A, C
UNI-REZ® 2238	117	N-POH	50	250	3	4	80.9	80	A, C
UNI-REZ® 2248	109	N-POH	50	205	5	3	81.4	80	No FDA Clearance
UNI-REZ® 2226	126	N-POH	50	195	3	2	77.9	80	A, C
UNI-REZ® 2239	113	N-POH	50	190	2	4	80.3	80	A, C
UNI-REZ® 2282	126	N-POH	50	175	3	4	76.8	80	A, C
UNI-REZ® 138	111	N-POH	50	135	2	2	69.9	70	No FDA Clearance
UNI-REZ® 2221	110	N-POH	50	115	4	3	80.9	80	A, C
UNI-REZ® 2224	115	N-POH	50	60	3	2	79.2	80	No FDA Clearance
UNI-REZ® 106/1	110	1:1 BUT:TOL	35	115	2	2	90.4	90	A, C, D, I
UNI-REZ® 1533	100	1:1 BUT:TOL	35	110	5	5	83.9	80	A, C, D, E, F, I, J
UNI-REZ® 2931	110	1:1 BUT:TOL	35	100	2	3	90.2	90	A, C, D, I
UNI-REZ® 2930	110	1:1 BUT:TOL	35	90	2	3	90.2	90	A, C, D, I
UNI-REZ® 2940	110	1:1 BUT:TOL	35	65	2	3	90.2	90	A, C, D, I
UNI-REZ® 147	104	1:1 BUT:TOL	35	65	2	2	89.1	90	A
UNI-REZ® 2934	103	1:1 BUT:TOL	35	60	1	4	86.3	90	A, C
UNI-REZ® 2210	140	1:1 BUT:TOL	35	35	2	2	80.6	80	A
UNI-REZ® 110	143	1:1 BUT:TOL	35	30	2	2	78.5	80	A

Resins for printing inks

▼ LIQUID INK RESIN (rosin resins)	AQCM 003 Softening Point °C	Solvent	Solids %	AQCM 004 Solution Viscosity. 25°C. cps	AQCM 001 Acid Number mg KOH/g	AQCM 055 Solution Viscosity 25°C, sec #3 Zahn	Percent Biomass ASTM D6866 (percent C14)	BRC INDEX	FDA REF
SYLVACOTE® 7003	133	Toluene	60	340	36	39	92.6	100	A, H, J, L
SYLVACOTE® 7097	127	Toluene	60	200	39	27	93.1	100	A, C, H, J, L
SYLVAPRINT® 8112	124	EtOH	60	275	115	36	88.7	90	A, C, E, F, H, J, L
SYLVAPRINT® 8115	131	EtOH	60	225	116	30	75.7	70	A, C, E, F, H, J, L
SYLVAPRINT® 8170	137	EtOH	60	225	165	30	80.0	70	No FDA Clearance
SYLVAPRINT® 8200	154	EtOH	60	165	199	23	83.6	80	A, C, E, F, H, J, L
SYLVAPRINT® 8190	151	EtOH	60	140	186	21	83.3	80	A, C, E, F, H, J, L
SYLVAPRINT® 8250	136	EtOH	60	65	246	11	89.6	80	A, C, E, F, H, J, L
SYLVAPRINT® 7115	115	IPAc	50	45	42	23 (#2 Zahn) Sol. In IPAc	93.6	100	A, C, H, J, L

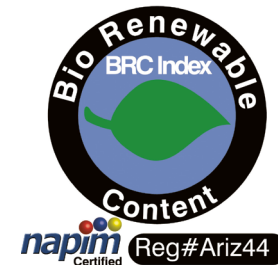
FDA REFERENCE CODES:

A	175.105	Adhesives
B	175.125	Pressure Sensitive Adhesives
C	175.300	Resinous & Polymeric Coatings
D	175.320	Resinous & Polymeric Coatings for Polyolefin Film
E	176.170	Components of Paper & Paperboard in Contact with Aqueous & Fatty Foods
F	176.180	Components of Paper & Paperboard in Contact with Dry Foods
G	176.200	Defoaming Agents Used in Coatings
H	176.210	Defoaming Agents Used in Manufacture of Paper & Paperboards
I	177.1200	Cellophane
J	177.1210	Closure with Sealing Gaskets
K	177.2260	Filters Resin-Bonded
L	177.2600	Rubber Articles Intended for Repeated Use
M	177.2800	Textiles & Textile Fibers

(When used in accordance with all appropriate and associated regulations)

BRC INDEX	BIO-DERIVED RENEWABLE CONTENT RANGE
10	10.0. to 15.0%
20	15.1 to 25.0%
30	25.1 to 35.0%
40	35.1 to 45.0%
50	45.1 to 55.0%
60	55.1 to 65.0%
70	65.1 to 75.0%
80	75.1 to 85.0%
90	85.1 to 95.0%
100	95.1 to 100%

Weight % of formula



▼ LITHOGRAPHIC INK RESIN

	Lithography			
	Heatset	Sheetfed	Overprint	Pigment Wetting
SYLVAPRINT® 9159	•	•		
SYLVAPRINT® HSR 96-150	•	•		
SYLVAPRINT® HSR 95-150 import	•	•		
SYLVAPRINT® 87-85	•	•		
SYLVAPRINT® 9357	•	•		
SYLVAPRINT® 9405	•	•		•
SYLVAPRINT® 77-115	•	•		
SYLVAPRINT® 9259	•	•		
SYLVAPRINT® HSR 88-90 import	•	•		
SYLVAPRINT® 9556	•	•		•
SYLVAPRINT® HSR 89-75	•	•		
SYLVAPRINT® 6201 HV	•	•		•
SYLVAPRINT® 9105	•	•	•	
SYLVAPRINT® 75-45 import	•	•		
SYLVAPRINT® 9094	•	•		
SYLVAPRINT® 4194	•	•	•	
SYLVAPRINT® 4560	•	•	•	•
SYLVAPRINT® 6202		•		•
SYLVAPRINT® 71-30	•	•		•
SYLVAPRINT® 9200		•		•

▼ LIQUID INK RESIN
(rosin resins)

	Rotogravure (Packaging)		
	Alcohol/ Aqueous	Solvent	Coatings for Wood
SYLVACOTE® 7003			•
SYLVACOTE® 7097		•	•
SYLVAPRINT® 8112	•		
SYLVAPRINT® 8115	•		
SYLVAPRINT® 8170	•		
SYLVAPRINT® 8200	•		
SYLVAPRINT® 8190	•		
SYLVAPRINT® 8250	•		
SYLVAPRINT® 7115		•	

▼ LIQUID INK RESIN
(polyamides)

	Flexography			
	Film/Foil	Cold Seal Release	Grease Resistance	Lamination
UNIREZ® 2291	•			•
UNIREZ® 2646	•			•
UNIREZ® 2228	•			•
UNIREZ® 2281	•			
UNIREZ® 2209	•			
UNIREZ® 2218	•			
UNIREZ® 2223	•			
UNIREZ® 2229	•			
UNIREZ® 2238	•			
UNIREZ® 2248	•			
UNIREZ® 2226	•			
UNIREZ® 2239	•			
UNIREZ® 2282	•			
UNIREZ® 138	•			
UNIREZ® 2221	•			
UNIREZ® 2224	•			
UNIREZ® 106/1	•	•	•	
UNIREZ® 1533	•		•	
UNIREZ® 2931	•	•	•	
UNIREZ® 2930	•	•	•	
UNIREZ® 2940	•	•	•	
UNIREZ® 147	•	•		
UNIREZ® 2934	•	•		
UNIREZ® 2210	•	•		
UNIREZ® 110	•	•		

Arizona Chemical quality control

AQCM 001, ACID NUMBER

Dissolve 1 gram of resin in a 1:2 isopropanol: toluene solution and titrate with 0.1 N methanolic KOH solution until a phenolphthalein endpoint (faint pink color persists for at least 15 seconds). Report results as mg KOH/g resin.

AQCM 002, GARDNER COLOR

Fill a glass color tube with the test resin solution and place in a Gardner-Delta Colorimeter (1963 color standards) with a 60-watt soft light bulb rated at 850 ± 10 lumens. Visually match the sample as closely as possible to one of the standards. Judge on intensity only (brightness and saturation) and ignore hue. Report results as a G (Gardner) value.

AQCM 003, SOFTENING POINT

Fill a 2.80 mm bottom orifice sample cup of a Mettler FP90/FP83HT Cup and Ball apparatus with the molten resin to be tested. Place the sample cup in the cartridge with a lead ball (3.4 ± 0.2 gram) centered on top of the sample and place in the furnace. The instrument rapidly heats to $20-25^{\circ}\text{C}$ below the expected softening point then ramps at $1.5^{\circ}\text{C}/\text{min}$ until the ball drops. Report results in $^{\circ}\text{C}$.

AQCM 004, BROOKFIELD VISCOSITY

Fill a Brookfield cell with 8.0 ml of the test resin solution, insert a #18 LVT spindle and position the adapter in a Brookfield DV-II+ rotational viscometer. Equilibrate the temperature to 25°C for 5 minutes before starting, then engage the motor and adjust the speed to obtain approximately 50% of full scale torque. Report results as centipoises (cps) @ 25°C .

AQCM 009, IODINE VALUE (WIJS METHOD)

Add Wijs solution to the sample, allow to stand in the dark for approximately 30 min, then add potassium iodide. Titrate the liberated iodine with sodium thiosulfate using a standard starch solution as the indicator. Report results as grams of iodine absorbed per 100 grams of sample.

AQCM 042, VISCOSITY LINE-TO-LINE GARDNER SECONDS

Fill a line-to-line Gardner Viscosity tube (10.65 mm ID) with the resin solution to the 108 mm line. Insert cork and place in a 25°C water bath for 10 minutes. Adjust the level of the solution to the 100 mm line and place back in water bath, cork side down, for an additional 10 minutes. Invert the tube and start timing when the bubble passes the 27 mm line. Stop the timer when the bubble passes the 100 mm line. Report the viscosity as L-L seconds at 25°C .

AQCM 042, GARDNER LETTER VISCOSITY

Fill a line-to-line Gardner Viscosity tube (10.65 mm ID) with the resin solution to the 108 mm line. Insert cork and place in a 25°C water bath for 10 minutes. Adjust the level of the solution to the 100 mm line and place back in water bath, cork side down, for an additional 10 minutes. Invert the tube and compare bubble rise rate to Gardner standard lettered tubes. Report the viscosity as the nearest letter matched at 25°C . Add a minus (-) or a plus (+) to the matched letter for faster or slower, respectively.

AQCM 055, EFFLUX CUP VISCOSITY

Fill a standardized metal cup having a finely calibrated orifice with the test resin solution equilibrated to 25°C . Allow the selected cup to drain while measuring the time to empty. Report results in seconds per the identified cup.

AQCM 058, RESIN SOLUTION PREPARATION

Using a Thermotronic Varnish Cooker Weigh crushed resin and test solvent into a metal Thermotronic test tube for a total sample size of 50 grams. Place the tube in the Thermotronic with a PT-100 temperature probe inserted. The solution is controllably heated to a selected top temperature (180°C for most mineral oils or 230°C for most vegetable oils), stirred at 1200 rpm for two minutes, and then cooled to 120°C .

AQCM 059, CLOUD POINT DETERMINATION USING A CHEMOTRONIC CLOUD POINT TESTER

Weigh 2.0 g of crushed resin and 18.0 g of the test solvent into a Chemotronic glass test tube. Place the tube in the Chemotronic and insert a PT-100 temperature probe. The solution is heated to 230°C at $40^{\circ}\text{C}/\text{min}$, held at 230°C for 2 minutes, then cooled at $40^{\circ}\text{C}/\text{minute}$ until the Chemotronic detects and reports the cloud point in $^{\circ}\text{C}$.

AQCM 063, RHEOLOGY FLOW MEASUREMENTS

Measure resin solution flow viscosity using a TA Instruments AR-1000N rheometer in flow mode at 23°C . Apply a shear rate of 25 s⁻¹ for 1 minute with 49 measurement points collected. The final measurement point is taken as the flow viscosity and is reported in Pa.s at 23°C .

AQCM 063, RHEOLOGY FREQUENCY SWEEP MEASUREMENTS

Measure resin solution rheology using a TA Instruments AR-1000N rheometer in oscillation mode. Apply a frequency of 1 Hz using a controlled strain of 0.10 Pa. Perform a temperature sweep between 10°C and 60°C over 15 minutes. Report results as G' (Pa), G'' (Pa), and $\tan \Delta$ at 23°C .

AQCM 066, DILUTION OF RESIN

Weigh 10 grams of resin solution into a 100 ml beaker. Tare the beaker and place in a water bath to equilibrate to 25°C . Place the beaker on top of 10 point printed substrate and titrate with MagieSol 47 Ink Oil (with continuous stirring) until the print can no longer be read while looking down through the solution. Multiply the grams of solvent added by 10 and report the results as percent dilution.

AQCM 069, AMINE NUMBER

Dissolve a 5 gram sample of resin in 1:1 n-butanol: toluene and titrate with 0.1 N alcoholic HCl solution until a bromphenol blue indicator endpoint (color changes from blue to yellow). Report results as mg KOH/g resin.

AQCM 081, TITER POINT

Cool a liquid sample at a controlled rate under mild agitation until a slight rise is detected due to the heat of crystallization. Report the maximum temperature detected during the rise as the titer point. Report results in $^{\circ}\text{C}$. Molecular Weight

DETERMINATION BY GPC

Perform a GPC analysis using a Waters model 515 pump, Waters model 717 auto injector and Waters 410 differential refractive index (RI) detector. Elute components with THF through a row of 3 Polymer Labs mixed-B GPC columns. Determine molecular weight by comparison of retention times through a column calibrated with polystyrene standards.

EPA METHOD 24, PERCENT VOLATILE MATTER (VOC)

Evaporate volatile organic compounds (VOC) from a 0.5 gram sample of a test material by heating in a forced draft oven for 60 min at $110 \pm 5^{\circ}\text{C}$. The final weight of the sample is compared to the starting weight and the weight lost is reported as a percentage.

Sustainable solutions globally

Arizona Chemical is headquartered in Jacksonville, USA with the European head office in Almere, the Netherlands. We have ten production sites in the US and Europe. Through our global network of more than 60 sales offices and distributors, we are able to serve our customers all over the world.

Contact us:

Head Offices:

Jacksonville, Florida, US
Tel: +1 800 526 5294

Almere, The Netherlands
Tel: +31 36 5462 800

Sales offices:

Miami, Florida, US
Tel: +1 305 377 8754

San Juan del Rio, Mexico
Tel: +52 427 272 99 85

Singapore
Tel: +65 6253 8500

St. Petersburg, Russia
Tel: +7 812 336 65 14

www.arizonachemical.com

