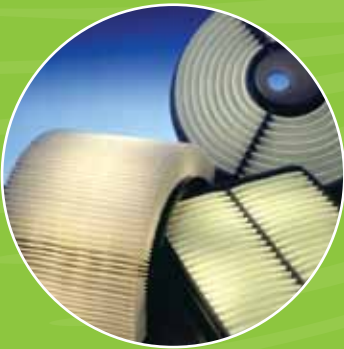




Renewable Resources.  
Endless Possibilities.™

## Hot Melt Polyamide Adhesives





## Sustainability solutions globally

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.

## Arizona Chemical's products offer increased performance properties and bio-renewable content (BRC)

Arizona Chemical is the leading producer and bio-refiner of pine chemicals. Our hot melt polyamide adhesive resins provide solutions to the most difficult bonding challenges. Our broad product line and innovative technologies offer formulators and end-users a wide range of performance options.

UNI-REZ™ hot melt polyamide adhesive resins are derived from sustainable resources. Our products offer 75-95% bio-renewable content, providing a renewable substitute to petroleum based alternatives.

Our leading tall oil fractionation capability and technical expertise enable us to supply consistent products for your high performance needs across the globe.

**Our products perform in a wide variety of and end use applications including:**



Automotive



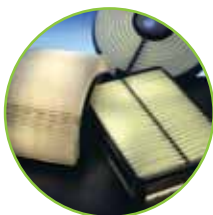
Packaging



Electrical



Telecommunications



Transportation  
Filters



Wood Assembly

# Our green tradition drives your green future

## Performance Advantage

Arizona Chemical's UNI-REZ™ hot melt polyamides offer a wide range of performance properties providing excellent adhesion to hard to bond to substrates.

Features	Description	Benefits
Strength development	65% to 80% of ultimate in 90 seconds	Immediately handle the bonded assembly. Minimizes inventories and work in progress.
Controllable open-time	<2 seconds to 40 seconds of real working time	Short open times for automated assembly. Long open time for manual assembly.
Broad range adhesion	Paper, wood, metals, plastics (including plasticized PVC)	Allows use of one adhesive for multiple substrates on a single assembly. Allows use of a single adhesive for many different applications.
High strength	To 2000 psi (13.8 MPa) on heated steel	Allows use of polyamides in high performance applications
Flexibility and impact resistance	To 100% pass at -40°C	Maintains excellent performance in low temperature applications
Heat resistance under 1kg. load	To 170°C	Maintains excellent performance in high temperature applications
Chemical resistance	Greases, oils, plasticizers, hydraulic fluids, acids, alkalis	Excellent adhesion performance under difficult exposure environments

## Performance Comparison

UNI-REZ™ hot melt polyamides deliver across-the-board high performance unmatched by alternative thermoplastic materials.

●● = Excellent  
● = Good

	UNI-REZ™	EVA	APO	Polyester	MCPUR
<b>Performance</b>					
Chemical Resistance	●●			●●	●●
Heat Resistance Strength	●●			●●	●●
Low Temperature Resistance	●●		●●		●●
PVC Plasticizer Resistance	●●				●
Green Strength	●●	●	●	●●	●
Long Open Time	●		●●		●●

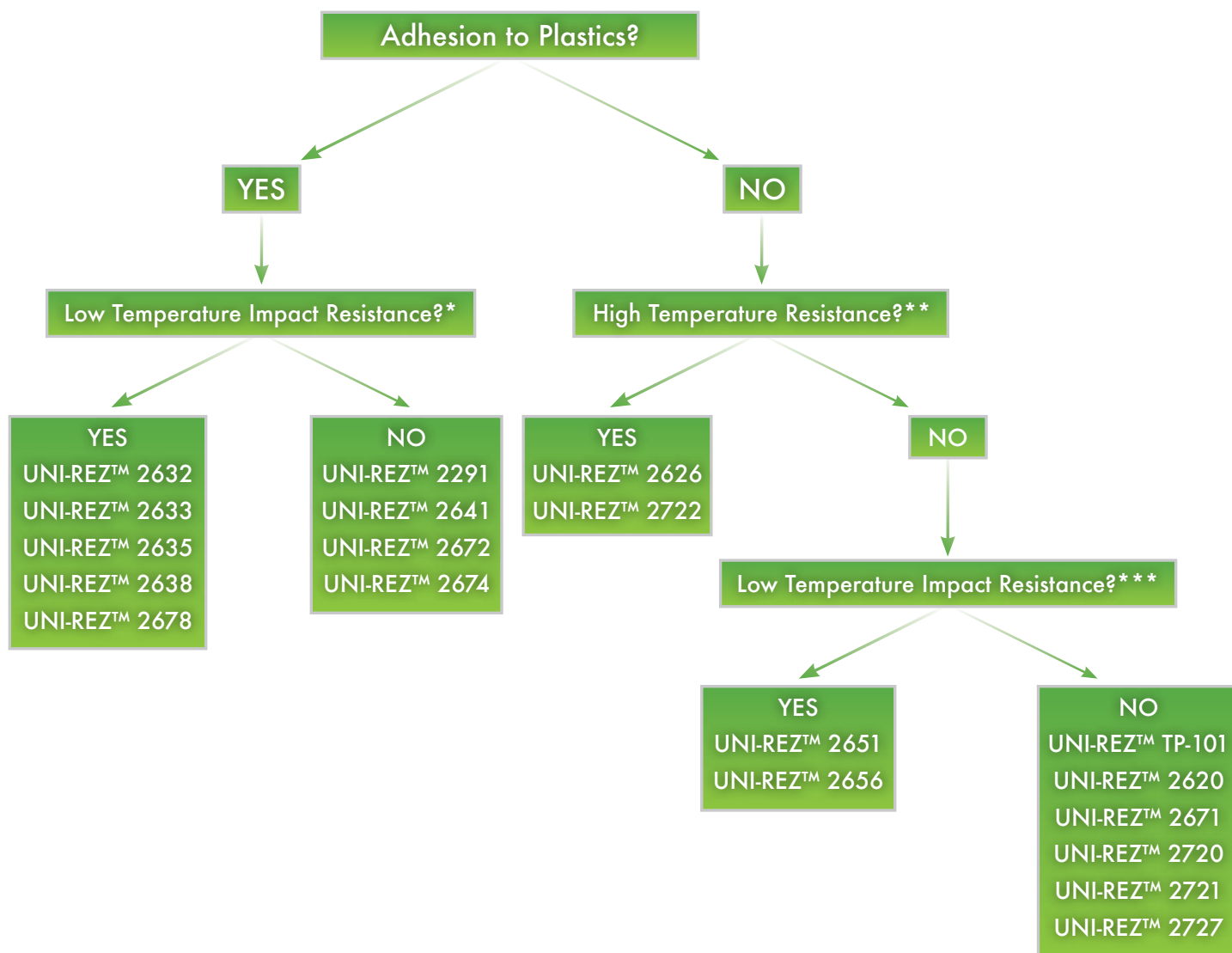


# Hot Melt Polyamide Adhesive Resins

Typical Properties	Softening Point, °C R&B	Viscosity cps/MPa.s @190 °C	Typical Color Gardner, 40% in Propanol	Tensile Strength psi (MPa)	Elongation, %	Modulus psi (MPa)	Peel Strength Plasticized PVC, lb./in. (n/25mm)
<b>2620 Series</b> - Good Chemical Resistance, Adhesion to Porous Substrates							
UNI-REZ™ TP-101	118	4500	5	750 (5.1)	350	22500 (155)	0
UNI-REZ™ 2620	105	2900 @160°C	5+	1000 (6.9)	50	30000 (206)	0
UNI-REZ™ 2626	175	2750 @205°C	5	1600 (11)	350	34000 (234)	0
<b>2630 Series</b> - Plastics Adhesion with Low Temperature Flexibility							
UNI-REZ™ 2632	125	2500	5	250 (1.8)	300	3100 (21)	30 (131)
UNI-REZ™ 2633	132	6250	5	250 (1.8)	300	3100 (21)	30 (131)
UNI-REZ™ 2635	140	4300	5	280 (1.9)	200	3000 (21)	20 (88)
UNI-REZ™ 2638	142	4500	5	280 (1.4)	200	4500 (31)	20 (88)
<b>2640 Series</b> - Tough Resins for Bonding ABS and Flexible Vinyls							
UNI-REZ™ 2641	142	8500	4-	520 (3.6)	700	7000 (48)	30 (131)
<b>2650 Series</b> - Low Temperature Flexibility							
UNI-REZ™ 2651	100	7000	5	380 (2.6)	550	9500 (65)	0
UNI-REZ™ 2656	125	11000	5	550 (3.8)	900	10000 (69)	0
<b>2670 Series</b> - Tough Resins for Bonding ABS and Plastics							
UNI-REZ™ 2671	160	7800	4	1000 (6.9)	500	12500 (86)	15 (66)
UNI-REZ™ 2672	138	9000	5	550 (3.8)	450	5000 (34)	25 (110)
UNI-REZ™ 2674	127	2000	5	450 (3.2)	230	12000 (83)	5 (22)
UNI-REZ™ 2678	142	4500	5	200 (1.4)	200	4500 (31)	20 (88)
<b>2720 Series</b> - Tough Resins for Porous Substrates, Metals and some Plastics							
UNI-REZ™ 2720	100	1300 @150°C	5	750 (5.2)	50	29500 (203)	0
UNI-REZ™ 2721	155	6000	5	900 (6.2)	350	21000 (144)	0
UNI-REZ™ 2722	187	6000 @210°C	5	1230 (8.5)	320	24500 (169)	0
UNI-REZ™ 2727	158	2500	5	600 (4.1)	150	16000 (110)	0
<b>2290 Series</b> - Resins for Bonding ABS and Plastics							
UNI-REZ™ 2291	142	15000 @ 205°C	4-	520 (3.6)	700	7000 (48)	30 (131)

					Suggested Applications							
	Open Time, seconds	SAFT, °C	Mandrel Bend, 100% Pass °C	Total Renewable Content	Automotive	Electronics	Filters	Footwear	Heat Shrink Sleeves	Packaging	Road Marking	Wood Assembly
	<5	95	-10	95%				•				
	<5	95	-10	95%				•		•		
	<5	170	-10	90%	•		•			•		
	30	115	-30	80%						•	•	
	30	115	-30	75%						•	•	•
	25	130	-30	75%								•
	20	130	-30	75%								•
	20	130	-10	85%	•					•		•
	5	100	-30	80%					•			
	10	110	-30	85%					•			
	5-10	135	-10	90%						•		•
	35	125	-10	90%	•					•		•
	25	115	-10	90%						•	•	•
	20	130	-30	75%		•				•		•
	5	85	-5	95%						•		
	<5	135	-10	90%						•		
	<5	170	-10	90%	•		•			•		
	<5	130	-30	90%						•		
	20	130	-10	85%	•					•		•

# Product Decision Tree



\*Criteria: PVC Peel Strength 20 or greater, Mandrel Bend -30 °C

\*\*Criteria: SAFT >160 °C

\*\*\*Criteria: Mandrel Bend -30 °C

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# Arizona Chemical Quality Control - Test Methods

## AQCM 001, Acid Number

Dissolve 1.5 - 2.0 grams of resin in n-Propanol 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

Prepare a 40% sample solution in n-Butanol. 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  $850 \pm 10$  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, Ring & Ball Softening Point

Fill a softening point ring with molten sample, making sure it is level and allow to set. Place ring into holder with ball-centering guide and ball. Add 600 mL glycerin to a 1000 mL beaker. Place a stir rod and the sample holder into glycerin. Place temperature probe into glycerin at the level of the samples. Heat glycerin at a rate of  $5^{\circ}\text{C}/\text{minute}$  with rapid, but not turbulent agitation. Record the temperature at which the ball, or the material surrounding the ball touches the bottom of the holder after falling through the molten sample.

## AQCM 056, % Moisture

Place a disposable aluminum tray in an AND MX-50 Moisture Analyzer. Place 1.0 g (+/- 0.10 g) on tray. Analyze sample at a rate of 0.05% / minute and temperature setpoint at  $200^{\circ}\text{C}$ , standard drying program.

## AQCM 069, Amine Number

Dissolve 1.5 - 2.0 grams of resin in n-Propanol and titrate with 0.1 N HCl in IPA solution until a bromophenol blue endpoint (turns green near endpoint, and will turn yellow). Report results as mg HCl/g resin.

## AQCM 146, LVT Brookfield Viscosity

Weigh 9.5 g (+/- 0.1g) into a Brookfield cell. Place cell into a thermosel that is set to the appropriate temperature. Allow sample to sit at set temperature for five minutes. Place #31 spindle into sample. Turn on viscometer and take measurement after 25 minutes.

## ASTM D6866-11, Standard Test Methods for Determining the Biobased Content of Solids, Liquids, and Gaseous Samples using Radiocarbon Analysis

The test methods directly discriminate between product carbon resulting from contemporary carbon input and that derived from fossil-based input. A measurement of a product's  $^{14}\text{C}/^{12}\text{C}$  content is determined relative to the modern carbon-based oxalic acid radiocarbon.

# Sustainable solutions globally

Arizona Chemical has principal executive offices in Jacksonville, USA and Almere, the Netherlands.

We have ten production sites in the US and Europe. Through our global network of more than sixty sales offices and distributors, we are able to serve our customers all over the world.



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