

Starting Formulation

Epoxy Research Resin RSL-4515 / EPIKURE™ Curing Agent 3300 and Epoxy Research Curing Agent RSC-4577

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Introduction	Epoxy Research Resin RSL-4515/EPIKOTE Curing Agent 3300 or Epoxy Research Curing Agent RSC-4577 is based on a toughened epoxy cured with very low viscosity cycloaliphatic amines. The systems low viscosity and high toughness make it favorable for good fiber wet-out for filament windings for all composite pressure vessels (including Type IV vessels). It will allow the manufacture of an all carbon tank without increase in cost (via reduction in wall thickness).		
Suggested Uses	<ul style="list-style-type: none"> • Composite Structures • Pressure Vessels 		
Features	•	•	Low Viscosity Good Elongation High Toughness

Typical Properties Table 1 / Typical Component Properties

	Method	Units	Epoxy Research Resin RSL-4515
Epoxide Equivalent Weight	ASTM D1652	g/eq	177
Viscosity @ 25°C (77°F)	ASTM D1545	cP or mPa·s	5,800
Density @ 25°C (77°F)	ASTM D1475	g/cc	1.18
	Method	Units	EPIKURE Curing Agent 3300
Amine Value	ASTM D 2896	Mg KOH/g	630-670
Amine Hydrogen Equivalent Weight	calculated	g/H eq	43
Viscosity @ 25°C (77°F)	ASTM D1545	cP or mPa·s	12-19
Color	ASTM D1544	Gardner	250 max.
Density @ 25°C	ASTM D1475	g/cc	0.92
	Method	Units	Epoxy Research Curing Agent RSC-4577
Amine Value	ASTM D 2896	Mg KOH/g	400-600
Amine Hydrogen Equivalent Weight	calculated	g/H eq	52
Viscosity @ 25°C (77°F)	ASTM D1545	cP or mPa·s	10-50
Density @ 25°C	ASTM D1475	g/cc	0.93-0.98

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Mix Ratio	Material	1	2
	Epoxy Research Resin RSL-4515, pbw ¹	100	100
	EPIKURE Curing Agent 3300, pbw	24	
	Epoxy Research Curing Agent RSC-4577, pbw		29

¹ pbw = parts by weight

Mixing Instructions: The stated mixing ratio should be followed carefully. Adding more or less hardener than desired will result in an incomplete cure with limited performance that cannot be corrected. Resin and curing agent must be mixed carefully. Mix until no clouding is visible in the mixing container. Special attention must be paid to the walls and bottom of the mixing container when mixing by hand.

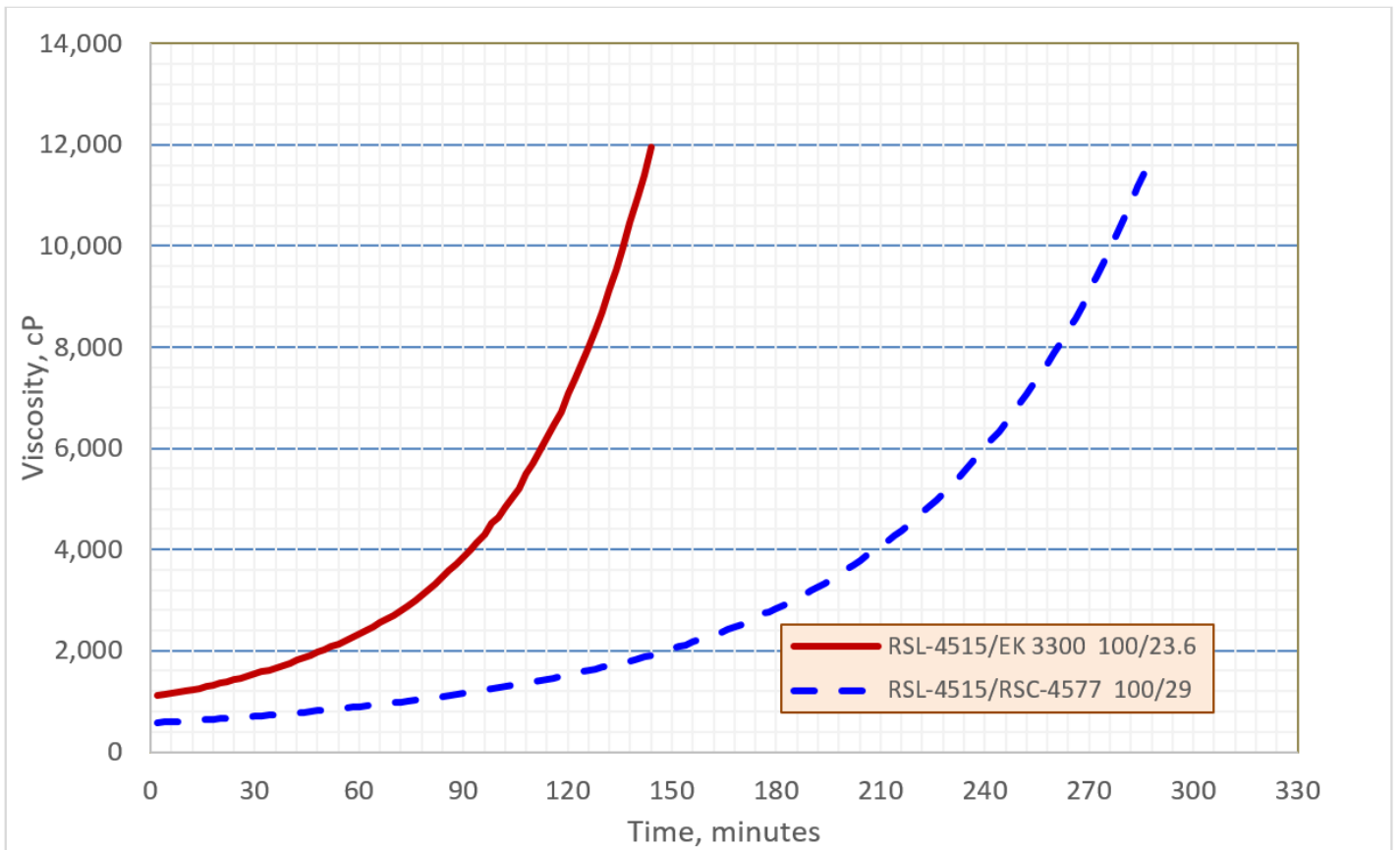
Typical System Properties	Table 2 / Properties of Resin System	Units	1	2
	Viscosity at 25°C (77°F)	cP or mPa·s	1115	573
	Pot Life ¹ (time to double initial viscosity @ 25°C)	minutes	58	90
	Working time ² at 25°C (77°F)	hrs	115	256
	Gel time ³ at 30°C (77°F), 100g	minutes	109	210

¹ Brookfield Viscometer

² Time to peak temperature, based on 100g mass

³ Shyodu gel time

Graph 1 / Viscosity Development @25°C (77°F), 10 grams



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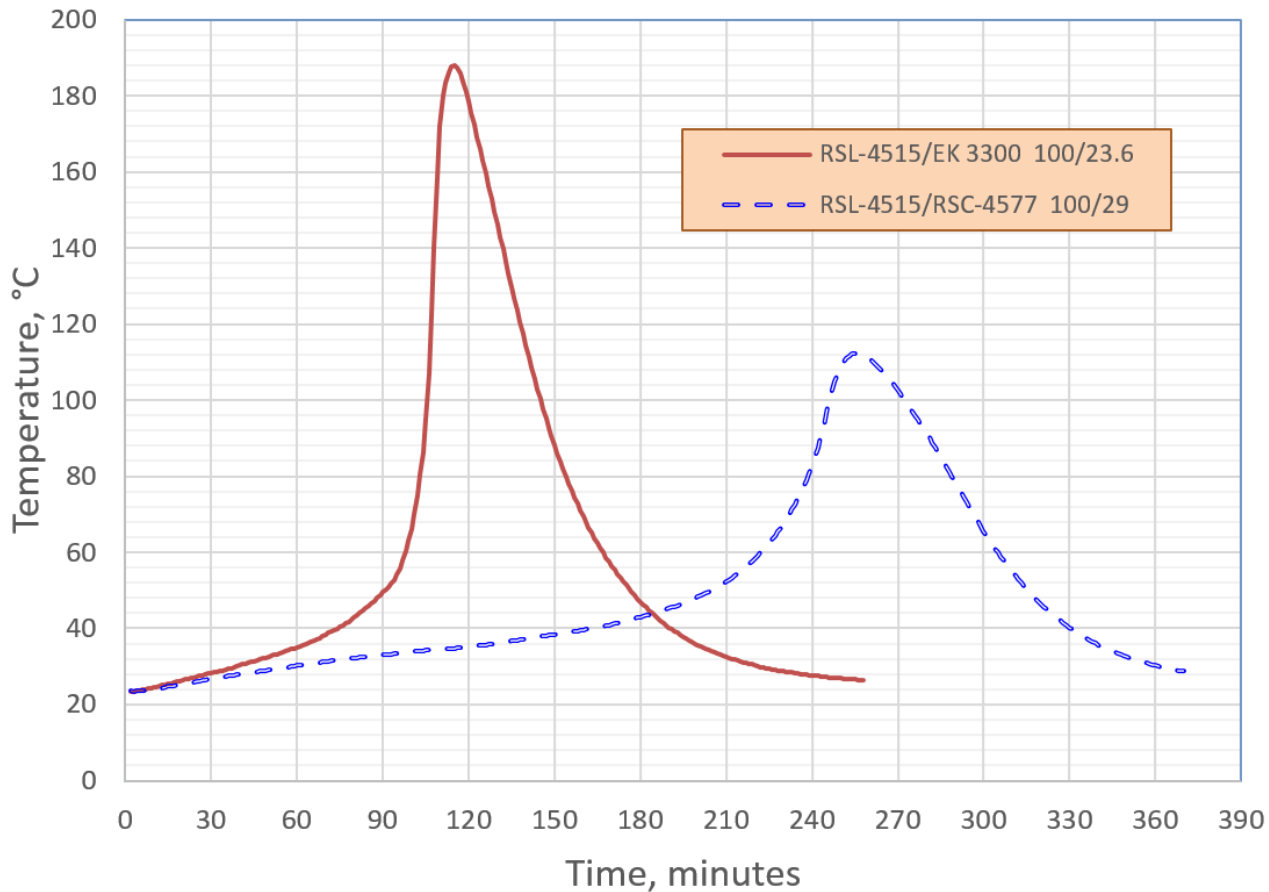
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Graph 2 / Temperature Development @25°C (77°F), 100 grams



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Typical Cured State Properties	Table 3 / Typical cured properties of neat resin system Epoxy Research Resin RSL-4515/EPIKURE™ Curing Agent 3300			
		Method	Units	
Cure Schedule				
Step 1 followed by			hrs/°C (°F)	1/66 (151) 1.5/82 (180)
Step 2			hrs/°C (°F)	4/96 (205) 1.5/150 (302)
Tg by				
DSC (20°C/min)	ASTM D-3418		°C (°F)	109 (228) 134 (273)
DMA - E' onset	ASTM D-4065		°C (°F)	112 (234) 135 (275)
DMA – tan delta peak			°C (°F)	121 (250) 143 (289)
Tensile				
Strength at Yield	ASTM D-638		ksi	12.6 12.5
Strength at Break			ksi	11.4 11.8
Elongation at Yield			%	5 6
Elongation at Break			%	7 9
Modulus			ksi	472 456
Fracture Toughness, K _Q	ASTM E-399		psi-in ^{1/2}	1596 1070

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Typical Cured State Properties		Table 4 / Typical cured properties of neat resin system Epoxy Research Resin RSL-4515/Epoxy Research Curing Agent RSC-4577	
	Method	Units	
Cure Schedule			
Step 1 followed by		hrs/°C (°F)	1/66 (151) 1.5/82 (180)
Step 2		hrs/°C (°F)	4/96(205) 1.5/150 (302)
Tg by			
DSC (20°C/min)	ASTM D-3418	°C (°F)	95 (203) 101 (214)
DMA - E' onset	ASTM D-4065	°C (°F)	96 (205) 98 (208)
DMA – tan delta peak		°C (°F)	104 (219) 109 (228)
Tensile			
Strength at Yield	ASTM D-638	ksi	10.7 11.3
Strength at Break		ksi	9.3 9.1
Elongation at Yield		%	5 5
Elongation at Break		%	10 11
Modulus		ksi	456 452
Fracture Toughness, K _Q	ASTM E-399	psi-in ^{1/2}	1217 1739

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