PRO-SET®

March 2023

Aerocet by Maguire Boats

HIGH PERFORMING EPOXIES FOR

Laminating, Infusion, Tooling and Assembly

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Photography Credit Martina Orsini

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Use PRO-SET Epoxy to create strong, lightweight composites that can withstand the harshest environments. PRO-SET meets your highest goals in composite performance.

We've reformulated and expanded our standard PRO-SET epoxy product offerings to best meet the needs of modern, high-performance composite manufacturing.

Standard PRO-SET Epoxies for Laminating, Infusion, Tooling and Assembly offer improved handling characteristics, excellent cure profiles, and rapid order fulfillment at competitive prices.

The PRO-SET epoxy range includes formulated, modern, high performance bio-based epoxies for composite manufacture. Specifically for composite manufacturers wanting to reduce their carbon footprint our biobased epoxies will produce lightweight, durable structures for the demanding composite industry. The biobased products* include systems for Infusion through to hand laminating, to assembly adhesives and have been formulated based upon our vast experience and knowledge of the demanding performance criteria needed from the epoxy systems.

This guide provides an overview of the PRO-SET product lineup with a comparison of resin and hardener handling characteristics and cured properties, and a general PRO-SET Epoxy Handling Guide. Refer to the individual combined Resin/Hardener Technical Data Sheets for detailed handling, ratio, mechanical and thermal property information.

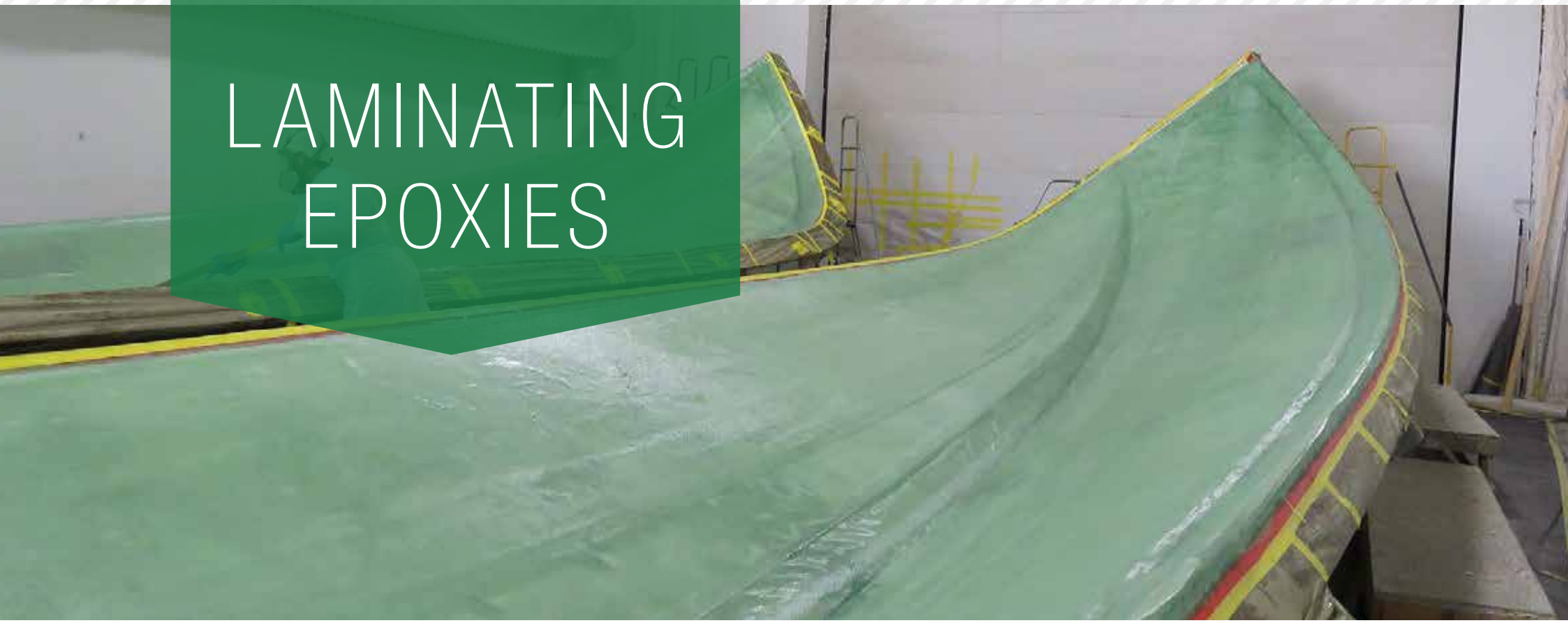
Custom Formulation

PRO-SET can formulate custom resin and hardener systems tailored to your specific processes and performance needs, working closely with you throughout the development of your custom formulation. Turnaround times are generally rapid, with only slightly extended lead times required once your custom formulation is placed into production. PRO-SET custom formulations usually require minimum volumes, and these products are typically made available under our Custom Formulations category, unless the customer specifies them as proprietary.

Fire Retardant laminating resin is now available as Special Order Formulation. Contact the Wessex Resins & Adhesives Technical Team or your local distributor for details.

*Products within this product guide that have a "G" at the end of their product number are biobased formulations.

LAMINATING EPOXIES



PRO-SET Laminating Epoxies are a versatile system of liquid resins and hardeners designed to meet a wide range of wet lay-up laminating applications.

Exocet International Moth by Maguire Boats

Use PRO-SET Laminating Epoxies to produce lightweight, high-performance composite structures that will withstand long-term cyclic loading in the harshest environments. These epoxies bond to core materials, wood, metal and all reinforcing fabrics. They offer excellent moisture resistance, toughness and superior resistance to heat and fatigue. **PRO-SET Laminating Epoxies develop excellent physical properties at room temperature** and may be post-cured for enhanced performance.

DNV Approval. PRO-SET LAM-125, LAM-125G and LAM-135 resins with LAM-224, LAM-226, LAM-229 and LAM-237 hardeners combinations all hold DNV Approval.

For bulk quatities Laminating Epoxies can be dyed, upon request, to provide for visual quality control. A yellow dye in the resin and a blue dye in the hardener, when properly metered and thoroughly mixed, will result in a consistent shade of green.

Fire Retardant laminating resin is now available as Special Order Formulation. Contact the Wessex Resins & Adhesives Technical Team or your local distributor for details.

CHOOSE RESIN BY VISCOSITY

LOW
LAM-125 or LAM-125G
LOW VISCOSITY LAMINATING RESIN

MED
LAM-135
MEDIUM VISCOSITY LAMINATING RESIN

HIGH
LAM-145
HIGH VISCOSITY LAMINATING RESIN

+

CHOOSE HARDENER BY SPEED

FAST
LAM-224
FAST LAMINATING HARDENER

MED
LAM-226
MEDIUM LAMINATING HARDENER

SLOW
LAM-229
SLOW LAMINATING HARDENER

X-SLOW
LAM-237
EXTRA SLOW LAMINATING HARDENER

EXTENDED
LAM-239
EXTENDED OPEN TIME LAMINATING HARDENER

OR SELECT HIGH TEMPERATURE HARDENER

HT
LAM-249
HIGH TEMPERATURE LAMINATING HARDENER

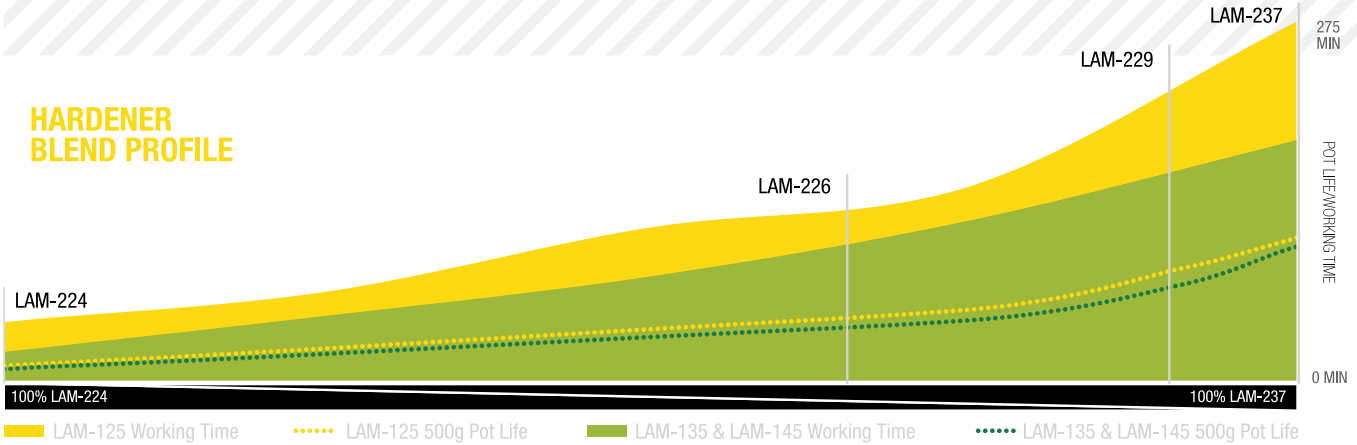
RESIN

		LAM 125[1]	LAM 125G[1]	LAM 135[1]	LAM 145[1]
Mix Ratio by Weight	R:H	3.5:1	3.5:1	3.5:1	3.5:1
Mixed Viscosity @ 77°F (22°C) ASTM D2196	mPas	500-900	500-900	904-1360	1495-2059
Mixed Density @ 72°F (22°C)	g/cc	1.16	1.16	1.17	1.17
LAM-125G Resin Biobased Content ASTM D6866-18	%		34		
Shear Thinning Index ASTM D2196	RPM Rotation				1.37
Compression Yield ASTM D695	MPa	~97.9	~97.9	~102	~102
Tensile Strength ASTM D638	MPa	~70	~70	~75.8	~75.8
Tensile Modulus ASTM D638	GPa	~3.1	~3.1	~3.1	~3.1
Tensile Elongation ASTM D638	%	~5.6	~5.6	~6.2	~6.2
Flexural Strength ASTM D790	MPa	~127.5	~127.5	~135.8	~135.8
Flexural Modulus ASTM D790	GPa	~3.1	~3.1	~3.2	~3.2
Tg Ultimate via DMA[2] ASTM E1640[3]	°C	>89	>89	>102	>102
Tg Ultimate via DSC[2] ASTM E1356	°C	~89.5	~89.5	~102.5	~102.5
Tg Ultimate via DSC[2] with LAM-249-HT Hardener[4] ASTM E1356	°C	129.1	129.1	144.7	

Test specimens are cured at room temperature to gelation and 82°C for eight hours, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

[1]Average of properties for combinations with LAM-224, LAM-226, LAM-229, LAM-237 and LAM-239 Hardeners. [2]Additional post cure may be required; contact the Wessex Resins Technical Team for details. [3]1 HZ, 3°C per minute. [4]Elevated temperature cure required.

HARDENER



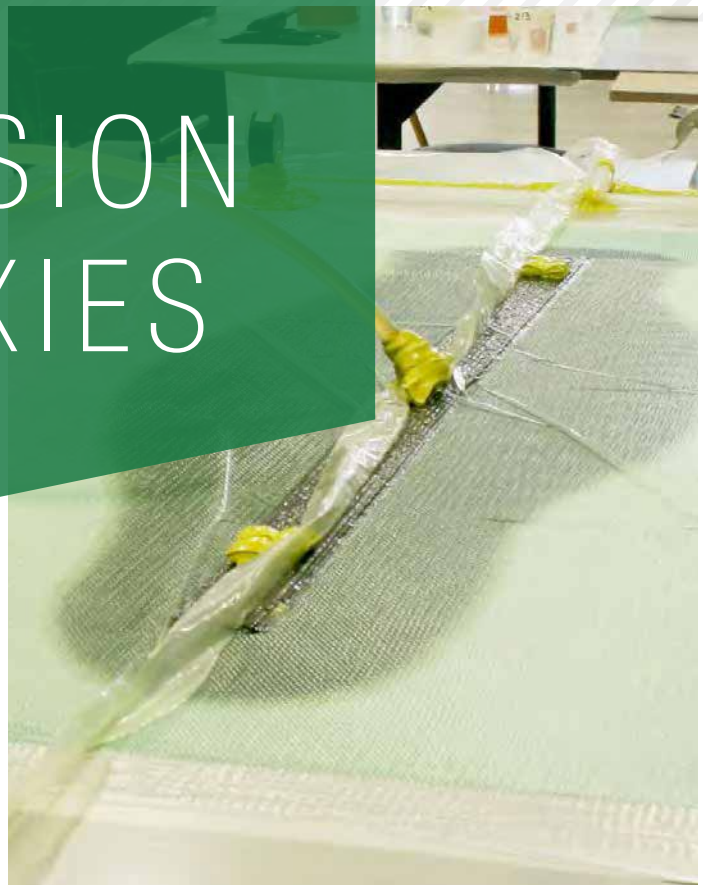
	LAM 224[1]	LAM 226[1]	LAM 229[1]	LAM 237[1]	LAM 239[2]	LAM 249-HT[2]
150g Pot Life @ 25°C ASTM D2471	13 min	52-59 min	93-100 min	128-163 min	208-260 min	85-91 min
500g Pot Life @ 25°C ASTM D2471	12 min	45-52 min	73-84 min	102-107 min	137-196 min	67 min
Approx. working time @ 25°C	40 min	2–3 hr	4–5 hr	7–8 hr	10-12 hr	2-3 hr
500g Pot Life @ 29°C					86-118 min	
Approx. working time @ 29°C					8-10 hr	

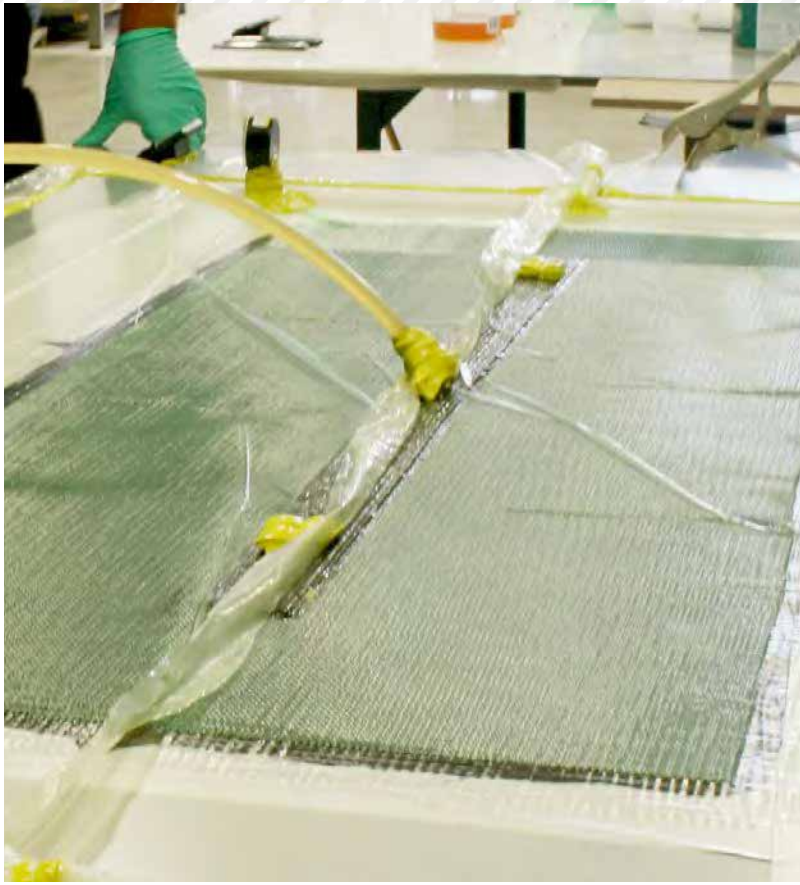
Test specimens are cured at room temperature to gelation and 180°F (82°C) for eight hours, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

[1]Hardeners can be blended for intermediate cure times (see chart above). Contact the Wessex Resins Technical Team for details.

[2]Not to be blended with other hardeners. **Additional post cure required.**

INFUSION EPOXIES





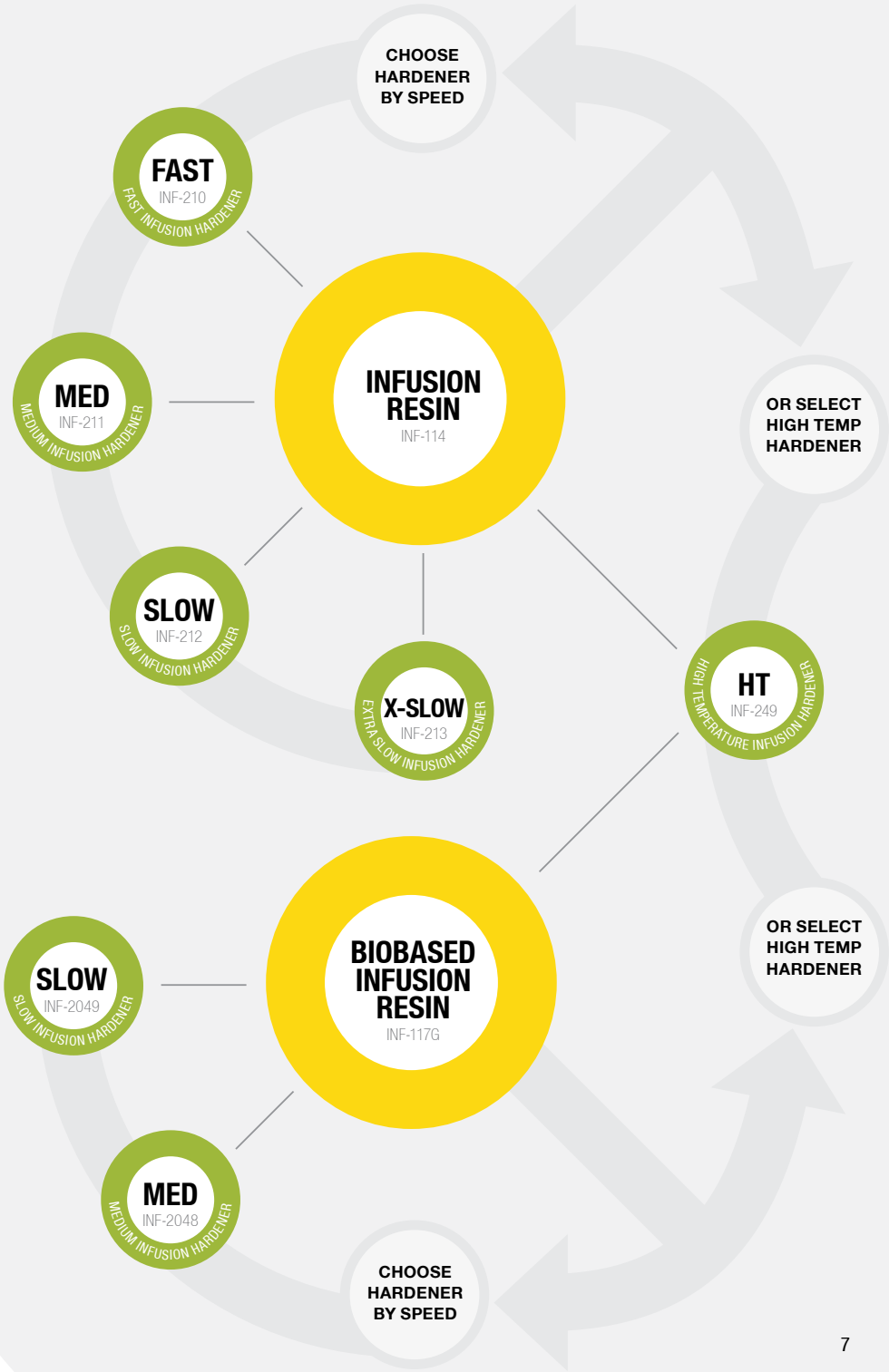
PRO-SET Infusion Epoxies are super low viscosity systems with a range of hardeners to meet the demands of modern infusion processes.

Rockpool Taran 16 Sea Kayak by Rockpool Kayaks

PRO-SET Infusion Epoxies and Biobased Infusion Epoxies result in lightweight, high performance composites that will withstand long term cyclic loading in the harshest environments. PRO-SET Infusion Epoxies **develop excellent physical properties at room temperature** and may be post-cured to further enhance performance.

DNV Approval. PRO-SET INF-114 resin with INF-210, INF-211, INF-212 and INF-213 hardeners combinations all hold DNV Approval.

For bulk quantities Infusion Epoxies can be dyed, upon request, to provide for visual quality control. A yellow dye in the resin and a blue dye in the hardener, when properly metered and thoroughly mixed, will result in a consistent shade of green.



RESIN

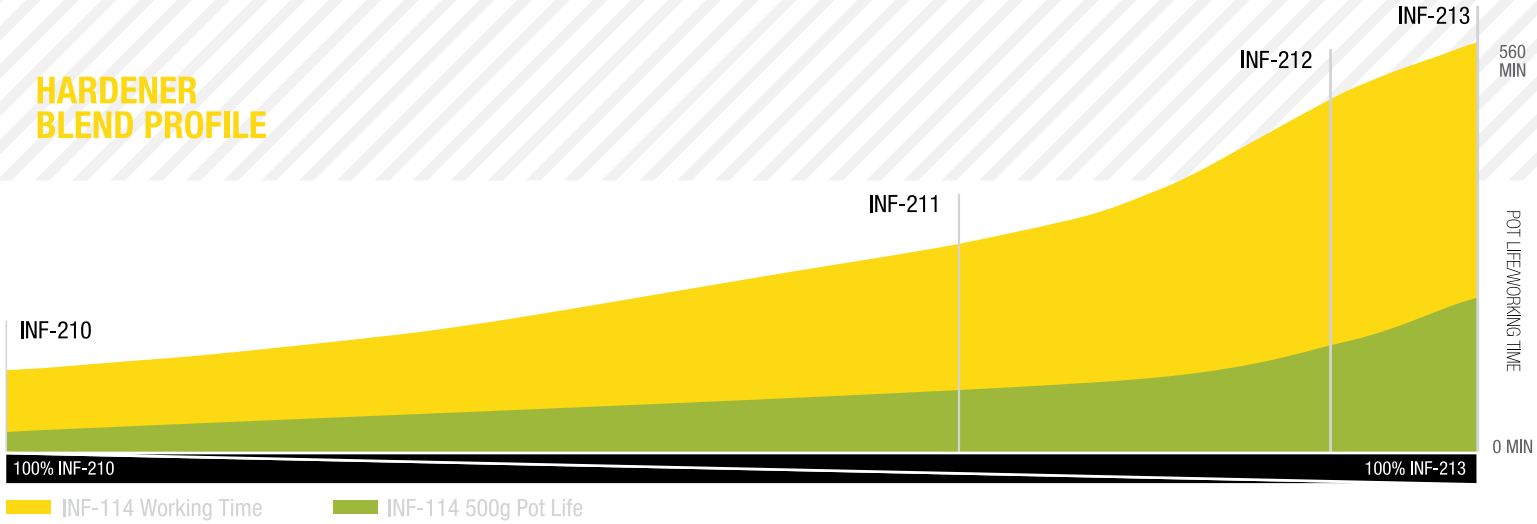
		INF 114[1]	INF 117G[2]
Mix Ratio by Weight with INF-210, 211, 212 or 213	R:H	~3.65:1	
Mix Ratio by Weight with INF-2048 or INF-2049	R:H		2.94:1
Mix Ratio by Weight with INF-249-HT	R:H	3.57:1	3.45:1
Mixed Viscosity @ 22°C ASTM D2196	mPas	~300	200-450
Mixed Density @ 22°C	g/cc	~1.14	~1.11
INF-117G Resin Biobased Content ASTM D6866-18	%		36
Compression Yield ASTM D695	MPa	~97.0	~94
Tensile Strength ASTM D638	MPa	~71.7	~62
Tensile Modulus ASTM D638	GPa	~3.4	~3.4
Tensile Elongation ASTM D638	%	~5.0	~4.4
Flexural Strength ASTM D790	MPa	~124	~101
Flexural Modulus ASTM D790	GPa	~3.2	~4.3
Tg Ultimate via DMA[3] ASTM E1640[4]	°C	>89.9	>86
Tg Ultimate via DMA[3] INF-249-HT Hardener[5] ASTM E1640[4]	°C	123.3	103.5
Tg Ultimate via DSC[3] ASTM E1356	°C	>85	>73
Tg Ultimate via DSC[3] with INF-249-HT Hardener[5] ASTM E1356	°C	126.5	109

Test specimens are cured at room temperature to gelation and 180°F (82°C) for eight hours, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

[1]Average of properties for combinations with INF-210, INF-211, INF-212 and INF-213 Hardeners, expect rows specifically labeled INF-249-HT. [2]Average of properties for combinations with INF-2048 and INF-2049 Hardeners, expect rows specifically labeled INF-249-HT. [3]Additional post cure may be required; contact the Wessex Resins Technical Team for details. [4]1 HZ, 3˚C per minute. [5]Elevated temperature cure required.

HARDENER

HARDENER BLEND PROFILE



INF 114 WITH	INF 210[1]	INF 211[1]	INF 212[1]	INF 213[1]	INF 249-HT[2]
150g Pot Life @ 25°C ASTM D2471	24-30 min	109-135 min	166-204 min	235-289 min	146 min
500g Pot Life @ 25°C ASTM D2471	22-28 min	76-94 min	118-146 min	157-193 min	100 min
Approx. working time @ 25°C	75–90 min	3–4 hr	6–7 hr	10 hr	3-4 hr

Test specimens are cured at room temperature to gelation and 82°C for eight hours, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications. [1]Hardeners can be blended for intermediate cure times (see chart previous page). [2]Not to be blended with other hardeners. **Additional post cure required.**

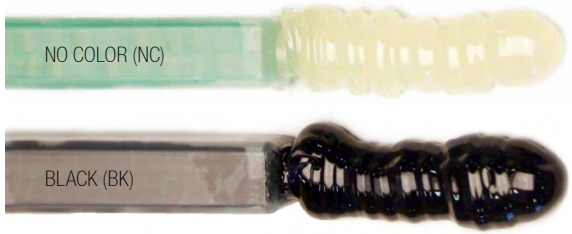
INF 117G WITH	INF 2048	INF 2049	INF 249-HT[2]
150g Pot Life @ 25°C ASTM D2471	50 min	136 min	72 min
500g Pot Life @ 25°C ASTM D2471	44 min	90 min	55 min
Approx. working time @ 25°C	2-3 hr	4-5 hr	2-3 hr

Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications. [2]**Additional post cure required.**

ADHESIVE EPOXIES

Photo by Harry KH

PRO-SET Assembly Adhesives are pre-thickened, two-part epoxy adhesives used for secondary bonding of laminated composites as well as steel, aluminum, cast iron, concrete, stone, and most woods.



Adhesives based on PRO-SET ADV-175 or ADV-175G Resins are paired with Fast (273), Medium (275) or Slow (277) hardener. They are suitable for most composite bonding applications.

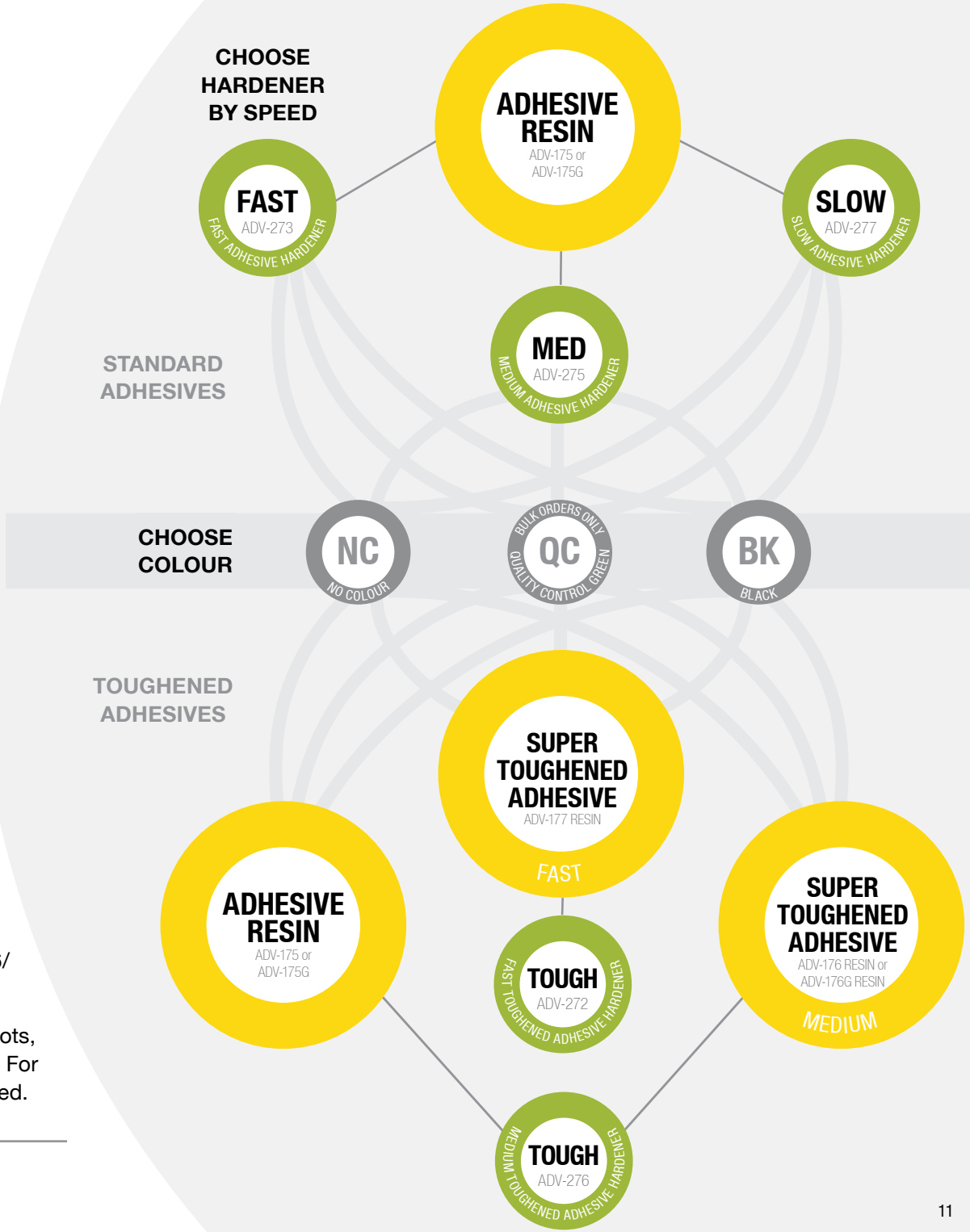
PRO-SET ADV-175/276, ADV-175G/276, ADV-176/276 and ADV-176G/276 are Toughened Adhesive systems that deliver exceptional toughness and superior peel strength for heavily loaded applications and difficult-to-bond substrates including pre-preg, sheet moulding compound, metals and most plastics.

PRO-SET ADV-177/ADV-272 Super Toughened Adhesive is a faster curing version of ADV-176/ADV-276.

The PRO-SET ADV-175, ADV-175G, ADV-176, ADV-176G and ADV-177 series of Assembly Adhesives are packaged in 400 ml two-component cartridges and in bulk container sizes and are available in No Colour (NC) and Black (BK).

Lloyd's Register Approval. ADV-175/ADV-275 and ADV-176/ADV-276 hold Lloyd's Register Approval.

PRO-SET Assembly Adhesives are packaged in cartridges, pots, tins or drums, are available in No Colour (NC) and Black (BK). For bulk quantities Quality Control Green (QC) can also be supplied.



ADHESIVE EPOXIES

PRO-SET Large Area Adhesives are pre-thickened, two-part epoxy adhesives used for secondary bonding of laminated composites as well as steel, aluminum, cast iron, concrete, stone, and most woods.

Teak side deck panel being installed with PRO-SET ADV-170/ADV-270

PRO-SET ADV-170/ADV-270 Adhesive is extremely versatile and has been developed for general purpose bonding of a veriety or materials. This adhesive has proved remarkably popular for bonding of teak decking. Both the resin and hardener componets are thixotropic pastes and the adhesive is available in a range of pack sizes.

PRO-SET ADV-171 resin is a higher viscosity version of PRO-SET ADV-170 therefore PRO-SET ADV-171/ADV-270 epoxy adhesive has greater resistance to slump in horizontal gap widths of 30mm.

Lloyd's Register Approval. PRO-SET ADV-170/ADV-270 holds Lloyd's Register Approval.

CHOOSE RESIN BY VISCOSITY

STANDARD ADHESIVES

		ADV-170 or ADV-171/ 270	ADV-175 or ADV-175G/ 273	ADV-175 or ADV-175G/ 275	ADV-175 or ADV-175G/ 277
Working Time, 12.5mm bead @ 22°C	minutes	120	18-22 min	64-80 min	135-165 min
ADV-175G Resin Biobased Content ASTM D6866-18	%		32	32	32
Hardness ASTM-D2240	Type D	81	82	85	84
Compression Yield ASTM-D695	MPa	67	74	87	81
Tensile Strength ASTM-D638	MPa	33	43	55	49
Tensile Modulus ASTM-D638	GPa	2.6	2.6	3.6	2.9
Tensile Elongation ASTM-D638	%	3.3	4.2	3.5	4.4
Flexural Strength ASTM-D790	MPa	70	77	98	83
Flexural Modulus ASTM-D790	GPa	2.5	2.5	3.9	2.7
Lap Shear on A-366 Steel ASTM-D1002	MPa	14	16	14	14
Lap Shear on 2024T Aluminum ASTM-D1002	MPa	12	13	9	14
Tensile Adhesion to A-366 Steel ASTM-D4541	MPa		18	19	18
Tensile Adhesion to 2024T Aluminum ASTM-D4541	MPa		10	10	12
Tg Ultimate via DSC[1] ASTM E1640[2]	°C	54[1]	69[1]	82[1]	63[1]

Test specimens are cured at room temperature for two weeks unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications. Adhesives are available in two colours as standard: No Color (NC) and Black (BK). For bulk quantities Quality Control Green (QC) can also be supplied.

[1]Additional post cure may be required; contact the Wessex Resins Technical Team for details. [2]1 HZ, 3˚C per minute

TOUGHENED ADHESIVES

		ADV 175 /ADV-276	ADV 175G /ADV-276	ADV 176 /ADV-276	ADV 176G /ADV-276	ADV 177 /ADV-272
Working Time, 12.5mm bead @ 22°C	minutes	45-55 min	45-55 min	81-99 min	81-99 min	75-85 min
ADV-175G Resin Biobased Content ASTM D6866-18	%		32		28	
Hardness ASTM-D2240	Type D	85	85	79	79	77
Compression Yield ASTM-D695	MPa	84	84	58	58	56
Tensile Strength ASTM-D638	MPa	44	44	35	35	34
Tensile Modulus ASTM-D638	GPa	3.16	3.16	2.0	2.0	2.0
Tensile Elongation ASTM-D638	%	6.2	6.2	4.3	4.3	3.1
Flexural Strength ASTM-D790	MPa	94	94	89	89	87
Flexural Modulus ASTM-D790	GPa	3.15	3.15	1.86	1.86	3.1
Lap Shear on A-366 Steel ASTM-D1002	MPa	13	13	20	20	24
Lap Shear on 2024T Aluminum ASTM-D1002	MPa	17	17	20	20	15
Tensile Adhesion to A-366 Steel ASTM-D4541	MPa	19	19	30	30	38
Tensile Adhesion to 2024T Aluminum ASTM-D4541	MPa	15	15	24	24	37
Tg Ultimate via DSC[1] ASTM E1640[2]	°C	77[1]	77[1]	70[1]	70[1]	70[1]

Test specimens are cured at room temperature for two weeks unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications. Adhesives are available in two colours as standard: No Color (NC) and Black (BK). For bulk quantities Quality Control Green (QC) can also be supplied.

[1]Additional post cure may be required; contact the Wessex Resins Technical Team for details. [2]1 HZ, 3˚C per minute

HIGH-TEMP EPOXIES

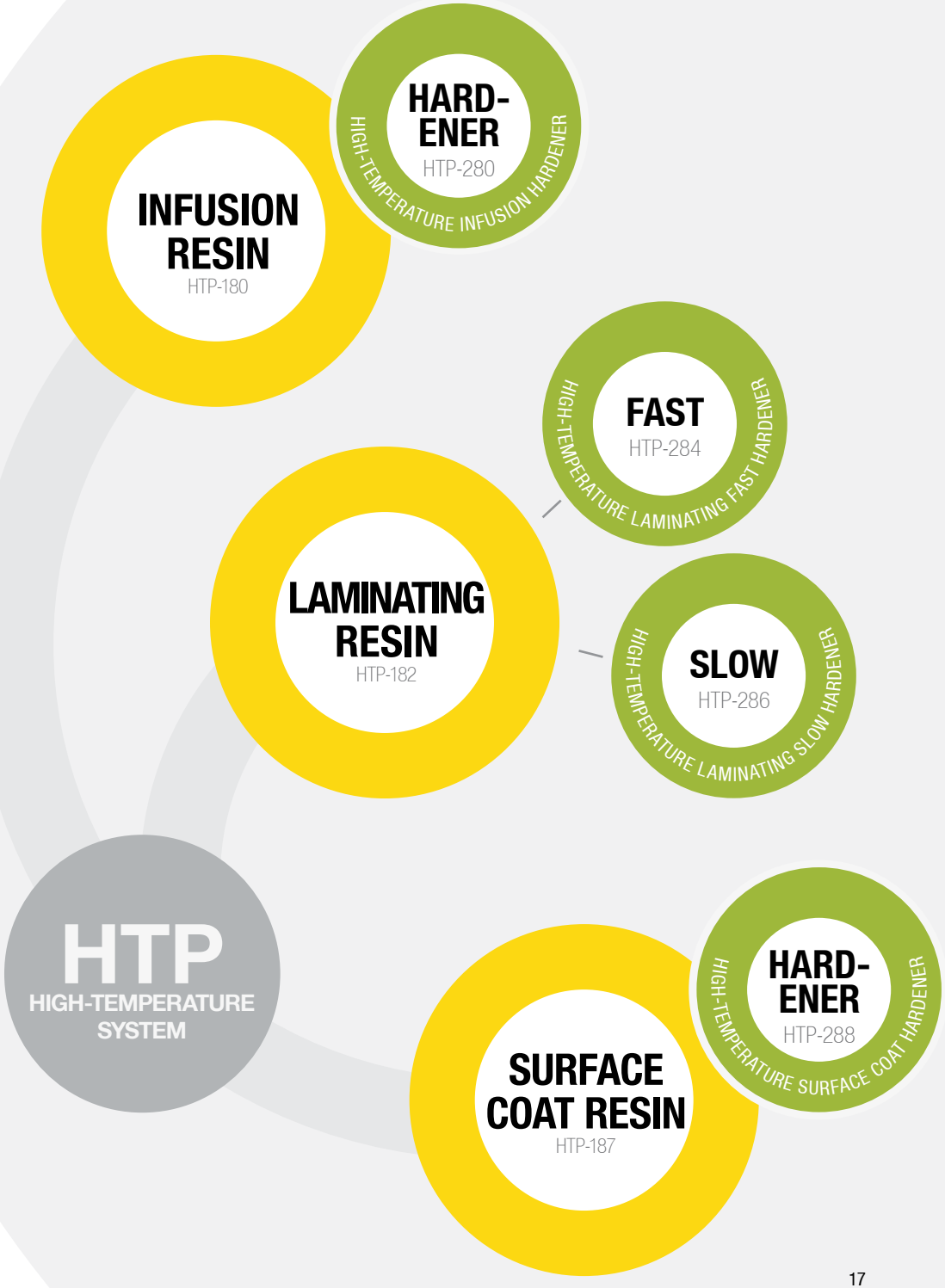
PRO-SET High-Temperature Epoxies are a system of high-performance epoxies for synthetic composite mould and part manufacture.

Car Seat mould tooling by J-TEC Composites

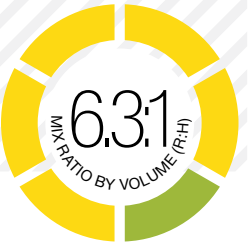
The PRO-SET High-Temperature system consists of a Surface Coat Epoxy, Laminating Epoxy and an Infusion Epoxy. When combined to manufacture composite parts, they can be demoulded after 24-48 hours at room temperature before a free-standing postcure.

The T_g of this system is as high as 149°C with a proper postcure. It has low shrinkage, excellent temperature stability and part cosmetics.

For bulk quatities the Infusion and Laminating Epoxy can be dyed, upon request, to provide for visual quality control. A yellow dye in the resin and a blue dye in the hardener, when properly metered and thoroughly mixed, will result in a consistent shade of green. The Surface Coat Epoxy is only available in black.



RESIN



		HTP 180[1]	HTP 182[1]	HTP 187[1]
		INFUSION	**LAMINATING**	**SURFACE COAT**
Mix Ratio by Volume	R:H	3:1	4:1	6.3:1
Mix Ratio by Weight	R:H	3.7:1	4.70:1	7.4:1
Mixed Viscosity @ 22°C ASTM D2196	mPas	600	2550-3000	16,000
Mixed Density @ 22°C	g/cc	1.15	1.16 - 1.18	1.20
Compression Yield ASTM D695	MPa	105	100 - 104	140
Tensile Strength ASTM D638	MPa	74	62 - 71	26
Tensile Modulus ASTM D638	GPa	2.99	2.82 - 3.05	3.9
Tensile Elongation ASTM D638	%	5.5	5.3 - 3.8	0.9
Flexural Strength ASTM D790	MPa	123	100 - 111	54
Flexural Modulus ASTM D790	GPa	2.85	2.76 - 2.8	2.8
Tg DMA Peak Tan Delta ASTM E1640[2]	°C	160	159 - 165	147
Tg DSC Onset - 1st Heat ASTM E1356[2]	°C	151	149 - 153	144

Test specimens are cured at room temperature to gelation and 60°C x 2 hrs + 135°C x 12 hrs. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

[1]Average of properties for HTP-180 with HTP-280, HTP-182 with HTP-284/HTP-286, and HTP-187 with HTP-287. [2]1 HZ, 3°C per minute.

HARDENER

	HTP 280[1]	HTP 284	HTP 286	HTP 288[1]
	WITH HTP-180	WITH HTP-182	WITH HTP-182	WITH HTP-187
150g Pot Life @ 22°C ASTM D2471	180 min	40 min	100 min	160 min
500g Pot Life @ 22°C ASTM D2471	120 min	38 min	75 min	150 min
Approx. working time @ 22°C	5-6 hr	1-2 hr	4-5 hr	2-3 hr

Test specimens are cured at room temperature to gelation and 60°C x 2 hrs + 135°C x 12 hrs. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

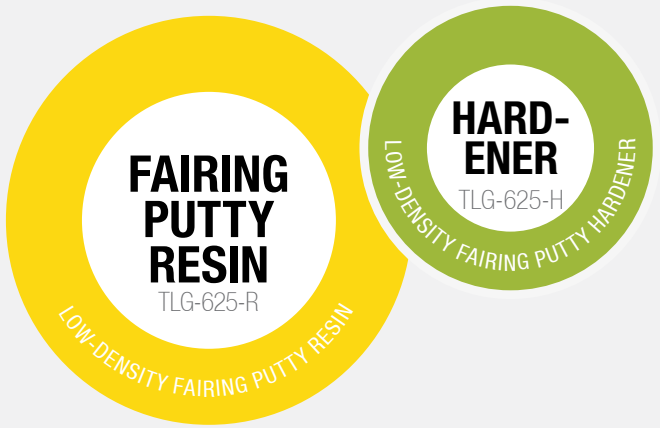
[1]Not to be blended with other hardeners.

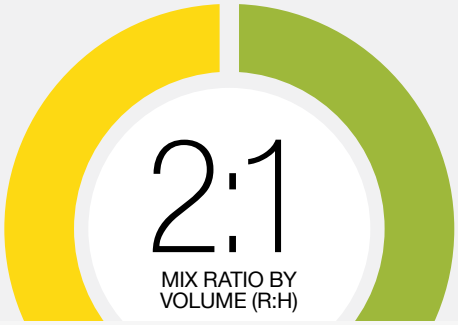
TOOLING EPOXIES

PRO-SET Tooling Epoxy is a 2-part paste formulated for surfacing molds and plugs.

The state-of-the-art chemistry behind PRO-SET Tooling Epoxy makes it easy to use, saving on labour and yielding high-quality results. It blends quickly, spreads easily, shrinks minimally and cures within eight hours.

PRO-SET TLG-625 Low-Density Fairing Putty is formulated for filling and fairing composite structures in manufacturing and repair applications. It can be applied in thicknesses up to 12 mm without slumping or sagging. The shear thinning characteristic provides excellent feather edge application. The cured putty is very easy to sand and the filler blend minimises airborne dust during sanding.





TLG
625
RESIN/HARDENER

Mix Ratio by Weight	R:H	1.79:1
100ml Pot Life @ 22°C ASTM 2471	minutes	31-39
500ml Pot Life @ 22°C ASTM 2471	minutes	27-33
Approx working time, 6.4mm application 22°C	minutes	90
Time to Sand, 6.4mm application 22°C	hours	8
Compression Yield ASTM D695	MPa	23
Hardness ASTM D2240	Type D	62

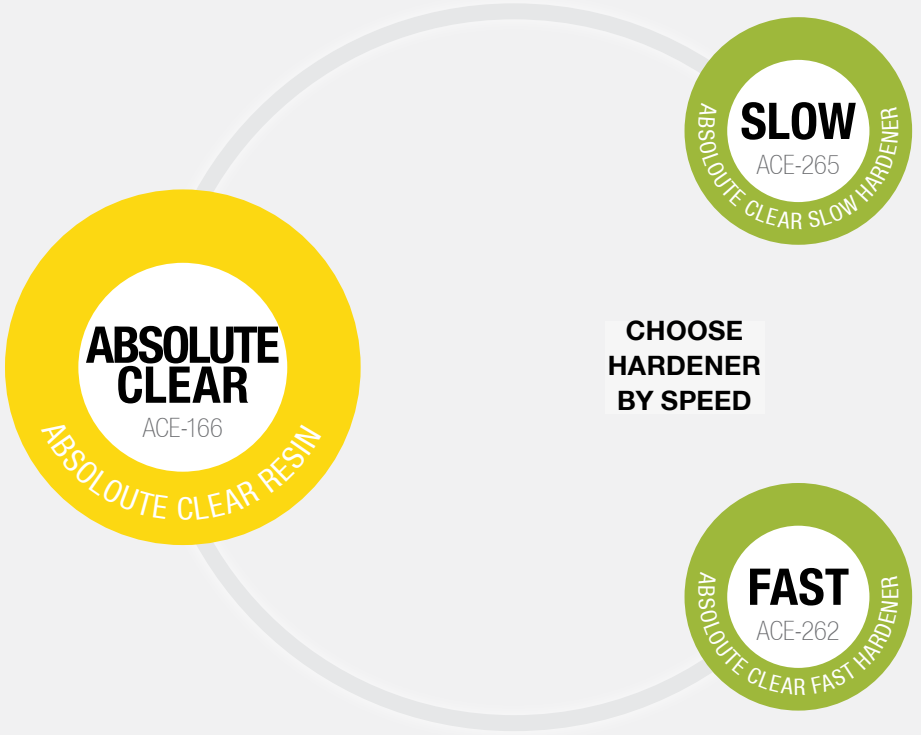
Test specimens are cured at room temperature to gelation and 25°C for two weeks, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

ABSOLOUTE CLEAR EPOXIES

PRO-SET Absolute Clear Epoxies are ultra-clear systems designed for high-volume production with fast tack-free times, excellent sandability and outstanding cosmetics.

Commonly used for lamination and clear coatings on wood, carbon fiber and other dark surfaces in a production setting, PRO-SET Absoloute Clear Epoxy has colorless clarity and UV stability. For ultimate long-term UV stability, use with a UV stable topcoat.

Absoloute Clear Epoxy is easy to process and optimized for fill coats and hand wet out of lightweight reinforcement fabrics or fibers. It provides an extremely smooth surface when cured and has excellent sandability. It reaches full physical properties at room temperature cure.



RESIN

ACE 166[1]

Mix Ratio by Weight	R:H	~2.35:1
Mixed Viscosity @ 22°C ASTM D2196	mPas	~1,102
Cured Density @ 22°C	g/cc	~1.16
Compression Yield ASTM D695	MPa	~86.9
Tensile Strength ASTM D638	MPa	~59.2
Tensile Modulus ASTM D638	GPa	~3.4
Tensile Elongation ASTM D638	%	~3.1
Flexural Strength ASTM D790	MPa	~95.1
Flexural Modulus ASTM D790	GPa	~3.2

Test specimens are cured at room temperature 22°C for two weeks, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.

[1]Average of properties for combinations with ACE-262 and ACE-265 Hardeners.

HARDENER

		ACE 262	ACE 265
Mix Ratio by Weight	R:H	2.31:1	2.39:1
150g Pot Life @ 22°C ASTM 2471	minutes	19-24	26-33
500g Pot Life @ 22°C ASTM 2471	minutes	19-24	26-32

Test specimens are cured at room temperature 22°C for two weeks, unless otherwise noted. Neat epoxy samples are used for testing. See Resin/Hardener Technical Data Sheet for exact values. Typical values, not to be construed as specifications.