

SR FireGreen 37 / SD 820x Bio-based Fire-Retardant Epoxy systems



SR FireGreen 37 is fire retardant intumescent and halogen free epoxy system for hand-laminating. **SR FireGreen 37** resin offers a low smoke opacity and toxicity that will allow you to pass Aerospace fire specification **FAR 25-853** and also **UL 94 V0**. SD 820x are hand-laminating hardeners. Other possibilities for hot / fast curing cycle are possible. FireGreen resin are produce with about 25% of carbon from plant origin and have a lower environmental impact than standard Epoxy Systems. The bio-based Carbon content of our resins is certified by an independent laboratory using C14 measurements (ASTM D6866).

		SD 8205	SD 8202
Reactivity level			
Initial viscosity (mPa.s)	@ 20 °C	2 300	2 100
	@ 30 °C	1 300	730
Pot Life	@ 20 °C	-	-
	@ 30 °C	-	-
Mixing ratio	By weight	100 / 20	100 / 20
	By volume	100 / 28	100 / 29
Maximum strength	N/mm ²	29	27
% Elongation at max strength	%	0,7	0,7
TG1 max onset	°C	90	91
Gel Time (1 mm)	@ 20 °C	07 h 00	10 h 00
	@ 30 °C	03 h 30	05 h 45
Time to reach 400 mPa.s	@ 20 °C	03 h 10	04 h 50
	@ 30 °C	02 h 00	03 h 20
Demold time	@ 20 °C	21 h 00	30 h 00
	@ 30 °C	10 h 30	17 h 15

FireGreen 37

- Maximum fire properties
- 24 % bio content

Hardeners :

SD 8205 – Standard

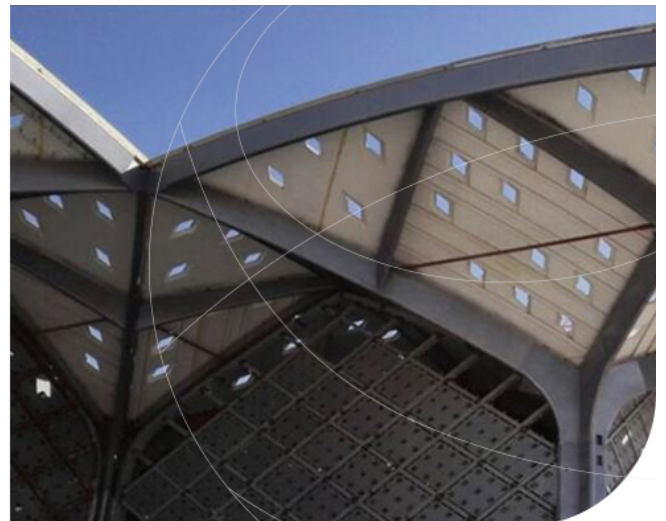
- For small and medium part, hand laminating / press / vacuum.
- Release best properties at room temp curing for 24h
- Faster hardener option available with SD 8207 B

SD 8202- very slow and low viscosity

- For medium and large parts, hand laminating / vacuum.
- Post-curing 12h at 40 °C
- Slower hardener / higher Tg options available with SD 8201 / SD 1305

Important guidelines :

- No filtering of the resin before laminating for an optimized fire performance.
- Use a stirrer with high shear to homogenize the resin before mixing with hardener.



Epoxy resin SR FireGreen 37

Appearance		thick liquid
Color		white
Viscosity (mPa.s)	@ 15 °C	9100 ± 1820
	@ 20 °C	5500 ± 1100
	@ 25 °C	3500 ± 700
Density	@ 20 °C	1,3700
Storage (months)	@ Ta	24

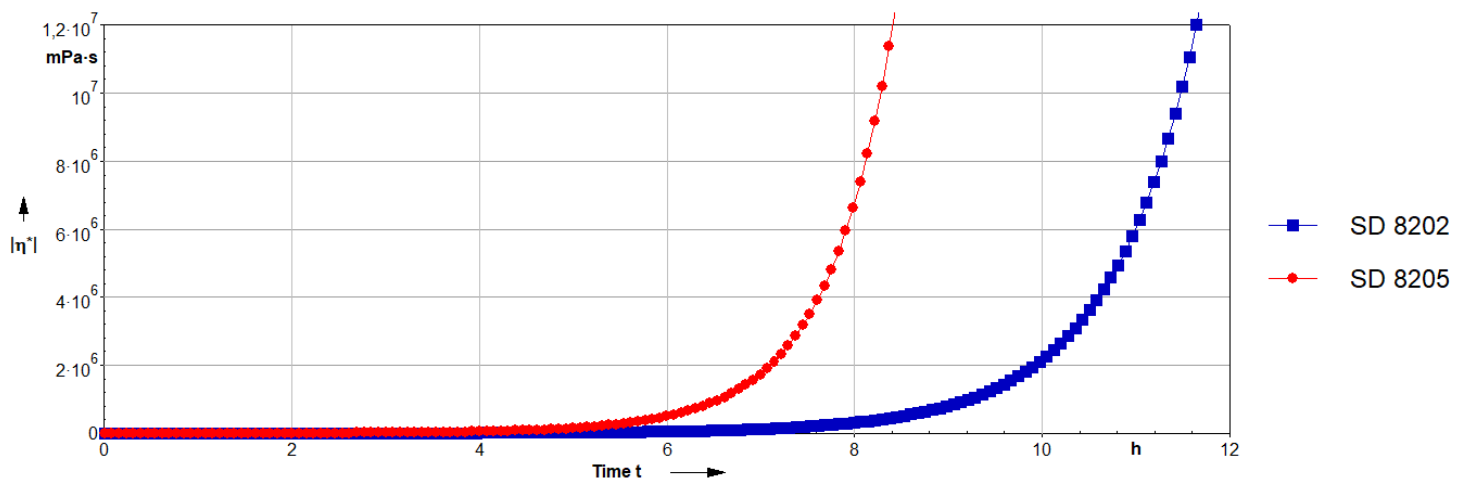
Hardener(s)

		SD 8205	SD 8202
Appearance		liquid	liquid
Color		light yellow	very light yellow
Gardner color		4	
Reactivity level			
Viscosity (mPa.s)	@ 15 °C	225 ± 45	47 ± 9
	@ 20 °C	155 ± 35	34 ± 6
	@ 25 °C	110 ± 20	25 ± 5
	@ 30 °C	75 ± 15	20 ± 4
	@ 40 °C	40 ± 10	
Density	@ 20 °C	1,0390	0,9500
Refractive index	@ 25 °C	1,5145 ± 0,002	
Storage (months)	@ Ta	24	24

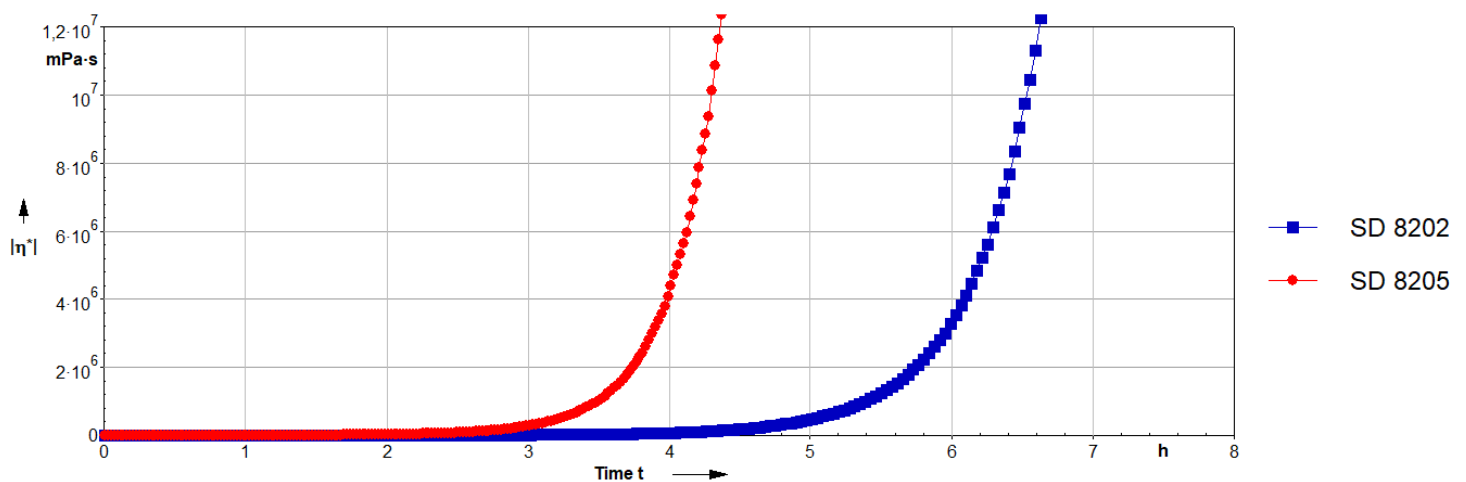
Mixe(s) SR Firegreen 37 / SD 820x

	SD 8205	SD 8202
Appearance	liquid	liquid
Color	white	white
Mixing ratio		
By weight	100 / 20	100 / 20
By volume	100 / 28	100 / 29
Initial viscosity (mPa.s) @ 20 °C	2 300	2 100
PP 50 mm / 10 s ⁻¹ @ 30 °C	1 300	730
Density @ 20 °C	1,27	1,27

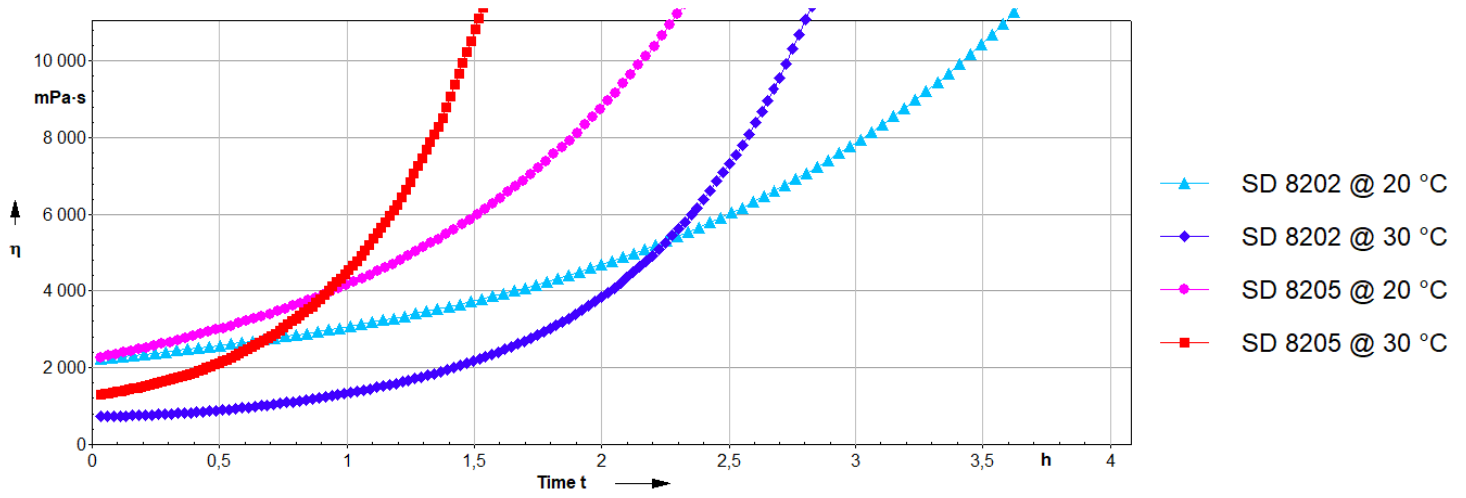
@ 20 °C



@ 30 °C



zoom @ 20 & 30 °C



Mechanical properties on cast resin :

		SR FireGreen 37 / SD 8205			SR FireGreen 37 / SD 8202		
Curing cycles		AT + 24h @ 40 °C	AT + 16h @ 60 °C		AT + 24h @ 40 °C	AT + 16h @ 60 °C	
Tensile							
Modulus	N/mm ²	4 100	4 100		4 000	4 000	
Maximum strength	N/mm ²	28	29		25	27	
Breaking Strength	N/mm ²	28	29		25	27	
Elongation at max strength	%	0,7	0,7		0,6	0,7	
Elongation at break	%	0,7	0,7		0,6	0,7	
Flexion							
Modulus	N/mm ²	3 800	3 600		3 800	4 110	
Maximum strength	N/mm ²	53	53		50	80	
Breaking Strength	N/mm ²	53	53		50	80	
Elongation at max strength	%	1,5	1,6		1,4	2,2	
Elongation at break	%	1,5	1,6		1,4	2,2	
Shear							
Breaking Strength	N/mm ²	32	34		31	34	
Compression							
Modulus	N/mm ²						
Yield strength	N/mm ²	73	77		74	78	
Offset compression yield	%	9,1	11		9,3	10,9	
Charpy impact strength							
Resilience	kJ/m ²		6		4		
DSC glass transition							
TG1 onset	°C	70	89		68	84	
TG1 max onset	°C		90			91	
DTMA glass transition							
TG tan delta	°C						
TeiG onset G'	°C						
TmG midpoint G'	°C						
TefG endpoint	°C						
TG peak G''	°C						

Tests carried out on samples of pure cast resin, without prior degassing, between steel plates.

Measures undertaken according to the following norms:

Mechanical tests:

Tension:	NF EN ISO 527-2:2012
Flexion:	NF EN ISO 178:2011
Compression:	NF EN ISO 604:2004 or NF EN ISO 844:2014 (foam product)
Charpy impact strength:	NF EN ISO 179-1:2010
Shear Strength:	ASTM D732-17 (Punch Tool)
Interlaminar shrinkage strength:	ASTM D5528-13
Toughness (GIC et KIC) :	ISO 13586:2000

Water absorption: Internal. Polymerization according to cycle, machining, weighing, time spent in distilled water at 70 °C / 48 hours, weighing 1 hour after emerging,

Bonding Strength Double lap shear:	ASTM D3528-96
	ADH = adhesive failure
	COH = cohesive failure
	TLC = thin-layer cohesive failure
	FT = fiber-tear failure.
	LFT = light-fiber-tear failure

Thermal tests:

Glass transition DSC:	NF EN ISO 11357-2:2014 -5°C to 180 °C under nitrogen gas
	T_{G1} or Onset: 1 st scan at 20 °C/min
	T_{G1} maximum or Onset: 2 nd scan at 20 °C/min

Glass transition DTMA:	Temperature ramp 0 °C to 180 °C @ 2°C/min under normal atmosphere
	NF EN ISO 11357-1:2016 T_g onset G'
	ASTM D4065-12 T_g peak G''

Physical tests:

Gardner color:	NF EN ISO 4630:2016	Visual method
Refractive index:	NF ISO 280:1999	
Viscosity:	NF EN ISO 3219:1994	Rheometer 50 mm, shear 10 s ⁻¹
Density on liquids:	ISO 2811-1:2016	Pycnometer
Density on solid:	NF EN ISO 1183-3:1999	Helium Pycnometer
Density on foam:	NF EN ISO 845:2009	
Gel time:	Cross G' G''	Rheometer CP50 - Shear rate 10 s ⁻¹
Green Carbone content:	ASTM D6866-16 or XP CEN/TS 16640 Avril 2014	

TA:	Ambient temperature (20 to 25 °C)
NC:	No information Communicated
NB:	No Breaking (maximum flexion deformation : 15 %)

Table 1st page:

Pot Life:	Time to reach 50 °C or time limit for use
Gel time:	Intersection of tangents on the viscosity curve of 1 mm thick layer
Release time:	Time required to obtain sufficient mechanical strength to release
Minimum Vacuum Time:	Time in which vacuum can be applied (25000 mPa.s)
Maximum Vacuum time:	Limit time below which a vacuum can be applied (G'G'' crossing)
Optimum Infusion time:	Time to reach 400 mPa.s
Max Infusion Time:	Time to reach 25000 mPa.s
Vacuum cut-off time:	Time to reach G'G'' crossover + 20%

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Mix

SR FireGreen 37	Resin part + Hardener part (kg)	Resin part (kg)	Hardener part (kg)
SD 8205	5,02 30 300,7	5 25 250	1,02 5,00 19,07 + 2 x 15,5
SD 8202	5,02 30 300,7	5 25 250	1,02 5,00 19,07 + 2 x 15,5