

SR 8200 / SD 740x Laminating Epoxy System

The wide range of hardeners associated with SR 8200 offers a large choice of reactivities, in order to produce small and big parts. This system achieves a triple purpose: low toxicity – mechanical properties – cost saving. The maximum temperature resistance is at least 90°C, we recommend a post curing to get parts able to work at a service temperature of 60°C to 70°C. Excellent mechanical properties after post curing at 40 to 60 °C.

		SD 7406	SD 7404	SD 7403	SD 7401
Reactivity level		Very Fast	Fast	Standard	Ultra slow
Initial viscosity (mPa.s)	20 °C	1 200	1 100	1 115	655
	30 °C	700	400	400	380
Pot Life (100 g)	20 °C	46 min	02 h 35	03 h 00	06 h 20
	30 °C	16 min	01 h 20	02 h 30	03 h 00
Mixing ratio					
	By weight	100 / 37	100 / 37	100 / 37	100 / 37
	By volume	100 / 42	100 / 44	100 / 43	100 / 46
Maximum strength	N/mm ²	87	80	82	76
% Elongation at max strength	%	4,2	4,4	4,6	4,5
Tg max onset	°C	92	92	99	94
Gel Time (1 mm)	20 °C	05 h 05	09 h 30	11 h 40	17 h 20
	30 °C	03 h 00	05 h 15	06 h 35	10 h 30
Time to reach 400 mPa.s	20 °C	37 min	03 h 20	04 h 10	07 h 30
	30 °C	01 h 05	02 h 05	02 h 50	04 h 55
Demold time	20 °C	11 h 30	21 h 30	26 h 00	42 h 30
	30 °C	06 h 45	11 h 45	15 h 00	24 h 00

The wide range of hardeners associated with SR 8200 offers a large choice of reactivities, in order to produce small and big parts. This system achieves a triple purpose: low toxicity – mechanical properties – cost saving. The maximum temperature resistance is at least 90°C, we recommend a post curing to get parts able to work at a service temperature of 60°C to 70°C.

Fast hardener SD 7406 Fast hardening at low temperature. Low surface pollution and mechanical properties allowing unmoulding small parts after one night at 20-25 °C. Excellent mechanical properties after post curing at 40 to 60 °C.

Hardeners SD 7404 & SD 7403 are specially formulated for hand laminating at ambient temperature, under press or small parts under vacuum. Good mechanical properties at ambient temperature, excellent after post cure

Slow hardener SD 7401 reactivity suitable for hand laminating, under press or medium to large parts under vacuum. Post-cure at 55°C to 60°C is required. Designed for manufacturing of high performance composite parts and tooling with service temperature of 60 °C to 70 °C.

Fast hardener SD 7406

Fast hardening at low temperature. Excellent mechanical properties after post curing at 40 to 60 °C.

Hardeners SD 7404 & SD 7403

Specially formulated for hand laminating at ambient temperature, under press or small parts under vacuum.

Fast hardening of the laminates at ambient temperature from 20°C to 30°C.

Slow hardener SD 7401

Reactivity formulated for hand laminating, under press or medium to large parts under vacuum.

Requires a post-cure at 55°C to 60°C.

Designed for manufacturing of high performance composites and tooling with service temperature of 60 °C to 70 °C.



Epoxy resin SR 8200

Appearance		liquid
Color		light yellow
Gardner color		≤ 2
Viscosity (mPa.s)	15 °C	6200 ± 1250
	20 °C	3200 ± 650
	25 °C	1600 ± 300
	30 °C	900 ± 200
	40 °C	400 ± 100
Density	20 °C	1,17
Storage (months)	23 °C	24

Hardener(s)

		SD 7406	SD 7404	SD 7403	SD 7401
Appearance		liquid	liquid	liquid	liquid
Color		light yellow	colourless	colourless	colourless
Gardner color		≤ 5	≤ 3	≤ 3	≤ 2
Reactivity level		Very Fast	Fast	Standard	Ultra slow
Viscosity (mPa.s)	15 °C	400 ± 80	130 ± 26	120 ± 24	80 ± 20
	20 °C	260 ± 50	95 ± 20	80 ± 16	60 ± 15
	25 °C	170 ± 35	65 ± 13	60 ± 12	45 ± 10
	30 °C	120 ± 25	50 ± 10	45 ± 9	35 ± 5
Density	20 °C	1,02	0,99	0,97	0,96
Storage (months)	23 °C	24	24	24	24

Mixe(s) SR 8200 / SD 740x

		SD 7406	SD 7404	SD 7403	SD 7401
Appearance		liquid	liquid	liquid	liquid
Color		yellow-orange	yellow-orange	light yellow	colourless
Mixing ratio					
	By weight	100 / 37	100 / 37	100 / 37	100 / 37
	By volume	100 / 42	100 / 44	100 / 43	100 / 46
Initial viscosity (mPa.s)	20 °C	1 200	1 100	1 115	655
	30 °C	700	400	400	380
Density	20 °C				

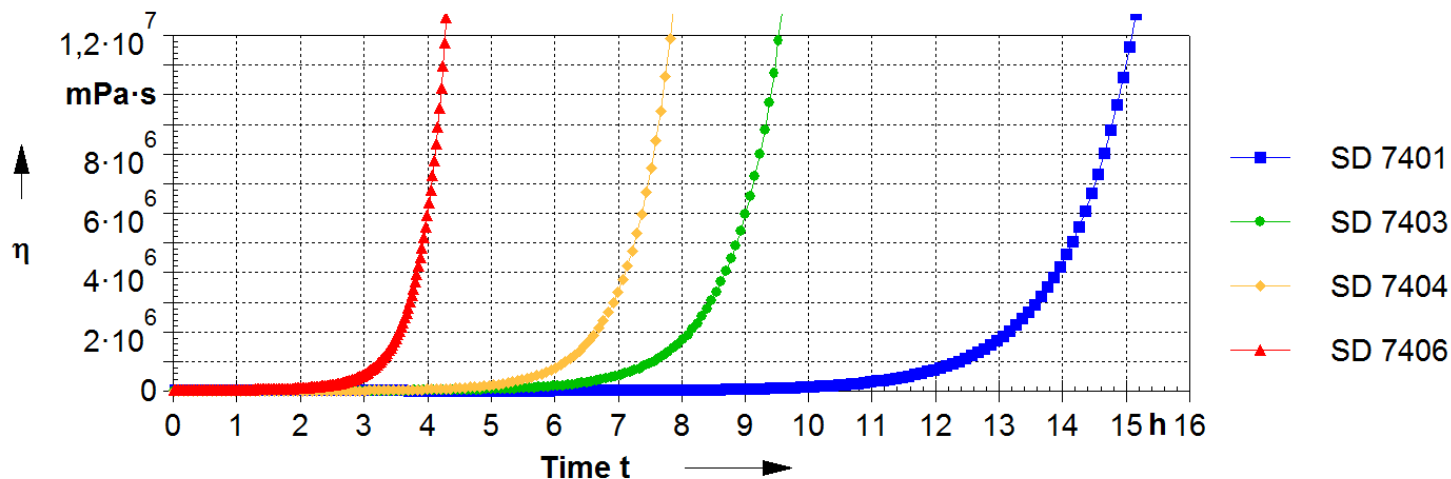
Reactivity SR 8200 / SD 740x

20 °C for 100 g	SD 7406	SD 7404	SD 7403	SD 7401
Exothermic temperature (°C)	178	157	130	38
Exothermic peak time	50 min	01 h 30	02 h 25	06 h 55
Time to reach 50 °C	40 min	01 h 20	02 h 00	

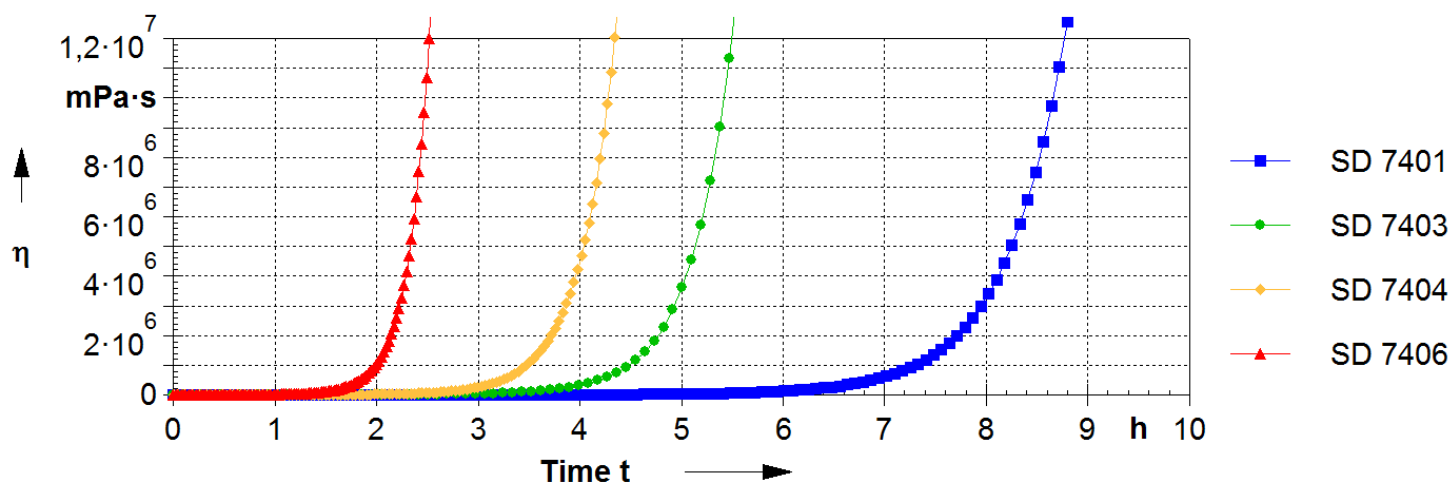
30 °C for 100 g	SD 7406	SD 7404	SD 7403	SD 7401
Exothermic temperature (°C)	181	184	179	151
Exothermic peak time	25 min	40 min	01 h 00	02 h 30
Time to reach 50 °C	20 min	30 min	45 min	02 h 00

Reactivity on 1 mm thick layer

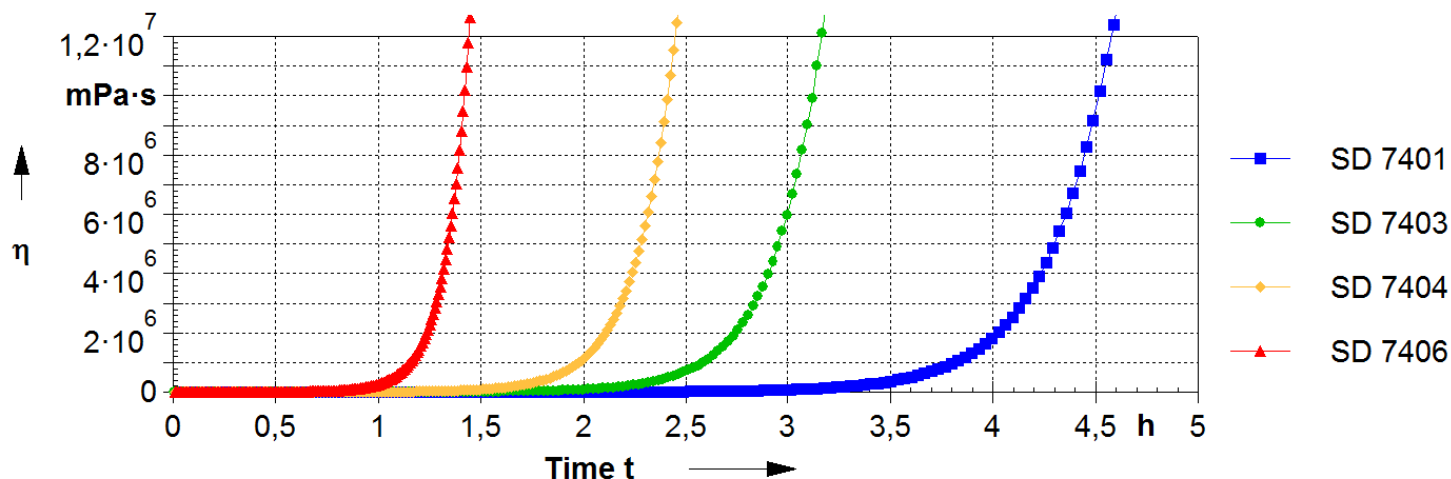
20 °C



30 °C



40 °C



Post-curing

The thermomechanical values of an epoxy system can be optimized by implementing a post-curing cycle. The Sicomin laboratory provides several predefined post cure cycles on its data sheets allowing users to compare systems. These experimental cycles are adaptable to your specific applications, taking the following parameters into account:

- Selected epoxy system (Tg max)
- Available heat source
- Room Dimension and Sampling
- Nature of the tooling (thermal conductivity of material)

Many systems can provide good mechanical properties after curing at room temperature and from 18°C for 24 to 48 hours before demolding.

The mechanical properties progress very quickly with a slightly higher temperature of around 40°C for several hours.

Epoxy systems with high Tg and slow and extra-slow hardeners imperatively require post-curing at a higher temperature. It is possible to start the cycle as soon as the exothermic peak passes, but also to start post-curing later after assembly of the various components and before the finishing operations. If the nature of the models and tools is not suitable for high temperatures, we recommend carrying out the first stages up to the maximum admissible temperature then, after cooling and demoulding, continuing the cycle on a suitable former.

For a conventional epoxy system, we recommend carrying out a cycle in steps of 20°C for 4 hours.

Example for an epoxy system Tg max 100°C:

4 hrs at 40°C + 4 hrs at 60°C + 4 hrs at 80°C + cooling to room temperature before unmoulding.

There are many short cycle, high temperature epoxy systems that do not fit into this post-cure scheme (pultrusion, hot press, pre-preg). For these systems, initial curing provides maximum thermomechanical performance without post-curing.

We invite you to contact our technical department for your questions on this subject.

Mechanical properties on cast resin :

		SR 8200 / SD 7406			SR 8200 / SD 7404		
		24 h TA 24 h 40 °C	24 h TA 16 h 60 °C	24 h TA 8 h 80 °C	24 h TA 24 h 40 °C	24 h TA 16 h 60 °C	24 h TA 8 h 80 °C
Tensile							
Modulus	N/mm ²	4 090	3 770	3 810	3 920	3 670	3 710
Maximum strength	N/mm ²	68	77	87	71	82	80
Breaking Strength	N/mm ²	68	76	85	71	78	74
Elongation at max strength	%	2	2,5	4,2	2,4	4	4,4
Elongation at break	%	2	2,9	5,4	2,4	5,3	5,9
Flexion							
Modulus	N/mm ²	3 510	3 380	3 330	3 480	3 330	3 220
Maximum strength	N/mm ²	130	141	141	130	135	134
Breaking Strength	N/mm ²	130	96	120	115	93	103
Elongation at max strength	%	4,2	5,3	5,7	4,4	5,4	5,9
Elongation at break	%	4,2	9,1	8	6,4	9,3	9,7
Shear							
Breaking Strength	N/mm ²	50	55	55	50	53	52
Compression							
Modulus	N/mm ²						
Yield strength	N/mm ²	120	118	116	118	115	112
Offset compression yield	%	12,5	12,9	13,4	11,4	12,6	13,3
Charpy impact strength							
Resilience	kJ/m ²	22	27	44	23	40	40
DSC glass transition							
Tg onset	°C	71	85	91	69	89	96
Tg max onset	°C			92			92

These curing cycles are applied after a 24-hour hardening period at room temperature, allowing the reaction to freeze and exotherm beyond.

Mechanical properties on cast resin :

		SR 8200 / SD 7403			SR 8200 / SD 7401		
		24 h TA 24 h 40 °C	24 h TA 16 h 60 °C	24 h TA 8 h 80 °C	24 h TA 24 h 40 °C	24 h TA 16 h 60 °C	24 h TA 8 h 80 °C
Tensile							
Modulus	N/mm ²	4 010	3 840	3 720	3 740	3 740	2 950
Maximum strength	N/mm ²	76	79	82	78	78	76
Breaking Strength	N/mm ²	76	76	74	77	70	70
Elongation at max strength	%	3	3,5	4,6	3,1	4	4,5
Elongation at break	%	3,1	3,9	7	3,2	5,4	6,9
Flexion							
Modulus	N/mm ²	3 380	3 250	3 110	3 350	3 160	2 950
Maximum strength	N/mm ²	129	133	132	128	128	126
Breaking Strength	N/mm ²	111	96	120	73	93	118
Elongation at max strength	%	4,7	5,3	6,1	4,8	5,4	6
Elongation at break	%	7,1	8,6	8,0	10,9	8,7	7,3
Shear							
Breaking Strength	N/mm ²	50	52	52	48	49	49
Compression							
Modulus	N/mm ²						
Yield strength	N/mm ²	114	111	109	109	105	102
Offset compression yield	%	11,5	12,5	13,5	11,6	12,1	14,6
Charpy impact strength							
Resilience	kJ/m ²	30	43	39	21	49	48
DSC glass transition							
Tg onset	°C	71	86	102	68	83	96
Tg max onset	°C			99			94

These curing cycles are applied after a 24-hour hardening period at room temperature, allowing the reaction to freeze and exotherm beyond.

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: 1st scan at 20 °C/min
 T_{G1} maximum or Onset: 2nd scan at 20 °C/min

Glass transition DTMA: Temperature ramp 0 °C to 180 °C @ 2°C/min under normal atmosphere
 ASTM D4065-12

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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