SR 8100 / SD 477x

SR 8100 is a two-component epoxy system. It has been specially formulated for resin transfer processes, such as injection or infusion.

		SD 4775	SD 4773	SD 4771
Reactivity level		Fast	Medium	Slow
Initial viscosity (mPa.s)	20 °C	730	380	200
	30 °C	350	240	165
Pot Life (100 g)	20 °C	01 h 25	03 h 00	04 h 40
	30 °C	30 min	45 min	01 h 40
Mixing ratio				
	By weight	100 / 29	100 / 29	100 / 29
	By volume	100 / NR	100 / NR	100 / NR
Maximum strength	N/mm^2	74	75	73
% Elongation at max strength	%	5,3	4,4	4,7
Tg max onset	°C	86	87	90
Gel Time (1 mm)	20 °C	06 h 20	11 h 30	20 h 50
	30 °C	03 h 10	05 h 50	11 h 00
Optimal infusion time	20 °C	15 min	01 h 40	03 h 25
	30 °C	35 min	01 h 20	03 h 00
Latest flow under vacuum	20 °C	03 h 10	06 h 10	12 h 20
	30 °C	01 h 50	03 h 25	06 h 50
Earliest vacuum off time	20 °C	10 h 00	18 h 20	34 h 30
	30 °C	04 h 25	09 h 00	17 h 50
Demold time	20 °C	19 h 00	34 h 30	62 h 30
	30 °C	09 h 30	17 h 30	33 h 00

SR 8100 is a two component epoxy system. It has been specially formulated for resin transfer processes, such as injection or infusion.
This system has a very low viscosity at ambient temperature. The different hardeners allow the moulding of small to large parts, with fast demoulding time.
High mechanical properties can be achieved using **SR 8100 / SD 477x**.
The cured system gives a temperature resistance up to 90°C ($T_{G1\ onset}$ max).

Profile:

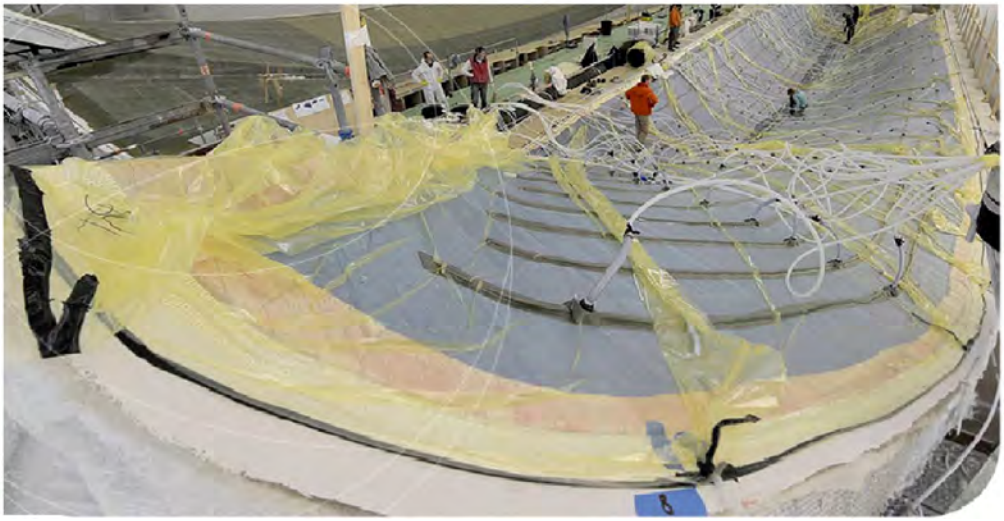
Implementation from 18 °C and with a hygrometry of less than 70% ideally.
Choose the hardener according to ambient temperature, implementation and size of the part to be made.
Cure at Ambient temperature and post cure at 40 to 60 °C

Applications:

RTM, infusion, injection, tooling …

DNV approved

DNV class programme DNV-CP-0089 – Type approval – Epoxy resin systems
DNV rules for classification – High speed and light craft
DNV standard DNV-ST-0342 – Craft



Epoxy resin SR 8100

Appearance		liquid
Color		yellow
Gardner color		≤ 2
Viscosity (mPa.s)	15 °C	2350 ± 450
	20 °C	1250 ± 250
	25 °C	765 ± 155
	30 °C	475 ± 95
Density	20 °C	1,16
Storage (months)	23 °C	24

Hardener(s)

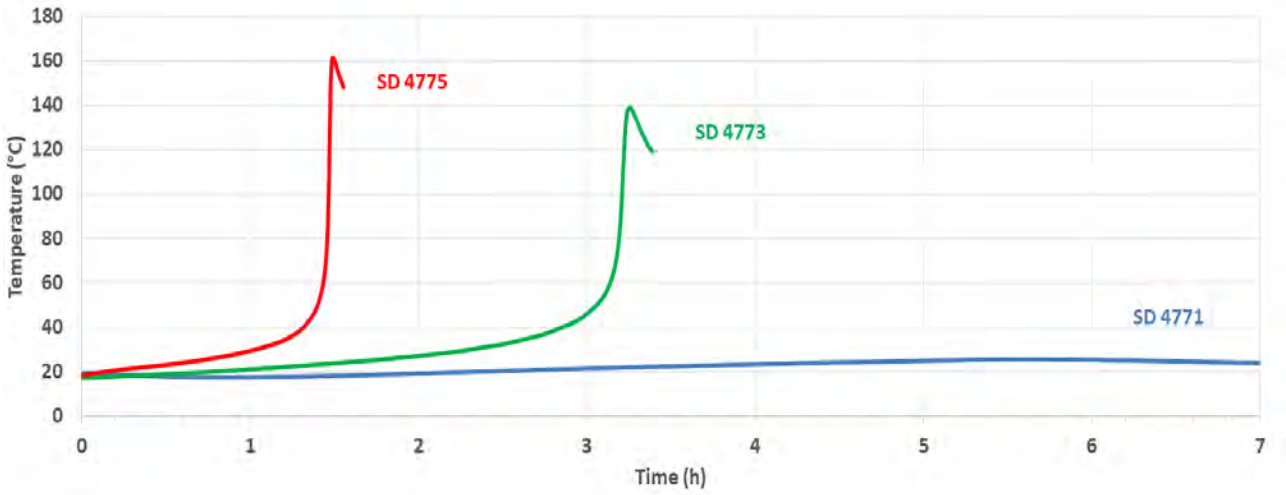
		SD 4775	SD 4773	SD 4771
Appearance		liquid	liquid	liquid
Color		light yellow	yellow	colourless
Gardner color		≤ 5	≤ 4	≤ 1
Reactivity level		Fast	Medium	Slow
Viscosity (mPa.s)	15 °C	200 ± 40	51 ± 10	13 ± 3
	20 °C	135 ± 30	41 ± 8	11 ± 2
	25 °C	95 ± 20	31 ± 6	9 ± 2
	30 °C	70 ± 15	24 ± 5	7 ± 1
Density	20 °C	1,00	0,98	0,94
Storage (months)	23 °C	24	24	24

Mixe(s) SR 8100 / SD 477x - DNV

		SD 4775	SD 4773	SD 4771
Appearance		liquid	liquid	liquid
Color		light yellow	light yellow	light yellow
Mixing ratio				
By weight		100 / 29	100 / 29	100 / 29
By volume		100 / NR	100 / NR	100 / NR
Initial viscosity (mPa.s)	20 °C	730	380	200
	30 °C	350	240	165
Density	20 °C	1,19	1,18	1,17

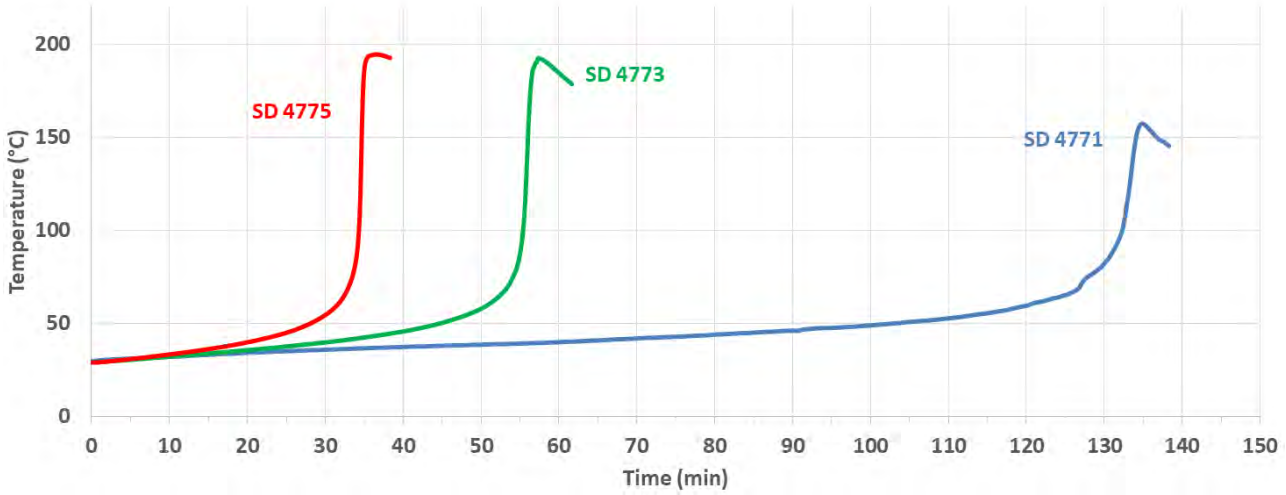
Reactivity 20 °C for 100 g SR 8100 / SD 477x - DNV

	SD 4775	SD 4773	SD 4771
Exothermic temperature (°C)	162	139	26
Exothermic peak time	01 h 30	03 h 15	05 h 25
Time to reach 50 °C	01 h 25	03 h 00	-



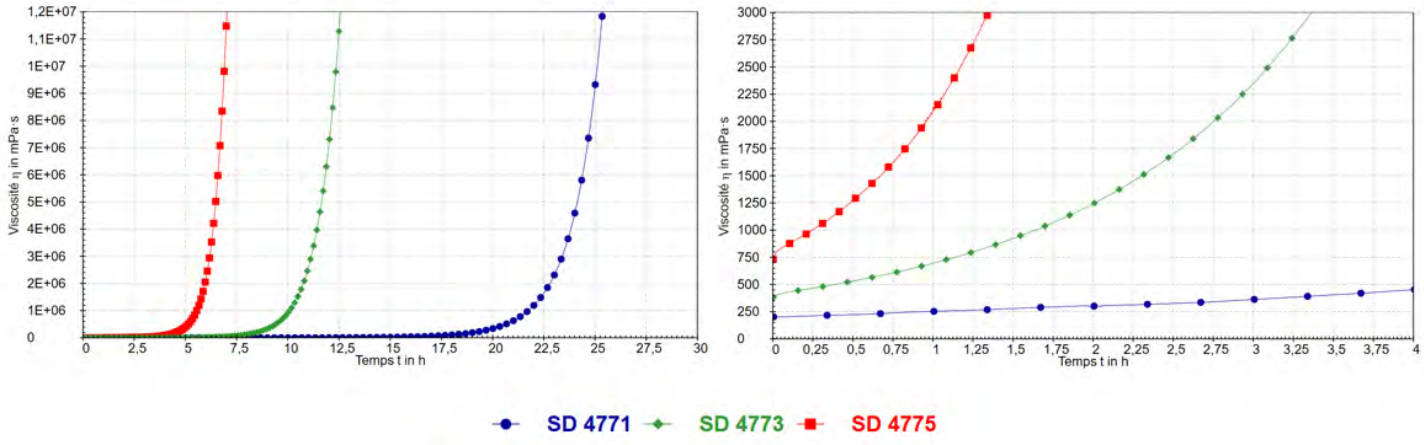
Reactivity 30 °C for 100 g SR 8100 / SD 477x - DNV

	SD 4775	SD 4773	SD 4771
Exothermic temperature (°C)	195	193	157
Exothermic peak time	35 min	55 min	02 h 15
Time to reach 50 °C	30 min	45 min	01 h 40

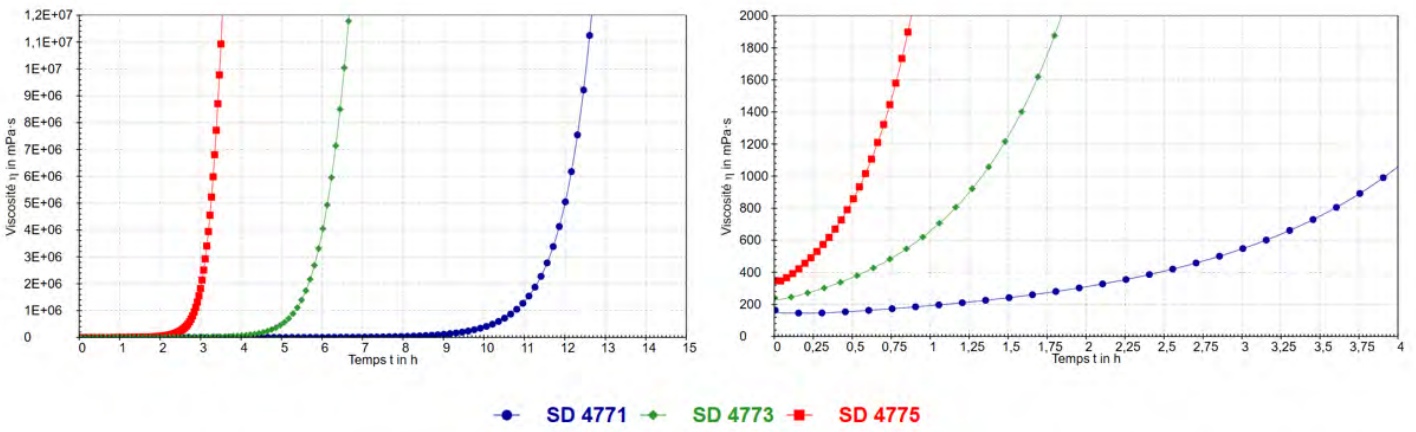


Reactivity on 1 mm thick layer

20 °C



30 °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 8100 / SD 4775			SR 8100 / SD 4773		
		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	3 340	3 165	3 115	3 390	3 100	3 230
Maximum strength	N/mm^2	73	74	74	74	74	75
Breaking Strength	N/mm^2	64	72	72	64	73	75
Elongation at max strength	%	3,9	4,8	5,3	3,7	5	4,4
Elongation at break	%	5,9	6,2	7,1	5,4	6,1	4,7
Flexion							
Modulus	N/mm^2	3 300	2 835	3 335	3 320	3 065	3 080
Maximum strength	N/mm^2	121	124	126	124	122	123
Breaking Strength	N/mm^2	94	99	114	79	120	120
Elongation at max strength	%	5,1	6,6	6,3	5	5,5	5,9
Elongation at break	%	8,3	11	8,9	10,1	6	6,8
Shear							
Breaking Strength	N/mm^2	48	47	44	48	48	44
Compression							
Modulus	N/mm^2						
Yield strength	N/mm^2	107	104	102	110	100	101
Offset compression yield	%	12,7	14,4	15,6	12,7	12,7	14,6
Charpy impact strength							
Resilience	kJ/m^2	56			57		
DSC glass transition							
Tg onset	°C	67	82	86	69	79	87
Tg max onset	°C			86			87

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

Mechanical properties on cast resin :

		SR 8100 / SD 4771		
		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	3 360	3 120	3 000
Maximum strength	N/mm^2	69	73	73
Breaking Strength	N/mm^2	54	61	62
Elongation at max strength	%	3,6	4,3	4,7
Elongation at break	%	6,6	7,3	7,2
Flexion				
Modulus	N/mm^2	3 090	2 920	2 900
Maximum strength	N/mm^2	115	116	119
Breaking Strength	N/mm^2	55	73	94
Elongation at max strength	%	5	5,6	6,2
Elongation at break	%	15,2	11,7	10,3
Shear				
Breaking Strength	N/mm^2	47	43	53
Compression				
Modulus	N/mm^2			
Yield strength	N/mm^2	105	99	99
Offset compression yield	%	12,2	13,2	14,1
Charpy impact strength				
Resilience	kJ/m^2	22		
DSC glass transition				
Tg onset	°C	68	81	89
Tg max onset	°C			90

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

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*	
	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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If our responsibility should nevertheless be involved, it would be, for all the damages, limited to the value of the goods supplied by us and processed by the customer. We guaranty the non-reproachable quality of our products, in the general context of sales and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

Mix

SR 8100	Resin part + Hardener part (kg)	Resin part (kg)	Hardener part (kg)
SD 4775	1,51 7,46 30,06 258,05	1,17 5,78 23,4 200	0,34 1,68 6,66 3 x 19,35
SD 4773	1,51 7,46 30,06 258,05	1,17 5,78 23,4 200	0,34 1,68 6,66 3 x 19,35
SD 4771	1,51 7,46 30,06 258,05	1,17 5,78 23,4 200	0,34 1,68 6,66 3 x 19,35