



SR 1270 / SD 499x Epoxy resin systems

SR 1270 :

Epoxy matrix
Without classified Toxic products (T)

Hardeners :

SD 4999 : Fast hardener , phenol free
SD 4990 : Ultra slow hardener

Approval n° :
WP 0320004 HH



Germanischer Lloyd

Profile:

Cure at ambient temperature and post cure at 40 to 60 °C

Applications:

Hand laminating, Adhesive, Tooling (casting and laminates @ 60°C)

Epoxy resin SR 1270 :

Appearance	Viscous liquid		
Chemical nature	Bisphénol / epichlorhydrine resin		
Storage	Can crystallize at low temperature or after a long storage. Shelf life : 2 years @ 18 – 25°C		
Color	Clear to yellow, Gardner < 3		
Density (Kg/l)	@ 20 °C	1.153 ± 0.005	Picnometer NF EN ISO 2811-1
Brookfield viscosity (m.Pas)	@ 25 °C	1900 ± 300	Mobil LV3 60 tr / mn ISO 2555

Base Hardeners SD 499x :

		SD 4999	SD 4990	
Aspect / color		Amber Liquid	Clear liquid	
Reactivity levels		Fast	Ultra slow	
Viscosities	@ 20 °C	150 to 210	20 ± 5	Mobil LV2 60 tr / mn ISO 2555
	@ 25 °C			
Density (g/cm ³ ± 0.005)	@ 20 °C	1.073	0.948 ± 0.010	Picnometer NF EN ISO 2811-1



SR 1270 / SD 499x Mixes :

Viscosities	@ 25°C @ 20°C	SD 4999 600 to 900 900 to 1200	SD 4990 200 to 260 330 to 390
Quantity by weight		100 g / 35 g	100 g / 35 g
Quantity by volume		100 ml / 38 ml	100 ml / 43 ml

Levels of Reactivities on 100 g mix SR 1270 / SD 499x :

	1270 / 4999	4999 : 80 % 4990 : 20 %	4999 : 60 % 4990 : 40 %	4999 : 40 % 4990 : 60 %	4999 : 20 % 4990 : 80 %	1270 / 4990
Exothermic temperature (°C) :						
@ 20 °C	215	215	197	67	28	22
@ 30 °C	215	215	215	207	100	40
@ 40 °C	215	215	215	215	210	110
Time taken to achieve exotherm :						
@ 20 °C	20'	32'	1 h 06'	3 h 30'	5 h	15 h
@ 30 °C	12'	15'	25'	60'	2 h 45'	7 h
@ 40 °C	6'40"	10'	15'	25'	45'	3 h
Time taken to reach 50 °C :						
@ 20 °C	13'	25'	55'	2 h 50'	nm	nm
@ 30 °C	8' 40"	10'	15'	45'	1 h 55'	nm
@ 40 °C	3' 20"	4' 40"	5' 10"	10'	21'	1 h 39'
500 microns dust free film :						
@ 20 °C	1 h 50'	2 h30'	3 h 30'	4 h 50'	7 h 50'	17 h
@ 30 °C	1 h 10'	1 h 40'	2 h	2 h 45'	4 h 30'	9 h
@ 40 °C	32'	52'	1 h 10'	1 h 45'	2 h 40'	4 h 30'

Toxicity guide (EEC Classification according Directive 67 / 548 / EEC) :

Products	Symbol		Risk phrases
SR 1270		Xi: Irritating N: Dangerous for the environment	R 36/38 R 51/53 R 43
SD 499x		C: Corrosive	R 21/22 R 34 R 43

Before use, read the Safety data sheet of each components

Packaging (kg)


Kits	SR 1270	SD 499x
Combinaison	200	200
270.2	200	3 x 23.4
90	33.3 x 2	23.4
16.2	12	2 x 2.1
8.1	6	2.1
1.35	1	0.35

Other :

SD 1119.10 : Development / experimental
Type : Ultra fast hardener for laminates and puty
Tg 1 maxi: Nearly 80 °C with 1270
Color: Better than SD 4999
Surface: Hight gloss
Mixing ratio: The same than 1270 / 4999 = 100 g / 35 g



Mechanical properties of pure resin

Cure Schedule 	SR 1270 / SD 4999			SR 1270 / SD 4990						
	14 days 23°C	24h 23°C + 24h 40°C	24h 23°C + 8h 60°C				14 days 23°C	24h 23°C + 24h 40°C	24h 23°C + 16h 60°C	24h 23°C + 8 h 80°C
Tensile										
Modulus of elasticity	N/mm ²	3250	3300				2750	2400	2300	
Maximum resistance	N/mm ²	76	78				66	64	54	
Resistance at break	N/mm ²	75	73				63	59	46	
Elongation at max. resistance	%	3.6	4.2				3.1	3.9	4.9	
Elongation at break	%	3.7	5.7				3.4	4.8	9.6	
Flexion										
Modulus of elasticity	N/mm ²	3500	3400				3100	2800	2500	
Maximum resistance	N/mm ²	125	123				103	99	87	
Elongation at max. resistance	%	4.9	5.6				4.1	5.0	5.5	
Elongation at break	%	9.3	7.0				11.5	9.3	13.0	
Charpy impact strength										
Resilience	KJ/m ²	20	28				28	40	37	
Glass Transition / DSC										
Tg 1	°C	65	73				65	79	85	
Tg 1 max	°C		78						87	

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

Measures undertaken according to Afnor normes :

Tension: NF T 51-034

Flexion : NF T 51-001

Choc Charpy: NF T 51-035

Glass transition DSC : Tg1: 1st point @ 10°C / mn, Tg 1 max.: 2nd passage 180°C

Mechanical properties of laminates :

Ref labo		CE 320	CE 323
Samples			
Resin / Hardener		1270 / 4999	1270 / 4990
Reinforcement material		3300	3300
Number of layers		15	15
Method		Press	Press
Weight of reinforcement	%	71.9	77
Cure Schedule		8 h 60 °C	16 h 60 °C
Flexural			
Modulus	N/mm ²	28 100	26700
Maximum resistance	N/mm ²	720	670
Maximum elongation	%	3.2	3.0
Bending delamination			
Shear load at rupture	N/mm ²	61	42
Impact (Choc Charpy)			
Resilience	KJ/m ²	200	215
Glass Transition			
Tg 1	°C	78	79
Tg1 max.	°C	80	85

Measures undertaken according to Afnor normes :

Flexural: NF T 57-105

Flexural Délamination: NF T 57-104

Impact : NF T 57-108

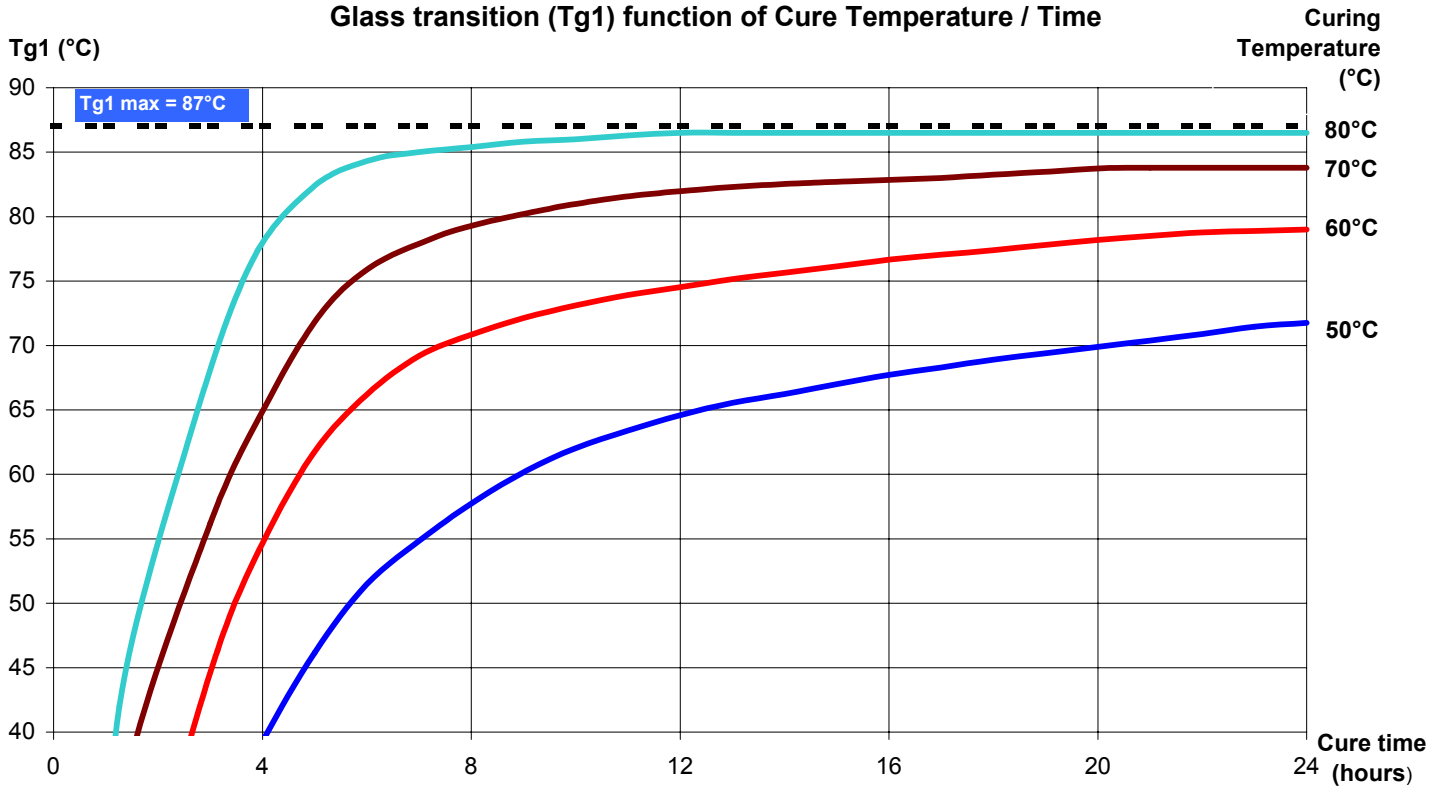
Glass transition : DSC 1° point at 10°C / mn

Water absorbtion : Internal. Polymerisation according to a cycle, weighing, time spent in water distilled à 70 °C / 48 hours, weighing 1 hr after removal, drying 24 hr / 40°C, weighing, mechanical tests on 10 samples

Reinforcement : Ref 3300, E Glass, sergé de 2, 300 g / m² :

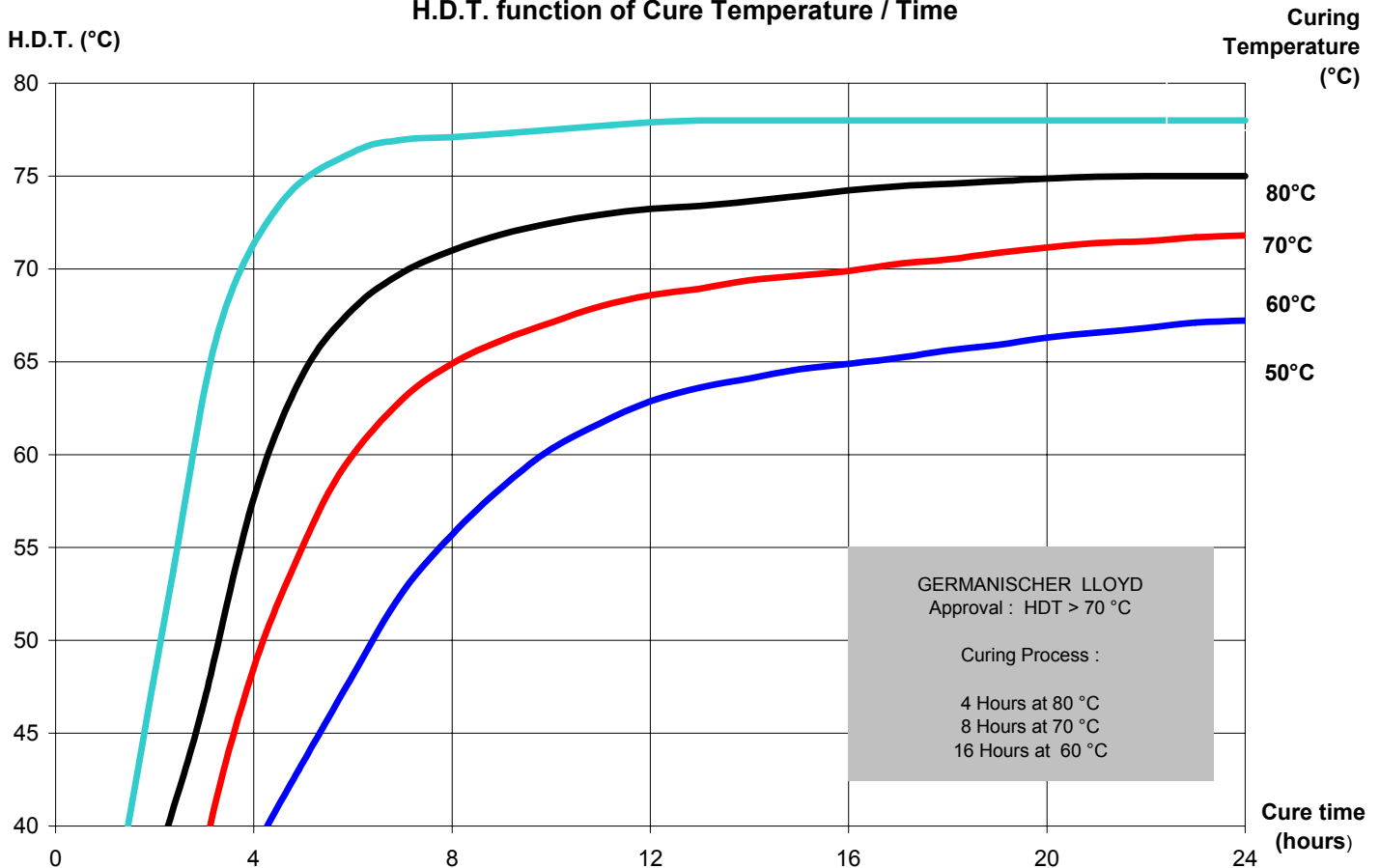


Epoxy system SR 1270 / SD 4990 Glass transition (Tg1) function of Cure Temperature / Time



Glass transition measured by DSC according to standard ISO 11357-2 : 1999.
Tg1 : 1st point at 20°C/mn (Onset method) - Tg1 max : second run -5°C/180°C under N₂

Epoxy system SR 1270 / SD 4990 H.D.T. function of Cure Temperature / Time



GERMANISCHER LLOYD
Approval : HDT > 70 °C

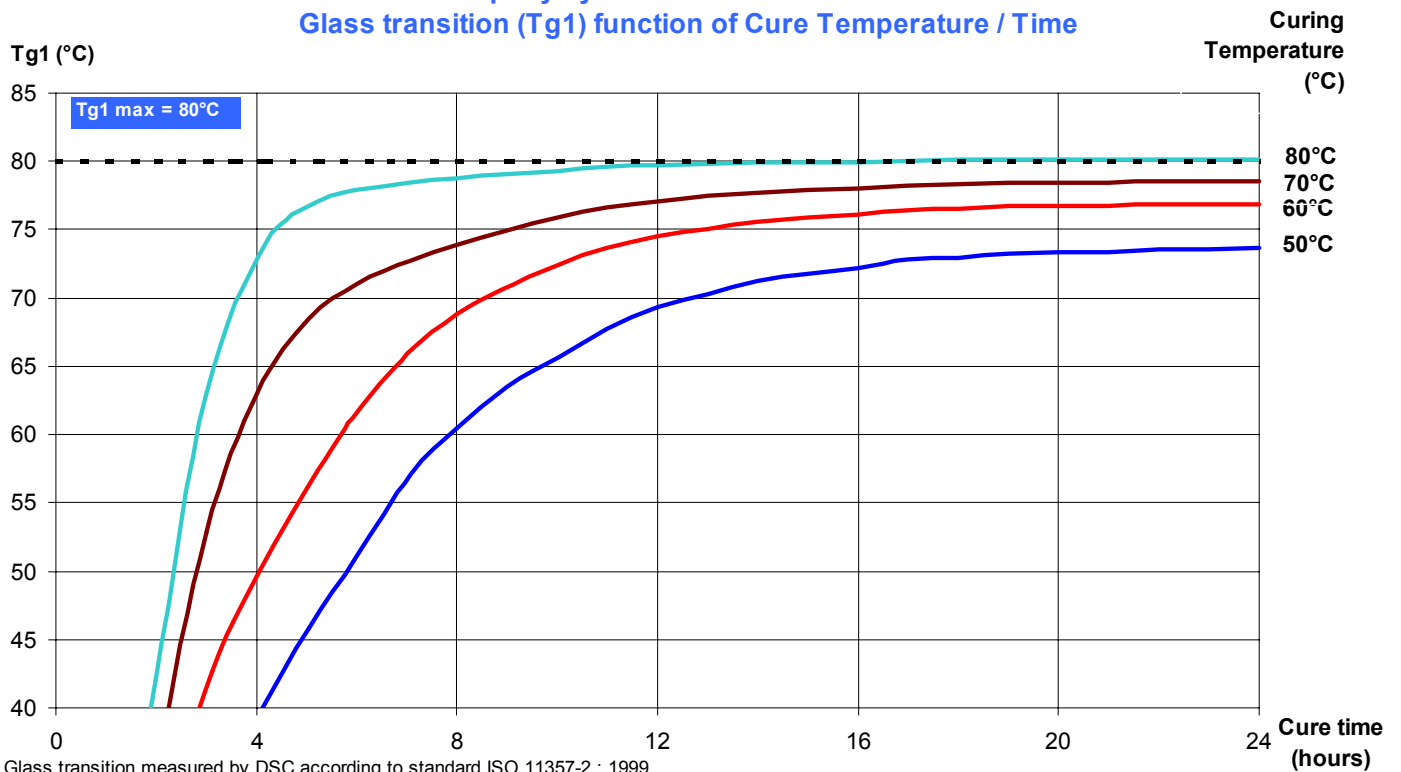
Curing Process :

- 4 Hours at 80 °C
- 8 Hours at 70 °C
- 16 Hours at 60 °C

HDT : (Heat Deflection Temperature) according ISO 75-2 : 1993 (F)

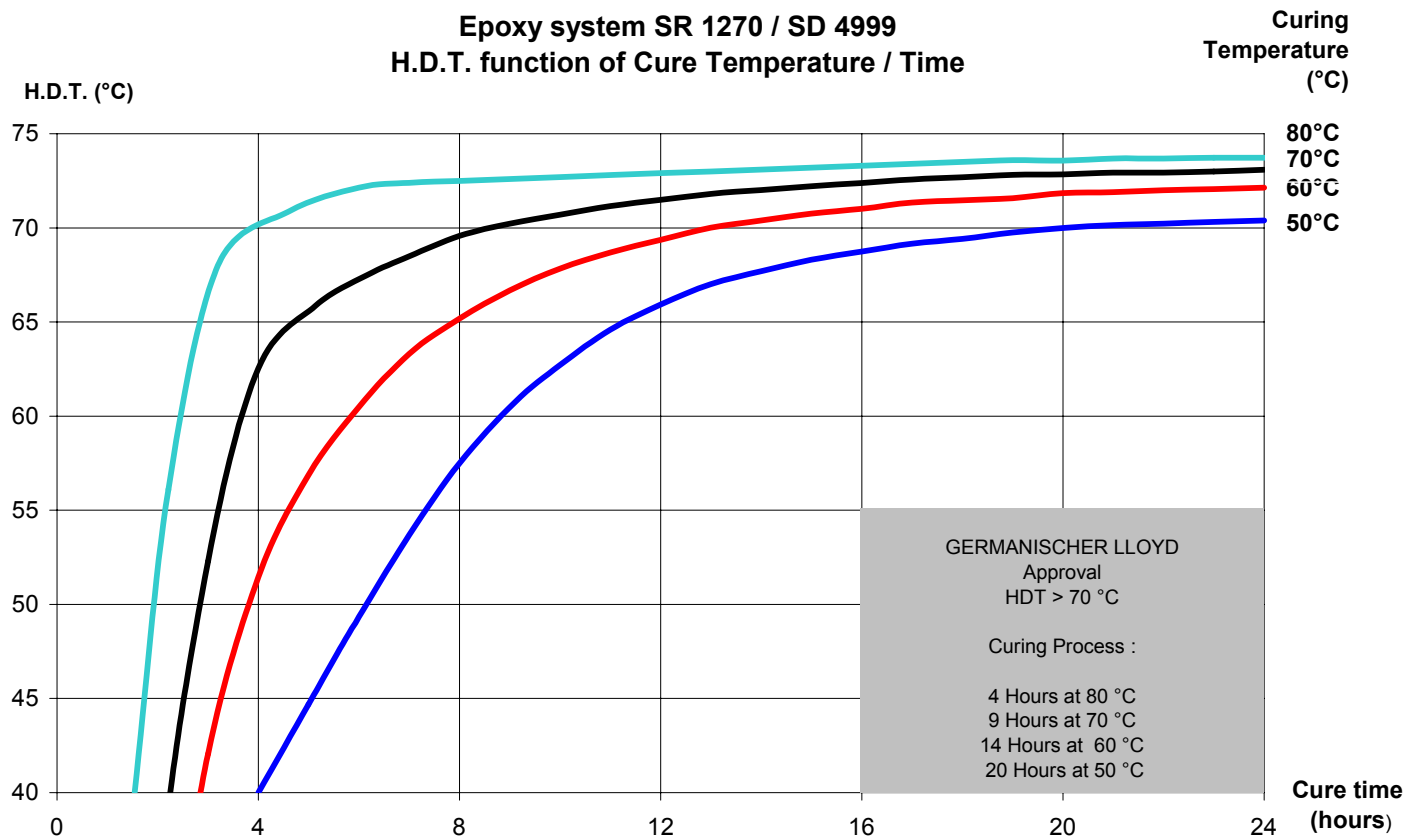


Epoxy system SR 1270 / SD 4999 Glass transition (Tg1) function of Cure Temperature / Time



Glass transition measured by DSC according to standard ISO 11357-2 : 1999.
Tg1 : 1st point at 20°C/mn (Onset method) - Tg1 max : second run -5°C/180°C under N₂

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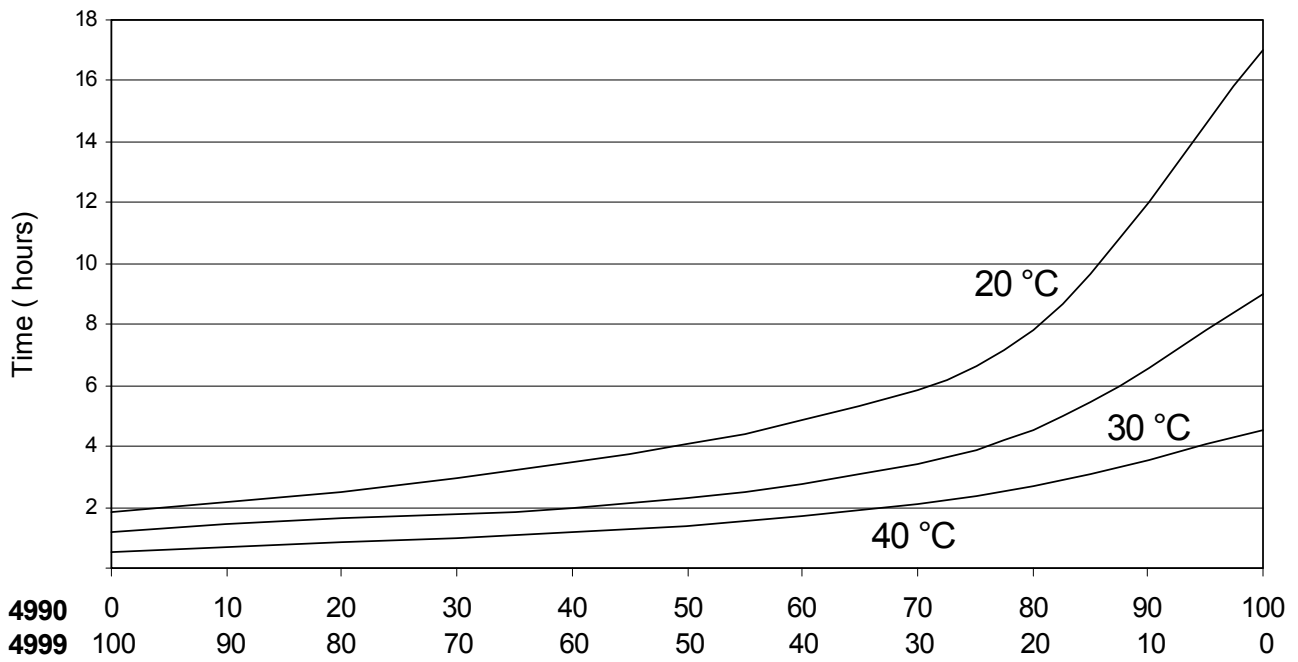
Curing Process :

- 4 Hours at 80 °C
- 9 Hours at 70 °C
- 14 Hours at 60 °C
- 20 Hours at 50 °C

HDT : (Heat Deflection Temperature) according ISO 75-2 : 1993 (F)



500 µm dust free film



Hardener mixing ratio SD 4999 / SD 4990 with SR 1270