

# CNSL Curing Agents for Epoxy Grout and Adhesive Formulations

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# Content

- Waterborne NX-8101
  - Tile grout and adhesives
- Phenalkamines/Phenalkamides
  - Fast strength development construction adhesive, NX-5608
  - Grout: cost effective, NX-2003D
  - Grout: high strength, GX-3090



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**Grout:** is a fluid form of concrete used to fill gaps. It is used in construction to embed rebars in masonry walls, connect sections of pre-cast concrete, fill voids, and seal joints such as those between tiles.

- Tiling grout
- Flooring grout
- Resin grout
- Non-shrink grout
- Structural grout



# Type of Grouts



# Clear System

Test items	Epon828/NX-8101
Lap shear strength(MPa) on steel	9.8
Shore D	74.3
Compressive strength (MPa)	33.0
Tg(°C)	65.5
PHR	141
Pot life	60min
Mixed Viscosity at 25 °C(cps)	1850
Comments	Cured 9days at RT



# Tile Grout/Adhesive I

Part A	Wt
NPEL128	7.3
XY748	1.3
<b>NX-2026</b>	1.7
A501	0.03
Betone 27	0.17
Cement	23.2
Total wt	33.7

  

Part B	Wt
<b>NX-8101</b>	10.93
A501	0.17
DI water	7.3
Silverbond602	36.8
100# sand	13.2
Total wt	68.4

**NPEL128:** Liquid epoxy (EEW=190)

**NX-2026:** Cardolite Cardanol

**XY748:** Aliphatic glycidyl ether

**Cement:** Portland cement (P.O 42.5R)

**100# sand:** 100mesh Silica sand

**A501:** Air Release additive.



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# Tile Grout and Adhesive I: Test Results

Test items		NX-8101
Compression strength, MPa		53.7
Shore D	1 day	77
	2 day	78
	7 day	80
Working time (minute)		>40
Viscosity		Paste

In the tile grout formulation, NX-8101 exhibits excellent compression strength and fast hardness development with extended working time



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# Tile Grout/Adhesive II

Part A	Wt
NPEL128	7.3
<b>Ultra LITE 513</b>	1.3
<b>NX-2026</b>	1.7
A501	0.03
Betone 27	0.17
Cement	23.2
Total wt	33.7

  

Part B	Wt
<b>NX-8101</b>	10.93
A501	0.17
DI water	7.3
Silverbond602	36.8
100# sand	13.2
Total wt	68.4

**NPEL128:** Liquid epoxy(EEW=190)

**NX-2026:** Cardolite Cardanol

**Ultra LITE 513:** Mono epoxy functional CNSL diluent

**Cement:** Portland cement (P.O 42.5R)

**100# sand:**100mesh Silica sand

**A501:** Air Release additive.



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# Tile Grout/Adhesive II: Test Results

Test items		NX-8101
Compression strength, MPa		48.5
Shore D	1day	75
	2day	80
	7day	80
Working time (minute)		>40
Viscosity		Paste

- ✓ Use of UL-513 instead of AGE offers comparable performance
- ✓ NX-8101 shows good compression strength, hardness and long working time



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Test items	Epon828/NX-5608	Epon828/NX-2003D	Epon828/GX-3090
Lap shear strength on steel (Mpa)	16	20	14.7
Tensile Strength(Mpa)	62	51	56.8
Compressive strength (Mpa)	92	75	105.8
Tg(°C)	99	79	98
PHR	50	50	36
Gel Time at 25 °C(min)	13	35	50
Mixed Viscosity at 25 °C(cps)	3770	3450	3650
Comments	Fast cure and high strength	Lower cost	High strength and longer working time



# Clear Systems

Components	1A	1B	2A	2B	3A	3B
Epoxy resin(EEW=190)	43.7		28		32	
<b>UL-513</b>			2			
<b>NX-5608</b>		43.7		28		16
<b>NX-2026</b>						5
Bentone 27	2.2	0.5				
Silverbond 602	52.8	52.8				
CaCO3 powder			70	72	68	79
Fumed silica(HL380)	1.3	3				
Total(wt)	100	100	100	100	100	100

Test results	Lap shear, Mpa	Tensile strength, Mpa	Flexural strength, Mpa	Compression strength, Mpa	Tg, °C	Gel time(min) at 25°C, 100g	Lap shear, Mpa, at 3hr at 25°C
1A/1B=2:1	16.2	26.1	47.0	75.4	94.2	29	5.58
2A/2B=2:1 Low cost	14.2	18.8	35.5	62.1	92.1	34	4.36
3A/3B=1:1 Low cost	12.3	19.5	34.4	34.4	77.5	30	4.56

\* Cure condition: 40°C/16hr

## 2K Epoxy: Construction Adhesives(Fast Strength Development)

Part A	Formulation, wt
Epoxy resin(EEW=190)	70
1,4 butanediol diglycidyl ether	30
Total	100
Part B	
<b>NX-2003D</b>	57
Part C	
Aggregate	471

Aggregate:Sikadur 42 MP Normal aggregate

Test items	Part A/B/C=100/57/471
Compression strength, Mpa	49.2
Tg, °C	48.1
Gel time at 250g at 25°C, min	88
Working time at 250g at 25°C, min	50
Flowability	Easy to flow

\* Cure condition: 40°C/12hr + 60°C/4hr

## 2K Epoxy Grout I: Cost Effective



Part A	Formulation I, wt	Formulation II, wt	Formulation III,wt
Epoxy resin(EEW=190)	75	75	75
1,4 butanediol diglycidyl ether	25	25	25
Total	100	100	100
Part B			
<b>GX-3090</b>	40	40	40
Part C			
Sikadur 42 MP aggregate	560		
Silverbond 602(silica)		140	
Sands*+Silverbond 602			350

\*Sand blend: 16#Sand/24#sand/40#sand=70/70/140

Test items	Formulation I, Part A/B/C=100/40/560	Formulation II, Part A/B/C=100/40/140	Formulation III, Part A/B/C=100/40/350
Compression strength at max, MPa, <b>cured at 60°C/24hr</b>	92	121	101
Tg, °C	74	74	74
Gel time at 250g at 25°C, min	95	95	95
Working time at 250g at 25°C, min	63	63	63
Flowability	Easy to flow	Easy to flow	Flowable

**GX-3090 can achieve compression strength greater than 120MPa with selected filler, i.e Silica**

## 2K Epoxy Grout II: High Strength