

Waterborne CNSL Curing Agent for Concrete Coatings

NX-8100 Series
Cardolite Marketing
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NX-8101

- Cardanol based waterborne curing agent for use in floor coatings
 - Low color with excellent film appearance
 - Fast cure and hardness development
 - Excellent adhesion over dry and damp concrete
 - Excellent self-leveling properties
 - Visible end of pot life
 - Good stain resistance
 - Good formulation latitude
 - Cost effective



Typical Properties

Properties	NX-8101	Competitive WBCA
Viscosity @ 25°C (cPs)	20000-55000	40000
Amine value (mg KOH/g)	140-180	150-190
Solids (%)	50	50
AHEW	270	275
Color (Gardner)	≤ 10	≤ 5
Recommended, (phr, EEW 190)	130-155	140-180

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Admix Reduction With Water

Curing Agent	Effort Required to Lower Admix Viscosity With Water
NX-8101	Very easy to reduce with water
Competitive WBCA	Initial resistance for water acceptance

When admixed with standard liquid epoxy, NX-8101 is easily reduced with water



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High Humidity Film Appearance with Liquid Epoxy



NX-8101

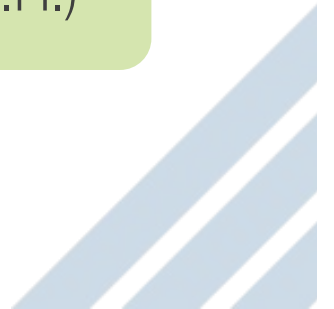


Competitive WBCA

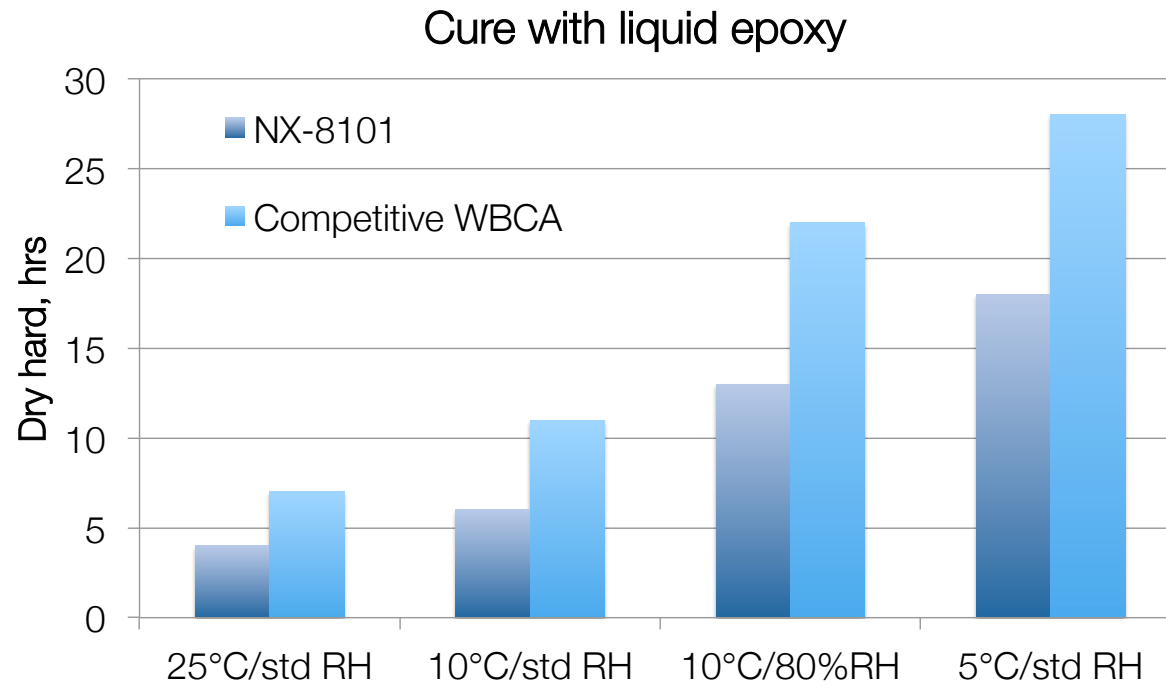
NX-8101 exhibits good flow and film formation under LTC and high humidity (10°C / 80% R.H.)



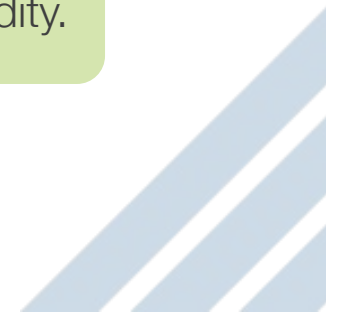
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Cure Properties

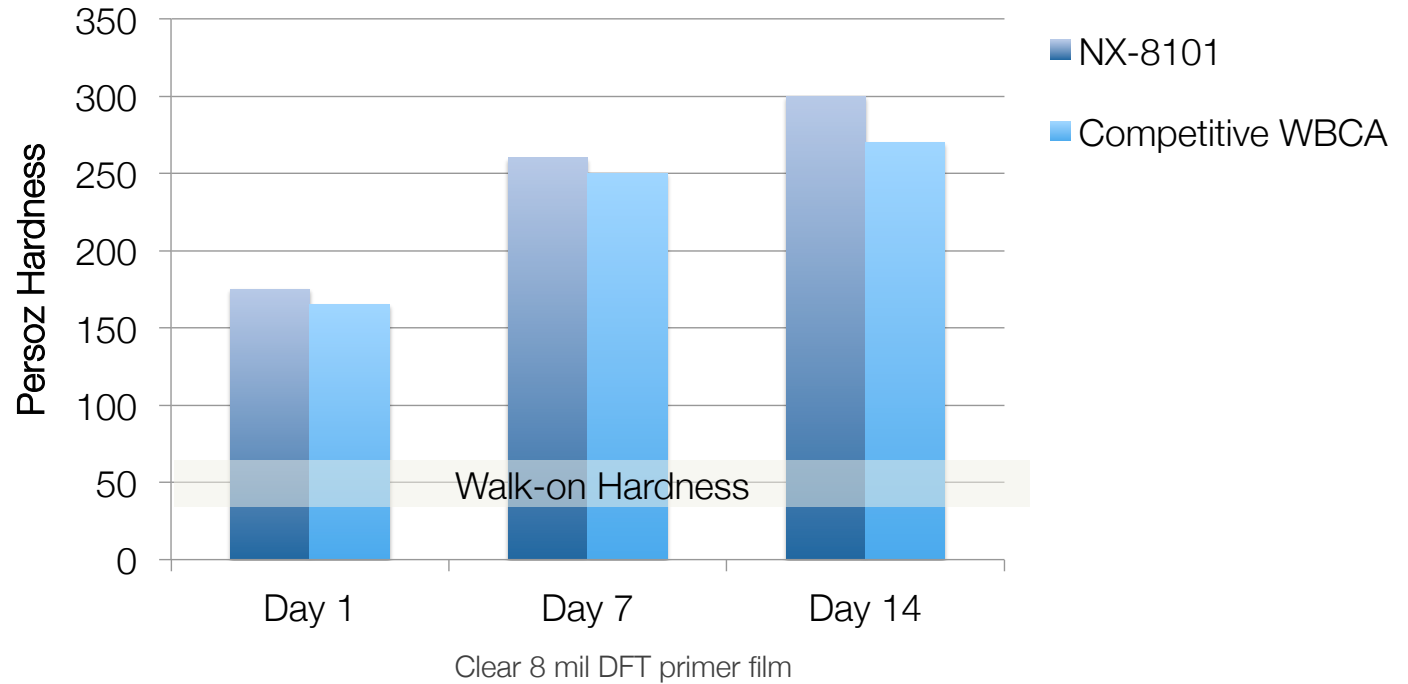


NX-8101 shows faster cure than competitive WBCA at room and low temperatures, and low and high humidity.



Hardness Development @ 25°C

Cured with liquid epoxy



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Both systems show fast walk-on hardness in clear non-pigmented formulation

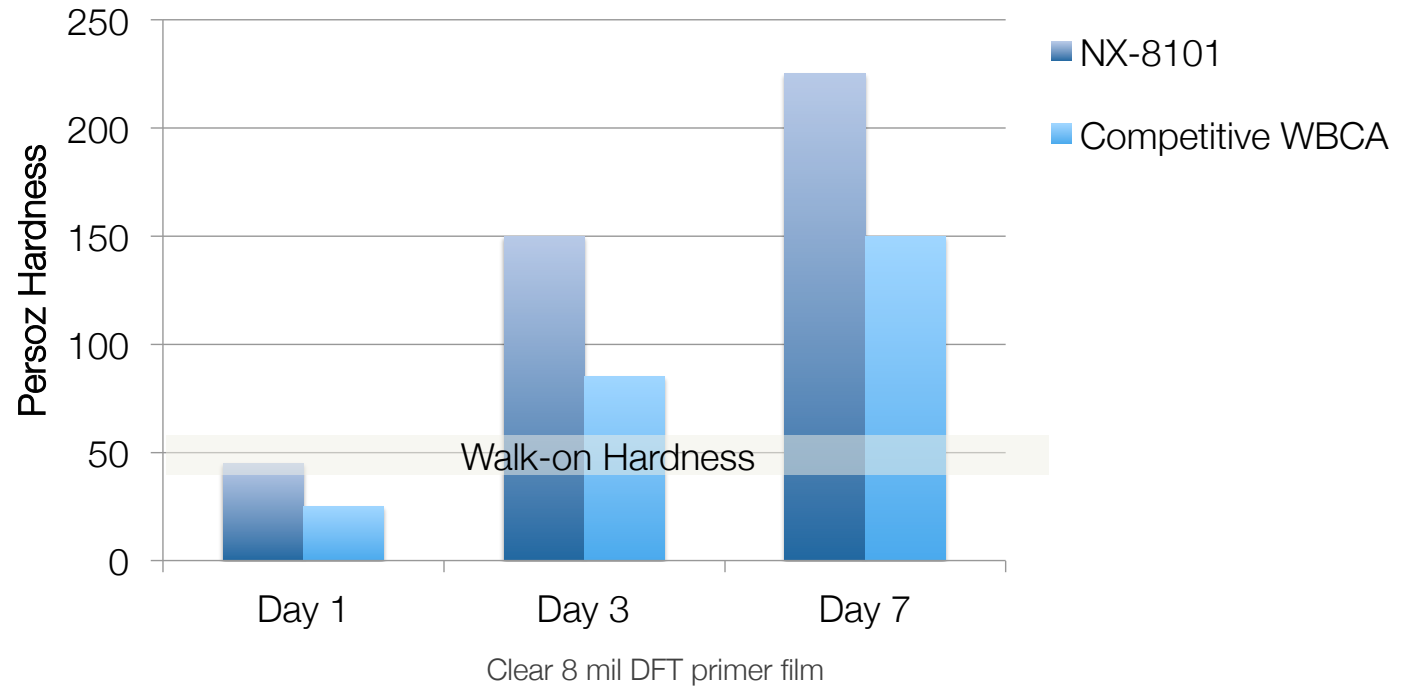


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Hardness Development @ 10°C/80% R.H.

Cured with liquid epoxy



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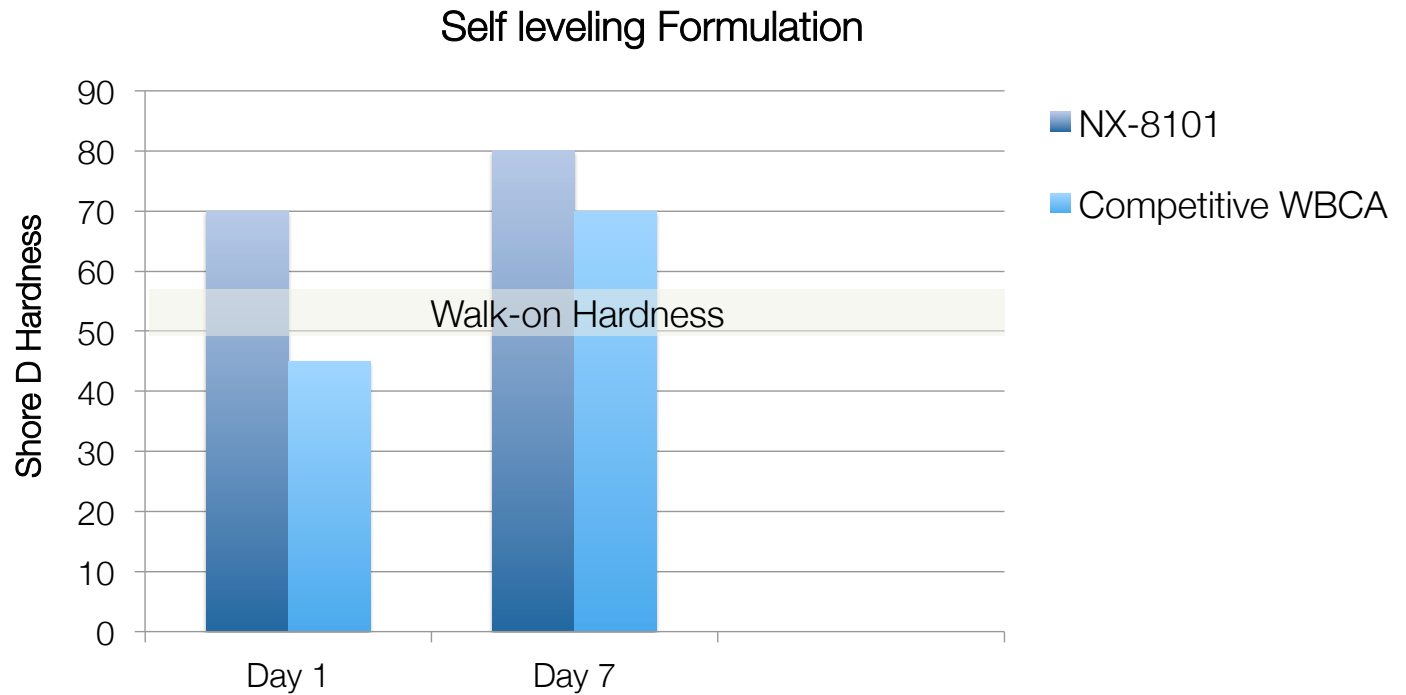
Even under high humidity LTC conditions,
NX-8101 allows quick walk-on times



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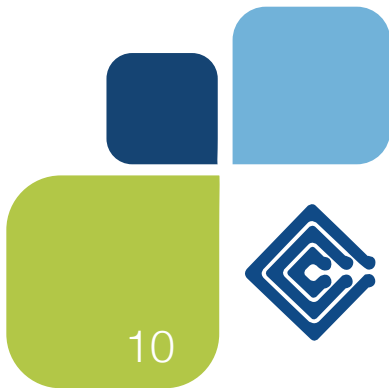


Hardness Development @ 25°C



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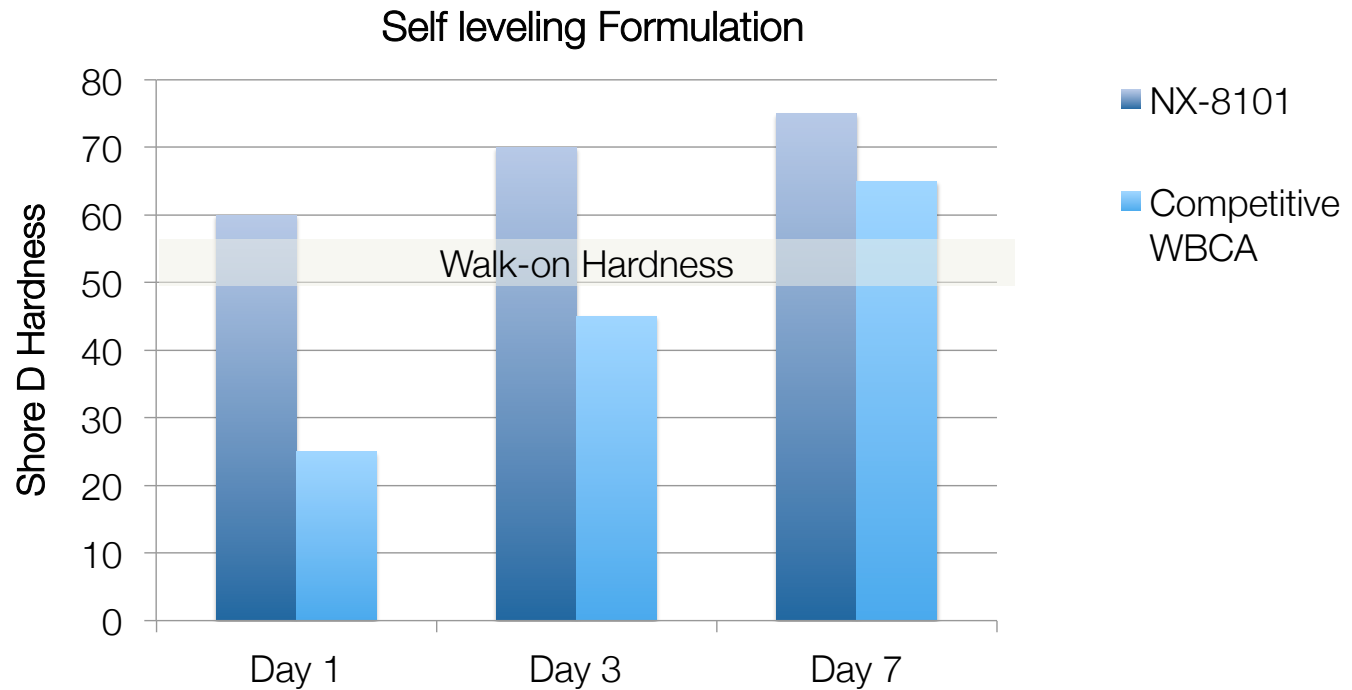
In a self-leveling formulation, NX-8101 achieves walk-on hardness on the first day, faster than competitive hardener. (3 mm film thickness)



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Hardness Development @ 10°C / 80% R.H.



NX-8101 self-leveling formulation permits early, Day 1, walk-on hardness at low temperatures and high humidity. It takes over 3 days to achieve the same hardness with competitive hardener. (3 mm film thickness)





Flexibility

Pigmented Formulation #1

	NX-8101	Competitive WBCA
Direct Impact	20 in-lbs	15 in-lbs
Reverse Impact	4 in-lbs	< 4 in-lbs

*25°C cure for 7 days before impact testing

NX-8101 shows slightly better impact resistance than competitive WBCA. DFT of 100μ (over CRS)





Adhesion to Concrete

Adhesion to Dry Concrete:

- Used 25 mil drawdown applicator to apply primer on concrete paver and cured film for 7 days before adhesion test.

Adhesion to Damp Concrete:

- Concrete pavers fully immersed in water. After 72 hrs freestanding water on the top removed by blotting with paper towels.
- Pavers were ½ immersed in water and primer was applied with a 25 mil drawdown applicator
- Coated pavers were cured for 7 days before adhesion test.



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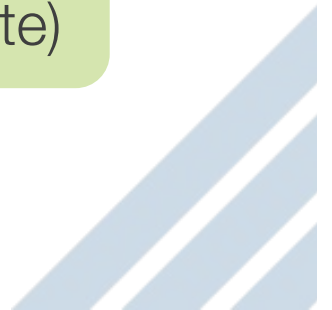


Adhesion to Concrete

Curing Agent	Dry Concrete (psi/MPa)*	Wet Concrete (psi/MPa)*
	Direct to concrete	Direct to concrete
NX-8101	650 / 4.48	620 / 4.27
Competitive WBCA	625 / 4.30	523 / 3.56

*Mode of failure: in the concrete

NX-8101 shows excellent adhesion to dry and wet concrete. (failure mode = concrete)



Chemical / Stain Resistance

MEK Resistance 7 day cure @ 25°C (200 double rubs)

	Marring	Break-through	Softening
NX-8101	Yes	No	Slight
Competitive WBCA	Yes	No	More

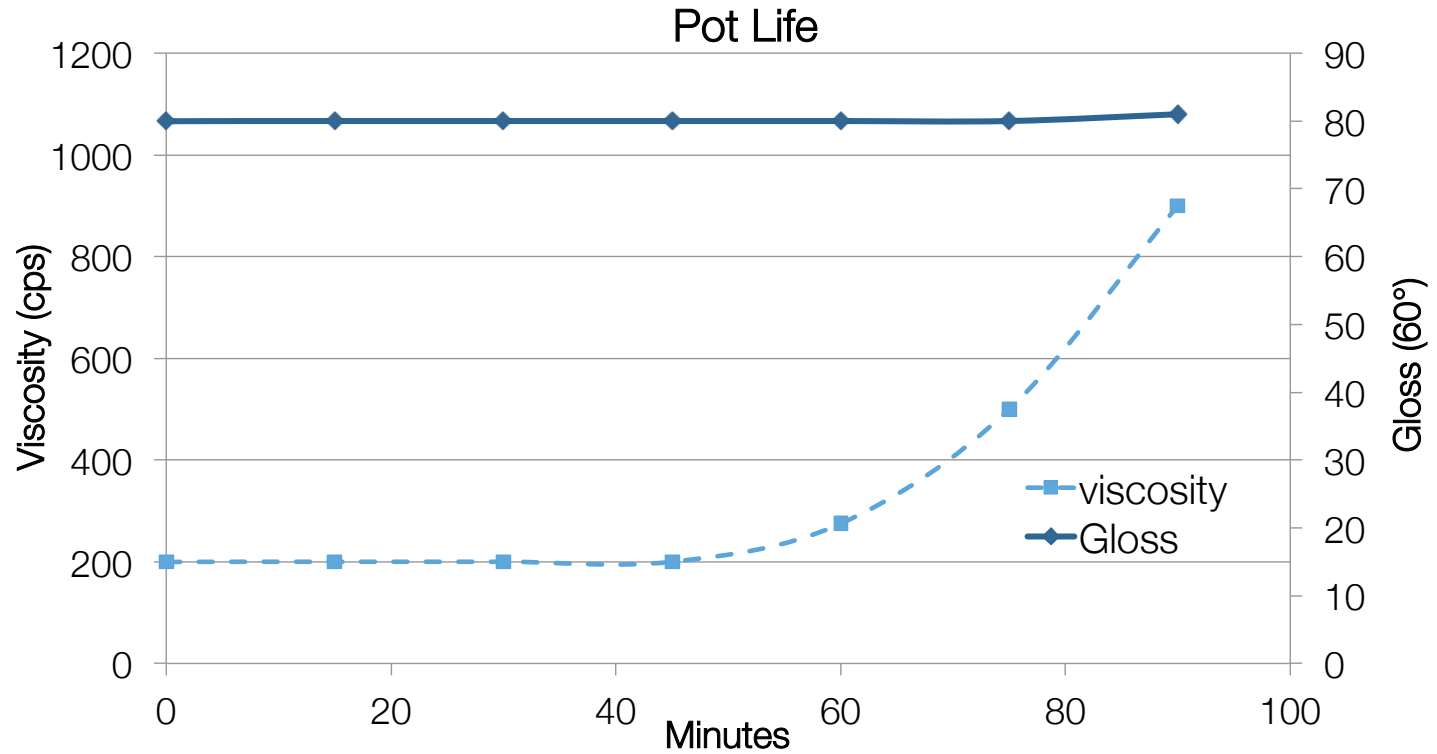
24 hour Spot Test @ 25°C

	NX-8101	Competitive WBCA
Mustard	Slight stain	Slight stain
Ketchup	No Effect	Slight stain
3% Acetic Acid	No Effect	No Effect
Bleach	No Effect	No Effect
Coffee	No Effect	No Effect
Ethanol	No Effect	No Effect
Xylene	No Effect	No Effect

NX-8101 shows good stain resistance.



NX-8101 Pot Life @ 25°C



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NX-8101 provides a visible end of pot life with admix viscosity starting to increase after 1hr at 25°C

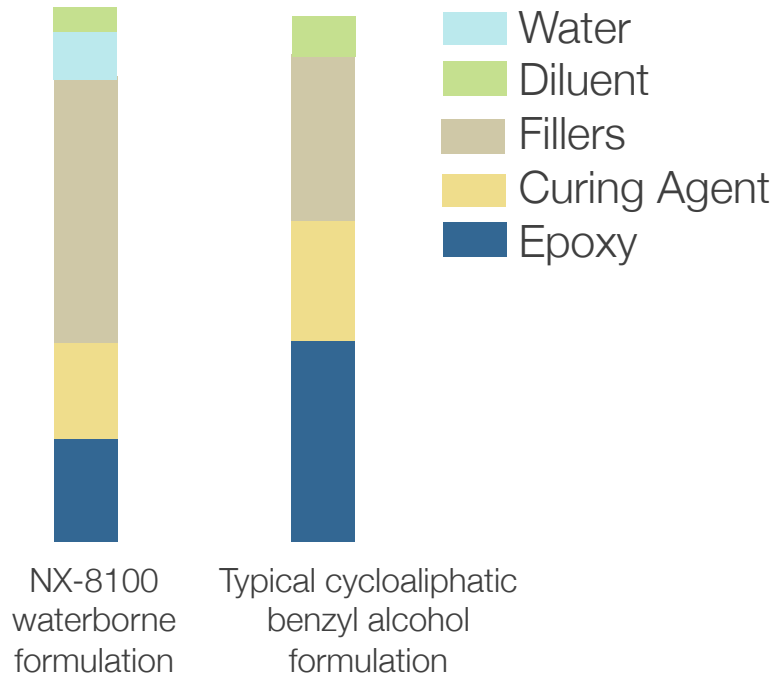
Admixed with standard liquid epoxy reduced with water – total weight solids 52%



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Formulation Relative Costs

Relative Amounts



NX-8101 Self-leveling formulation:

- Diluent demand is less
- Relative filler loading is more than 2 times greater
- Water content used for viscosity reduction is a minimal cost
- Results in lower relative applied cost

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Systems based on NX-8101 can take greater filler loading, which results in lower cost formulations.



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Formulation Guidelines

- Standard liquid epoxies can be used (based on Bisphenol A or F)
- No additional emulsifiers are required
- Reactive diluents (mono or di-functional) can be used without additional emulsifiers
- Dispersants like Disperbyk 192 help with pigment wetting
 - *(The dispersant can be used in either the epoxy (PART A) or the curing agent (PART B) to aid in pigment dispersion)*
- Defoamers like BYK 045 and BYK 054 help with air release and surface appearance
- NX-8101 systems can be pigmented in the part A or B
- Temperature of NX-8101 should remain below 40°C during the pigment dispersion phase



Clear Floor Primer

PART A	Wt.
EPON 828	86.93
Heloxy 8	11.84
BYK 348	0.62
BYK 054	0.62
subtotal	100.00

PART B	Wt.
NX-8101	130.00
subtotal	130.00

PART C	Wt.
D.I. Water	42.00
subtotal	42.00

- Mix Part A + B together first
- Then reduce with half the Part C water
- Adjust final mix with remaining water

Total Wt. A + B + C 272.00



Self-Leveling Formula

PART A	Wt.
EPON 828	19.27
Heloxy 8	2.13
DISPERBYK 111	0.51
Rhodopol 23 (xanthan gum)	0.05
Cimbar 325 (barium sulfate)	20.50
TIPURE R-706	6.30
BYK 054	1.23
subtotal	50.00

PART B	Wt.
NX-8101	27.00
subtotal	27.00

PART C	Wt.
D.I. Water	24.00
subtotal	24.00

PART D	Wt.
Sil-Co-Sil 106 (quartz powder)	81.29
US Silica NJ #70 (quartz sand)	98.71
subtotal	180.00

Total A + B + C + D 281.00

- Mix Part A + B together first
- Then reduce with half the Part C water
- Next stir in the Part D silica sand mixture
- Adjust final mix with remaining water



Pigmented Formulation #1

PART A	wt.
EPON 828	52.16
Heloxy 8	3.13
Disperbyk 192	1.59
Cimbar EX barium sulfate	11.70
TIPURE R-706	31.30
BYK 054	0.13
subtotal	100.00

PART B	wt.
NX-8101	74.00
subtotal	74.00

Total Wt. A & B 174.00

PART C	wt.
D.I. Water	25.00
subtotal	25.00

Total Wt. A + B + C 199.00

- Mix Part A + B together first
- Then reduce with half the Part C water
- Adjust final mix with remaining water



Pigmented Formulation #2

Part A

EPON 828	32.00
sub total	32.00

Part B

NX-8101	43.59
D.I. Water	18.54
Disperbyk 192	2.32
Imsil A25 silica	9.05
Cimbar EX barium sulfate	9.41
TIPURE R-706	10.50
BYK-361N	0.54
BYK 054	0.62
D.I. Water	5.43
sub total	100.00

Total Wt. A + B 132.00

- Mix Part A + B together well before application



Conclusion

Properties	NX-8101	Competitive WBCA
Easy Mixing with liquid epoxy	Excellent	Fair
Fast cure at low temperatures and high humidity	Excellent	Poor
Fast hardness development at low temperatures and high humidity	Excellent	Poor
Excellent adhesion to dry and damp concrete	Excellent	Excellent
Cured films resistance to stains	Excellent	Good
Visible end pot life	Excellent	Excellent
Suitable for concrete primer formulations	Excellent	Excellent
Suitable for self-leveling formulations	Excellent	Fair

NX-8101 shows excellent properties in waterborne epoxies for concrete primers and self-levelers.

