TECHNICAL BRIEF #2
COMPARISON OF EPOXY CURING AGENTS G-91 AND G-92

REVISION DATE: 3.18.2016

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SUMMARY

Epoxy Hardeners G-91 or G-92 can be employed for quick cure or low temperature cure applications with a high confidence of full cure, exceptional mechanical properties, and solvent resistance. G-91 is used at a lower dosage amount in the binder than G-92, but the G-92 cured films have the advantage of minimal yellowing. The formulator has a wide degree of latitude in formulating with either product because the curative level does not require exact stoichiometric calculation but is determined empirically depending on desired coating properties.

Epoxy powder coatings are reputable for their broad range of attributes including flexibility, toughness, chemical resistance and formulative latitude. The intent of this comparison of Epoxy Curing Agents G-91 and G-92 is to differentiate between their properties in a finished powder coating. The simplistic formulation described with these two epoxy hardeners is illustrative of functional rather than decorative applications.

FORMULATION

Binder (700 EEW epoxy + Hardener)	63.5 parts
Benzoin	0.3 parts
Resiflow P-64F	1.2 parts
Titanium Dioxide	25.0 parts
Blanc Fixe Micro, barytes	10.0 parts

PHYSICAL RESULTS

RESULTS FROM POWDER COATING EVALUATIONS			
EPOXY HARDENER USED	**EPOXY HARDNER G-91**	**EPOXY HARDNER G-91**	**EPOXY HARDNER G-92**
CHEMISTRY	MODIFIED IMIDAZOLE	MODIFIED IMIDAZOLE	ACCELERATED PHENOLIC
RATIO OF EPOXY TO HARDENER	100 : 3	100 : 5	75 : 25
PCI ORANGEPEEL RATING	2	2	2
GEL TIME, SECONDS AT 200°C	75	50	35
FASTEST CURE TIME AT 200°C (based on Solvent Resistance and Impact)	3 MINUTES	2 MINUTES	3 MINUTES
LOWEST CURE CYCLE FOR 30 MINUTES	120°C	110°C	120°C
RESISTANCE TO BRAKE FLUID (10 minute cure at 200°C)	SOME FILM SWELLING	SOME FILM SWELLING	FILM DELAMINATES
YELLOWING	TENDS TO YELLOW AT HIGHER BAKE TEMP	MORE TENDENCY TO YELLOW	REMAINS WHITE

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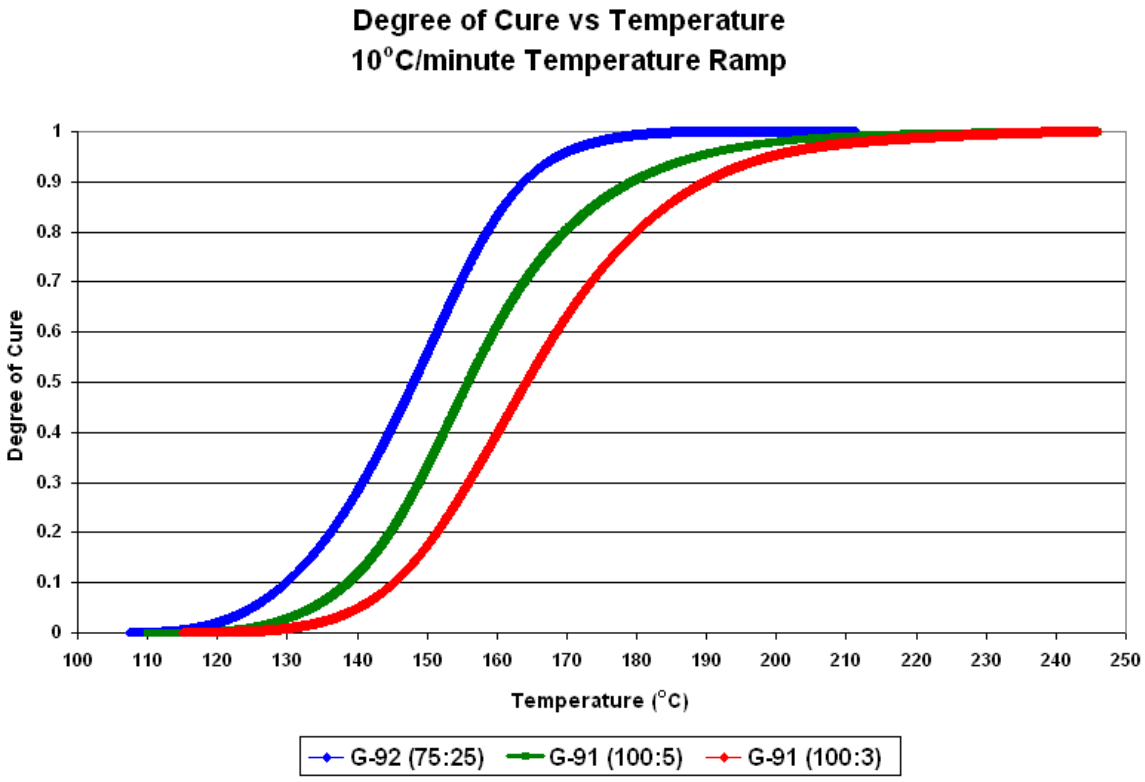
THERMAL ANALYSIS

Differential Scanning Calorimetry was undertaken to differentiate the cure kinetics. Isothermal (120°C, 160°C, and 200°C) results are tabulated, and ramp (100-250°C, 10°C/min) results are graphically illustrated below.

ISOTHERMAL DSC ANALYSES			
EPOXY HARDENER USED	**EPOXY HARDNER G-91**	**EPOXY HARDNER G-91**	**EPOXY HARDNER G-92**
RATIO OF EPOXY TO HARDENER	100 : 3	100 : 5	75 : 25
	TIME TO PEAK IN EXOTHERM (MINUTES)		
120°C ISOTHERM	9.46	5.87	1.97
160°C ISOTHERM	1.49	1.20	0.68
200°C ISOTHERM	< 45 SECONDS	< 45 SECONDS	< 45 SECONDS



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