

GMA-300G TECHNICAL BRIEF #1 HIGH TEMPERATURE APPLICATION FOR POWDER COATINGS

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OBJECTIVE

To compare film properties of high temperature resistant powder coatings made with polyester/GMA-300G to those made with polyester/TGIC. The film forming resin portion of high temperature resistant powder coatings consists of two parts, a polysiloxane resin and an organic portion such as a conventional thermoset binder. Although the organic system is eventually burned off during high temperature exposure, it has been shown to have an influence on the ultimate performance of the high temperature resistance coating.

GMA-300G is a highly functional, glycidyl acrylic polymer that easily reacts with carboxyl functional polyester resins. The formulations listed below use GMA-300G or TGIC as curing agents for a typical, linear 30-35 AV polyester at stoichiometric balance for the carboxyl-epoxy reaction. The formulations take into consideration the difference in epoxy equivalent weights of the two crosslinkers.

PROCEDURE

The black powder formulations were prepared with standard laboratory processing practices, corona spray application onto cold rolled steel panels and initially cured 10 min at 200°C (392°F). Test panels were heated for 24 hours to 700, 1000 and 1200°F (371, 538, 649°C, respectively). Gloss, chalking, pencil hardness, and adhesion were measured after high temperature exposure.

FORMULATIONS

	<u>GMA-300G</u>	<u>TGIC</u>
Silres 604, Wacker Chemie	30	30
Polyester Resin, 30-35 AV	16	18
Crosslinker	4	2
Resiflow P-67	1	1
Benzoin	0.3	0.3
Black Iron Oxide, Bayferrox 303T	7	7
Carbon Black	1	1
Barium Sulfate	40.7	40.7

FILM PROPERTIES AFTER HEAT EXPOSURE

24 hr exposure	<u>700°F</u>		<u>1000°F</u>		<u>1200°F</u>	
	<u>GMA-300G</u>	<u>TGIC</u>	<u>GMA-300G</u>	<u>TGIC</u>	<u>GMA-300G</u>	<u>TGIC</u>
Film thickness, mils (initial)	1.08	1.03	1.08	0.73	0.92	0.91
Film thickness, mils (after)	0.7	0.64	0.74	Almost No Film	No Film remaining	No Film remaining
60° Gloss (initial)	46	76	51	73	50	74
60° Gloss (after)	7	13	2	n/a	n/a	n/a
Chalking *	None	Severe	None	Severe	n/a	n/a
Pencil Hardness	2B	2B	2B	n/a	n/a	n/a
Cross Hatch Adhesion	Slight adhesion loss	Slight adhesion loss	Slight adhesion loss	n/a	n/a	n/a

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CONCLUSION

Powder coatings formulated with GMA-300G maintain a significantly higher level of film integrity than those formulated with TGIC. The most notable differences are the thermal stability as determined by adhesion to the substrate and relative amounts of chalking. The GMA-300G panels out-perform the TGIC panels.

CONTACT INFORMATION

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Revision Date: February 2, 2017