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3 GENERAL PURPOSE SYNTHETIC ENAMELS

Series Development Bulletin No. 49-4-C

Monsanto Chemical Company
Merrimac Division

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SUMMARY

These rapid-bake synthetics are designed for such products as metal furniture, exterior or interior, cabinets, shelves, lockers, waste baskets, storage cans, buttons, office partitions or any product requiring a high quality, yet medium priced, finish.

The general characteristics are:

1. High gloss, non-chipping and mar-resistant.
2. Good adhesion, flexibility and an impact-resistant finish.
3. Excellent durability.
4. Short baking cycle.
5. Good coverage.
6. Moderate price for quality obtained.
7. The white enamel in this line, A-1237, has outstanding whiteness, gloss, mar-resistance and durability with excellent retention of color and gloss after aging. One spray or dip coat properly applied produces a top quality white finish at minimum cost.

The information in this bulletin is based on our experience, represents our best judgment in the matter, and is intended to be helpful; but we cannot assume responsibility for any loss or accident that may result from its use.

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THE PRODUCT

These enamels are available in white, black, gray, beige, chocolate brown, olive green, red, maroon and yellow. The black and colored enamels are formulated of vehicle and pigment combinations designed to produce medium cost enamels of excellent quality. The black has extreme jetness and gloss. The white is necessarily more expensive in order to obtain maximum whiteness and color stability. In addition to the above colors, bright pastels and bright pigment colors are available in the same vehicle as the white. The white is 56% solids. Black and colors contain 38 to 54% solids, depending on the color. The balance of solids, pigmentation and flow properties of all these products make it possible to obtain excellent coverage in one spray or dip coat.

APPLICATION

Cleaning Surface:

As with all enamels, it is essential that the surface to be finished be thoroughly cleaned with one of the standard alkali cleaners or Triclorethylene degreasers. These Synthetics are designed for application to bare or bonderized steel and adhesion to other metals and alloys should be evaluated before using on production basis.

Thinning:

Aromatic thinners such as Xylol, Toluol or their equivalents are recommended for thinning. The colors are thinned 25 - 30% for

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spray application and 40 - 50% for dip coating. See Plate #1 for viscosities when thinned with Xylol.

The white is thinned 10 - 15% for spraying and 25 - 30% for dip application. See Plate #2 for viscosities when thinned with Xylol. Although a higher percent of thinner will be required to reach spraying viscosity, the white can be thinned with a straight petroleum thinner such as V.M. & P. Naphtha or a combination of aromatics and petroleum solvents can be used, such as Xylol and V. M. & P. Naphtha. Normal spraying viscosities are 25 - 30 seconds on the No. 2 Zahn Cup but, of course, this varies with equipment and pressures being used. Dipping viscosity is normally 20 - 25 on No. 2 Zahn Cup but viscosity and evaporation rate of the thinner will vary with speed of withdrawal and size and shape of object being dipped.

Baking:

These synthetics are formulated with a combination of resins that develop hard films with short bake cycles. With a 1 mil film thickness, the colored synthetics will bake to normal hardness with the following baking schedules:

7 minutes at 325°F.
15 minutes at 300°F.
25 minutes at 275°F.
40 minutes at 250°F.

The average baking schedules for the white enamel is as follows:

8 minutes at 325°F.
25 minutes at 300°F.
40 minutes at 275°F.
60 minutes at 250°F.

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These enamels are considered cured when the Sward hardness reaches 35-40% on the basis of the hardness of plate glass being 100%. Hardness may be increased some by longer bakes, as shown by the curves in Plates #3, #4, #5 and #6. In addition to hardness, the metal thickness and type of oven are factors to be considered in arriving at the exact baking schedule.

Any standard oven of batch or continuous type with gas, electric or infra-red heat source is suitable for baking.

PHYSICAL PROPERTIES AND LABORATORY TESTS

	A-1237 White 1999	A-1252 Brown 2253	A-1253 Black 2193	A-1255 Gray 1017
Initial Viscosity:				
Seconds with Ford No. 4 Cup at 25°C.	35	164	66	90
Abrasion Resistance:				
Using the Taber Abrader with CS-10 wheels and 500 gm. weights. Loss in mg/1000 wear cycles.	80	32	44	59
Gloss:				
Using the Photovolt Glossmeter.	85	83	100	87
Flexibility:				
Quick bend over a 1/8" D. mandrel of a 24 gauge panel with a 1.0 mil. thick film.	No Cracks	No Cracks	No Cracks	No Cracks
Impact Resistance:				
Using various striking heads on 20 gauge panels with various film thicknesses.				
100 in-lb. with a 2" D. head and 0.8 mil film	No Cracks	No Cracks	No Cracks	No Cracks

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	A-1237 White 1999	A-1252 Brown 2253	A-1253 Black 2193	A-1255 Gray 1017
20 in-lb. with a 1/2" D. head and 0.6 mil film	No Cracks	No Cracks	No Cracks	No Cracks
20 in-lb. with a 1/2" D. head and 0.8 mil film	No Cracks	Fine Cracks	Fine Cracks	Fine Cracks
20 in-lb. with a 1/2" D. head and 1.0 mil film	No Cracks	Fine Cracks	Fine Cracks	Fine Cracks
30 in-lb. with a 1/2" D. head on 1.1 mil film on the finished side of the panel	No Cracks	No Cracks	No Cracks	No Cracks
30 in-lb. impact using a 1/2" striking head on the unfinished side of 20 gauge panel	No Cracks			

In addition to the above, the durability of these enamels has been demonstrated by the following laboratory tests:

1. Panels of the white, black and brown enamels with two diagonal scratches through the film have been immersed in aerated water at 100 - 105°F. for 800 hours without serious blistering or rust creepage back from the scratch.
2. Several resistance tests of the Steel Kitchen Cabinet Institute have been made on the A-1237 White Enamel. When drops of 190 proof alcohol are placed on this finish and allowed to evaporate at room temperature, no etching, softening or loss of gloss results. A panel immersed in

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vegetable oil at 200°F. for two minutes shows no signs of discoloration, softening or loss of gloss. A panel immersed in 1.5% of "Gold Dust" solution for 60 minutes at 180°F. shows no blistering, pinholing, gloss reduction or undue softening.

QUALITY CONTROL

In order to insure uniform high quality, each batch of these enamels is tested for percent solids, viscosity, storage stability, adhesion, flexibility, impact-resistance, abrasion-resistance and gloss.

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