MARCUS OIL & CHEMICAL

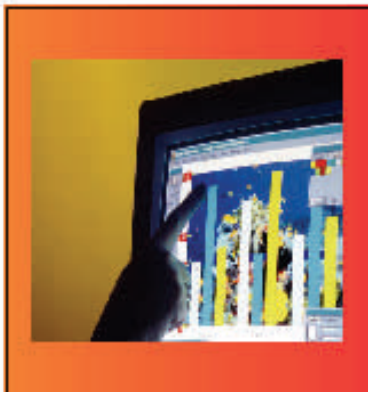
Marcus Low Molecular Weight Polyethylene Waxes For Ink Application

Marcus Micronized Product Offering

Marcus Grade	Mettler Drop Point ^{0}C	Needle Pene-tration dmm	Density gms/cc	Average Particle Size (microns)	Acid Number (mgKOH/g)
M5005	118	2	0.94	5	nil
M5010	118	2	0.94	10	nil
M3310	118	4	0.97	10	7

Marcus Homopolymer Product Offering

				Viscosity	
M200	118	2-3	0.94	10-20	nil
M300	118	2-3	0.94	20-40	nil
M500	118	2-3	0.94	40-60	nil
Test Method	ASTM D3954	ASTM D1321	ASTM D1505	ASTM D3236	



Marcus Polyethylene waxes are used in printing inks as additives to improve scuff and scratch resistance, to reduce blocking and offsetting of stacked sheets, and to vary the coefficient of friction or slip.
Marcus Polyethylene waxes are used in many areas of letterpress, lithographic, gravure, flexographic, and silk screen printing including oil-based, aliphatic and aromatic solvent, water flexo, water-based gravure, and glycol-based inks.
In drying oil and heatset inks, the usual amount is 2 to 4 percent. In gravure or flexographic inks, the usual amount is 1 to 2 percent of total ink solids. In oleoresinous, heatset, and other paste-type inks, the grades most commonly used are Marcus M200 and M300. These grades are supplied in pellet or powder form. Finely micronized Marcus Polyethylene waxes grades are also used for these types of inks, particularly M5010 and M5005.

Incorporation of Low Molecular Weight Polyethylene
There are several options to incorporate Marcus Polyethylene Waxes into printing inks depending on the equipment available and the printing method being used.

In letterpress and offset paste inks the particle size must be very small. Marcus Micronized grades can be dispersed into any ink vehicle after the pigment grinding without additional processing.

Non micronized Homopolymer grades are normally too large and require compounding. This involves the preparation of a fine particle size paste by mechanical means.

Polyethylene waxes can be incorporated into liquid inks by: i) Cold Milling; ii) Dissolving in solvents at elevated temperatures or iii) Dispersing micronized grades in a high shear mill / mixer or ball/pebble mill.

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Marcus Low Molecular Weight Polyethylene Waxes For Ink Application

Marcus Micronized Polyethylene waxes may be stirred into almost all types of inks without the need for further particle size reduction. Other grades require compounding or milling. For oleoresinous, heatset, and similar inks, this usually involves the preparation of a compound similar in appearance to a thick petrolatum. This can be done in several ways:

1. Heat with stirring a mixture consisting of 25 percent Marcus polyethylene and 75 percent of an ink vehicle to a temperature at which the polyethylene is in solution 105-150°C (225-300°F). Pour the hot liquid onto the rear roll of a three-roll mill and allow to pass through the mill. The resulting compound can be stored for later addition to the ink during the pigment dispersion step.
2. A mixture of about 40 percent Marcus polyethylene and 60 percent of a high viscosity ink vehicle (bodied linseed or other) is brought to a temperature of 105-120°C (225-250°F) by the action of a high speed disc-type disperser. Sufficient room temperature ink vehicle is added rapidly as a quench to reduce the polyethylene content to 25 or 30 percent. The resulting compound can be stored and used as above.
3. Dissolve 20 to 25 percent of Marcus polyethylene in a high boiling hydrocarbon ink oil. Required temperature is about 85°C (185°F). Pour the hot solution onto a rotating chill roll equipped with a doctor blade, or pass it through a 3-roll mill. The gels obtained can be used in the same manner as in 1 and 2 but are more difficult to disperse in the ink.

For dispersion in liquid inks, the following methods are suggested.

1. Ball or pebble mill 20 to 25 percent of powdered grade of Marcus polyethylene into a solvent (xylene, toluene) or into a low solids solution of the ink resin. This concentrate can be stirred into the ink at any stage of manufacture. For water flexo inks, isopropanol is used rather than the xylene or toluene. Also, as with the solvent-based inks, 20 to 25 percent of the powdered polyethylene can be ball or pebble milled into a low solids solution of the ink resin. The resulting polyethylene concentrate can be easily stirred into the ink.
2. Heat the polyethylene in xylene or toluene with stirring until completely dissolved (85°C, 185°F), and cool with stirring. Twenty percent polyethylene will form a stiff gel which can be easily ball or pebble milled into the ink along with the pigment. Ten percent or less of polyethylene will form a soft gel which can usually be stirred into the ink without milling.
3. Is the same as 2 except that a 30 - 40 percent solids solution is prepared. Enough cold solvent is added to the hot solution to bring the solids down to 10 or 20 percent. This method gives rapid cooling, which results in finer particle size. Less solvent is heated, which reduces flammability and toxicity problems.
4. Polyethylene can be heated to 150°C (300°F) and poured into cold solvent with vigorous agitation. Dispersions produced in this manner tend to be slightly coarse, but flammability and toxicity problems are minimized.

Water based emulsions have also been used—see Marcus Emulsion

Polyethylene is not soluble in the lower alcohols, esters, and ketones. Grinding techniques are generally used