

DOVER PRODUCTS ADD PERFORMANCE AND CUT FORMULATION COSTS FOR PAINTS, LACQUERS AND VARNISHES

- MILIDIN® GX-3
- DOVERSPERSE®

- PAROIL® & CHLOROWAX®
- CHLOREZ® & HORDARESIN®

- DOVERLUBE® CALCIUM & ZINC STEARATE PRODUCTS

Dover offers a broad range of additives to reduce coatings formulation costs by extending resins, reducing dispersants, and replacing more expensive plasticizers and pH buffers.

Additional benefits to end products are described in the following pages. Dover offers additives suitable for solvent or waterborne systems. Your Dover representative will help you select the products that best meet your performance requirements.

MILIDIN® GX-3

Milidin GX-3 advanced technology hindered amine cuts dispersant costs by 52 percent and overall additive costs by 35 percent compared to ammonia in water-based coatings systems. It also improves storage stability, neutralizes water borne resins, improves thickener performance, controls viscosity and aids in pigment dispersion.

Milidin GX-3 represents the third generation in hindered amine technology. The second generation reduced the smell and volatility associated with ammonia, the first hindered amine. This latest technology also solves those problems, and is a much better pH buffer, offering far greater storage stability.

Results of laboratory tests comparing the pH control of Milidin GX-3 to a commonly used second-generation hindered amine are shown in Figure 1.

pH OF LATEX PAINT

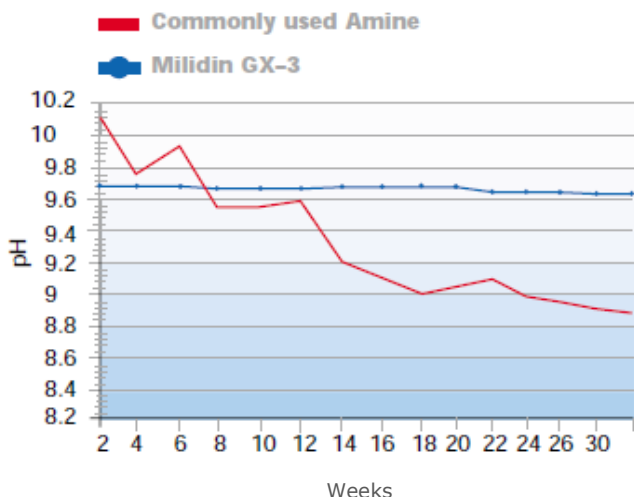


FIGURE 1

Oxidation or evaporation of the amine buffer caused a decrease in pH, which led to decreased gloss, changes in viscosity and less efficient pigment dispersion. Milidin GX-3 is a trifunctional molecule with very high reserve alkalinity to keep pH constant longer for increased shelf life. Its pH in a 1 percent solution is 10.5. For sufficient pH control, Milidin GX-3 can be added to water-based solutions or emulsions so that the concentration in the finished material is 1000–2000 ppm.

Milidin GX-3 also provides excellent pigment dispersion, and reduces the amount of expensive dispersants required by 52 percent. In the test shown in Figure 2, Milidin GX-3 was compared to a commonly used hindered amine at equal levels in a dispersion of a difficult pigment.



FIGURE 2

Samples were mixed and allowed to settle for 30 days, and checked again at six months; Milidin GX-3 showed no change. Milidin GX-3 provides excellent performance at lower cost than the other amine product, and reduces overall additive costs by 35 percent.

Milidin GX-3 is compatible with other additives that are stable under alkaline conditions. It does not contain any phenol or phenolic derivatives, heavy metals, nitrates, nitrites or nitroso-amines. It is a low toxicity product.

Water-based formulations using Milidin GX-3 have improved gloss retention, improved wetting, faster overall cure, reduced odor and longer shelf life.

PAROIL® & CHLOROWAX®

Paroil and Chlorowax liquid chlorinated alkanes improve the flame resistance of coatings, adhesives, caulks and sealants. They are cost-effective extenders of most resins. They also are cost-effective, non-volatile plasticizers. Additionally, they improve adhesion, water and chemical resistance, and oil and gas resistance.

LONG-CHAIN CHLORINATED ALKANES , C₂₀₊

Product	Color, Typical Gardner (1933 Std.)	Chlorine Content % by Wt.	Specific Gravity @ 25°C	Viscosity, Poise @ 25°C	Viscosity, SUS @ 210°F	Density, Pounds Per Gallon	Volatility % Loss, 24 hrs. @ 100° C	Stability JQD % HCl, 4hrs @ 175°C	Flash Point ° F (Cleveland Open Cup)
Chloroflo 42	2	40.0	1.120	8	83	9.3	0.5	0.3	>450
Paroil 140	1	42.0	1.170	29	150	9.6	0.8	0.3	>450
Paroil 140 LV	2	43.5	1.185	30	140	9.9	N/A	0.2	>450
Paroil 140 LVXS	1	42.0	1.171	23	127	9.8	N/A	N/A	>450
Paroil 142	2	45.5	1.215	70	200	9.9	0.8	0.4	>450
Paroil 142 LV	2	43.2	1.200	49	167	10.0	N/A	0.2	>450
Paroil 145	2	46.5	1.220	95	230	10.0	0.8	0.5	>450
Paroil 150	2	50.0	1.260	375	450	10.3	1.0	0.5	>450
Paroil 150 LV	2	49.0	1.259	150	251	10.5	N/A	0.3	>450
Paroil 500	4	53.2	1.309	N/A	649	10.9	N/A	0.3	>450
Chlorowax 40	2	43.0	1.170	27	140	9.7	0.8	N/A	>450
Chlorowax 41SW	2	42.5	1.172	24	130	9.8	N/A	N/A	>450
Chlorowax 50	3	48.0	1.230	117	210	10.3	0.8	0.3	>450

MEDIUM-CHAIN CHLORINATED ALKANES , C_{14-C17}

Product	Color, Typical Gardner (1933 Std.)	Chlorine Content % by Wt.	Specific Gravity @ 25°C	Viscosity, Poise @ 25°C	Viscosity, SUS @ 210°F	Density, Pounds Per Gallon	Volatility % Loss, 24 hrs. @ 100° C	Stability JQD % HCl, 4hrs @ 175°C	Flash Point ° F (Cleveland Open Cup)
DO 8110	1	52	1.246	6	61	10.3	0.8	0.25	>450
Paroil DO-152	1	50.7	1.269	9.8	63	10.6	N/A	N/A	>392
Paroil 10-NR	1	40.8	1.113	0.37	35	9.3	8	0.2	>350
Paroil 45	1	45.0	1.180	2.5	48	9.6	15	0.2	>400
Paroil 152	1	51.0	1.270	15	70	10.3	0.9	0.2	>450
Paroil 51-NR	1	50.1	1.228	5.8	57	10.2	N/A	0.2	>450
Paroil 53-NR	1	53.7	1.292	14	71	10.8	1.0	0.2	>450
Paroil 54-NR	1	55.3	1.294	17.8	75	10.8	N/A	0.2	>450
Paroil 56-NR	1	56.9	1.327	119	119	11.1	N/A	0.3	>450
Paroil 58-NR	1	59.0	1.390	271	172	11.6	0.5	0.2	>450
Paroil 63-NR	1	63.6	1.439	N/A	317	12.0	N/A	N/A	>450

The products listed above represent a small portion of available Paroil and Chlorowax liquid grade products. Many combinations of chlorine percentage and viscosity are available. Emulsifiable grades and water dispersions also are available.

Paroil and Chlorowax may be used in the applications described below. They provide greater resistance to cracking, while Chlorez and Hordaresin provide greater resistance to scratching.

CHLOREZ® & HORDARESIN®

Flame retardant coatings, adhesives and intumescent paints produced with Chlorez and Hordaresin yield excellent results. Intumescent paints can contain these additives as primary flame retardant components. During the decomposition of burning, HCl given off catalyzes the intumescent reaction.

Chlorez and Hordaresin also:

- Extend expensive vehicle solids—replace up to 20% of epoxy, chlorinated rubber, etc.
- Impart hardness
- Improve adhesion
- Lower viscosity
- Resist water, acid, alkali and mold growth
- Are compatible with most paint solvents, resins, plasticizers, waxes and drying oils
- Are essentially non-toxic

INK VARNISHES

In phenolic ink varnishes, Chlorez and Hordaresin enhance gloss retention, increase adhesion and improve rub resistance while reducing ink penetration into the surface.

ALKYD RESIN PAINTS

Chlorez 700 and Hordaresin NP-70 are non-flammable and chemically resistant, and are compatible with almost all known alkyd resins. Because of their all-around solubility and compatibility, they can be used as resins in the manufacture of different paints and coatings. They can be used in any ratio, and give alkyd resin paints these properties:

- Good gloss and gloss retention
- Rapid surface drying & easy application
- Satisfactory adhesion to difficult substrates
- Resistance to mild chemical attack
- Good water resistance, particularly when the paint is still wet
- Good scratch resistance

WATER & CHEMICAL RESISTANT PAINTS

Chlorez 700 and Hordaresin NP-70 increase gloss and adhesion in physically-drying binders such as chlorinated rubber and polypropylene, cyclized rubber, styrene/butadiene copolymers and similar products.

They improve elasticity and impart plasticizing of paint films. They help paint to resist chemicals and seawater, and actually improve gloss retention under weathering conditions.

Because of their low solution viscosity, Chlorez 700 and Hordaresin NP-70 can be used to increase solids content, particularly with high-viscosity binders.

TRAFFIC PAINTS

Chlorez 700 and Hordaresin NP-70 are used in traffic paints as cost-effective resin extenders and to improve adhesion, water and chemical resistance, and oil and gas resistance.

Typical Properties	Chlorez 700	Hordaresin NP-70	Chlorez 700-S	Hordaresin CH-151P	Hordaresin CH-171F	Chlorez 700-SS
Color, APHA	130	105	100	100	102	95
% Chlorine	70.8	71.0	70.8	71.1	71.2	71.5
Specific Gravity/25°C	1.6	1.6	1.6	1.6	1.6	1.6
Bulk Density, g/l	1,619	1,619	1,619	1,619	1,619	1,619
Particle Size, % thru 297 Micron	96	96	96	87	N/A	N/A
% Volatiles	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Softening Point, °C	102	102	102	102	106	106
Heat Stability, % HCl	<0.1	0.01	0.05	<0.01	0.01	0.01
Physical Form	White Powder	White Powder	White Powder	White Powder	White Flake	White Flake

DOVERSPERSE®

Dispersions and emulsions of resinous and liquid chlorinated alkanes are available as Doversperse products. These are useful in both cationic and anionic emulsion systems because of their non-ionic bases. In addition to contributing to flame-retardancy, they improve adhesion, impart chemical and water resistance, and allow the user to formulate aqueous rather than solvent systems. Application areas include adhesives, rubber coatings, inks, carpet backings, paper and fabric coatings.

Typical Properties	Doversperse A-1	Doversperse 3-NR
% Solids	65	66.5
Poise/25°C	64 ¹	150-300 ²
% Chlorine	45	40
SG/25°C	1.60	1.54
Appearance	Cream White	Cream White

¹ #5 Spindle, 20 rpm

² #6 Spindle, 10 rpm

Doversperse A-1 and Doversperse 3-NR typically contain 40-45 percent available chlorine for maximum flame retardant efficiency.

Doversperse A-1, a 65% water dispersion of Chlorez 700, may be substituted for Chlorez 700 or Hordaresin NP-70 on a dry basis in intumescent paints to reduce grinding time and eliminate agglomeration.

Doversperse A-1 and Doversperse 3-NR also promote adhesion in adhesives and UV curable inks.

DOVERLUBE® CALCIUM & ZINC STEARATE PRODUCTS

Metallic stearates are important ingredients in paints and coatings, improving suspension of solids, modifying viscosity and imparting flatness. The specific properties of a metallic stearate depend on the particular metal utilized, the type and grade of fatty acid, the manufacturing conditions and the method of production.

CALCIUM STEARATE

Fine particle size and limited solubility in solvents make calcium stearate a highly suitable flattening agent for paints, varnishes and lacquers. It is especially useful when low viscosity is desired. Because of its comparatively low solubility in vehicles and solvents, thickening action is minor despite heat encountered during the manufacture or application of coatings.

Calcium stearate also aids in pigment suspension and viscosity control. It produces a mild thickening effect and provides a good means of controlling body, sag and flow characteristics. Its fine particle size permits mill grinding with other pigments to obtain fine enamel dispersions; one pass through a roller mill usually is sufficient to obtain dispersion.

In silk screen extender bases, calcium stearate is incorporated as a viscosity modifier. In cold water or marine paints, it is applied as a water repellent additive. It is preferred in some lacquer sanding sealer formulations where it provides desired adhesion and sanding properties.

ZINC STEARATE

Zinc stearate is extensively used in the production of lacquer sanding sealers. It imparts the necessary sanding characteristics to nitrocellulose- and ethylcellulose-based films, seals the pores of wood and gives a flat, hard finish. Zinc stearate is used for grinding of fluid pastes that can be discharged from mills even where high temperatures are encountered, and for lacquer films which have the maximum degree of flattening consistent with good film hardness.

Zinc stearate is used as a flattening agent and sanding aid, and is often incorporated in semi-gloss finishes. Its low gelling characteristics give excellent flattening to paints, varnishes, and lacquers since they can be subjected to high temperatures that develop in some dispersion operations without danger of excess viscosity increase.

Zinc stearate also serves as a good suspending agent in both solvent-base and cold water or marine paints. It eliminates excessive settling and caking and reduces color "floating".

MANUFACTURE

Doverlube calcium and zinc stearates are manufactured by the fusion method, which reacts a metallic oxide, hydroxide or salt of a weak acid directly with selected fatty acid at an elevated temperature. All Doverlube metallic stearates are available from tallow or vegetable-based stearic acid. Dover uses steel reactors equipped to provide required agitation and heat application.

We take all precautions to achieve a controllable and uniform reaction. As water is driven off, the reaction is completed and forms a molten mass. This mass is then cooled, crushed, pulverized, classified for desired particle size and packaged.

Information on specific products and physical properties is outlined in separate technical data sheets.

FORMS

Doverlube metallic stearates are available in various standard forms. Doverlube CA, calcium stearate, is available in two flowable powders and a flowable granular product. Doverlube ZN, zinc stearate, is available in fine powder, prill and bead forms. Historically, powder has been the form of choice. Granular prill and bead forms have grown in acceptance because they reduce dust and its related issues.

PACKAGING

Doverlube metallic stearates are packaged in standard 50 pound, multi-wall paper bags, and in 2,000 pound super sacks. 50 pound corrugated boxes, fiber drums and other sizes of super sacks are also available upon request; upcharges may apply.

PROCESSING

Doverlube CA and ZN are insoluble or very sparingly soluble in water, methyl and ethyl alcohols, esters and ketones. They are soluble in hot turpentine, benzene, toluene, xylenes, carbon tetrachloride, vegetable oils, mineral oils, waxes, oleic acid and pyridine.



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