

LEAD INDUSTRIES ASSOCIATION

882 MADISON AVENUE

NEW YORK 17, N. Y.

November 22, 1961

To: Dr. L. L. Carrick
Mr. M. E. Kinore
Mr. R. P. Bates
Mr. Paul Whitford
Mr. E. K. Zimmermann

SUBJECT: PIGMENTS MANUAL - SECTION FROM E. E. PUTZOW

Attached please find a copy of the section "Trade Sales Paints - Solvent Type" prepared by E. E. Putzow, Hammond Lead Products, Inc., for inclusion in our "Pigments Manual."

I would appreciate your reviewing this section, making whatever changes or additions you deem advisable and returning it to me at your earliest convenience.

The sections and authors, as decided at the meeting on March 30, and the status is as follows:

<u>SECTION</u>	<u>AUTHOR</u>	<u>RECEIVED BY SECRETARY</u>	<u>SUBMITTED TO COMMITTEE</u>
Industrial Paint, Solvent Type	E.K. Zimmermann R.P. Bates	No	
Industrial Paint, Water Thinnable Type	Paul Whitford	No	
Industrial Maintenance Paints, Solvent Type	E.K. Zimmermann R.P. Bates	No	
Industrial Maintenance Paints, Water Thinnable Type	Paul Whitford	No	
Trade Sales, Solvent Type	E. E. Putzow	Yes	Yes
Trade Sales, Water Thinnable Type	Paul Whitford	No	
Materials Handling	D.M. Borsina	No	
Lead Pearlescent Paints	Not Selected		

PROJECT: PIGMENTS MANUAL
SECTION FROM E.H. BUTZOW

November 22, 1961

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All sections, as agreed at the March 30, 1961 meeting should include for the compounds discussed in each section such data as:

1. The properties imparted by lead compounds.
2. Lead compounds and their properties.
3. Formulating factors.
4. Compatibility with vehicles.

I would appreciate receiving a draft of the sections assigned you as soon as possible so that I can distribute them to the other members of the committee.

Sincerely yours,

David M. Borcia

David M. Borcia
Secretary
Lead Pigments Technical Committee

DSB:EDM

1. *White Lead Paint*

2. *White Lead Paint*

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white lead paint for the most important parts of the system. These
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- 2 -

Manufacturers who were not fully aware of the importance of the prime cost of the engine in the overall cost of the aircraft were not fully aware of the importance of the prime cost of the engine in the overall cost of the aircraft. However, it was a common knowledge of the new formulation that the prime cost of the engine was a major factor in the overall cost of the aircraft. This was particularly true when the new formulation was used in the design of the engine.

Although the manufacturer's primary concern was the necessity for a low cost engine, it had failed to acknowledge that the performance of any engine was largely dependent on the performance of the prime cost. When two cost systems became the major factor in the importance of the prime cost as a foundation for an engine's cost, it was inevitable that the manufacturer's primary concern was the necessity for a low cost engine.

There is no doubt that in the haste to realize economic advantages there were numerous instances in which quality suffered and dependable performance was seriously sacrificed. Much of this result can be attributed directly to the lack of a full knowledge of the prime cost of the engine. The manufacturers who examined the use of low cost primers were spared much of the misfortune experienced by others.

WHITE LEAD

Historically, white lead has been known since the time of the Egyptians. In the early days, white lead was obtained from the mineral lead carbonate, which was known as ceruse. The ceruse was obtained by the Egyptians, Greeks, and Romans. Methods for obtaining white lead from metallic lead and vinegar or sour wine are described in the literature of the time. The Old Dutch process by which the pigment was obtained for hundreds of years is essentially the same in principle as the method used by the moderns.

Modern methods of manufacturing have replaced the Old Dutch process which required from 90 to 120 days for conversion from metal to pigment. The conversion period is now reduced to 12 days or less. Instead of formation through a long conversion process, the pigment is precipitated from solutions of lead acetate by conversion contact with carbon dioxide gas. The lead acetate solutions are prepared either directly from metallic lead or from lead that has previously been converted to lead oxide. In modern processes it is possible to control composition and other characteristics within much closer limits than was ever possible by the conversion method.

The composition of basic carbonate white lead is usually indicated by the formula $2PbCO_3 \cdot Pb(OH)_2$, which corresponds to a combined lead carbonate content of 67 percent. The range in composition of commercial white lead is from 61 to 75 percent lead carbonate. Actually there are three separate chemical compounds which make up the composition of basic carbonate white lead.

(1) PbCO_3 (white lead)

(2) PbO (red lead)

(3) PbO_2

Lead carbonate, which is the lead compound, is composed of a mixture of the above two oxides. At 125°C. the composition is more closely represented by the point number one. Virtually all paint grades of white lead are very close to the composition of the point number one. If the carbonate content increases with the quality of the pigment, which is the case, PbCO_3 is indicated, which compound is itself a pure point pigment.

For many years white lead was used as a single pigment in exterior house paints. It served the dual purpose of providing opacity or hiding power to the coating while contributing several other protective or service features for which it is known.

More recently the opacity function of white lead has been relegated to the background by titanium dioxide or lead-free versions of the titanium pigment. In many formulations white lead was replaced entirely by titanium and cadmate pigments. It was not until the early 1960s that the necessity for a positive pigment such as white lead that the latter is being returned to the proper place in the paint formulations.

It is generally recognized that a house paint primer must contain a film-forming, strongly adherent, and durable binder. The binder and the other ingredients must be in the right proportions of the mixture and the primer

-3-

to the lead. The particles that must be removed are not only lead particles, but also to establish a good foundation for the fresh coat. The ability of the lead to oxidize and produce the film to strengthen it, and to fully it is not a very good one. It is a matter of all the particles of the lead particles so inevitably to the effectiveness of a lead paint primer. The improved primer is not only improved to the lead by the lead particles, but also by the lead particles. The most common cause of the greatest degree of paint flaking and peeling, the most common cause of paint failure.

The most common cause of paint failure is a lead particle which is actually the paint particles. It becomes an integral part of the paint film and actually reinforces the paint, resulting in a tough flexible film, remarkably resistant to corrosion.

When lead, being extremely hard, reacts with vehicle fatty acids to produce compounds (generally referred to as "lead soaps"). Microscopic examination reveals that lead soaps are distinctive in their form and in their effect. They consist of bar-like crystals with an array of spiny projections extending from a central core. By later coating and interlocking the spiny crystals form a filled mesh-type structure which exceptionally reinforces a paint film. Other pigments form variable soaps which are much softer and more plastic in nature but which lack the strength and strength of the lead soaps. It has also been proved that the development of lead soaps is a paint film even after the surface is fully coated.

The lead particles and primary particles present in lead soaps is somewhat

1. The first step in the process of identifying a problem is to define the problem. This involves identifying the symptoms of the problem and determining the scope of the problem. Once the problem has been defined, the next step is to identify the causes of the problem. This involves identifying the factors that are contributing to the problem and determining the underlying causes. Once the causes have been identified, the next step is to develop a plan of action. This involves identifying the steps that need to be taken to solve the problem and determining the resources that will be needed to implement the plan. Finally, the last step in the process is to implement the plan and monitor the results. This involves putting the plan into action and tracking the progress of the solution. Once the problem has been solved, the final step is to evaluate the results and determine if the solution was effective. This involves comparing the results of the solution to the original problem and determining if the problem has been solved. If the problem has not been solved, the process must be repeated.

1. *Journal of the American Medical Association*, 1997; 277: 1033-1036.

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Engine Performance

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The process of producing lead is a complex one, involving several stages of refining and casting. The first stage is the smelting of lead ore, which is then refined to produce pure lead. This refined lead is then cast into various forms, such as sheets, rods, and ingots, depending on the intended use.

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The above surface and physical properties of the various soils found in the town, with gravity compared to that of other reactive white pigments such as those employed as hard white paint, and white, and listed in the table.

It has been used as a substitute for books and cards and for the collection of data in various papers and in multiple copies for the purpose of. It has been used also for the purpose of replacing books and cards in the collection of data.

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Lead White

Lead white is a synthetic pigment which is prepared by the reaction of lead acetate with sodium carbonate. The product is a white, crystalline powder which is insoluble in water and has a high refractive index. It is used in a wide variety of applications, including paints, pigments, and plastics. The chemical composition of lead white is Pb_3O_4 .

The primary advantage of lead white is its high refractive index, which gives it a high opacity. It is also very stable and does not fade or discolor over time. However, it is toxic and should be handled with care. It is also a heavy metal and can be a source of lead poisoning if ingested.

Lead white is recognized as an excellent pigment contributing substantially to film integrity, color stability, and general durability of many paints.

Lead white pigments may be used with various solvents, such as oil, and in a wide range of applications. Its low specific gravity will permit a relatively high volume loading of active lead pigment with corresponding reduction in surface pigment concentrations, thus introducing greater durability and permanence into the paint film.

Blended Pigments

Blended pigments are a mixture of two or more pigments.

Blended pigments are used in a variety of applications, including inks, paints, and plastics. They are used to create a wide range of colors and shades.

There are many different types of blended pigments, each with its own unique properties. Some are used for specific applications, while others are used for general purposes.

Blended based dyes and pigments are dry mixtures of one or more dyes and pigments, separately produced. They can be used in a variety of applications, including inks, paints, and plastics. The most popular types of blended based dyes and pigments are the 10 and 15 series.

The oil absorption of the blended pigments can be varied greatly by using different oil absorption grades of the dyes. Low, medium, and high oil absorption types are available whereas oil soluble products are low in oil absorption.

The blended pigments have better color fastness but do not disperse quite as readily as the unfaded. Specific gravity and loading values are approximately the same although the blended types tend to have a slightly higher density.

Blended dyes and pigments are used in a variety of applications, including inks, paints, and plastics. They are used to create a wide range of colors and shades. They provide a convenient and economical way to create a wide range of colors and shades. They are used in a variety of applications, including inks, paints, and plastics. They are used to create a wide range of colors and shades. They provide a convenient and economical way to create a wide range of colors and shades.

The above listed observations are due to the fact that the lead chromate pigments are not pure and contain various impurities which are responsible for the color variations.

All the chemical pigments except manganese are from raw materials which are themselves not pure and contain various impurities.

They are also found to contain in their composition, in the form of lead chromate or other compounds thereof, also in combination with lead sulphate and other chemical compounds.

Chrome Orange

Chrome orange pigments are basic lead chromates made by precipitation from lead nitrate or lead nitrate solutions by sodium or potassium dichromate.

By varying the conditions, particularly the alkalinity, it is possible to produce a wide range of colors. They are generally made available in five depths of shade running from extra light orange through the very red deep shade which is referred to as International Orange.

These pigments are the most popular orange pigments used in paints and enamels. They are high in specific gravity and have the lowest oil absorption of any common chemical pigment. They possess excellent light fastness and durability and are therefore used in both interior and exterior finishes. Their oil-solubility and drying power are better than those of Chrome Yellows and weathering properties are better, with less tendency to darken both by redness and by dirt.

Basic Lead Chromate possesses color and an excellent and good inhibitive properties and is used in many cases in the form of a pigment in various systems of

1. Lead Chromate

2. Lead Chromate

Lead chromate is a bright yellow pigment, insoluble in water, and is used in the manufacture of yellow pigments, enamels, and in the treatment of leather. It is also used in the manufacture of yellow dyes and in the treatment of wood.

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Chrome Yellow

Chrome yellow pigments are precipitates of lead chromate, the lighter hues being corresponding to lead chromate and lead sulfate.

They are the most versatile and most widely used class of bright yellow pigments. Marketed as C. P. Yellow, the name does not indicate any degree of chemical purity except that the color is full strength and free from any least extraneous.

This class of colors possesses a wide range of hue from a greenish pale yellow through orange and brilliant reds.

They are highly opaque pigments, with low absorption, easily dispersed in oil or solution. They are used in the manufacture of yellow pigments, enamels, and in the treatment of leather. They are not suitable for use in the treatment of wood.

Chlorophylls are the most important pigments in the green color of plants. The presence of iron leading to the formation of chlorophyll is essential in the synthesis of chlorophyll. The chlorophylls are the most important pigments in the green color of plants. They are extremely yellow with excellent opacity. Large quantities are used in general coloring of pigments and dyes. They are also used in the coloring of pigments and dyes.

Chlorophylls

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C. P. Chlorophyll pigments are bright in color, have excellent opacity, good light-fastness and excellent weathering properties at maximum depth. The light fastness is high.

Oil absorption and ease of grind will vary according to depth of color. It is the oil absorption of iron blue is higher than that of chrome yellow. The oil absorption of chrome green will increase with depth of chroma. Iron blue is somewhat more difficult to disperse than chrome yellow, therefore the amount of dispersant should be increased.

Chlorophyll pigments containing iron and chrome green have a distinctive color and opacity. Chlorophyll pigments can be used in general as very effective coloring materials and dyes for pigments and dyes.