

# Paints, Pigments, Varnishes & Enamels Technology Handbook (with Process & Formulations) 2nd Revised Edition

**Author:** NIIR Board of Consultants and Engineers

**Format:** paperback

**Code:** NI168

**Pages:** 624

**Price:** Rs 1675 | US\$ 150

**Publisher:** NIIR PROJECT CONSULTANCY SERVICES

**Shipping:** 5 days

## About the Book

The use of paints, varnishes and enamels for decoration is nearly as old as human culture itself. These are widely used in homes as well as in industry because painted surfaces are attractive and easy to keep clean. Paint is generally made up of a pigment. It is a chemical material, which alters the color of reflected or transmitted light due to wavelength-selective absorption. Varnish is a transparent, hard, protective finish or film primarily used in wood finishing but also for other materials. Varnish is traditionally a combination of a drying oil, a resin, and a thinner or solvent. The technology of paints, varnishes and enamels is changing rapidly and becoming more complex each day. The paint industry is an important segment of the chemical industry. Enamel paint is paint that air dries to a hard, usually glossy, finish, used for coating surfaces that are outdoors or otherwise subject to wear or variations in temperature.

The Indian paint industry has seen a gradual shift in the preferences of people from the traditional whitewash to higher quality paints like emulsions and enamel paints with improvement in lifestyle. India is the second largest consumer of paint in Asia. Over the past few years, the Indian paint market has substantially grown and caught the attention of many major players. The market for paints in India is expected to grow at 1.5 times to 2 times GDP growth rate in the coming years. In terms of volumes, pigments demand is expected to reach 4.4 million tonnes. Due to increased Government funding for infrastructure, demand for paints both in industrial and decorative segment is set to rise, thereby rendering Indian paint industry to be poised for further growth.

This handbook is designed for use by everyone engaged in the paints, pigments, varnishes and enamels industry. It provides all the information of the various formulae and processes of paints, pigments, varnishes and enamels.

The major content of the book are paint testing, color in paint, maintenance paints, emulsion paints, exterior or interior paints, exterior or interior multicolor paints, exterior swimming pool paints and enamels, interior ceiling paints, metal paints, marine paints, enamel paints, interior fire- retardant paints, interior gloss paints, paint formulation, manufacture of natural copal varnishes, floor paints and enamels, varnishes, lacquers and floor finishes, white pigments, colored pigments, pigment dispersion etc. The book contains addresses of plant & machinery suppliers with their Photographs.

It will be a standard reference book for professionals, entrepreneurs, those studying and researching in this important area and others interested in the field of paints, pigments, varnishes and enamels technology.

## Contents

### 1. TESTING OF RAW MATERIALS FOR COATINGS

Pigments  
Oil Absorption  
Color  
Tinting Strength of Colored pigments  
Tinting Strength of White Pigments  
Coarse Particles  
Oils  
Mono-Di-and Triglycerides  
Instrumental Analysis of Oils  
Gas Chromatography  
Resins, Polymers, Plasticizers  
Solvents

## 2. PAINT TESTING

Importance of testing  
Classification  
Discernment of Appropriate Qualities  
Selection of Test  
Conduct of Test  
Interpretation of Results  
Establishment of Standard Variances  
Color Testing  
Incorrect Standards And Test Procedures in Industry  
Statistical Analysis

## 3. COLOR IN PAINT

Visible Spectrum  
Three Dimensions of Color  
Tristimulus Values X, Y, Z  
Chromaticity Coordinates  
Color Order Systems  
Sample Preparation for Color Measurement  
Tolerance Specification  
Color Control by Visual Observation  
Color Control by Instrumentation  
MacAdam Tolerances  
Instrument Accuracy for Tolerance Limitations  
Gloss and Its Effect on Color  
Light Sources For Color Matching  
Color Formulation

## 4. MAINTENANCE PAINTS

Paint Types and Selection  
Barrier Protection  
Sacrificial Protection  
Coating Types  
Resistances  
Description by Generic Types  
Oil Derived  
Sacrificial Metal  
Silicones

Thermosetting Resins  
Neoprene  
Waxes and Greases  
Bitumens  
Rubber Base  
Vinyl Chloracetate  
Principles of Effective Maintenance Painting  
Failure Mechanism  
Coating Thicknesses  
Number of Coats  
Wood  
Nonferrous Metals  
Effect of Exposure  
Paint System and Application  
Surface Preparation  
Priming  
Intermediate and Finish Coating

#### 5. EMULSION PAINTS

Ingredients of an Emulsion Paint  
Surfactants  
Structure of Surfactants  
Types of Surfactants  
Behavior of Emulsions  
Protective Colloid  
pH  
Emulsion Formation  
Emulsion Polymerization  
Polymerization.  
Ingredients  
Post-emulsification  
Stability of Emulsions

#### 6. EXTERIOR OR INTERIOR PAINTS

Exterior or Interior White Medium Texture Masonry Paint  
(TT-C-00555) (Styrene-Acrylate/Chlorinated Paraffin)  
Exterior or Interior White Medium Texture Masonry Paint  
(TT-C-00555) (Styrene-Acrylate/Chlorinated Paraffin/Resin)  
Exterior or Interior White Medium Texture Masonry Paint  
(TT-C-00555) (Styrene-Butadiene/Chlorinated Paraffin)  
Exterior or Interior White Medium Texture Masonry Paint  
(Vinyl Toluene-Acrylate/Chlorinated Paraffin)  
Exterior or Interior White Medium Texture Masonry Paint  
(TT-C-00555) (Vinyl Toluene-Butadiene/Chlorinated Paraffin)  
Exterior or Interior General Purpose Aluminum Paint (Alkyd)  
Exterior or Interior General-Purpose High-Quality Aluminum Paint (Coumarone-Indene/Menhaden Oil)

#### 7. EXTERIOR OR INTERIOR MULTICOLOR PAINTS

Exterior or Interior White Multicolor Paint  
(Vinyl Toluene-Butadiene)  
Exterior or Interior Tint Base Multicolor Paint

(Vinyl Toluene-Butadiene)  
Exterior or Interior Black Multicolor Paint  
(Vinyl Toluene-Butadiene)  
Exterior or Interior Red Multicolor Paint  
(Vinyl Toluene-Butadiene)  
Exterior or Interior Varnish  
Exterior or Interior Clear Varnish (Polyurethane)

#### 8. EXTERIOR SWIMMING POOL PAINTS AND ENAMELS

Exterior White Swimming Pool or Masonry Paint  
(Chlorinated Rubber/Hydrocarbon Resin/Chlorinated Paraffin)  
Exterior Semigloss Blue Swimming Pool Paint  
(TT-P-95A) (Styrene-Acrylate)  
Exterior Gloss Blue Swimming Pool Paint  
(Styrene-Acrylate)  
Exterior Gloss Blue Swimming Pool Paint  
(TT-P-95A) (Styrene-Acrylate)  
Exterior Blue Swimming Pool Enamel  
(Chlorinated Rubber/Chlorinated Paraffin)  
Exterior Light Green Swimming Pool Enamel  
(Two Component: Urethane-Catalyst)

#### 9. INTERIOR CEILING PAINTS

Interior Flat White Ceiling Paint (Alkyd)  
Interior Flat White Ceiling Paint (Alkyd)  
Interior Flat White Ceiling Paint (Alkyd)  
Interior Flat White High-Quality Low Cost Ceiling Paint (Alkyd)

#### 10. METAL PAINTS

Ready-Mix Aluminum Paint  
(Linseed Oil)  
Galvanized Metal Primer  
Zinc Chromate Primer  
Specification of Suspension Properties  
Lower Cost Utility Red Oxide Primer  
Corrosion Resistant Top Coat  
Deep Yellow Aerosol Enamel  
Gray Automotive Enamel  
Gray Automotive Enamel  
Implement Enamel  
Screw-Cap Coating  
White Coating for Can Bodies  
Metal Protective Coating  
Valve and Actuator Selection  
Application  
Zinc Rich Primer  
Zinc Chromate Primer  
Iron Oxide - Zinc Chromate Primer  
Epoxy-Ester Zinc Chromate Spraying Primer  
Lead Silico Chromate Primer  
Baking Primers

Red Lead Metal Primer

Uses

Red Lead/Red Iron Oxide General Purpose Flash Dry Primer

Iron Oxide Primer

Red Primer

Automotive Flash Primer

Strontium Chromate Primer

Appliance and Metal Furniture Primer

Detergent-Resistant Appliance Primer

Stainless Steel Industrial Maintenance Primer

Gray Baking Sanding Primer Surfacer

Uses

White Appliance Enamel

Epoxy White Gloss Enamel

White Enamel

White Brushing Enamel

White Metal Deco Enamel

Machinery Enamel

Gray Enamel

Epoxy Green Enamel

Clear Epoxy Coating

Application

Epoxy Clear Film

Black Aerosol Enamel

Gray Spraying Finish

Uses

Unpigmented Can Coating

Can Coating and Drum Lining

Unpigmented Drum Lining

Clear Interior Drum Lining

Uses

Unpigmented Tank Lining

High Solids Tank Liner

Chemical Resistant Metal Coating

White Roller Coat Tube Enamel

Red Lead-Iron Oxide Mastic Coating

Resin Coating

Procedure

Aluminum Paint

Interior Mill White Gloss Enamel

(Triamino-Ester)

Coil Coating - Resistant Siding Type

Polyester White Coil Coating Enamel

White High Gloss Electrocoating

Primer for Galvanized

Red Iron Oxide Primer

Procedure

Dark Grey Single Coat or Primer

Beige Single Coat

Latex Maintenance Enamels

Exterior Latex Metal Paint

Interior Latex Flat Wall Paint for Machine and Tube Colorants

Latex Aluminum Paint

Latex Aluminum Paint

Zinc Chromate, Corrosion Inhibiting Primer

Maintenance Primer

Acrylic Lacquer Aerosol Metal Coating

Package

Directions for Use

Precautions

Aerosol Aluminum Enamel

Aerosol High Temperature Aluminum Paint

Package

Directions for use

Precautions

Lead Primer

Lead Silico Chromate Primer

Anticorrosive Primer

Anticorrosive Chlorinated Rubber Thick Coatings Primers

Anticorrosive Chlorinated Rubber Topcoats

Thixotropic Zinc Chromate Primer

## 11. MARINE PAINTS

Marine Anticorrosive Primer High Flash Point Solvent

Marine Anti-Fouling Ship-Bottom Paint with High Flash Point

Marine Vinyl/Alkyd Enamel (Black)

Grey Marine Vinyl/Alkyd Enamel

Zinc Dust Primer

Underwater Coating

Composition of Rosin-Vinyl Antifouling Paints

(Nonvolatile Portion Only)

Rosin Antifouling Coatings

Chlorinated Rubber Marine High-Build Coatings with Inhibiting Pigment for Airless Spray

Metallic Lead Primer

Chlorinated Rubber Antifouling Coatings

Chlorinated Rubber Antifouling Marine Paint System

(Metallic Coatings)

(Thick Coatings)

(Antifouling Topcoat)

Marine Coating for Cold, Damp Weather Application

Marine Primer for Cold, Damp Weather Application

Tri-Amino Marine Enamel

Tri-Amino Marine Spar Varnish

## 12. ENAMEL PAINTS

Semi-Gloss Enamel

White Semi-Gloss Enamel

Dark Green Porch and Deck Enamel

High Quality Semi-Gloss Enamel

Black Rapid-Dry Enamel

Gloss White Architectural Enamel

Semigloss Tint Base

Odorless Alkyd Gloss Enamel

Odorless High Gloss White  
Nonpenetrating Semi-Gloss  
Nonpenetrating Gloss Enamel  
Spraying Red Automotive Enamel  
Alkyd Aerosol Enamels  
Aerosol Packing  
White Aerosol Enamel  
Deep Yellow Aerosol Enamel  
Stipple Gloss Enamel  
High Solids, Light Blue Enamel  
Preparation of Base Component  
High Solids, Beige Enamel  
Preparation of Base Component  
White Tinting Enamel  
Black Aerosol Enamel  
White Aerosol Enamel  
Epoxy-Amine High Solids White Spray Coating  
Epoxy Solventless Enamel  
Gloss Enamel  
Semigloss Enamel  
Painter's Enamel  
Gray High Solids Epoxy-Polyamide Spraying Enamel  
Vanoxyl Green, Enamel  
Red Epoxy Enamel  
Epoxy Green Enamel  
Epoxy White Enamel  
Yellow Gloss Epoxy Enamel  
Gloss White Enamel  
Blue Gloss Enamel  
Yellow Industrial Enamel  
Automotive and Equipment White Enamel  
Bright Red Automotive Enamel  
Industrial Orange Enamel

### 13. INTERIOR FIRE-RETARDANT PAINTS

Interior Intumescent Fire-Retardant White Paint  
Interior Intumescent Fire-Retardant White Paint  
Interior Intumescent Fire-Retardant White Paint  
Interior Intumescent Fire-Retardant White Paint  
Interior Fire-Retardant White Paint

### 14. INTERIOR GLOSS PAINTS

Interior Gloss White Paint (Acrylic)  
Interior Gloss White Paint (Acrylic)  
Interior Gloss White Paint (Acrylic)  
Interior Gloss White Paint (Acrylic)  
Interior Gloss White Paint (Acrylic)  
Interior Gloss White Paint (Acrylic/Vinyl Acetate-Acrylic)  
Interior Gloss White Paint (Acrylic/Vinyl Acetate-Acrylic)  
Interior Gloss White Paint (Latex)  
Interior Gloss White Paint (Styrene-Acrylate)  
Interior Gloss White Paint (Vinyl Acetate)

Interior Gloss White Paint (Vinyl Acetate-Acrylic)  
Interior Gloss White Paint [Vinyl Acetate-Acrylic(S)]  
Interior Gloss White Paint (Vinyl Acetate-Ethylene)  
Interior Gloss White Paint (Vinyl Acetate-Ethylene)  
Interior Gloss White Paint (TT-p-1511A, Type II) (Acrylic)  
Interior Full Gloss White Paint (Acrylics)  
Interior High Gloss White Paint (Acrylic)  
Interior Gloss White And Tint Base Paint (Vinyl Acetate)  
Interior Gloss White And Tint Base Paint  
Interior Gloss White and Tint Base Paint  
Interior Gloss White And Tint Base Paint  
(Vinyl Acetate - Ethylene)  
Interior Gloss Tint Base Paint (Vinyl Acetate-Ethylene)  
Interior gloss enamels  
Interior Gloss White Enamel (Acrylic)  
Interior Gloss White Enamel (Acrylic-Styrene/Alkyd)  
Interior Gloss White Enamel (Alkyds)  
Interior High Gloss White Enamel (Acrylic)  
Interior High Quality Gloss White Enamel (Acrylic)  
Interior High Quality Gloss White Enamel (Acrylic)  
Interior High Quality Gloss White Enamel (Acrylic)  
Interior High Quality Gloss White Enamel (Acrylic)  
Interior High Quality Gloss White Enamel (Acrylic)  
Interior Medium Cost Gloss White Enamel (Acrylic)  
Interior Gloss White And Tint Base Enamel (Acrylic)  
Interior Gloss White And Tint Base Enamel (Alkyd)  
Interior High Gloss White And Tint Base Enamel (Alkyds)

#### 15. INTERIOR SEMIGLOSS WHITE PAINTS

Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior Semigloss White Paint (Vinyl Acetate-Acrylic)  
Interior High Quality Semigloss White Paint  
(Vinyl Acetate)  
Interior High Quality Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior High Quality Semigloss White Paint

(Vinyl Acetate-Acrylic)  
Interior High Quality Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior High Quality Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior Low Cost Semigloss White Paint (Acrylic)  
Interior Low Cost Semigloss White Paint (Acrylic)  
Interior Low Cost Semigloss White Paint (Acrylic)  
Interior Low Cost Semigloss White Paint (Acrylic)  
Interior Low Cost Semigloss White Paint (Acrylic)  
Interior Low Cost Semigloss White Paint (Vinyl Acetate)  
Interior Low Cost Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior Medium Priced Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior Medium Priced Semigloss White Paint  
(Vinyl Acetate-Acrylic)  
Interior Semigloss White and Tint Base Paints  
Interior Semigloss White and Tint Base Paint (Acrylic)  
Interior Semigloss White and Tint Base Paint  
(Vinyl Acetate)  
Interior High Quality Semigloss White and Tint Base Paint (Acrylic)  
Interior Low Cost Semigloss White and Tint Base Paint  
(Vinyl Acetate)  
Interior Low Cost Semigloss White and Tint Base Paint  
(Vinyl Acetate)  
Interior Low Cost Semigloss White and Tint Base Paint  
(Vinyl Acetate-Acrylic)  
Interior Semigloss Tint Base Paint  
Interior Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Medium Tint Base Paint (Acrylic)  
Interior Semigloss Pastel Tint Base Paint (Acrylic)  
Interior High Quality Semigloss Tint Base Paint (Acrylic)  
Interior Semigloss Enamel  
Interior Semigloss White Enamel (Acrylic)  
Interior Semigloss White Paint (Acrylic)  
Interior Semigloss White Enamel (Acrylic)  
Interior Semigloss White Enamel (Acrylic)  
Interior Semigloss White Enamel (Acrylic)  
Interior Semigloss White Enamel (Acrylic)  
Interior Medium Gloss White Enamel (Acrylic)  
Interior Medium Gloss White Enamel (Acrylic)  
Interior High Quality Semigloss White Enamel (Acrylic)  
Interior High Quality Semigloss White Enamel (Acrylic)  
Interior High Quality Semigloss White Enamel (Acrylic)  
Interior Low Cost Semigloss White Enamel  
(Vinyl Acetate)  
Interior Moderate Cost Semigloss White Enamel (Acrylic)

Interior Semigloss White and Tint Base Enamel (Alkyd)

Interior Semigloss White and Tint Base Enamel (Alkyd)

Interior Semigloss White and Tint Base Enamel

(Vinyl-Acetate Acrylic)

Interior Semigloss White and Tint Base Enamel

(Vinyl-Acetate Acrylic)

Interior High Semigloss White and Tint Base Enamel

(Alkyd/Acrylic)

## 16. PAINT FORMULATION

Art

Science

Raw Materials

Manufacture

Cost

Performance

Principles

Pigment - Volume Concentration

Critical Pigment Volume Concentration

Pigments

Vehicle

Solvents and Driers

Formulation Example

White House Paint

Computer

## 17. MANUFACTURING TECHNOLOGY

1. Process Technology

1.1 Paint Manufacture

1.2 Powder Coating Manufacture

1.3 Resin Manufacture

2. Equipments

3. Laboratory Equipment

4. Quality Control

5. Automation

## 18. THE MANUFACTURE OF NATURAL COPAL VARNISHES

Disintegration or Size Reduction of the Copal

Method of Heating

Stirring

Capacity of the Kettle

Condensation of Vapours

Addition of Drying Oil

Addition of Driers – Lithorge, etc.

Addition of Liquid Driers and Thinners

Temperature Measurement

Discharging

Access to the Inside of the Kettle

Flanged or Welded Bottoms

Choice of Metal

Special Accessories

Fire Risks

Special Plant Designs  
Choice of Running Kettle  
General Plant Arrangement

#### 19. THE MANUFACTURE OF BLACK VARNISHES

Charging the Vessel with Bitumen  
Heating and Sweating  
Addition of Resin  
Addition of Oil  
Addition of Driers  
Cooling and Thinning  
Cleansing  
Storage  
Oil-free Black Varnishes  
Special Equipment

#### 20. THE MANUFACTURE OF SPIRIT VARNISHES

Spirit Manila Varnishes  
Shellac Varnishes  
Accroides Varnishes  
Oxidised Rosin Varnishes  
Phenolic Resin Varnishes  
Urea-formaldehyde Resin Varnishes  
Hydrocarbon Base Varnishes

#### 21. FLOOR PAINTS AND ENAMELS

Medium Tint Base Paint (Vinyl Acetate-Acrylic/Epoxy)  
Gray Floor Paint (Acrylic)  
Green Floor Paint (Vinyl Acetate-Acrylic/Epoxy)  
Red Floor Paint (Vinyl Acetate-Acrylic/Epoxy)  
Gray Floor Enamel (Acrylic/Alkyd)

#### 22. INTERIOR CONCRETE PAINTS AND ENAMELS

Interior White Concrete Floor Paint (TT-P-0091D) (Styrene-Butadiene)  
Interior Brown Concrete Enamel (Styrene-Butadiene)  
Interior Battleship Gray Concrete Enamel  
(Styrene-Butadiene)  
Interior Light Gray Concrete Enamel (Styrene-Butadiene)  
Interior Olive Gray Concrete Enamel (Styrene-Butadiene)  
Interior Silver Gray Concrete Enamel (Styrene-Butadiene)  
Interior Dark Green Concrete Enamel (Styrene-Butadiene)  
Interior Tile Red Concrete Enamel (Styrene-Butadiene)  
Interior Yellow Concrete Enamel (Styrene-Butadiene)

#### 23. EXTERIOR WHITE ENAMELS

Exterior Low Gloss White Low-Odor Enamel  
(Two-Component, Epoxy-Polyester)  
Exterior Low Gloss White Low-Odor Enamel  
(A.P.A. Approved) (Two-Component, Epoxy-Polyester)  
Exterior Low Gloss White Low-Odor Enamel  
(A.P.A. Approved) (Two-Component, Epoxy-Polyester)

Exterior Low Gloss White Low-Odor Enamel  
(TT-C-545D Type) (Two-Component, Epoxy-Polyester)  
Exterior Semigloss White Enamel (Alkyd)  
Exterior Semigloss White Enamel (TT-E-490B) (Alkyd)  
Exterior Semigloss White Low-Odor Enamel  
(Two-Component: Epoxy Polyester)  
Exterior Semigloss White Low-Odor Enamel  
(Two-Component: Epoxy-Polyester)  
Exterior Semigloss White Enamel (Styrene-Acrylate)  
Exterior Semigloss White Enamel (Styrene-Acrylate)  
Exterior Gloss White Color-Retentive Enamel (Acrylic)  
Exterior Gloss White Enamel (Alkyd)  
Exterior Gloss White Fast-Drying Enamel (Alkyd)  
Exterior Gloss White Fast-Drying Enamel (Alkyd)  
Exterior Gloss White Odorless Enamel (Alkyd)  
Exterior Gloss White Trim Enamel (Alkyd)  
Exterior Gloss White Enamel  
(Two-Component: Epoxy-Polyester)  
Exterior Gloss White Low-Odor Enamel  
(Two-Component: Epoxy-Polyester)  
Exterior Gloss White Enamel (Oxazoline)  
Exterior Gloss White Enamel (Styrene-Acrylate)  
Exterior Gloss White Enamel (Styrene-Acrylate)  
Exterior Gloss White Marine and General Purpose Low-Cost Enamel (Urethane)  
Exterior White Rapid-Drying Enamel (Alkyd)  
Exterior White Enamel (Urethane)  
Exterior White Tile-Like Enamel  
(Two-Component: Urethane-Catalyst)

**24. EXTERIOR OR INTERIOR ENAMELS**

Exterior or Interior Gloss White Enamel (Alkyd)  
Exterior or Interior Gloss White Enamel (Alkyd)  
Exterior or Interior Gloss Blue Enamel  
(Alkyd/Hydrocarbon Resin)  
Exterior or Interior Gloss Gray Enamel  
(Alkyd/Hydrocarbon Resin)  
Exterior or Interior Gloss Green Enamel  
(Alkyd/Hydrocarbon Resin)  
Exterior or Interior Gloss Yellow Enamel  
(Hydrocarbon Resin)

**25. VARNISHES, LACQUERS AND FLOOR FINISHES**

Cold-Blend Spar Varnish – Metal  
General-Purpose Utility Varnish  
Crown Cap Varnish  
Furniture Rubbing Varnish  
Four-Hour Floor and Trim Varnish  
Clear Floor Varnish  
Flatted Alkyd Varnish  
Alkyd Rubber Lacquer  
Epoxy Clear Coating  
Epoxy-Amine Clear Coating

Epoxy Clear Coating  
Clear Flexible Epoxy-Amine Exterior Coating  
Flatting Base  
Clear Varnish  
Gray Floor Enamel  
MFMA Gym Floor Finish – 40% Solids  
General Purpose Varnish – 50% Solids.  
Marine Spar Varnish  
Chemically Resistant Varnish  
Overpaint Varnish  
Porch and Deck Varnish  
Venetian Blend Varnish  
Clear Acrylic Lacquer  
Directions for Use  
Package  
Precautions  
Acryloid Acrylic Wood Lacquer  
Protective Acrylic Coating for Copper Metal  
Acrylic Lacquer  
Clear Sanding Sealer  
Varnish  
Maroon Floor Varnish  
(Phenolic Resin)  
Shellac Primer Sealer  
Furniture Lacquer  
Cold-Blend Floor Varnish  
Maroon Floor Paint  
Vehicle  
Gray Floor Enamel  
Dull Finish Varnish  
Flooring Primer  
Green Floor Enamel  
Red Floor Enamel

## 26. PIGMENTS - GENERAL CLASSIFICATION AND DESCRIPTION

### Part A. Pigment Classification

Definition of Paint

The Functions of Pigments in Paint

Types of Pigments

Principles of Hiding Power

The Hiding Power of Paint

### Part B. Supplemental Pigments

Definition

History

White Pigment Evaluation Methods

General Properties of Supplemental Pigments

Manufacture of Supplemental Pigments

The Major Supplemental Pigments

The Future of Supplemental Pigment Technology

## 27. WHITE PIGMENTS



Opacity  
The Reactive White Pigments  
Basic Carbonate White Lead  
28. COLORED PIGMENTS  
Chrome Yellows  
Zinc Yellows  
Strontium Yellow  
Nickel Titanate Yellow  
Nickel Azo Yellow  
Cadmium Yellow  
Yellow Iron Oxide  
Hansa Yellows  
Benzidine Yellows  
Vat Yellows  
Chrome Orange  
Molybdate Orange  
Cadmium Orange  
“Mercadium” Orange  
Benzidine Orange  
Dinitraniline Orange  
Vat Dye Oranges  
Chrome Greens  
Chromium Oxide  
Hydrated Chromium Oxide  
Copper Phthalocyanine Green  
Organic Green Toners  
Iron Blues  
Copper Phthalocyanine Blues  
Ultramarine Blue  
Organic Blue Toners  
Indanthrone Blue  
Carbazole Dioxazine Violet  
Organic Violet Toner  
Mineral Violet  
Quinacridone Violet  
Lithols  
Para Reds  
Toluidine Reds  
BON (-OxynaphthOic) Reds and Maroons  
Lithol Rubine  
Chlorinated Para Red  
Quinacridone reds and maroons  
Red Iron Oxide  
Cadmium Red and Maroons  
“Mercadium” Reds and Maroons  
Red Lead  
Thioindigo Reds and Maroons  
Arylide Maroons  
Siennas, Ochres and Umbers  
Carbon Blacks, Lampblacks and Bone Blacks  
Tinting Properties of Colored Pigments

Chrome Yellows  
Zinc Yellows  
Basic Zinc Chromate  
Strontium Yellow  
Nickel Titanate Yellow  
Nickel Azo Yellow  
Cadmium Yellow  
Yellow Iron Oxide  
Hansa Yellow  
Benzidine Yellow  
Vat Yellows  
Chrome Orange  
Molybdate Orange  
Cadmium Orange  
"Mercadium" Orange  
Benzidine Orange  
Dinitraniline Orange  
Vat Dye Orange  
Chrome Greens  
Chromium Oxide  
Hydrated Chromium Oxide  
Copper Phthalocyanine Green

## 29. PIGMENT DISPERSION

Definition  
Method  
Equipment  
Mill Base Formulation  
Setting up a Laboratory Formula  
Equipment Setups and Limitations  
Tank Configuration  
Premixers  
Conclusions

## 30. ADDRESSES OF PLANT & MACHINERY SUPPLIERS

## 31. PLANT & MACHINERY PHOTOGRAPHS

---

**NIIR PROJECT CONSULTANCY SERVICES (NPCS)** is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Market Research, Manufacturing Process, Machinery, Raw Materials, Project Feasibility, Investment Opportunities, Technical Consultancy and Startup Help.

NPCS also publishes process technology books, technical books, startup books, directory, business database, detailed project reports and market research reports.

Our Detailed Project Report aims at providing all the critical data required by entrepreneurs for starting new business ventures.



AN ISO 9001 : 2015 CERTIFIED COMPANY

---

**NIIR PROJECT CONSULTANCY SERVICES**

106-E, Kamla Nagar, New Delhi-110007, India

**Email:** [npcs.india@gmail.com](mailto:npcs.india@gmail.com) **Website:** <https://www.niir.org/>