Paint can be applied to almost any kind of object. It is used in the production of art, in industrial coating, as a driving aid (road surface marking), or as a barrier to prevent corrosion or water damage. Quality control for paint product can be achieved through conducting a number of physical and chemical tests to paint samples. In the paint and coating industries, paint testing is often used to determine if the paint or coating will adhere properly to the substrates to which they are applied. Testing of paint, varnishes and resins can be done in a number of different ways. The fact of the matter is that many industries use several different paint testing methods in order to ensure accurate results. Products of the surface coating are essential for the preservation of all types of architectural structures, including factories, from ordinary attacks of weather, micro and macro organisms, atmospheric pollutant, etc. Architectural coatings are usually applied to wood, gypsum wall board, or plaster surfaces. Bituminous coatings are used on surfaces to reduce or eliminate the destructive effects of weather, chemicals and water vapour. They are also used as sound deadeners, to provide resistance to heat transfer and to provide abrasive coatings to minimize slip hazards. Traffic paint is an important factor in the control of traffic, not only of motor vehicles but also of aircraft at airports and of pedestrian traffic. Proper paint formulations depend upon raw materials selection and accurate calculation of the amounts of its constituents. Therefore it becomes necessary to adopt various test methods for testing the quality of product. The final product shall have no adverse effect on the health of personnel when used for its intended purpose and applied in approved facilities with the use of approved safety equipment.

This testing manual elaborates the methods used to determine the physical and chemical properties of paint, varnish, resins, and related materials. Some of the fundamentals of the book are biological deterioration of paints and paint films, weathering tests natural weathering, artificial weathering machines, new jersey zinc company machine, gardener parks wheel, atlas weather Ometer, sunshine carbon arc weather Ometer, British railways machine, British paint research station machine, waxes and polishes, putty, glazing compounds, caulking, compound and sealants, tile like coatings, applicable specifications, adhesion tests, Evans adhesion test, resistance to alkaline peeling (Evans method), paint for electrocoating, synthetic resins, driers and metallic soaps, natural resins.

The purpose of this book is to help its readers to establish standardized testing methodologies and to eliminate unnecessary or undesirable variations in test results when evaluating a products adherence to specification requirements. It is hoped that this book will help its readers who are new to this sector and will also find resourceful for new entrepreneurs, existing industries, technical institution etc.

Contents
1. BIOLOGICAL DETERIORATION OF PAINTS AND PAINT FILMS

2. WEATHERING TESTS NATURAL WEATHERING

3. ARTIFICIAL WEATHERING

4. ATMOSPHERIC POLLUTANTS
Source of Pollutants, Regulations, Analytical Methods, Smog Chambers

5. SPECIFIC PRODUCTS TESTS ON VARNISHES
Introduction, Test on Liquid Varnish, Appearance, Color, Viscosity, Viscosity Control During Manufacture, Nonvolatile Content, General Method, Method Flash Point A, Resin Solutions, Density (specific gravity), Elasticity (toughness), Linseed Oil Addition, Predicting Kauri Reduction, Leafing Test, Spatula Test, Beaker Test, Skinning, Reactivity, Acid Value, Alkali Increase Test, ASTM Reactivity Test, Rosin Content, Drying Time, Tests on Dry Films, Film Irregularities, Bell Jar Test, Oven (cabinet test), Smokey Joe Oven, Rogers Test, Draft Test, Resistance to Selflifting, Rubbing Property, Hardness and Abrasion Resistance, Plasticizer Migration, Temperature Change Resistance (cold check test), Tests on Clear Floor Sealers, Specimens, Appearance, Resistance to Ink Stain, Restoration of Worn Areas, Finishing with Other Coatings, Tests on Shellac Varnish, Color, Drying Time, Nonvolatile Content

6. ARCHITECTURAL PAINT

7. CEMENT BASE PAINT AND THE PAINTING OF MASONARY

8. WAXES AND POLISHES
Introduction, Tests on Raw Materials, Melting Point, Specific Gravity, Acid Value, Saponification Value, Crystallinity of Petroleum Waxes, Paraffin Hydrocarbons in Caranauba Wax, Detection of Glycerides,

9. PUTTY, GLAZING COMPOUNDS, CAULKING, COMPOUND AND SEALANTS


10. TILE LIKE COATINGS AND SEAMLESS FLOOR TESTING


11. BITUMINOUS COATINGS


12. TRAFFIC PAINT


13. PAINT FOR MARINE ENVIRONMENT


14. PAINT FOR ELECTROCOATING
15. ANALYSIS OF WHOLE PAINT

Sampling, Separations and identification of Binder and Solvent, Sampling, General Precautions and Suggestions, Procedure, Preliminary Tests on Whole Paint, Nonvolatile Content by Weight, Nonvolatile Content by Volume, Pigment Content, Water Content, Flash Point, Separation of Pigment, Separation of Vehicle, Identification of Binder, Solvent Based Paints and Lacquers, Water Based Paints, Separation of Solvent, Identification of Solvent

16. CHEMICAL ANALYSIS OF PIGMENTS

Sampling, Purity of Reagents and Water, Some Common Properties, Moisture Content, Loss on Ignition and Ash, Matter Soluble in Water, Hydrogen I on Concentration, Alkalinity or Acidity, Single White Pigments, Titanium Dioxide and Titanium-Calcium, Titanium, Alumina, Silica, Lead, Carbon Dioxide, Carbon Dioxide and Combined Water, Lead Carbonate, Matter insoluble in Acetic Acid, Impurities Other Than Moisture, Sulfate, Basic Lead Oxide, Impurities, Basic Silicate White Lead, Trisicatic Lead Phosphosilicate, Moisture, Water of Hydration, Silica, Lead, Phosphorus as P2O5, Zinc, Sulfur, Lead, Zinc, Sulfur, Zine Oxide, Zinc Sulfide, Barium Sulfate, Titanium Dioxide, Antimony Oxide, Antimonous Oxide, Total Oxide, Matter Soluble in Hydrochloric Acid, Silica, Aluminum Oxide, Alumina and Iron Oxide, Calcium Oxide, Magnesium Oxide, Mica, Calcium Carbonate, Calcium Oxide, Calcium Sulfate, Free Water, Combined Water, Matter Insoluble in HCI, Barium Sulfate, Ferric Oxide, Free Silica, Mixed White Pigments Extracted from Paint, Moisture, Loss on Ignition, Acidity or Alkalinity, Matter Insoluble in Hydrochloric Acid, Total Lead, Lead Tinate, Aluminum Oxide, Zinc Oxide, Soluble Barium, Calcium, Magnesium, Total Soluble Sulfur, Sulfide Sulfure, Carbon Dioxide, Soluble Sulfate, Sulfur Dioxide, Black Pigments, Bone Black, Carbon Black, and Lampblack, Identification, Acetone Extract, Carbon and Insoluble Mineral Matter, Synthetic Black Iron Oxide, Identification Ferrous Iron Oxide, Metallic Pigments, Aluminum, Qualitative Analysis, Fatty and Oily Matter, Metallic Zinc, Zinc Oxide, Calcium as Calcium Oxide, Lead Cadmium, and Iron, Chlorine, Sulfur, Blue pigments, Iron Blue, Identification, Moisture, Water-Soluble Matter, Acid Insoluble Extenders, Acid-soluble Extenders, Organic Colors and Lakes, Copper Phthalocyanine Blue, Identification, Basic Dye Derivatives, Other Organic Coloring Matter, Ultramarine Blue, Iron Blue, Yellow, orange, and green pigments containing lead chromate and chromium oxide green, Chrome Yellow, Chrome Orange, and Molybdate Orange, Preparation of Samples, Lead Chromate, Total Lead, Total Sulfate, Molybdenum, Extenders, Lead, Chromium Trioxide, Silica, Lead Chromate, Barium Sulfate and Insoluble Siliceous Material, Sulfate, Calcium Oxide, Yellow, orange, and brown pigments containing strontium chromate and zinc chromate, Strontium Chromate, Moisture and Other Volatile Matter Strontium, Chromium, Chloride, Sulfate, Zinc Yellow (zinc chromate yellow), Combined Water, Aliquots for Tests, Chromium, Alkaline Salts, Matter Insoluble in Acetic Acid, Yellow, orange, red, and brown pigments containing iron and manganese, Iron Oxide, Calcium Compounds, Calcium Carbonate (in Venetian Red), Sulfates Soluble in Hydrochloric Acid, Qualitative Test for Lead Chromate in Ochre, Manganese (in sienna and umber), Other red pigments, Copper Oxide (antifouling) and Other Copper Pigments, Special Precautions for Sample Treatment, Total Copper, Total Reducing Power as Cuprous Oxide, Metallic Copper, Copper Oxide, Cupric Oxide, Metals Other than Copper, Chlorides and Sulfates, Acetone-Soluble Matter, Dry Red Lead, Total Lead and Insoluble Matter, Lead Peroxide and True Red Lead, Zinc, Total Silica, Carbon Dioxide, Soluble Sulfate (other than barium sulfate), Iron Oxide, Dry Mercuric Oxide Ash, Free Mercury, Total Mercury, Organic Pigments and Colorants, Solubility in Chloroform, Qualitative Test for Identity and Purity, Resistance to Acids and Alkalis, Henlein Color Identification Chart

17. SYNTHETIC RESINS

General Methods of Resin Identification, Chemical Methods, Spectrometric Methods, Alkyd and Polyester Resins, Identification by Chemical Methods, Identification by Spectrometric Methods, Carboxylic Acids, Phthalic anhydride, Procedure, Reagents, Modification for Lacquers, Gas-Liquid Chromatographic Method-, Equipment and Conditions, Reagent, Procedure, Isophthalic, terephthalic, and benzoic acids, Chlorendic acid, Apparatus, Reagents, Maleic, adipic, and other acids in polyesters, Equipment and Conditions,

18. RAW MATERIAL

19. DRIERS AND METALLIC SOAPS

20. NATURAL RESINS
Classifications, Identification of Natural Resins, Identification of Rosin, Identification of Lac, Commercial Grades of Natural Resins, Manila (Macassar) Spirit Soluble, Manila (Philipppine) Spirit Soluble, Manilla (Singapore), Congo (American Gum Importers Classification), Refractive Index, Hardness, Softening Point, Capillary Tube Method, Ring and Bull Method, Preparation of Sample, Durrans Method, Witter Method, Paramet Method, Drip Method, Density, Bulkling Value, Solubility, Nonvolatile Content of Resin Solutions, Dirt in Resins, Volumetric Method for Dirt, Gravimetric Method for Din, Ash Content, Moisture Content, Acid Value, Reserve the specimen for the indirect acid value, AGI Indirect Acid Value, AGI Saponification Value,

21. CELLULOSICS
Cellulose Nitrate, Viscosity Grade, Solubility and Appearance of Solution, Film Test, Toluene Dilution Ratio, Cellulose Nitrate Base Solutions, Viscosity, Nonvolatile Content, Appearance, Cellulose Acetate, Viscosity, Color and Haze, Solubility and Appearance of Solution, Cellulose Acetate-Butyratce and Cellulose Acetate-Propionate, Ethylcellulose, Viscosity, Methylcellulose, Viscosity of Water-Soluble Methylcellulose, Viscosity of Alkali-Soluble Methylcellulose, Sodium Carboxymethylcellulose, Viscosity, Hydroxyethylcellulose, Hydroxypropyl Methylcellulose, Viscosity, Hydrogen Ion Concentration, Solids

22. PLASTICIZERS
Introduction, Physical and Chemical Test Methods, Acidity, Color, Compatibility, Copper Corrosion, Distillation Range, Electrical Properties, Ester Value, Flash Point, Refractive Index, Residual Odor, Sampling, Solidification Point, Specific Gravity, Viscosity, Water, Chemical Methods of Identification and Measurement, Isolation of Plasticizer, Qualitative Methods, Quantitative Methods, Instrumental Methods, Identifications by Refractive Index and Density, Fluorescence, Spectrophotometry, Chromatography

23. SOLVENTS
Definition and Requirements, Solvency, Solubility Parameter System, Viscosity Reduction, Aniline Point, Kauri-Butanol Value, Dilution Ratio, Dilution Limit, Evaporation (volatility), Vapor Pressure, Evaporation Rates by Electrobalance, Butyl Acetate Evaporation Standard, Historical Evaporation Rate Methods, Evaporation of Solvent from Coatings, Solvent Retention by Films, Distillation Temperature, Mc Ardle-Robertson Evaporation Index, Analytical Distillation, Flash Point, Composition, Chromatography, Liquid Chromatography, Acid Absorption and Bromine Number Methods, Refractively Intercept, Ester Value of Lacquer Thinners, Physical Properties, Density and Specific Gravity, Refractive Index, Purity and Impurities, Color, Acid Wash Color, Odor, Sulfur Compounds, Nonvolatile Residue, Water Contamination, Acidity and Alkalinity, Other Contaminants, Specifications, Systematic Identification and Analysis

About NIIR

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.


NPCS also publishes varies process technology, technical, reference, self employment and startup books, directory, business and industry database,
bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

NIIR PROJECT CONSULTANCY SERVICES, 106-E, Kamla Nagar, New Delhi-110007, India. Email: npcs.india@gmail.com Website: NIIR.org