



PROTECTIVE COATINGS

Protective coatings are used to protect the metals from corrosion. Protective coatings act as a physical barrier between the metal and environment. In addition to corrosion protection, they are also used for decoration purposes. The protective coatings must be chemically inert to environment and sufficiently thick. They impart some special properties such as hardness, corrosive resistance, electrical conductivity, thermal insulating property, etc.

1.12.a. ORGANIC COATINGS

Organic coatings are inert organic barriers applied on the metal surface. Organic coating provides corrosion protection and decoration for metallic surface.

Example: Paint, varnish, enamels and lacquers are the main organic coating.

Paints

Definition

Paint is a mechanical dispersion of one or more finely divided pigments in a medium (thinner + vehicle). When paint is applied on a metal surface, the thinner evaporates, while the vehicle forming a pigmented film.

Characteristics of good Paints

- It should spread easily on the metal surface.
- It should adhere well to the metal surface.
- It should have high hiding power.
- It should not crack on drying.
- It should have stable colour.
- It should have high corrosive resistance.
- It should have high water repelling property.
- It should give a glassy film.
- It should have long life.
- It should have high covering power.

Constituents and their functions of Paint

i) **Pigments** They are solid and colour producing substances in the paint.

Functions of Pigments

i) It gives desired colour and opacity to the film.



- ii) It provides strength to the film.
- iii) It protects the film from the destructive uv-rays.
- iv) It improves weather-resistance to the film.

Examples:

- White Pigments – White lead [2PbCO_3 , $\text{Pb}(\text{OH})_2$] or ZnO .
- Lithophone (75 % BaSO_4 + 25 % ZnS)
- Red Pigments – Venetian red (Fe_2O_3 and CaSO_4)
- Indian red (Fe_2O_3)
- Blue Pigments – Prussian blue $\text{Fe}_4 [\text{Fe}(\text{CN})_6]_3$
- Green Pigments – Chromium oxide
- Black Pigments – Lamp black, carbon black
- Yellow – Chrome yellow, Zinc yellow
- Brown – Brown umber

ii) Vehicle or Drying Oil It is a non-volatile portion of a medium. It is the film forming constituent of the paint. These are higher molecular weight fatty acids present in vegetable and animal oils.

Functions

- i) They form a protective film by the oxidation and polymerisation of oil.
- ii) They bind the pigment particles together on the metal surface.
- iii) They impart water repelling property, toughness and durability to the film.

Examples: Linseed oil, dehydrated castor oil, soyabean oil, etc.

iii) Thinners or Solvents It is a highly volatile portion of a medium which evaporates after the application of the paints.

Functions

- i) It reduces the viscosity of the paint.
- ii) It dissolves oil, pigments, etc. and produces a homogeneous mixture.
- iii) It increases the penetrating power of the vehicles.
- iv) It increases the elasticity of the paint film.
- v) It helps the drying process of the paint.

Examples: Turpentine, benzene, dipentene, naphtha, kerosene, etc.



iv) Extenders or Fillers They are inert white or colourless and low refractive indices pigment materials.

Functions

- i) It reduces the cost of the paints.
- ii) It retards the settling of the pigments.
- iii) It modifies the shades of pigments.
- iv) It reduces the cracking of dry paint film.
- v) It increases the durability of the paint.

Examples: Talc, gypsum, china clay, CaCO_3 , ground silica, magnesium silicate, etc.

v) Driers

They are used to increase the rate of drying process (oxygen carriers). Examples: Metallic soaps like Naphthenates, linoleates, resinate borates and tungstates of cobalt, zinc, manganese and lead.

vi) Plasticizers: They are added to provide elasticity to the film and to prevent cracking of film.

Examples: Triphenyl phosphate, tributyl phthalate, tricresyl phosphate, dibutyl tartarate, etc.

vii) Anti-skinning Agents

They are added to prevent gelling and skinning of the paints. Example: Polyhydroxy phenol.