

POWDER COATINGS

Powder coatings are the paints containing 100% of solid components (binders, pigments and additives) in form of finely atomized powders.

Powder coatings contain no solvent.

- ☐ **Polymer resins used as the binders in powder coatings**
- ☐ **Methods of application of powder coatings**
- ☐ **Advantages and disadvantages of powder coatings**

Polymer resins used as the binders in powder coatings

- ☐ Thermosetting resins
 - ☐ Epoxies
 - ☐ Epoxy-polyester hybrid
 - ☐ Polyurethane
 - ☐ Polyester
 - ☐ Silicone
 - ☐ Acrylic
 - ☐ Polyester-TGIC cross-linked with TGIC
- ☐ Thermoplastic resins
 - ☐ Polyethylene
 - ☐ Polypropylene
 - ☐ Polyamide (nylon)
 - ☐ Polyvinyl Chloride (PVC)
 - ☐ Thermoplastic polyester
 - ☐ Polyvinylidene fluoride (PVDF)

Methods of application of powder coatings

- ☐ **Electrostatic spraying.**

Electrostatic spraying utilizes electrostatic attraction of electrically charged powder particles to the grounded metallic substrate.

The powder particles gain the electric charge when they pass through the ionized air in the spray gun. Air is ionized in the high voltage (40-100 kV) electrostatic field generated by an electrode located in the spraying gun. This method of electrostatic spraying is called “**corona charging**”. **Friction charging (tribocharge)** is another method of charging powder particles. The particles gain positive electric charge when they rub against the gun lining. The charged powder particles are attracted by the grounded part forming a thin coating

☐ **Fluidized bed**

Fluidized bed presents a suspension of the coating powder particles dispersed in air. The fluidized bed tank has a porous bottom through which low pressure air is fed. The air stream keeps the powder particles in dispersed state. A preheated part is dipped into the air-powder suspension. The powder particles come in contact with the part surface, melt on the preheated substrate surface and form polymer coating. Thick coating of 0.003 - 0.01 inch (75 - 250 μm) may be obtained by a single dip in a fluidized bed.

☐ **Electrostatic fluidized bed**

Electrostatic fluidized bed differs from the conventional fluidized bed by using ionized air for formation of the air-powder dispersion. The ionized air charges the powder particles, which repel each other by electrostatic force. The charged particles are attracted by the grounded part dipped into the chamber. preheating is not necessary in this method. However the coated parts should be postheated to provide curing of the polymer coating. Electrostatic fluidized bed is used for coating small parts with simple shape.

☐ **Flame spray**

In flame spray method the air-powder dispersion is injected by a flame gun together with burning combustible gas (eg. propane). The powder particles melt in the flame and form a coating on the cold surface of the part. Preheating of the part is not necessary. The powders for flame spray is prepared from thermoplastic polymers. The method is generally used for coating large objects, which can not be placed in a curing oven.

Advantages and disadvantages of powder coatings

Advantages of powder coatings:

- ☐ High coating properties
- ☐ Easy application
- ☐ Possible automation
- ☐ Low capital investment
- ☐ Low toxicity due to absence of VOC (volatile organic compounds)
- ☐ Low amount of paint is stored, shipped and sprayed for obtaining a coating of a given thickness and area.
- ☐ Simple and non-expensive exhausting equipment is required
- ☐ Low fire hazard
- ☐ Simple substrate Surface preparation
- ☐ Low waste (up to 4%)

Disadvantages of powder coatings:

- ☐ Risk of explosion
- ☐ Difficult to deposit thin coatings
- ☐ Difficult to coat parts of intrinsic geometry