

Powder Coating

Technical Data Sheet

What is powder coating?

Powder coating is a method of coating a substrate in a polymer material using either a fluidized bed, or more usually, spray equipment.

The major difference between powder and wet spraying is that the wet spray principle requires a carrier or solvent to allow the material to be atomised and transferred from a spray gun to a substrate; when powder coating, the material is propelled from a spray gun using air at low pressure and drawn towards workpieces using an electric charge which is imparted to the powder as it exits the coating gun. The powder is then fused and cross-linked using heat in an oven through which parts travel on an overhead conveyor.

There are two types of powders available, thermoplastic, which re-melts with a subsequent application of heat and thermosetting powders which are much more widely used.

Thermosetting plastics are primarily composed of relatively high molecular weight solid resins of between 30 and 50 μm in particle size and curing agents or catalysts which form or assist in the formation of crosslinks between polymer chains to form a non-reversible polymer film that will not re-melt if subjected to heat for a second time.

The primary resins used in the formulation of thermosetting powders are:

- Epoxy
- Polyester
- Polyester / epoxy blends (known as hybrids)
- Acrylic
- Polyurethane

Powder types

Epoxy powders are one of the most used systems, these are produced in a wide range of formulations depending upon the destined use of the applied coatings. They impart excellent levels of gloss, toughness, adhesion, chemical resistance, corrosion resistance and flexibility, and, as such, are useful for under bonnet and under body automotive applications, as well as for office equipment.

The primary drawback of epoxies is that they degrade, leaving a white, dusty residue when exposed to ultra violet light for prolonged periods. For this reason; they are rarely used in outdoor applications. They also have a poor heat tolerance and can change colour at high temperatures.



Polyester powders are used in some applications. These have excellent durability and a high resistance to degrading when exposed to ultra-violet light. Polyester resin systems are available with two types of crosslinking systems, urethane or triglycidyl isocyanurate (TGIC)

Whilst there are small differences between the systems, most modern powders are TGIC-free, these impart good weathering properties and exterior durability; they also offer very good visual appearance at fairly low film thicknesses.

They are used for exterior applications such as patio furniture, automotive wheels and trims, lawnmowers and a wide range of other products requiring high quality, decorative finishes comparable to wet coatings.

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Epoxy polyester hybrids are blends of the two materials previously described blends with a greater proportion of polyester are designed to give reasonable chemical resistance and adhesion combined with durability and good outdoor exposure performance.

The resultant powders are tough, flexible, competitively priced and are frequently used in similar applications to epoxies.

Acrylic materials impart good gloss and colour retention excellent exterior durability as well as heat and alkali substance resistance, however they are not as flexible but can be applied to high thicknesses.

Polyurethane powders: provide good all-round physical and chemical properties as well as giving good exterior durability.

There are many features that make the choice of applying thermosetting powder coatings attractive.

- Powder coating leads to the emission of zero or minimal volatile organic compounds.
- Powder is immediately ready for use.
- There is little powder wastage during the application process, since over sprayed material can be recycled
- Low health hazard during application
- Robust cured-film properties
- Coatings can be achieved in one coat without primers
- Coatings can mask or hide flaws in machined or cast surfaces

The Anochrome Group offers thermoset epoxy, polyester and a hybrid range of AkzoNobel powders which are applied via a manual application process.

Pre-treatment, which is critical to obtaining good adhesion and longevity, can be carried out in house using anodising, phosphating, shotblasting, electroplating or electropainting prior to application.

	Powder types and properties				
Property	Epoxy	Acrylic	Polyester	Hybrid	Polyurethane
Weatherability	Poor	Excellent	Excellent	Fair -Poor	Good
Corrosion Resistance	Excellent	Good	Very Good	Excellent-Very Good	Very Good
Chemical Resistance	Excellent	Very Good	Very Good	Very Good	Very Good
Heat Resistance	Very Good	Good	Good	Very Good - Good	Very Good
Impact Resistance	Excellent-Very Good	Good -Fair	Good	Very Good	Very Good
Pencil Hardness	HB-5H	HB-4H	HB-4H	HB-2H	HB- 3H
Flexibility	Excellent-Very Good	Good - Fair	Very Good	Very Good	Very Good
Adhesion	Excellent	Good - Fair	Excellent	Excellent	Very Good

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