

Coating name	Colour	Example	Standard thickness [µm]	Cost [€]	Working temperature [°C]	Corrosion resistance	Abrasion resistance	Glueability	Characteristics	Application
Ni-Cu-Ni	Silver		15-25	€	< 325	Medium poor in salty environment	Good	Poor	Metallic coating.	Widely used coating for consumer goods, industrial magnets, Automotive & motors.
Ni-Cu-Epoxy	Black		15-30	€€	-50 to +180	Good	Poor	Good	Combination of metallic and organic coating.	Suited for linear motors, Automotive applications and generators.
(Raw) Epoxy (BE)	Black		10-20	€€	< +120	Good	Good	Good	Organic coating.	Suited for linear motors, Automotive applications and generators.
Parylene	Transparent		2-8	€€€	+20 to +100	Good	Good	Good	Organic coating. High electrical resistivity. Hydrophobic. Low permeability of ions. Excellent resistance to solvents, acids and alkaline substances. No outgassing from coating. May be used in combination with e.g. NiCuNi or Zn base layer coating.	Well suited for use in Aerospace and military purposes. Also used in the food industry and for commercial uses.
Ni-Au	Golden		2-8	€€€	< +200	Medium poor in salty environment	Good	Poor	Metallic coating.	Well suited for medical applications due to chemically inert gold top layer. Also used for esthetics.
Zn	Light blue		7-15	€	< +160	Medium poor in salty environment	Good	Good	Metallic coating.	Well suited for the Automotive industry and motor applications.
Everlube (6155)	(Golden) Yellow		10-30	€€€	-70 to +200	Good	Good	Good	Organic coating. Low friction coefficient. Good resistance to solvents, acids and alkaline substances.	Suited for electric vehicles, wind energy, Aerospace, chemical industry and defense applications.
PTFE (Teflon)	White (amongst other colour options)		5-20	€€€	< +260	Good	Good	Poor	Suited for environment with aggressive chemicals. Electrically insulating. Good resistance against UV rays. Good resistance to solvents, acids and alkaline substances. May be used in combination with e.g. NiCuNi base layer coating.	Well suited for medical, food and chemical industries.
NiP (Chemical Nickel)	Silver		3-10	€€	< +860	Good	Good	Poor	Metallic coating. Nickel-Phosphorus electro-plating.	Well suited for Automotive, Aerospace, oil & gas, electronics industries
PVD Al	Silver		4-12	€€€	< +660	Medium poor in salty environment	Poor	Poor	Metallic coating.	Suited for high-tech and automotive applications, as well as Aerospace
HDPE	Transparent		> 300	€€€€	-40 to +85	Good	Good	Good	High Density Poly-Ethylene. High rigidity and toughness. Good mechanical strength. Higher costs due to tooling.	Suited for applications in food and packing industry, as well as pipe laying business
ABS	Beige		> 300	€€€€	-20 to +85	Good	Good	Good	Amorphous thermoplastic. High strength and toughness. Easy to process and form. Relatively thick coating layer. Higher costs due to tooling.	Suited for water resistant applications in medical electronics and oil & gas industry
LLDPE	Transparent		> 300	€€€€	-40 to +85	Good	Good	Good	Linear Low Density Poly-Ethylene. Higher costs due to tooling.	Suited for use in food and packing industry as well as piping and cable covers

Remarks:

For many applications an extra thin layer of coating on the outside of the magnet is required, even if – for some applications – it may mean some loss in magnetic performance. A very important motivation for coating is protection from corrosion, which particularly applies to Neodymium magnets. Other reasons for applying coating include enhancement of cosmetic appeal, prevention of swelling and fracture due to hydrogen adsorption, and partial improvement of physical properties such as its strength.

The table above provides an overview of most commonly used coatings available at Goudsmit, together with properties of these coatings that are relevant for selection for most applications. As can be seen, coatings can be of a metallic or organic nature, and may also include various layer types on top of each other, each with its own specific properties. The table offers the user the possibility to make a first selection of a coating for a specific application. Nevertheless, it is highly recommended to contact a Goudsmit professional for a definite selection as coating selection is not a trivial issue and may involve considerations not mentioned in the table such as electrical resistance, availability and food compliancy.

The corrosion properties are expressed in generic terms to keep matters simple. It is common practice to determine and express the coating corrosion properties in terms of outcomes of dedicated tests. Common tests for determining magnet coating corrosion properties are so called Temperature & Humidity (H&T) tests, bulk corrosion tests (BCT), pressure cooker tests (PCT) and salt spray (fog) tests (SST). Several standard tests are provided by international standards organizations such as ASTM, IEC, ISO and SAC. Please contact us when interested in these tests or specific outcomes for specific coatings.

