

Onto™ EP3001 and EP3002 are development stage adhesion promoters from the EP3000 series of products which have been designed to improve adhesion of metals (particularly PVD aluminium coatings) to polymeric substrates. The treatments have been successfully applied in both in-line (before biaxial orientation) and off-line (after biaxial orientation) applications.

Substrate	Metal Coating
Polyolefins (PP, PE, TPO) Polyesters (PET, PEN, PEEK) Polyimides Epoxy Thermoset	Vacuum deposited Metals PVD Al Thermal Evaporated Au Ag or Cu inks (Screen or Ink jet) Cu or Ni E-Less Plating

Table 1: Substrates and metallisation techniques for EP3000

Onto™ EP3000 series properties

EP3000 products come as three-pot systems which require mixing before application. The formulations have an active pot life of 24 hours from mixing when stored away from strong light. Typical properties for EP3001 and EP3002 formulations can be found in Table 2. Currently we are evaluating specific applications to determine which of EP3001 or EP3002 is most suitable for providing optimum property improvement.

	EP3001	EP3002
Viscosity at RT [cP]	<40	<40
Flammable component [wt. %]	5-10	40-80
Solids content [wt.%]	5-10	5-10
Colour of solution	Lightly coloured	Lightly coloured
Film colour after curing	Colourless	Colourless

Table 2: Properties of EP3000 formulations

Application and curing for off-line coating

EP3000 formulations are applied using meyer rod (K Bar) or gravure (direct, reverse or offset) to give a wet coat weight typically in the region of 4-12gsm. In general, a thicker coating will result in better adhesion of the metal to the substrate. Curing of the coating is achieved using a hot air oven with minimum temperature 130°C, however curing at higher temperatures is recommended to minimise the time and to obtain best performance. Once the substrate is coated and cured the EP3000 treated film is stable over time and can be rolled or handled.

Onto™ EP3000: Adhesion Promoter for Metallisation of Plastics

Application and curing for in-line coating

For application of EP3000 in an in-line manner the degree of biaxial stretching must be taken into account when considering initial coat weight. For in-line coating of PP or PET there is no need for a separate curing step as the biaxial orientation process will impart sufficient temperature to cure the EP3000 layer (Figure 1). Once the substrate is coated and cured the EP3000 treated film is stable over time and can be rolled or handled.

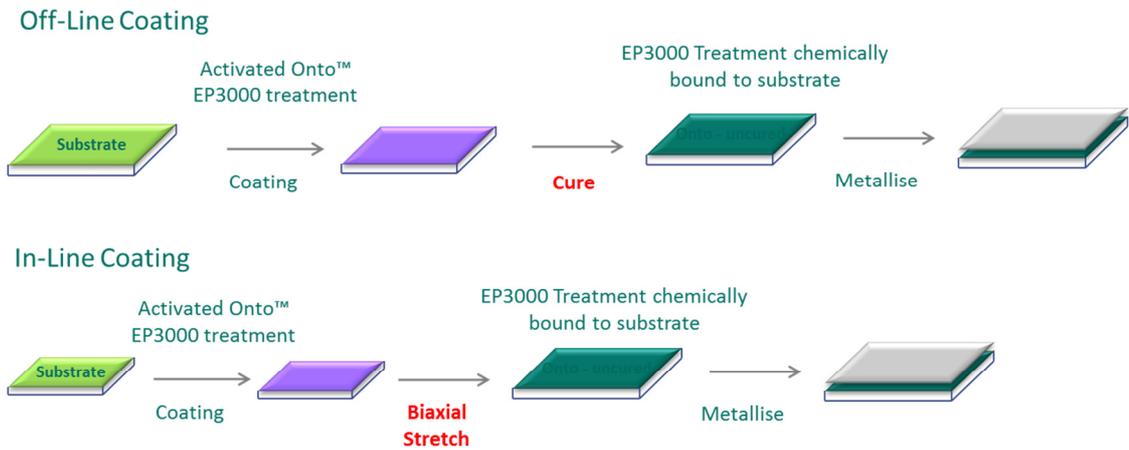


Figure 1 Overview of EP3000 processing

Performance

EP3000 treatments have been shown to improve adhesion of PVD aluminium coating to a polyester substrate Melinex OD (Off-line coating). In testing using a standard Scotch tape test, EP3000 treated substrates show no delamination of aluminium.

Further evaluation using a modified AIMCAL TP-105-92 method was carried out to quantify the adhesion improvement. Typical peel force values for aluminium coating after EP3000 treatment on an offline coated Melinex OD substrate are between 2-3.5N/15mm (c.f. <0.6N/15mm on the untreated Melinex OD) indicating substantial adhesion improvement in the EP3000 treated samples.

Prospects for Onto™ EP3000 products

Although Onto™ EP3000 products are still in the development stage, they are already showing excellent performance in tested systems. The treatment is very versatile and can be applied in in-line and off-line coating units. The active component of EP3000 treatments can be formulated into solvent or water based non-toxic systems and can be modified to minimise the amount of flammable components.

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