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Pad Printing

# PRINTING ON SOFT MATERIALS SUCH AS TPE, TPU AND SOFT-TOUCH

Printing of soft materials has become a quite popular application during the past few years.

One reason why printing on elastomeric materials has become so important is that our customers increasingly set store by tactile effects. This mainly applies to the automotive and marketing industry. During various discussions with pad printers it became obvious that there will be a significant increase of printing on soft materials in the future. Some customers even believe that classic substrates like ABS and polycarbonate - approx. 80% of current applications - will be substituted with soft materials shortly. In other words there will be a shift from 80% classic substrates to 20% and instead printers will use about 80% elastomeric materials.

Coates Screen Inks has foreseen this trend and continued with developments of suitable inks for these materials.



## SUBSTRATES TPE OR TPU

TPE (generally known as "thermoplastic elastomers") are plastic materials composed of an elastic polymer chain incorporated into a thermoplastic material. The different shares of elastic plastics/thermoplastics and various mixing ratios result in a tailor-made material.

There are various groups of TPE materials:

|                    |  |
|--------------------|--|
| <b>TPE-0 (TPO)</b> | Thermoplastic elastomeric material based on olefins, mainly a PP/EPDM, e.g. Santoprene<br>PP = Polypropylene<br>EPDM = Ethylene-propylene-diene-rubber |
| <b>TPE-V (TPV)</b> | Crosslinked thermoplastic elastomeric material based on pololefine PP / EPDM mixture, e.g. forprene  |
| <b>TPE-E (TPC)</b> | Mixture of thermoplastic elastomeric materials and thermoplastic copolyester, e.g. Hytrel, Ritaflex  |
| <b>TPE-S (TPS)</b> | Styrene block copolymers like SBS, SEBS, SEPS, MBS e.g. Septon   |
| <b>TPE-A (TPA)</b> | Thermoplastic co-polyamide, e.g. Pebax   |
| <b>TPE-U (TPU)</b> | Thermoplastic elastomeric materials based on urethane e.g. Desmopan, Texin   |





On account of the variety of different TPE materials and mixtures it would be difficult to offer only one pad printing ink for all TPE types.

Coates Screen Inks GmbH in Nuremberg currently has two pad ink systems for various types of TPE materials. These are: TP 253 and TP 273/T. Both ink types can be processed with or without hardener as 1- or as 2-component ink. However processing with hardener TP 219/N or TP 219/N-00 is strongly recommended. Hardener TP 219 should not be used with TP 253 or TP 273/T as it would cause a brittleness of the applied ink film and subsequently non-adhesion. The resulting ink film of these inks processed with hardeners TP 219/N and TP 219/N-00 will be much more flexible and therefore adhesion will be better.

Most TPE types have an insufficient surface tension and require flame or Corona pre-treatment in order to ensure a good adhesion. For best results some TPE could also be treated with adhesion promoter PP. Often also post-treatment with heat application, Leister blower or flame-treatment can be used to enhance adhesion.

As most customers do not know anything about the composition of the TPE they need to print, suitable pad inks and method of application have to be identified by corresponding printing trials.

Although our pad inks TP 253 and TP 273/T are very successful on the market Coates Screen Inks GmbH continues development work with the aim to find a good solution for printing of soft materials with only one ink range for all these materials.

Another topic in this context is printing of soft-touch coatings. For this application our two aforementioned inks TP 253 and TP 273/T, processed as two component inks are also suitable.

However printing of soft-touch coatings always requires pre-treatment as these coatings are mostly water based and therefore silicone derivative flow agents are used to reduce the high surface tension of the water. Such flow agents have a negative influence on adhesion properties. Therefore pre-treatment with adhesion promoter PP will be essential to achieve good adhesion, not only as a primer but also as cleaning agent.



### TPE Types and recommended pad printing inks

| TPE Type    | Pad printing ink | Hardener<br>MV = 10:1 | Pre-treatment                   |
|-------------|------------------|-----------------------|---------------------------------|
| TPE-0 (TPO) | TP 253           | TP 219/N              | adhesion promoter PP/Leister    |
| TPE-V (TPV) | TP 253           | TP 219/N              | adhesion promoter PP/Leister    |
| TPE-E (TPC) | TP 273/T         | TP 219/N              | flame pre-treatment             |
| TPE-S (TPS) | TP 253, TP 273/T | TP 219/N              | adhesion promoter PP            |
| TPE-A (TPA) | TP 253, TP 273/T | TP 219/N              | 80°C/60min/ flame pre-treatment |
| TPE-U (TPU) | TP 253           | TP 219/N              | Corona / flame pre-treatment    |

Above chart is only intended as a recommendation based on experiences of Coates Screen Inks GmbH. As processing conditions vary from printer to printer pre-tests are always essential.

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