

## DIENER TEST INKS

Test inks are fluids used to measure the surface energy.



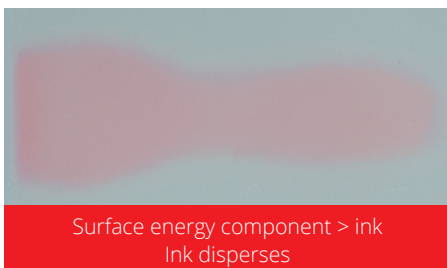
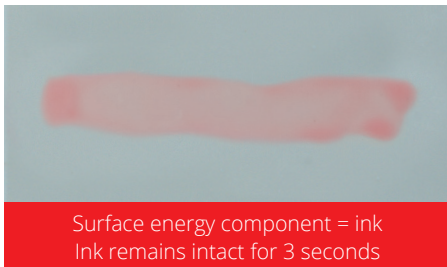
Surface energy is a vital aspect when it comes to the adhesion of inks, paints, adhesives etc. It is specified in mN/m (millinewton per meter).

With some exceptions, the following applies in general: The higher the surface energy of a material, the better the adhesion of a substance applied to its surface.

A low surface energy may be attributable to the properties of the material. Many synthetic materials, for example, are characterised by a low surface energy and thus need chemical or physical pre-treatment to improve the adhesion.

Determination with test inks is a simple method for measuring the surface energy of a wide range of materials such as plastic, metal, glass or composites. Test inks are an excellent tool for quality assurance during ongoing production as well as for the determination of the exact parameters of a plasma pre-treatment.

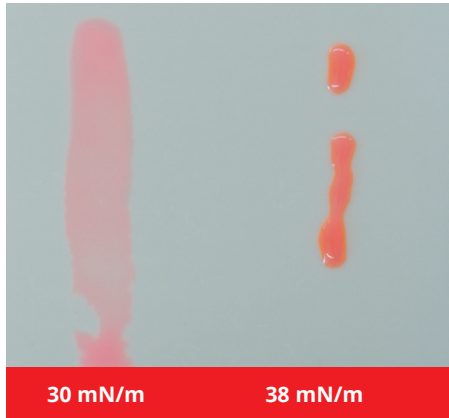
### How to use the test inks:



1. It is known from experience that untreated materials have a low surface energy. Therefore, it is advisable to first select a test ink from the bottom measuring range.
2. Then, observe the behaviour of the brush stroke applied to the surface of the material for 3 seconds.
3. When the brush stroke remains intact, the wettability of the material is good and the surface energy is at least the same as the value of the test ink.
4. When the brush stroke contracts, the surface energy of the material is smaller than that of the test ink. Repeat the test with a lower value of the test ink and step by step select smaller values until the brush stroke does not change. In this way, you gradually approach the correct value of the material.
5. When the brush stroke disperses, the surface energy of the material is greater than that of the test ink. In this case, repeat the test with a higher value of the test ink and step by step select higher values until the brush stroke does not change.

## Example images of an ABS material for illustration before and after plasma treatment

### Untreated



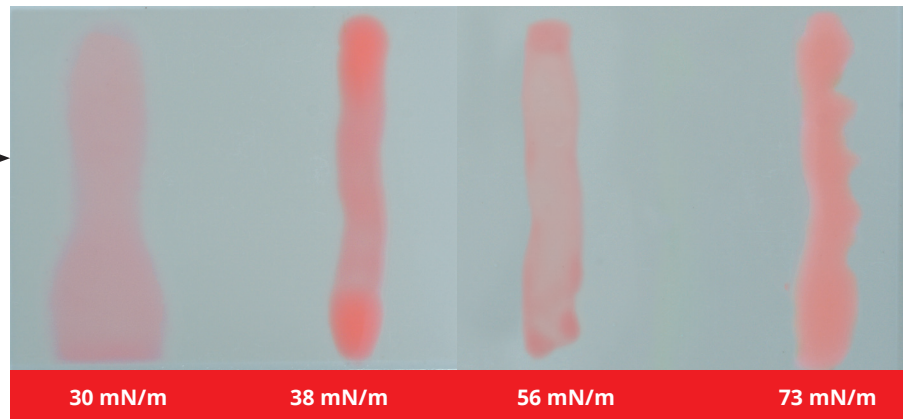
This example shows that the component has a low surface energy: Contraction is already visible in a low test ink of 38 mN that accordingly has a higher surface energy than the component.

The brush stroke of the 30 mN/m test ink, on the contrary, remains intact for 3 seconds. Accordingly, the surface energy of the component is 30 mN/m.

Surface  
treatment in  
low-pressure  
plasma



### Treated



It is evident that the surface energy of the component has changed following the treatment. After treatment, the 30 mN/m ink and also the 38 mN/m ink disperse heavily. This 56 mN/m ink is the first ink to display a stable wetting behaviour, while the 73 mN/m already contracts.

### Note:

The maximum error resulting from a measurement is 2 mN/m. Doing series with multiple measurements reduces the error tolerances accordingly. As with every other measuring method, the determination of surface energies by means of test inks must be followed by a critical assessment of the measuring results. The values determined by the test ink method for measuring the surface energy are relative values; comparison with other measuring methods is possible to a limited extent only. The surface energy determined can only ever be a measure of the current state of the substrate, because experience shows that the surface energy decreases over storage time.

The inks will keep for approx. six months after opening the bottle, and must be replaced after that. The inks and brushes must not be contaminated or mixed with other test inks or different fluids. Close the bottle immediately after use!

### Hazard statements: Safety Data Sheet

<https://www.plasma.com/downloads/>

### The following test inks are available:

Test inks coloured/non-toxic, according to ISO 8296 DIN 53364, non-toxic, not hazardous to health.

Test inks coloured/toxic, according to ISO 8296 DIN 53364, longer readability. Toxic. Teratogenic.

Test inks colourless/toxic, according to ISO 8296 DIN 53364, toxic. Teratogenic.

For more information, go to: <https://www.plasma.com/testtinten/>