arcotest®
Made in Germany

Test Inks

for testing surface energy
/ surface tension

Test Inks since 1976

Checking surface cleanliness
with test inks

arcotest GmbH is a manufacturer of test inks

Test inks can be used to determine the surface energy / surface tension of solids made of plastics – metals – glass – ceramics. The adhesion possibility of the surfaces in particular for printing, bonding and painting should also be determined based on the wetting pattern.

The surface tension is determined by applying a stroke of ink measuring just a few centimetres in length to the surfaces to be evaluated and observing the behaviour of the stroke of ink.
If the stroke contracts within 2 or 4 seconds – depending on the ink specification – the surface tension of the test area is lower than that of the test ink.
Conversely, if the stroke spreads, this would show that the surface tension of the applied ink is lower than that of the surface.
If the stroke remains unchanged during the observation period, the value of the surface tension has been reached exactly or is slightly higher.

The same inks can be used **for all measurements**, whether on metals or plastics or other materials. They can be used for both production and laboratories.

Alternatively, **contact angle measuring devices** are mainly only used in laboratories as the measurements are time-consuming and need an expert to operate them.

Test inks are mixtures of chemical substances that can be graduated and therefore have a large detection range, i.e. 18 to 105 mN/m (dyn/cm) to evaluate the surfaces.

To use a simple example, there are water-repellent surfaces (pearl formation) and those that allow the absorption and spreading of water (73 mN/m) and there are all the states in between them, where good adhesion values above 40 mN/m are to be expected, depending on the properties of the printing ink, adhesive or paint.

In the metal industry, the surfaces are contaminated with oil to a greater or smaller extent depending on the production process, the results of which need to be determined quickly and accurately, whereby it is also necessary to bear in mind that this contamination is not always distributed evenly over the surfaces.

Plastics, whether produced as films or in an injection moulding process as moulded parts, usually do not have any contaminated surfaces. They are treated physically or chemically for printing, painting and adhesion depending on the material, especially polyolefins, in order to bring the surface tension to the required values.

The test inks are supplied in bottles of 10 millimetres upwards or in a pencil form and are available from stock.

Customer enquiries are answered quickly in an applications engineering department and sample testing is also possible, generally without a charge.

The shelf life of the test inks is not subject to any special conditions. It is generally deemed to be 6 months.

The usability is generally only limited by contamination that can be removed from the surfaces, whereby this influence can be eliminated as far as possible with disposable cotton swabs.

Testing surface energy by means of test inks/pens

General information

Each solid has a specific surface energy (SE) in its natural state, which declines due to impurities during the production and storage process. In many technical processes, such as gluing, painting and printing, surface energy plays an important role and determines the adhesive bond and wettability. The SE is measured in mN/m (dynes/cm). This is displayed with test inks according to DIN 53364/ ISO 8296 or other compounds.
When compared to liquids or polymer melts, the SE of a solid can only be determined indirectly from the contact angle. In this case, a test liquid with a particular SE is applied on the solid.

Application of the test inks/pens

Metals:
Assessing the cleanliness of the surfaces.
Assessing the suitability of cleaning fluids.

Plastics:
Determining the activation energy for further processing (e.g. when printing, gluing, painting, wetting).

Material	Metals /plastics/ceramics...etc.
Impurities on the surface	Oils, dust, antistatic agents, lubricants, release agents, fingerprints
Surface cleaning/ treatment	Plastics: with water / solvents/ pre-treatments Metals: Corona/plasma/flame treatment (in this case, the surface must be precleaned with aqueous cleaners or brushes)
SE (untreated surface)	Metals: 25-35 mN/m Plastics: < 38 mN/m
SE (treated surface)	From 38 mN/m (minimum cleanliness value) From 44 mN/m (setpoint for further processing) The original SE of the metals (> 100 mN/m) cannot be achieved simply by cleaning, because of the exposed oxide layer.

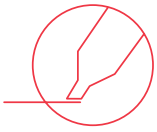
Correct measurement of the surface energy of solids by means of test inks/pens BLUE and PINK

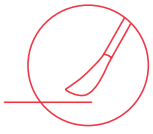
		Further information
Measuring means	Ink/pens available in BLUE and PINK **BLUE:** 18 - 105 mN/m (toxic from 24 - 57 mN/m) **PINK:** 28 - 60 mN/m (non toxic)	Carry out measurement with one type (colour) of ink only! The inks are composed differently and can thus give different values; difference of up to 2 mN/m.
Measuring temperature of environment and solid	20°C	The SE decreases by approx. 1,0 mN/m, when the temperature increases by 10°C and vice versa.
Condition of the solid to be tested	Cleaned; should not be touched with bare hands.	Even the tiniest layers of grease can change the SE.
Application	**Ink:** Apply with a cotton-tipped applicator made of pure cotton. (in heavily soiled/oiled surfaces) Use a new cotton-tipped applicator after each application. **Pens:** Apply with little pressure.	It is recommended to use this cotton-tipped applicator with metals. Commercially available cotton-tipped applicators (cotton buds) contain oils. Contamination particles can come off if excessive pressure is used during application of the ink, thus giving the wrong SE value.
Applicable stroke length	20 - 40 mm (as one uniform continuous stroke)	
Observation time	**BLUE:** 2 sec. (after application) **PINK:** 4 sec. (after application)	
Result	The following reactions are to be expected: **1.** Uniform continuous stroke **2.** Drop formation, (poor/no wetting) **3.** Spreading of the ink	**1.** The SE has reached the set value on the bottle or is higher. **2.** Not clean, repeat cleaning. SE is lower than the value of the ink **3.** SE is much higher than the value of the ink
Shelf life	6 months **BLUE:** 18 - 105 mN/m **PINK:** 28 - 60 mN/m	Individual components of the test ink evaporate at different rates. Close bottles and pens tightly after use.

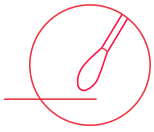
Application

Untreated surfaces
dirty surfaces
poor wetting

Treated surfaces
clean surfaces
good wetting







Use of cotton swabs is recommended for metals.
For heavily soiled/oiled surfaces.
Use new cotton swabs for each application.

TEST INKS PINK

Pink coloured test inks are special testing liquids in ranges of defined surface tension. They were developed to get “non toxic” test inks.

These test inks PINK are meant to substitute the blue coloured inks as they were declared to be toxic according to DIN 53364 / ISO 8296. The test inks PINK are available in bottles or in pens.

TEST PENS **PINK**

- from 28 to 60 mN/m
- with accuracy +/- 1,0 mN/m
- simple handling
- no spilling
- Pen sets from 28 to 60 mN/m available in sets of 4, 6 and 8 pcs. or as single pens

TEST INKS **PINK** in bottles

- from 28 to 60 mN/m
- with accuracy +/- 0,5 mN/m
- observation time 28 to 60 mN/m is 4 sec.
- bottles containing each 10 or 100 or 250 mL or in sets of 7 bottles of each 10 mL

TEST INKS BLUE

Blue coloured test inks are special testing liquids in ranges of defined surface tension (in accordance with ISO 8296 / ASTM 2578 / DIN53364).

The surface tension of a substrate is checked by simply applying the test ink to the surface. The blue test inks BLUE are available in a range from 18.4 to 105 mN/m. Test pens filled with blue test ink are available from 28 to 72 mN/m. Test inks BLUE are toxic from 24 to 57 mN/m.

TEST PENS **BLUE**

- from 28 – 60 mN/m in steps of one by one from 62 - 72 mN/m in steps of two by two
- with accuracy +/- 1.0 mN/m
- observation time is 2 sec.
- simple handling
- no spilling

28 - 72 mN/m

TEST INKS **BLUE** in bottles

- available from 18.4 to 105 mN/m (18.4, 76, 84, 90, 105 mN/m colourless)
- with accuracy +/- 0.5 mN/m
- observation time is 2 sec.
- bottles containing 10, 100, 250 ml or in sets of 7 bottles of 10 ml each

18 - 105 mN/m

QUICKTEST 38®

RAPIDTEST 38®

QUICKTEST 38® and **RAPIDTEST 38®** serve to check if the treatment of polyolefins (polypropylene, polyethylene, polybutylene) has shown an effect onto the material. A stroke of the pen leaves a full line on the material if the material's surface tension has a value of 38 mN/m or more. If the material's surface tension is below 38 mN/m, the fluid contained in the pen will form small drops on the surface.
The fluid applied to the surface will dry within seconds, it does not need to be wiped off anymore.

- **good readability due to striking red discoloration**

- **not toxic to aquatic organisms**
- **does not cause eye damage**
- **not harmful to health**

QUICKTEST 38®JUMBO

RAPIDTEST 38®JUMBO

- **better color presentation**
- **big line 15 mm**
- **optimal for testing large film areas**

ADVANTAGES:
- extremely easy to handle
- perfect for quick checks on polyolefins
- no wiping off necessary, lasting display of result
- archiving of the image possible

ATTENTION:
The test fluid of QUICKTEST 38® and RAPITEST 38® contains solvent. This might cause wrong results being displayed on materials not being solvent resistant, as PS for example.

Test Ink Case

For transport and storage
• upright standing of the bottles during use

Big case
• for 24 bottles
of 10 ml each

Small case
• for 7 bottles of 10 ml each
• partition for test pens or
cotton tipped applicators

Cotton Tipped Applicators

for testing inks
• approved
• 100 pcs of each 6 inch long
• for single use on dirty surfaces
• ideal for handling from large glass bottles

Test Light

For use in case of low contrast
between measuring surface and test ink.
e.g. dark plastic / dark ink
• 2.4 inch long

Product overview

TEST INKS **PINK** in bottles

from 28 to 60 mN/m // non-toxic
with accuracy measurement ± 0,5 mN/m

STANDARD: 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 mN/m
SPECIAL (SE): 28 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 mN/m

PINK STANDARD Set A

32 34 36 38 40 42 44 mN/m
7 glass bottles of 10 ml
art.no. 40.60000.0 with brush
art.no. 40.60000.4 without brush

PINK OPTIONAL 7 Set

28 to 60 mN/m
7 glass bottles of 10 ml of your choice
art.no. 40.60001.0 with brush
art.no. 40.60001.4 without brush

PINK PET bottles 10 ml

32 to 44 mN/m
especially for use in the food sector
art.no.40.700XX.0 with brush
art.no. 40.700XX.4 without brush

PINK GLASS bottles 10 ml

28 to 60 mN/m
standard and special
art.no. 40.601XX.0 with brush
art.no. 40.601XX.4 without brush

PINK GLASS bottles 100 ml

28 to 60 mN/m
standard and special
art.no. 40.602XX.0
art.no. 40.602XX.0 (SE)

PINK GLASS bottles 250 ml

28 to 60 mN/m
standard and special
art.no. 40.603XX.0
art.no. 40.603XX.0 (SE)

TEST PENS **PINK**

from 28 to 60 mN/m // non-toxic
with accuracy measurement ± 1,0 mN/m

STANDARD: 30 32 34 36 38 40 42 44 mN/m
SPECIAL (SE): 28 31 33 35 37 39 41 43 45 - 60 mN/m

PINK STANDARD Set

30 32 34 36 38 40 42 44 mN/m
8 test pens
art.no. 40.45001.0

PINK OPTIONAL Set of 8

28 to 60 mN/m
8 test pens of your choice
art.no. 40.45000.0

PINK OPTIONAL Set of 6

28 to 60 mN/m
6 test pens of your choice
art.no. 40.45002.0

PINK OPTIONAL Set of 4

28 to 60 mN/m
4 test pens of your choice
art.no. 40.45003.0

TEST PEN PINK

28 to 60 mN/m
standard and special
art.no. 40.451XX.0

QUICKTEST 38®

QUICKTEST 38®

38 mN/m approx.
quick check for polyolefins
5 ml
art.no. 40.55100.0

QUICKTEST 38® JUMBO

38 mN/m approx.
quick check for polyolefins
17 ml, 15 mm line width
art.no. 40.55100.4

RAPIDTEST 38®

RAPIDTEST 38®

38 mN/m approx.
quick check for polyolefins
5 ml
art.no. 40.66100.0

RAPIDTEST 38® JUMBO

38 mN/m approx.
quick check for polyolefins
17 ml, 15 mm line width
art.no. 40.66100.4

TEST INKS **BLUE** in bottles

from 18 to 105 mN/m // toxic from 24 to 57 mN/m
30 to 72 mN/m according to ISO 8296 (DIN 53364 and ASTM)
with accuracy measurement ± 0,5 mN/m

STANDARD:	28 32 35 38 41 44 48 56 mN/m
SPECIAL (SE):	18 (colourless) 20 22 24 26 29 30 31 33 34 36 37 39 40 42 43 45 46 47 49 50 51 52 53 54 55 57 58 60 62 64 66 68 70 72 mN/m (colourless:) 76 84 90 105 mN/m

BLUE Set A

28 35 38 41 44 48 56 mN/m
7 glass bottles of 10 ml
art.no. 40.30001.0 with brush
art.no. 40.30001.4 without brush

BLUE Set B

28 32 35 38 41 44 48 mN/m
7 glass bottles of 10 ml
art.no. 40.30000.0 with brush
art.no. 40.30000.4 without brush

BLUE Set C

30 32 34 36 38 40 42 mN/m
7 glass bottles of 10 ml
art.no. 40.30003.0 with brush
art.no. 40.30003.4 without brush

BLUE OPTIONAL Set

18 (colourless) 20 to 72 mN/m
7 glass bottles 10 ml of your choice
art.no. 40.30002.0 with brush
art.no. 40.30002.4 without brush

BLUE GLASS bottles 10 ml

18 (colourless) to 72 mN/m
standard and special
art.no. 40.301XX.0 with brush
art.no. 40.301XX.4 without brush

BLUE GLASS bottles 100 ml

18 (colourless) to 72 mN/m
standard and special
art.no. 40.302XX.0
art.no. 40.302XX.0 (SE)

BLUE GLASS bottles 250 ml

18 (colourless) to 72 mN/m
standard and special
art.no. 40.303XX.0
art.no. 40.303XX.0 (SE)

COLOURLESS GLASS bottles 10 ml

76 84 90 105 mN/m
special
art.no. 40.301XX.0 (SE)

TEST PENS **BLUE**

from 28 - 60 mN/m in steps of one by one
from 62 - 72 mN/m in steps of two by two
toxic from 24 bis 57 mN/m
with accuracy measurement +/- 1 mN/m

BLUE OPTIONAL Set of 8

28 to 72 mN/m
8 test pens of your choice
art.no. 40.35001.0

BLUE OPTIONAL Set of 6

28 to 72 mN/m
6 test pens of your choice
art.no. 40.35002.0

BLUE OPTIONAL Set of 4

28 to 72 mN/m
4 test pens of your choice
art.no. 40.35003.0

TEST PEN BLUE

28 to 72 mN/m
art.no. 40.351XX.0

ORDER INFORMATION

by e-mail, fax or post or contact-forms
www.arcotest.info

Stating the article number:
Add your desired value (mN/m) instead of XX.

Example for Order:
art. no.: 40.451**XX**.0
your desired value: 40 mN/m
art. no.: 40.45140.0

For this our general terms and conditions apply
www.arcotest.info/agb

EQUIPMENT

COTTON TIPPED APPLICATORS

approved,
100 piece/pack, 6 inch long
art.no. 40.31700.0

TEST LIGHT

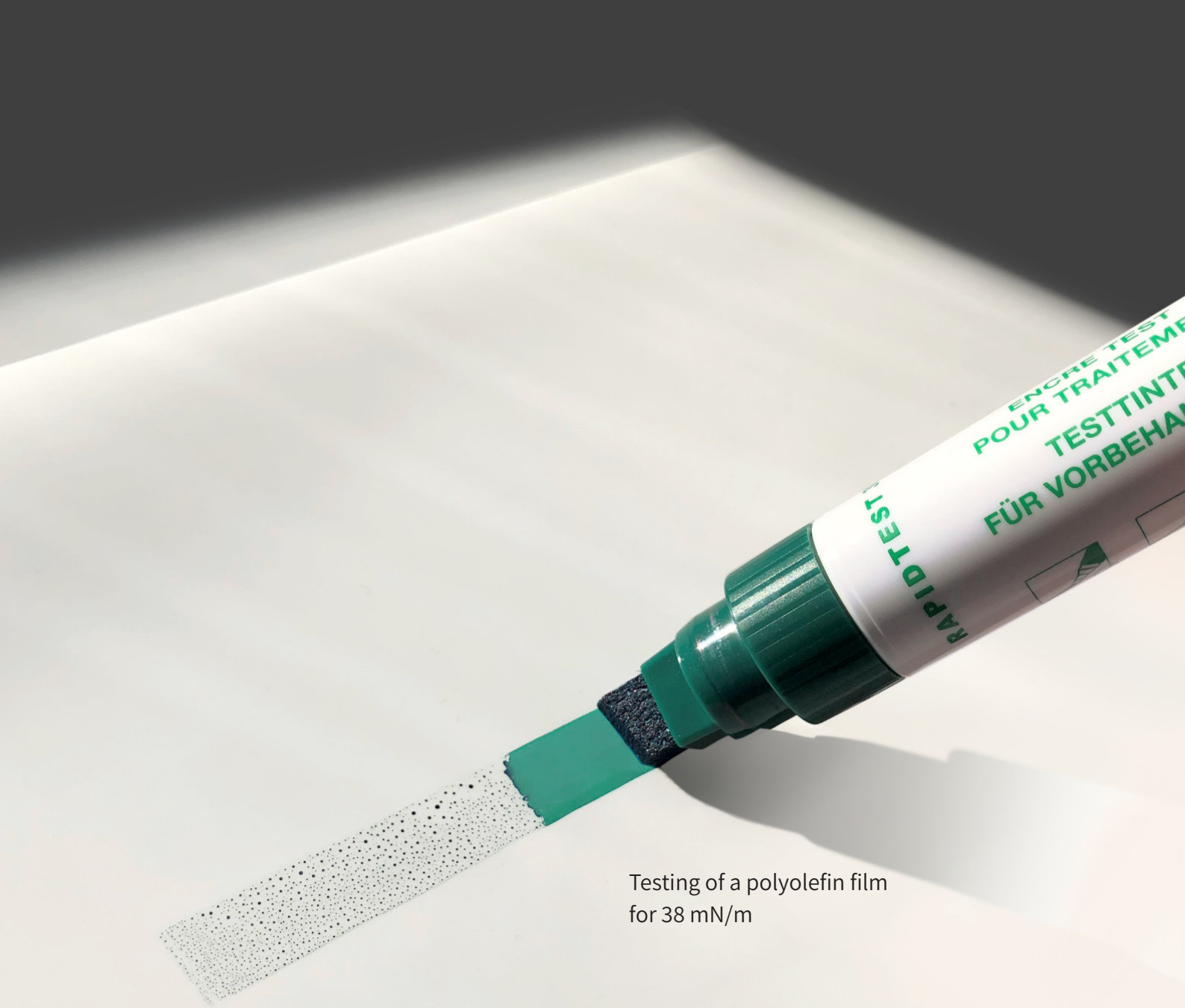
for use in case of low contrast
art.no. 40.31600.0

TEST INK CASE SMALL

for 7 test ink bottles of 10 ml, with separate storage for test pen set of 4 or 1 pack of cotton tipped applicators
without contents
art.no. 40.31800.0

TEST INK CASE BIG

for 24 test ink bottles of 10 ml
without contents
art.no. 40.31900.0



Testing of a polyolefin film
for 38 mN/m

arcotest®
Made in Germany

Test Inks since 1976

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