



## Prüfstelle für Kunststoffe und Gummi STS 036

### Short description of the YPAP 21

(Provisionally described)

The test equipment described here is an advancement of the existing plant YPAP 90 and makes possible a multiplicity of further testing methods to accomplish.

The test equipment is a fully automatic testing set for the examination of permeable and impermeable fabrics from textiles, plastics and rubbers opposite chemical agents. In a first phase the chemical warfare agents is Mustard agent (HD) in gaseous or liquid form uses. In a later phase it is examined whether also different chemical warfare agents (e.g. GD) can be used. The testing equipment is in such a way laid out that four different chemical warfare agents can be applied on the samples.

The test equipment runs 24 hours during the whole year fully automatic. The examiner must enter the samples and make after the examination the evaluations.



## Short description of the YPAP 21

### Test possibilities:

#### Conductivity measuring system

Corresponds to the conditions of the test equipment YPAP 90.

Methods: L 036 001  
L 036 002  
L 036 003  
L 036 004

Number of cells to measure = 20  
Break-through liquid/gas or gas/gas  
Number of drops 1 to 10  
Droplet size 1 to 50  $\mu$ l  
Test temperature 25-40 °C (normally 30°C)  
Test media: Pure Mustard or  
Mustard/Chlorobenzene 80/20

Suitable for permeable and impermeable flat samples

Results take place in the form of exact numerical data with the break-through time e.g. after 36.7 hours as average value with indication of the individual values.



#### Indicator paper method

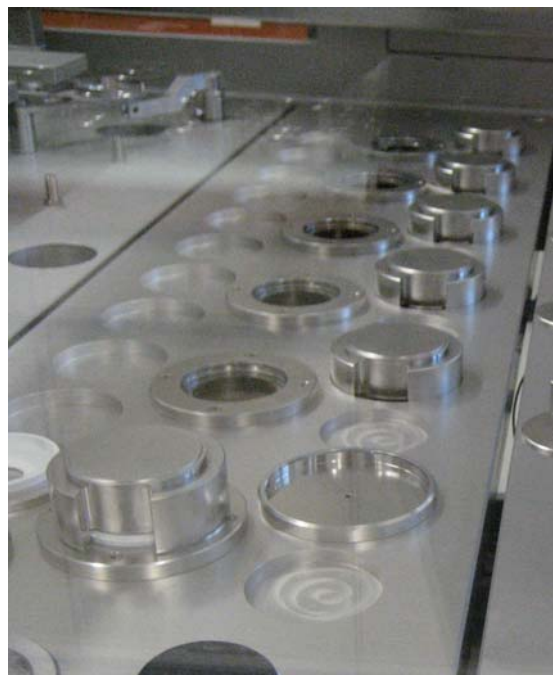
Corresponds to NATO e.q. Finabel method

Methods L 036 007  
Number of cells to measure = 6  
Break-through liquid/gas or gas/gas  
Number of drops 1 to 10  
Droplet size 1 to 50  $\mu$ l  
Test temperature 25-40 °C (normally 37°C)  
Test media: Pure Mustard or  
Mustard/Chlorobenzene 80/20

Suitable for permeable and impermeable flat samples

The colour change of the indicator paper is held by means of photo camera. The pictures can be stored in intervals of 5 minutes until 10 hours intervals. Results take place in the form of exact numerical data with the break-through time e.g.

after 36.7 hours as average value with indication of the individual values. The break-through is documented by means of starting picture and colour change picture.



## Short description of the YPAP 21

### Quantitatively gas/gas

(Provisional data)

Methods: "vapor test"

Suitable for impermeable flat samples

Number of cells to measure = 6

Test temperature 25-40 °C

Test media: Pure Mustard gaseous

Conditioned air (selectable)

- Temperature 25 - 40 °C

- Humidity 0 to 80% rel. humidity

- Mustard concentration 10 to 60 mg/m<sup>3</sup>

- Wind velocities through sample 1 or 5 m/s with consideration of the air resistance of the sample

- Wind velocities 2,5 m/s, 0,13 cm/s, 0.17 cm/s (selectable in one still too determining range)



As result per sample a curve of the ct-product is available during the whole time. Also evidently starting from when a break-through and like the break-through took place with increasing time rises.

In principle the conditions can be specified relative to the air flow over the sample and under the sample by the customer according to its desires. The range of these conditions must be still determined.

### Quantitatively liquid/gas

(Provisional data)

Methods: "Laid convectiv flow"  
"Laid diffuse one flow"

Suitable for permeable and partially for impermeable flat samples

Number of cells to measure = 6

Test temperature 25-40 °C

Test media: Pure Mustard

Number of drops 1 - 10

Droplet size 1 to 50 µl

Conditioned air (selectable)

- Temperature 25 - 40 °C

- Humidity 0 to 80% rel. humidity



## Short description of the YPAP 21

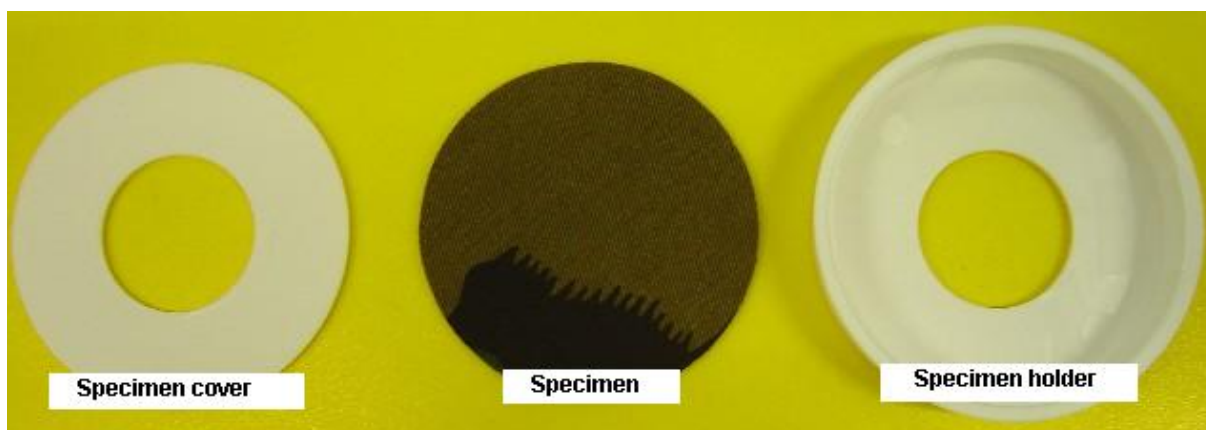
- Air flow over sample 0,3, 0,5 m/s or 0,3 l/min. (selectable in one still too determining range)

As result per sample a curve of the ct-product is available during the whole time. Also evidently starting from when a break-through and like the break-through took place with increasing time rises.

In principle the conditions can be specified relative to the air flow over the sample and under the sample by the customer according to its desires. The range of these conditions must be still determined.

### Specimen dimensions

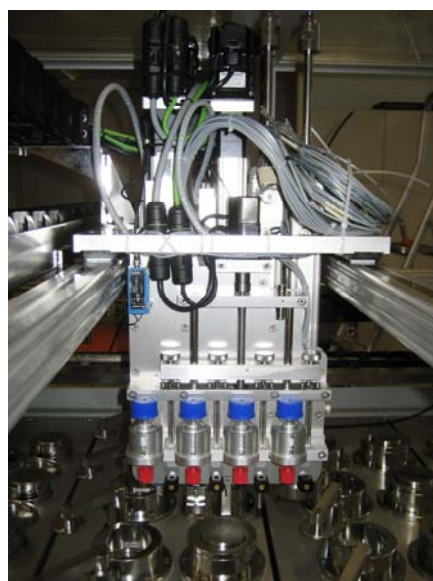
For all descriptive methods a sample with a diameter of 68 mm is used. The cover of the samples has a diameter of 32 mm. This corresponds to a sample surface of 8 cm<sup>2</sup>. When desired the cover on 40 mm can be punched out for a sample surface of 12.6 cm<sup>2</sup>.



### Chemical warfare agent application

Laid droplet

Chemical warfare agent can be completely normally up-dripped as before in droplet size from 1 to 50 µl. In the final development different chemical warfare agent can be used up to four.

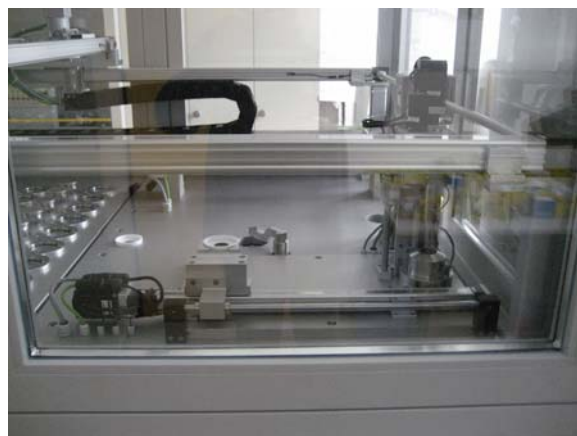


## Short description of the YPAP 21

### Reamed one or pressed drop

Drop can be reamed. The number of revolutions of the distributor drum can be selected freely from 1 to  $\infty$

Drop can be pressed on. The pressing on strength can be selected 5 possibilities between 2 and 20 N/cm<sup>2</sup>



### Falling drop

In a separate unit beside the plant the drop is brought with a special mechanism on the appropriate speed and coiled on the sample. (Only the delivery of the sample is in the accompanying picture yet does not watch)

Here again 4 possibilities of the chemical warfare agent which can be selected exist in the final development. (In the first phase only pure mustard) The height of the falling drop can be selected between 2.5 m and 7 m. (one determines still exactly)



## **Short description of the YPAP 21**

### **Remarks**

The conductivity and indicator paper method are already today contained in our accredited range. The new additional methods the quantitative gas/gas and liquid/gas measurements are likewise taken up after successful validation to the accreditation.

The costs of appropriate examinations descriptive above are still determined.

Today's costs of a sample with the conductivity testing method is Fr. 80,00 and for 3 samples with the indicator paper method is fixed the price on Fr. 265,00.

With the new equipment the existing prices will have to be raised somewhat and with additional costs of more ream, pressed on or falling drop be supplemented.

Spiez in March 2009

Christian Krebs