Gas permeability (plastic films manometric) after DIN 53380-2 / DIN 53380-M

Description:
Universal testing method applicable to nearly all gases for the determination of gas transmission rate through plastic films or other materials depending on temperature and testing gas.

Result Unit:
- Gas permeability in cm$^3$/(m$^2$*d*bar);
- based on the thickness: permeability coefficient in cm$^3$*mm/(m$^2$*d*bar).
- Declaration of cm$^3$ at normal condition according to DIN 1343: volume of the gas at 273.15 K (0 °C) and 101325 Pa (1 atm).
- Permeability in cm$^3$/(d*bar).
- Length related oxygen permeability in cm$^3$/(m*d*bar) for tubes. Declaration of cm$^3$ at normal condition according to DIN 1343: volume of the gas at 273.15 K (0 °C) and 101325 Pa (1 atm).

(Related) Standards:
- DIN 53380-1,
- DIN 53380-3,
- DIN 53380-4
- ISO 1399:1983: Testing of rubber, determination of gas permeability, test with constant volume,

Test method:
The test sample is mounted in a permeation cell so as to form the barrier between two chambers.

One chamber is filled with the test gas until test pressure is reached. After reaching the desired temperature, the measurement is started. The rising pressure of the permeated gas in the second chamber is measured by electronic sensors.

Detection limit:
Range of the norm: approx. 0.5 to 20000 cm$^3$/(m$^2$*d*bar). Please contact us if you have different requirements.

Required specimen:
For testing, please send us a sample of the approximate size of a sheet of paper (DIN A4, 210*297 mm).

For non flat specimens: please send after consulting us.

Proposed by the norm: 70 cm$^2$ active area of the samples.

The specimens shall be uniform in thickness, representative for the material and free of pinholes and folds. On request we measure your sample thickness according to DIN 53534.
We recommend the measurement of three independent samples per test (minimum number not regulated by the standard). Our standard is to measure samples of 20 µm - 3 mm, others on request.

Required sample dimension: we perform the preparation of the samples for you.

For different test gases and type of samples we use appropriately sized samples.

If you want to conduct the cutting of the specimens by yourself, please contact us for the required dimensions.

For sensitive coating test sometimes it makes sense to prepare first the support followed by the coating. Please inform us if your samples tend to mechanical failure under applied pressure (of the test gas or the sealings).

**Testing medium:**

According to the norm:

Permanent, dry gases, e.g. O₂, N₂, CO₂ and mixtures thereof.

Our permeation measurement cells are nearly all-purpose because they are resistant to corrosion.

Please contact us for special applications. The testing method is normally restricted to substances or mixtures which contain substances with strongly skewing permeation rates.

**Test conditions:**

- Scope of the standard: 10 °C - 40 °C.
- Gas pressure: not regulated by the standard.

Mecadi's possible testing temperatures:

- Standard -50 °C up to +150 °C, other temperatures on request.

Temperature tolerance possible with Mecadi equipment: better than +/- 0.1 K (target: +/- 0.01 K)

Experience shows that +/- 1 K tolerance leads to permeation rate scattering up to 20 %.

Mecadi’s possible testing pressures:

- Standard: Until 100 bar, others on request.
- Please contact us for information on special effects and requirements for the samples at high pressures.

Also possible are temperature profiles (nonisothermic measurements) for the determination of morphology changes and the influence of media and pressure on polymer properties. Based on this method, Mecadi offers further examination to determine gas solubilities (sorption and desorption), diffusion coefficients and the measurement of break through times through barriers.

Furthermore, interactions between media and polymer can be investigated. Thus the predictions according resistance, physical and chemical reactions under process conditions can help in the selection process of materials.

Copyright © Mecadi GmbH, www.mecadi.com