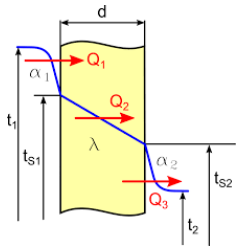
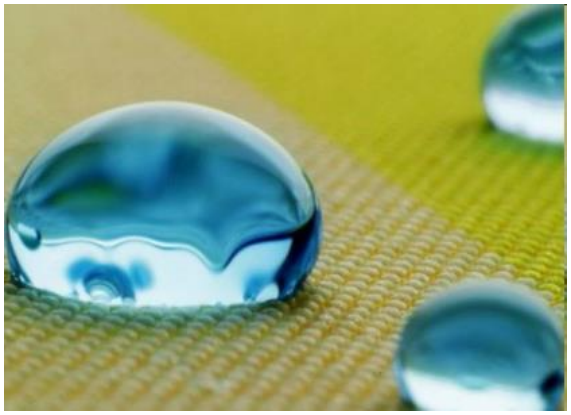


Comfort properties



Handle

Heat transfer

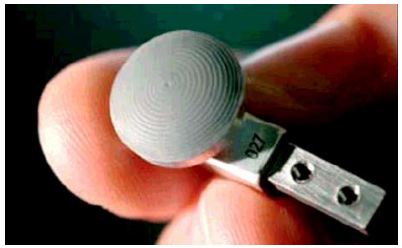
Air permeability

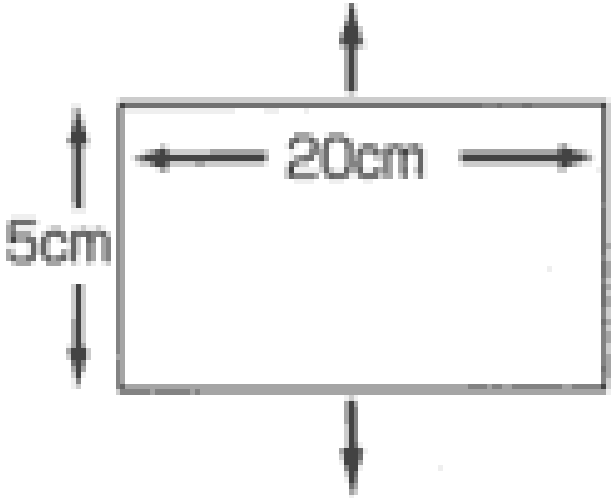
Water Vapour Permeability

Wetting and Wicking

Fabric handle

- Feeling while touching textile material
- Quality of textile
  - „pleasant touch",
    „pleasant feeling",
    „comfortable to wear"



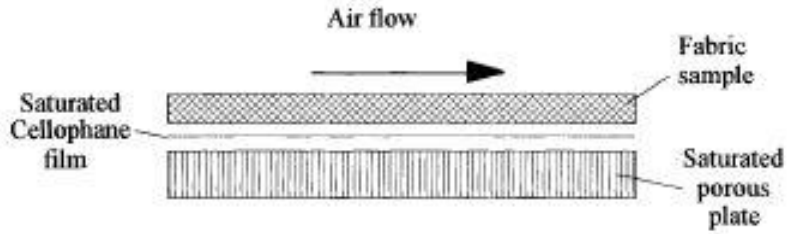


- Complex parameters linked to material properties
  - Bending, compression, flexibility, strength, density
  - Surface properties (roughness, smoothness)
  - Thermal characteristics

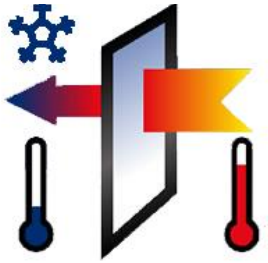
Methods for handle measurement

- **KES FB (Kawabata Evaluation System - KES - System)**
  - Complex measurement
    - mechanical properties (tensile, bending, shear, compression)
    - surface (friction, roughness)
    - fabric design (thickness, area mass density)
  - Japonsko -Tokio, Prof. Sueo Kawabata, Prof. Masako Niwa
  - 1974-1978, Kato TechCompany
  - 4 devices –16 properties
    - KES FB 1 – tensile, shear
    - KES FB 2 – bending
    - KES FB 3 – compression
    - KES FB 4 – surface
- **FAST fabric assurance by simple testing ⇒** Evaluation:
  - mechanical properties (tensile, bending, shear, compression)
  - shape stability
  - drapability
- **KTU – Griff Tester**
- **UST universal surface tester**
- **HAPTEX**

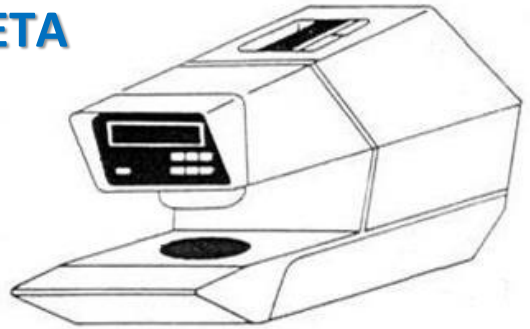
Heat transfer



- **Analysis of heat flow – device TP 2**
  - Analysis of energy necessary to stacionary heat flow
  - Fabric is placed on heated plate, in tunel with flowing air of 3 $m.s^{-1}$ speed



- **Analysis of thermal conductivity – device ALAMBETA**
  - Heat flow transfer $q_1(t)$, and $q_2(t)$
  - Stacionary heat flow - t_1 - temperature of measuring head, t_2 - temperature of specimen
  - Calculation of:
    - thermal conductivity ***λ*** **[W/m.K]**
    - thermal capacity ***b*** **[$W.s^{1/2}/m^2K$]**
    - area resistance to heat transfer ***r*** **[$m^2.K/W$]**
    - thickness of material ***h*** **[mm]**



Air permeability

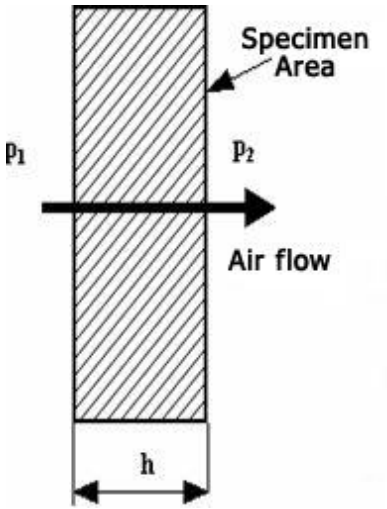
- Volume of air [l/min]

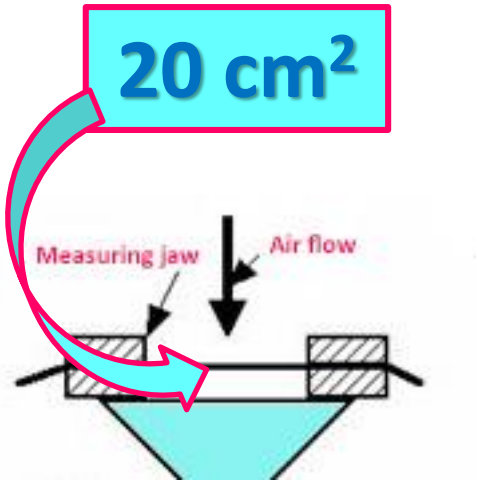
  passed through fabric under

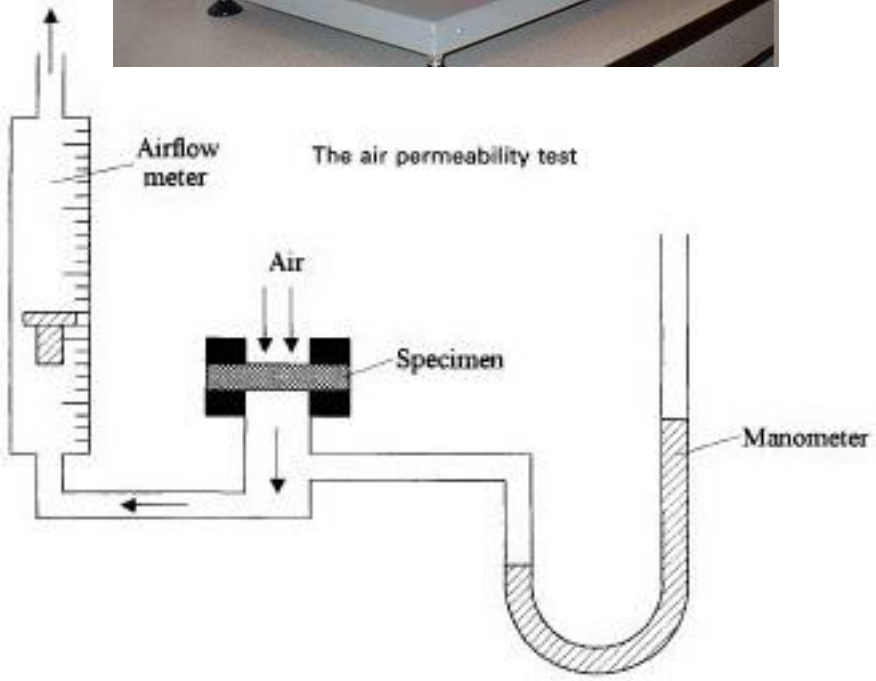
  defined pressure drop **Δp = 100 Pa**

  ⇒ $p_1 > p_2$

- Size of measurement jaw

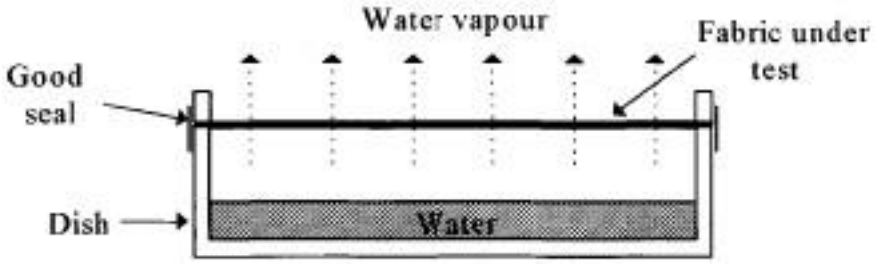






Water vapour permeability

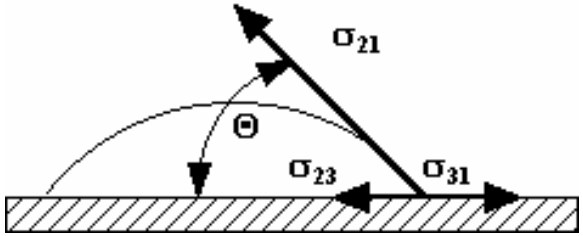
- Analysis of water vapour transfer through fabric placed over water surface in exicator



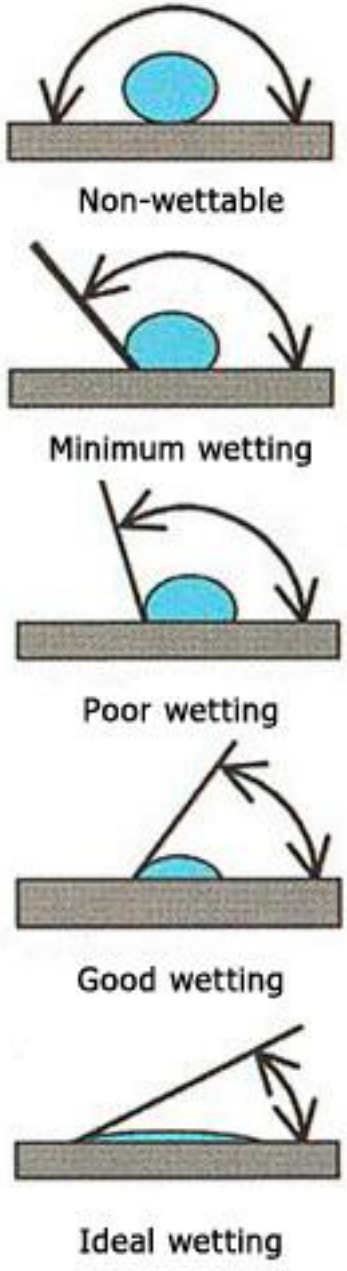
$$M_V = \frac{m_1 - m_2}{m_1} \cdot 100\ [\%]$$

- M_V - amount of water vapour transfered through the fabric [%]
- m_1 - mass of water before test [g]
- m_2 - mass of water after test [g]

- **ISO 15496:2018** -Textiles — Measurement of water vapour permeability of textiles for the purpose of quality control



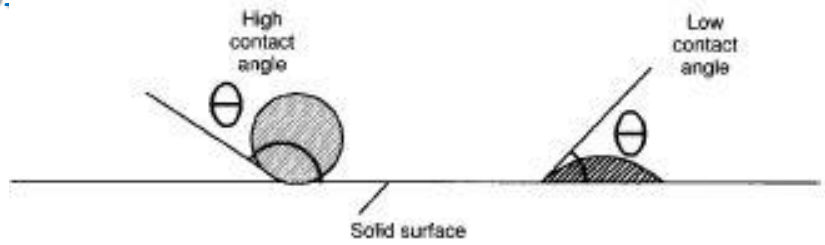
Wetting



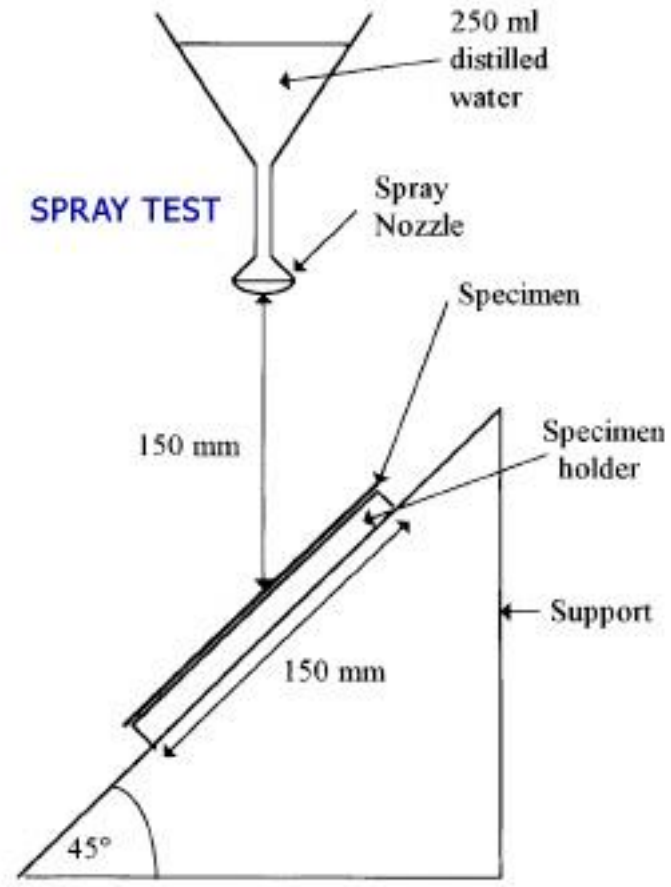
- Measurement of contact angle **Θ [°]**
  - **Θ < 90°**, textile is wettable
  - **Θ > 90°**, textile is non-wettable

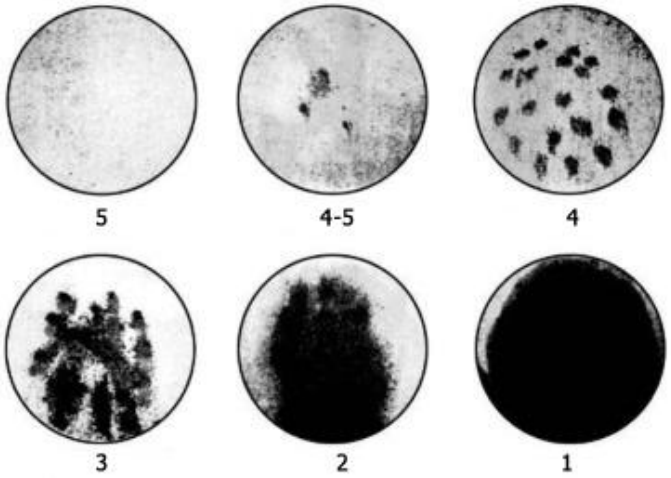
$$\sigma_{21} \cdot \cos\theta = \sigma_{31} - \sigma_{23}$$

- σ_{23} - surface tension water - textile
- σ_{21} - surface tension water - air
- σ_{31} - surface tension textile - air



Grade	Description
1	Complete wetting of the whole of the sprayed surface
2	Wetting of more than half the sprayed surface
3	Wetting of the sprayed surface only at small discrete areas
4	No wetting of but adherence of small drops to the sprayed surface
5	No wetting of and no adherence of small drops to the sprayed surface





WICKING PHENOMENA