



Research Results of Permeability of Water Steam
according to the method developed in Industrial Design of Technical University of Radom
Department of Leather Manufacture in cooperation with RADWAG Weighing Instruments

Chart 1. Determination Results of Water Steam Permeability

Item No.	Exhibitor (Leather Manufacturer)	Symbol of Leather Sample	General characteristics of leather (manufacturer)	Permeability	
				[mg/10cm ² ,24h]	[%]
1					
2					
3					

Results examples of other materials

0	-----	-----	Filmed Split	50	1
00	-----	-----	Lacquered Leather	700	9
000	-----	-----	Suede Leather Split	3700	50

Chart Commentary:

0 – very low permeability material
00 – low permeability material
000 – very high permeability material

- Water steam permeability is the ability of material to transmit water steam. Its measure is the mass of water steam “passing through” specific surface of the material in definite time and condition enforced by such permeability.
- Permeability of water steam is one of the most significant parameters determining hygienic characteristics of leather
- Permeability of water steam is a specific feature of porosity materials, which structure allows to transmit water steam. Such a material is for example: natural leather. Production process of leather, determines high or low permeability of water steam. What processes or operations significantly influence permeability of water steam?
 - 1) Natural character of raw leather, breed etc. (cattle, pig, sheep, goat, horse, amphibian)
 - 2) Type of finish , including thickness and quality of finish layer
 - 3) Liming and bating (the degree of leather structure loosening_)
 - 4) Tannage method (the degree of leather structure filling)
 - 5) Bathing finish (mainly: greasing, retannage, filling).

Method description

The method is based on obtaining permeability of water steam as a result of differences in vapour pressure caused by increased temperature of water inside the vessel. It is advisable to place a leather sample in an air-conditioned chamber for the period of 24h with the temperature at 20°C and relative humidity at 65%. For measurement by comparison it is not necessary.

Permeability of water steam is marked on a moisture analyzer (ex. MAC 50). According to this method, measurement process of permeability of water steam, is conducted by inserting $5 \div 10 \pm 0,2$ g of water into a special aluminium vessel. Then a leather sample, cut out by knife-edge die, is seized in the vessel.

The next step is to place the seized sample in a chamber of a moisture analyzer, set the temperature to 40°C and register the mass change of the system: vessel-water-tested material sample, with readability of 0.001g and time of 1h. The measurement of permeability of water is the mass of water steam, which left the system: vessel-water-tested material sample, per surface unit of the material sample (2000mm²), with the time of 1h. The results of the measurement are expressed in mg/10 cm²/ 24 h and in %.



The result is expressed in % which is, so called , relative permeability (for the given method). It indicates, in percentage terms, the quantity of transmitted steam through the tested material and the relation of the transmitted mass (evaporated) of the steam, if the denotation was made using the given vessel without the tested sample.



Fig 1. Vessel for permeability of water steam determination [XX]

The remarkable advantage of this method is using a moisture analyzer and a specially shaped vessel.

Advantages of the method:

- Short measurement time approx - 1h
- Low price of the device
- Operating does not require special qualifications

X) Śmiechowski K., Żarłok J., Skiba J., Patent Application No. P 381787, Determination Method of Water Steam Permeability 2007.

XX) Śmiechowski K., Żarłok J., Skiba J., Operational Use Design Application No W 116646. 2007.

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