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Determination of water vapour transmission properties of plastic films and laminates

Tupler Oy

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Task **Determination of water vapour transmission properties of plastic films and laminates**

Samples Plastic films (3 products) and laminates (2 products) were delivered to VTT by the customer. The laminates were prepared of two plastic films with small pellets of polystyrene between them.

Performance of the task

The water vapour transmission rates were determined according to standards prEN ISO 12572 *Building materials – Determination of water vapour transmission properties* and SS 02 15 82 *Byggmaterial – Provning – Vattenånggenomgångsmotstånd*. The test was carried out in conditions, where the relative humidity of air on one side of the sample was RH 50% and on the other side RH 92,5%. The test was performed at a temperature of 23 °C.

Research results

The water vapour transmission properties for the plastic films are given in table 1 and for the laminates in table 2.

Table 1. Water vapour permeance W and resistance Z according to prEN ISO 12572 and water vapour resistance Z according to SS 02 15 18 for plastic films.

Sample	Water vapour permeance (prEN ISO 12572) W	Water vapour resistance (prEN ISO 12572) Z	Water vapour resistance (SS 02 15 18) Z
	[kg/(m ² sPa)]	[Gm ² sPa/kg]	[s/m]
0,06 dense	$2,7 \cdot 10^{-12}$	370	$2750 \cdot 10^3$
0,05 dense	$3,6 \cdot 10^{-12}$	278	$2040 \cdot 10^3$
0,04 normal	$17,5 \cdot 10^{-12}$	57	$418 \cdot 10^3$

Table 2. Water vapour permeance W and resistance Z according to prEN ISO 12572 and water vapour resistance Z according to SS 02 15 18 for laminates.

Sample	Water vapour permeance (prEN ISO 12572) W	Water vapour resistance (prEN ISO 12572) Z	Water vapour resistance (SS 02 15 18) Z
	[kg/(m ² sPa)]	[Gm ² sPa/kg]	[s/m]
Tuplex 0,04 + 0,04 normal	$14,0 \cdot 10^{-12}$	71	$517 \cdot 10^3$
Tuplex 0,04 normal + 0,06 dense	$2,5 \cdot 10^{-12}$	400	$2920 \cdot 10^3$

Conclusions

According to the results of the individual plastic films and laminates consisting of two plastic films, there can be seen a certain correlation of water vapour resistance. The water vapour resistance of a laminate is as good or even better as the resistance of the densest individual film.

An estimation of water vapour transmission properties for a laminate consisting of 0,04 normal film and 0,05 dense film is therefore:

$$W \leq 2,7 \cdot 10^{-12} \quad \text{kg/(m}^2\text{sPa)}$$

$$Z \geq 370 \quad \text{Gm}^2\text{sPa/kg}$$

$$Z \geq 2750 \cdot 10^3 \quad \text{s/m}$$

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