

Oxygen and Water Vapour Permeability testing at Pira International

Over the past 40 years Pira International has been a leading provider of independent permeation test results in the UK.



Recent capital investment in eight benchmark MOCON Oxtran 2/21 and MOCON Permatran 3/33 modules has significantly reduced turnaround times for determining oxygen and water vapour transmission rates through films, packs and closures.

The transmission rates of other gases such as carbon dioxide, nitrogen, methane etc., through films can be measured using the latest Lyssy L100-5000 equipment.

Pira also offer a pre-test integrity assessment on packs using a high sensitivity gas leak detection system and pre-conditioning of films by controlled flexing to ASTM F392 using a standard Gelbo flextester.

Pira is ISO 17025, UKAS accredited for testing to the following International Standards and operates an inter-laboratory comparative testing scheme for permeability measurement to monitor the proficiency of testing procedures and equipment:

- Oxygen transmission rate testing to ASTM D3985-05, ASTM F1927-07 and ASTM F1307-02
- Water vapour transmission rate ASTM F1249-06 and BS 3177:1959

Measurement capabilities:

Oxygen permeability – MOCON OX-TRAN 2/21

- Controlled temperature and relative humidity
- Films: 0.005 cc/m².day to 10⁵ cc/m².day
- Packs 5x10⁻⁵ cc/pack.day to 9 cc/pack.day

Water vapour transmission – MOCON PERMATRAN-W 3/33

- Controlled temperature and relative humidity
- Films: 0.005 cc/m².day to 6800 g/m².day
- Packs: 5x10⁻⁵ g/pack.day to 3.4 g/pack.day

Gravimetric method

- For low barrier films/packs

Other gas permeation – Lyssy L100/5000

- Manometric method
- Suitable for all gases, including N₂, CO₂ and He
- Films: 1 cc/m².day to 10,000 cc/m².day

Table 1 - Some typical permeation rates for packaging films

Film type	Thickness (micron)	OTR (cc/m ² .day) at 23°C	WVTR (g/m ² .day) at 38°C, 90% rh
PET	12	90	40
Metallised PET	12	0.5	<1
PVdC coated polyester	15	6	14
Plain cellulose	22	8 - 130 dependant on moisture	3500
NC coated cellulose	30	10	12
PVdC coated cellulose	28	8	5
LDPE	25	8,000	18
HDPE	25	3,000	9
EVA	25	10,000	70
Cast PP	25	4,200	12
Cast nylon	50	140 (dependant on moisture)	35
Cast nylon 66	30	80 (dependant on moisture)	180
Oriented nylon 6	15	45 (dependant on moisture)	260
EVOH	20	0.2 - 1.8 (dependant on moisture)	30 - 75
Plasticised PVC	20	2,000 (dependant on plasticiser)	200+
Rigid PVC	20	260	60
Extruded PVdC	20	3	5
Oriented PS	25	2,500	170
Aluminium foil	9	0 (if pinhole free)	0+ (dependant on pinholes - see Table 2 below)

Table 2 - The effect of a pinhole on water vapour transmission rate

