Note on the test report

This document is an excerpt from the test report, which contains a comparison of foil materials currently available for purchase in Europe. The aim of the test report was to determine the oxygen and water vapour permeability of various films intended for use in hygienically demanding applications, particularly in the caravanning sector and in mobile sanitary solutions.

Conclusion of the test report:

The results of this report clearly show that the permeability to oxygen and water vapour varies considerably depending on the film material used. It should be noted that the results are only valid for the samples tested and cannot be readily transferred to other products or materials.

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The complete test report was prepared by the Fraunhofer Institute for Process Engineering and Packaging (DAkkS-accredited, D-PL-11140-04-00). The results remain the property of the client. Any use, publication or reproduction – even in part – is only permitted with the express consent of Clesana AG, Werdenstraße 72, CH-9472 Grabs.

Clesana AG,

Grabs 2025

21.01.2025

TESTREPORT

Determination of the oxygen and water vapour permeability of films

The results of this test report are the property of the client. The written consent of the Fraunhofer Institute for Process Engineering and Packaging must be obtained for the use of the results by third parties, their publication or reproduction in excerpts.

Client:	Clesana AG
	Werdenstraße 72
	CH-9472 Grabs
Order from:	20.12.2024
Sample received:	07.01.2025
Test date (period):	07.01.2025 – 21.01.2025
Date of test report:	21.01.2025
Sample designation;	Foil samples:
	LooSeal® bio foil PREMIUM white (liner)
	LooSeal® compostable foil (liner)
	Clesana high-barrier foil liner
	Clesana bio high-barrier foil liner

We received the above samples to determine their oxygen and water vapour permeability.

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Methods:

Oxygen permeability

Oxygen permeability was tested in accordance with DIN 53 380, Part 3:1998-07 (oxygen-specific carrier gas method) using a measuring device from Modern Controls, Inc. at a temperature of 23°C with pure oxygen. The relative humidity of the measuring and carrier gas was 50% relative humidity. Contrary to the standard, the thickness of the samples was not determined. Contrary to the standard, only two samples were measured.

Water vapour permeability – electrolysis method

The water vapour permeability test was carried out in accordance with DIN EN ISO 15106-3 (electrolytic method) at 23°C and a relative humidity gradient of 85% → 0% using a measuring device from Modern Controls. This method was used for the 'Clesana high-barrier foil liner' and 'Clesana bio high-barrier foil liner' samples. This measurement method can be used to measure materials with permeabilities of up to 25 g/(m^2 d). Contrary to the standard, the thickness of the samples was not determined. Contrary to the standard, only two samples were measured for measurement deviations < 10%.

Water vapour permeability – gravimetric method

The water vapour permeability of the samples 'LooSeal® bio foil PREMIUM white' and 'LooSeal® compostable foil' was determined using the gravimetric method. The test was carried out in accordance with DIN 53 122-1: 2001-08 (gravimetric method) at 23°C and a relative humidity gradient of 85% → 0%. This measurement method is used to measure highly permeable materials. Contrary to the standard, the area-related mass of the samples was not determined. Contrary to the standard, screw-top containers with mechanical closures were used.

Results:

The test results refer exclusively to the test samples examined as received.

They can be found in the following tables.

Table 1: Oxygen permeability in [cm^3/(m^2 d bar)]

Sample name	Sample 1	Sample 2
LooSeal® bio foil PREMIUM white	397	432
LooSeal® compostable foil	1392	1372
Clesana high-barrier foil liner	2,47	2,31
Clesana bio high-barrier foil liner	0,14	0,18

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Table 2: Water vapour permeability (electrolysis method) in [g/(m^2 d)]

Sample name	Sample 1	Sample 2
Clesana high-barrier foil liner	1,54	1,55
Clesana bio high-barrier foil liner	1,42	1,38

Table 3: Water vapour permeability (gravimetric method) in [g/(m^2 d)]

Sample name	S. 1	S. 2	S. 3	S. 4	Average +/- s
LooSeal® bio foil PREMIUM white	48,8	48,8	50,7	56,0	51 +/- 3,50
LooSeal® compostable foil	125	124	114	126	122 +/- 5,56

Note on sample storage:

Samples are stored at Fraunhofer IVV for a period of six months.

Fraunhofer Institute for

Process Engineering and Packaging