

Determination of the oxygen permeability

Plastics piping systems with an oxygen barrier layer

Test report No. LC 26132

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Requested by Modus Plastik Metal A.Ş.
Dilovası/Kocaeli (TR)

Performed request Determination of the oxygen permeability of the barrier pipe

Reference document(s) ISO 17455

Plastics piping systems – Determination of the oxygen permeability of the barrier pipe (ISO 17455: 2005 + C1: 2007)

EN ISO 21003-2

Multilayer piping systems for hot and cold water installations inside buildings; Part 2: Pipes (ISO 21003-2: 2008 + A1: 2011)

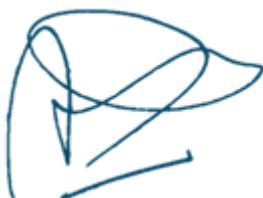
Tested product(s) MODUS PEXA Oxygen Barrier pipe,
16 x 2,0 mm

Conclusion(s)*

The products investigated meet the requirements for all tested and evaluated aspects as detailed in this report.

* The conclusions are not part of the accreditation scope L015.

Authorised by



Mr A.J. Rikers, Coordinator Lab C

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Overview test results

Characteristic	Test method / Reference standard	Requirement	Measured	Passed*
Pipe or piping system				
Oxygen permeability	ISO 17455	@40 °C: $F_{ox, day} \leq 0,32$ mg O ₂ /m ² ·day (ISO 21003-2)	@40 °C: $F_{ox, day} = 0,05$ mg O ₂ /m ² ·day	Yes

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Sample description

Pipe(s) :

Manufacturer	:	Modus Plastik Metal A.Ş.
Production location	:	Dilovası/Kocaeli (TR)
Commercial name	:	MODUS PEXA
Type of material/construction	:	PE-Xa/EVOH pipe
inner layer	:	PE-Xa
inner adhesive layer	:	Not specified
barrier layer	:	EVOH
outer adhesive layer	:	Not specified
Outer layer	:	Red Masterbatch
Nominal dimensions	:	16 × 2,0 mm
Marking	:	PE-Xa/EVOH SDR 8/S 3.5-16x2,0 Class CW,1,2,4/10 BAR Class 4/8 bar Tmax=95°C SKZ A 884 GOST 32415 / DIN 4726/DIN 1689/EN ISO 15875 14/08/2025 14:49:09 EXT NO 9/1 www.modusgroup.com.tr 001 M
Date of production	:	14-08-2025
Other aspects	:	None

Appearance

Colour inside/outside	:	Natural/red
Surface	:	Smooth
Defects/damage	:	None
Discolorations	:	None
Remarks	:	None

Sampling information

Sampled by	:	Sent by manufacturer
Date of sampling	:	Not specified
Received at Kiwa lab	:	01-10-2025
Registered by	:	Mr J.P. Hendrikx

Assembly

Length of pipe(assembly)	:	(20 ± 0,5) m
Number of fittings in assembly	:	None

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Oxygen permeability

Test Method

ISO 17455: 2005

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Sample preparation, conditioning and apparatus

The sample preparation, conditioning, used measuring devices and test equipment are all in accordance with ISO 17455.

Test parameters

Used method (ISO 17455)	:	Dynamic test method (method I)
Test temperature	:	(40 ± 0,5) °C
Conditioning period	:	1 h ($e_{min} < 3$ mm)
Number of test assemblies	:	1
Length of pipe(assembly)	:	(20 ± 0,5) m
Number of fittings in assembly	:	None
Free pipe length of assembly	:	(20 ± 0,5) m
Internal diameter of the pipe	:	11,6 mm
External diameter of the pipe	:	16,2 mm
Oxygen detection limit	:	0,1 µg O ₂ /l
Test run O ₂ measuring time	:	1 h + 5 h
Date of test	:	24-11-2025
Test performed by	:	Mr B. Bonekamp
Test location	:	Kiwa Lab C, Apeldoorn (NL)

Test results

Test run No.	Oxygen uptake (ppb/h)	Atmospheric pressure (mbar)		(Corrected) Oxygen permeation F _{ox, day} (mg O ₂ /m ² ·day)
		Initial	End	
14	1,38	1016	1015	0,07
15	0,86	1015	1013	0,04
16	0,46	1013	1012	0,02
Avg. Oxygen permeation (mg O ₂ /m ² ·day)				0,05

Remarks

Oxygen permeability results smaller than 0,10 mg O₂/m²·day are not subjected to the statistical requirement of an absolute 5% repeatability.