

REPORT OF ANALYSIS

Testing of oxygen permeability.

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The results of the analysis are given on the next pages. These results relate only to the samples tested. The report may not be reproduced without the written approval of Kiwa Water Research.



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Handelsregister
Utrecht, nr. 30142292

Testing of oxygen permeability.

Manufacturer: Novaplast Co.

Production place: Eyup Istanbul (Turkey)

Requirements: DIN 4726

1. Examined product

Trade name	: PE-X pipe (external diameter \varnothing 16 x 2 mm)
Base material	: PE-X (not specified)
Manufacturer	: Novaplast Co.
Proposed use of the product	: Floor heating and radiator connections
Sample from	: Novaplast Co.
Production place	: Eyup Istanbul (Turkey)
Production date	: May 01, 2005
Lot/Batch number	: Unknown
Sampling date	: September 29, 2005
Date of sample reception	: October 04, 2005
Material code	: VESBO oxygen barrier PEX pipe 16x2 01/05/05 06:25:21 (MO) ext no. 6 (According to DIN 16892/ 16893 Germany) TS 10762 PN 12.5 Batch no. 250321 058
Certificate number	: None

2. Scope

Oxygen permeability is an important parameter to measure the protection afforded by barrier materials in plastic piping systems. It applies to plastic piping systems used to carry water under operational pressures of 4, 6, 8 or 10 bar for the distribution of hot water for heating in buildings.

3. Experimental

Conditioned test water with an oxygen level of less than 100 pbb is circulated for 16 hours at a temperature of 40 ± 0.5 °C in a closed test-piping system. In this closed system, oxygen can only be transported through the wall of the test pipe. The increase in oxygen level of test water relates to the oxygen permeability of the test pipe. The experiment is performed in triplicate. The average oxygen flux (or standard oxygen permeation) of the three experiments is expressed in g O₂/m³.day.

4. Results of analysis

Table 1: Results of analysis for the PE-X pipe from the manufacturer Novaplast Co. at a temperature of 40 ± 0.5 C.

Description	Unit	Results
Internal diameter	mm	14
External diameter	mm	16
Length	meter	20
Pre-conditioning	-	According to DIN 4726: 2000-01
Temperature	°C	40 ± 0.5
Experimental time frame per measurement	hours	16
Number of measurements	-	3
Average standard oxygen permeation	$\text{g O}_2/\text{m}^3.\text{day}$	< 0.10

5. Conclusion

The PE-X pipe from the manufacturer Novaplast Co. meets the requirements as defined by DIN 4726.

6. Analytical information

Parameter	: Standard permeation of oxygen
Pre-conditioning	: According to DIN 4726: 2000-01
Method	: Kiwa-house method ATA-050, own method
Technique	: Oxygen measurement with a specific electrode, continues flow
Detection limit	: $0.1 \mu\text{g O}_2/\text{l}$
Coefficient of variation of the reproducibility	: Between 15 and 40% for measurements from different materials
RvA accreditation	: Yes