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<b>Requested by</b>	Roth Nordic Oy Kauppiaankatu 11 FI-10300 Karjaa Finland
<b>Order</b>	Order no 2030000725, 11 December 2012
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<b>Assignment</b>	<b>To study whether the pipes are suitable for transport of drinking water in accordance with the standard SFS 2335, clause 3.3</b>
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<b>Specimen</b>	PE-RT pipes marked: Roth Systemrohr Alu-Laserplus Made in Germany BPD Ø 32 32x3 mm PE-RT Typ II/Al/PE-RT Typ II DWGW DW-8236BP5589 70 °C/10 bar (LOGO) EN ISO 21003-2 geprüft Class 1,2,4/10 bar Class5/6 bar (8 bar) öVGW W 1.433 TW KIWA KOMO (Logo) TG 0797 PS 1248 (Logo) VA1.14/18078 AENOR N-001/151 UNE 53960 Classe 1-5/6 bar (Logo) sauerstoffdicht nach DIN 4726 IMA Tmax 95 °C 19.06.12 261529, length ca. 100 cm, 4 pieces.
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The manufacturer of the pipes is Roth Nordic.  
The PE raw material of the pipes is Dowlex 2388.

The customer delivered the sample pipes on 12 December 2012.

## Performance and results

### Evaluation of compositional data

The raw material suppliers have delivered detailed information on the composition of the plastic raw material used for the manufacture of the pipes. On the basis of the information obtained, we consider that substances used in the manufacture of the above mentioned pipe are mentioned in the substance lists of the following documents:

- Commission regulation (EC) 10/2011 (monomers and additives)
- Dutch guidelines for polyethylene coming into contact with drinking water (Guideline quality of materials and chemicals for drinking water supplies).

### Chemical analysis

The procedure described in standard SFS-EN ISO 8795:2001 '*Plastics piping systems for the transport of water intended for human consumption. Migration assessment. Determination of migration values of plastics pipes and fittings and their joints*' was used in the chemical analysis. The pipes (two parallel samples) were filled with purified water which was let to stand in the pipes for 72 hours at  $23 \pm 2$  °C. The migration tests were conducted three times in all.

The amount of migrated organic substances, specified as total organic carbon (TOC) was determined according to standard SFS-EN 1484:1997. The TOC contents (mg TOC / l) of the first, the second and the third test water and calculated results for the amount of migrated organic substances per day and per pipe inner surface area in contact with water are in Table 1.

The chemical determination was performed between 7 and 18 January 2013.

*Table 1. TOC results*

Test water	mg TOC / l	Migration value	mg TOC / ( $\text{dm}^2 \cdot 24 \text{ h}$ )
$C_{24;1}^{23}$	< 0.2	$M_{24;1}^{23}$	< 0.01
$C_{24;2}^{23}$	< 0.2	$M_{24;2}^{23}$	< 0.01
$C_{24;3}^{23}$	< 0.2	$M_{24;3}^{23}$	< 0.01

### Sensory evaluation

Any taint possibly migrating from the pipes into water and the intensity of the taint was analysed in accordance with the method of the standard SFS 2335, appendix A. Tap water was let to flow through the pipes for 2 hours at  $20 \pm 2$  °C. Water was stored for 4 x 24 hours (the water was replaced three times at intervals of 24 hours) at  $22 \pm 2$  °C. The fourth water sample stored for 24 hours was evaluated.

Sensory evaluation was performed by using the extended triangle test, the reference sample being tap water stored in an odourless glass vessel at  $22 \pm 2$  °C for 24 hours. The taint intensity was determined on a scale of 0 to 3.

Intensity scale:

- 0 = no off-odour or off-flavour
- 1 = weak off-odour or off-flavour
- 2 = clear off-odour or off-flavour
- 3 = strong off-odour or off-flavour

An eight member panel with proven skills and experience in sensory assessment evaluated the samples.

The results of the sensory evaluation are presented in the following table.

The test results relate only to the sample tested.

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*Table 2. Results of the sensory evaluation.*

Sample	Off-odour 0-3	Off-flavour 0-3	Off-flavour, odd sample detected by	Statistical significance of difference*	Possible descriptions
Pipe 1	0	1.0	5/8	ns	Off-flavour: plastic
Pipe 2	0.3	0.9	6/8	p<0.05	Off-flavour: plastic

\* The statistical significance of the difference between the odd sample and the reference in the triangle test: p<0.001 = very significant, p<0.01 = significant, p<0.05 = almost significant, ns = not significant.

In the sensory evaluation plastic-like off-flavour was found to transfer from the pipes to water.

The storage tests and sensory evaluations were performed between 3 and 11 January 2013.

## Conclusions

On the basis of the chemical and the sensory research results and the information on the composition of the pipes, we consider that pipes identical to the sample meet, to the extent studied, the general requirements of regulation (EC) No 1935/2004 of the European parliament and of the council. The regulation entered into force on 3 December 2004 and repeals Decree 364/85 mentioned in standard SFS 2335. Although the pipes transfer weak off-flavour to water the pipes are in compliance with standard SFS 2335 requirements and are therefore suitable for transport of cold drinking water.

Espoo, 25 February 2013



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