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Test requirements for PE and PVC pipes

Requirements for the release of health hazardous substances, flavour and odour for INSTA-CERT certified PE and PVC pipes

The test is composed of several analyses which aim to reveal whether substances are released from the material to the drinking water. These substances may be hazardous to health and result in change of flavour and/or odour.

Table 1 - Analysis requirements

Parameter	Analysis method	Requirements[1]
TOC	SM5310B	Detection limit: ≤ 0.1 mg/l
Flavour and odour	DS/EN 1420 and DS/EN 1622	'Unforced choice paired test' is used with a minimum of five assessors for determination of TON and TFN.
Turbidity	DS/EN ISO 7027-1	Detection limit: ≤ 0.06 FNU or FTU
Phenols	DS 281 or DS/EN ISO 14402	Detection limit: ≤ 2 µg/l
Specific substances	Specified in the test outline	Detection limit is specified in the test outline

1) If possible, the analyses should be performed accredited.

Table 2 - Acceptance criteria

Parameter[2]	Migration periods	Acceptance criteria[4]
TOC[2]	3	C ≤ 0.3 mg/l and the migration rate ≤ 1 mg/m²/day. Both requirements must be met.
Flavour and odour[2]	3	TFN and TON = 1
Turbidity[2]	3	No changes compared to the blind test.
Phenols[2]	3	The sum of phenols must not be detectable at a detection limit of 2 µg/l.
Specific degradation products[2+3]	3	Migration of degradation products from antioxidants which are not specifically mentioned in 'Executive order on water quality and surveillance of water supplies', but which may be found in and released from pipes, is assessed individually. Besides, degradation products with identical toxicological effect are assessed as a whole.
Specific substances	3	Migration of each substance is assessed (including residue monomers and fractions of substances). The migration must be less than the quality requirement of the tap, cf. 'Executive order on water quality and surveillance of water supplies'. Migration of other health hazardous substances which are not specifically mentioned in 'Executive order on water quality and surveillance of water supplies' but may be found in and released from pipes are assessed individually. Besides, substances with identical toxicological effect are assessed as a whole. Migration of substances that are or are under suspicion of being endocrine disrupting or carcinogenic are not accepted.

2) Further analyses are accepted up to the 9th migration period. The analysis result is accepted provided that the concentration shows a declining tendency and meet the acceptance criterion after the last migration period.
3) The acceptable level for specific degradation products must maximum constitute an exceeding of 10% of the acceptance criterion for the parameter in the last measured extraction, however provided that a declining tendency is shown.
4) The overall assessment is made in accordance with DK-VAND's 'Supplementary provisions for certification of products for drinking water supply' and follows the guideline 'Baggrund for toksikologiske vurderinger af kemiske stoffer fra drikkevandsinstallationer'.

Sampling

To obtain a DK-VAND certificate for a pipe, an approved test result must be available for each dimension group, for each material and for each manufacturing site.

Example: A product range includes pipes of dimension groups 1 and 2 which are made from two types of materials and by two manufacturing sites. Consequently a total of 2 x 2 x 2 = 8 samples must be selected, and all samples must meet the requirements described in tabel 2.

The test must be performed on the pipe of each dimension group with the lowest SDR value, i.e. the largest wall thickness, e.g. PE100 ø110 SDR11 (ø110 x10.0 mm). This pipe validates all pipes with identical or higher SDR values. SDR (Standard Dimension Ratio) is the ratio of the outside pipe diameter to the wall thickness.

For pipes with co-extruded stripes, the stripe material must be included in the toxicological test outline and the migration test. However, after the toxicological assessment, stripes may be omitted if they constitute less than 10% of the outside surface of the pipe. Migration tested pipes with stripes also represent pipes made from identical PE material without stripes.

For co-extruded pipes and pipes with a peelable layer, all layers must be included in the toxicological test outline. The pipes must be migration tested without removing the the co-extruded layer and/or the peelable layer.

The migration test represents the PE materials from which the tested pipe is made.

Time limits

The test samples must not be more than 60 days old when sampled at the manufacturer.
The test must be commenced not later than 60 days after the analysis laboratory has received the test sample.
The test must be completed not later than 90 days after the analysis laboratory has commenced the test.

Table 3 – Dimension groups

One sample for each material	One sample for each material for each manufacturer	One sample for each material for each manufacturer for each dimension group	Test sample Outside diameter
		Group 1: ø20 mm ≤ D < ø75 mm	If ø32 mm or ø40 mm are selected, the DK-VAND certificate also covers smaller dimensions. If neither ø32 mm nor ø40 mm pipes are manufactured, the smallest dimension is tested.
		Group 2: ø75 mm ≤ D < ø250 mm	If a DK-VAND certificate for group 2 is requested, ø75 mm or the smallest diameter is selected. If group 1 is DK-VAND certified, a random dimension in group 2 is selected.
		Group 3-4: D ≥ ø250 mm	Certified based on the test of dimensions ø250 - ø400 mm

Table 4 – Test conditions

Cold water test, 23 °C	Migration S/V dm^{-1}	Flavour and odour S/V dm^{-1}	Method
Standard	DS/EN 12873-1	DS/EN 1420	
d < 80 mm	5 < S/V ≤ 40	5 < S/V ≤ 40	Filled
80 mm ≤ d < 300 mm	≥ 5	≥ 2.5	Filled or cylinder[5]
D ≥ 300 mm	≥ 5	= 2.5	Cylinder[5]

5) If the S/V (surface/volume ratio) is smaller than specified in the table, a cylinder must be used, cf. DS/EN 12873-1 Annex B, test arrangement 2.

Specific conditions for test documentation

After the certificate holder and the buyer of the product has signed a sales contract, the buyer may request an additional agreement about getting access to the documentation on which the DK-VAND certificate is based, including the accept criteria for the toxicological assessment. The additional agreement ensures that the buyer handles the documentation confidentially and do not use the documentation as a competitive parameter for tenders.