

DK-VAND 1-2-1, 8 November 2023

Test requirements for homogeneous plastic fittings made of PE or PP

Requirements for the release of health hazardous substances, flavour and odour for INSTA-CERT certified homogeneous^{a)} plastic fittings made of PE and PP without metal parts in contact with water

The test is composed of several analyses which aim to reveal whether substances are released from the material to the potable water. These substances may be hazardous to health or 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	$C \leq 1.5 \text{ mg/l}$ and the migration rate $\leq 15 \text{ mg/m}^2/\text{day}$. 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 fittings, is assessed individually. Besides, degradation products with identical toxicological effect are assessed as a whole.
Specific substances	3	<p>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'.</p> <p>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 fittings are assessed individually. Besides, substances with identical toxicological effect are assessed as a whole.</p> <p>Migration of substances that are or are under suspicion of being endocrine disrupting or carcinogenic are not accepted.</p>

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'.

a) Homogeneous plastic fittings: A product, whose water contact surface is made from the same material as the rest of the product.

Sampling

To obtain a DK-VAND certificate for a plastic fitting which is part of a well-defined product range, an approved test result must be available for each material and for each manufacturing site.

Representative test samples are selected in accordance with table 3. Test of fittings with the highest S/V ratio (smallest inside diameter) validates larger fittings manufactured by the same production method.

The test must always be performed on the fitting with the lowest SDR value, i.e. the largest wall thickness, e.g. PE100 d40 SDR11 (ø40 x3.6 mm). This fitting validates all plastic fittings with identical or higher SDR values. SDR (Standard Dimension Ratio) is the ratio of the outside diameter of the plastic fitting to the wall thickness.

If a plastic fitting is manufactured only in dimensions larger than ø40 mm (inside diameter), it is accepted that test samples of the same material are specifically manufactured in a smaller dimension. It is also accepted that other types of fittings are sampled, provided that - due to practical reasons - it not possible to perform the migration test based on the required S/V ratio.

The aim is to test a representative segment of the fitting groups during the course of some years.

Fittings must not be cut into pieces prior to a migration test; however, copper wires are allowed to be removed, so that they will not affect the test result.

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 – Fitting groups

Material	Manufacturer	Production method	Type
One sample for each material	One sample for each material for each manufacturer	Injection moulding	Electrofusion fittings for coupling: Double couplers, bends, tees, reducers, end caps Electrofusion fittings and saddle fittings: Tapping tees, branches Spigot end fittings for butt fusion: Bends, tees, reducers, end caps
		Extrusion	Fittings manufactured from pipes, segmented fittings ⁵

5) PVC pipes that are shaped by heating for fittings must be tested. Segment-welded fittings made from DK-VAND marked PE pipes must not be tested further

Table 4 – Test conditions

Inside diameter	Migration S/V dm ⁻¹	Flavour and odour S/V dm ⁻¹	Method
-	DS/EN 12873-1	DS/EN 1420	23 °C
d ≤ 40 mm	≥10	1.5	Filled or immersed