RECOMMENDATION

30. November 2010

Umwelt Bundes Amt
Für Mensch und Umwelt

Guideline for Sanitary Assessment of Organic Coatings in Contact with Drinking Water (Coating Guideline)[1]

1 Preliminary remark

Until 1998, the assessment of organic coating substances in contact with drinking water was based on the Fortieth Recommendation on "Paints and coating materials for food containers and food packagings" of the Federal Institute for Consumer Health Protection and Veterinary Medicine [*Bundesinstitut für gesundheitlichen Verbraucherschutz und Veterinärmedizin*] (BgVV, since 1 November 2002 the Federal Institute for Risk Assessment [*Bundesinstitut für Risikobewertung*], BfR).

Pursuant to the 195th Communication of the BgVV, entitled "Health assessment of plastics in the context of the Food and Consumer Products Act [*Lebensmittel- und Bedarfsgegenständegesetz*]", the Fiftieth Recommendation was revoked (*Federal Health Gazette [Bundesgesundheitsblatt] no.* 40(1998)4 p. 182). The Recommendation no longer reflected the state of scientific and technological knowledge, and the now more stringent safety requirements.

With a view to the sanitary assessment of coatings in continued use in the actual practice of water supply, the first step consisted of the preparation of a Guideline for sanitary assessment of epoxy resin coatings, whose first revision was published in *Federal Health Gazette no.* 46(2003)9 p. 797-817. This Guideline contained a Positive List of substances permitted to be present in epoxy resin coatings.

The second step was an extension of this Guideline. The Guideline now also applied to polyurethanes, polyacrylates and polyesters, these being organic coating materials frequently used in water supplies.

The present Guideline may be used to assess coatings in contact with water intended for human use (drinking water) as defined in the Drinking Water Regulation [*TrinkwV*] 2001, Article 17(1). This paragraph provides that for the construction or maintenance of installations processing or distributing water for human consumption, "only such materials [*may*] be used which, when in contact with water, do not release substances in concentrations exceeding the limits considered unavoidable according to generally accepted technical standards, which directly or indirectly affect the level of protection of human health provided for by this Regulation, or which alter the odour or flavour of the water..."

---

[1] Account has been taken of the obligations pursuant to Directive 98/34/EC of the European Parliament and the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations (OJ L 204 of 21 July 1998, p. 37), most recently amended by Directive 2006/96/EG of 20 November 2006 (OJ L 363 of 20 December 2006, p. 81).

The possibility of certification of coating procedures, and the specialist undertakings implementing them, by the German Technical Association for Gas and Water [*Deutsche Vereinigung des Gas- und Wasserfaches e. V., DVGW*] is an additional instrument to increase sanitary safety.

A precondition for the aforementioned certifications is that the manufacturer should submit both a test certificate pursuant to this Guideline and a test certificate of the microbiological suitability of the coating system, pursuant to DVGW Data Sheet W 270.

The Guideline was prepared by the Federal Environmental Agency in cooperation with KTW-AG (Joint Working Group of the Drinking Water Commission of the Federal Ministry of Health at the Federal Environmental Agency and the BfR Commission for Consumer Products for the sanitary assessment of plastics and other non-metallic materials in contact with drinking water), the Paint Industry Association [*Verband der Lackindustrie e.V.*], the Chemical Industry Association [*Verband der Chemischen Industrie*] (now PlasticsEurope Germany), the German Association for Construction Chemistry [*Verband der Deutschen Bauchemie*] and the Association of Plastics Manufacturers [*Verband der kunststofferzeugenden Industrie*].

Coatings as envisaged in this Guideline are products made from substances - or mixtures of predominantly organic substances - which in their final state do not themselves form a load-bearing layer, but which in case of application on a substrate (metals, concretes) form a solid layer with a particular technological effect.

Similar to the "Recommendations on the health assessment of plastics and other non-metallic materials in connection with the Food and Consumer Products Act for drinking water uses (KTW-recommendations)," this Guideline is made up of three sections: the Positive Lists of permitted starting substances for the manufacture of the substances and materials; the prescribed testing procedure (migration test procedure); and the test values (limits) to be complied within the tests. It is therefore in line with the general structure of the future European Acceptance System (EAS) for construction products in contact with drinking water.

The progress made in drawing up the EAS has made it possible to determine the test values/ limits for this Guideline for the sum parameter "Total Organic Carbon Content (TOC)" as well as for individual substances in accordance with the present state of progress towards the EAS. Allowance has also been made for future differentiation in the requirements for individual groups of coating products used in water supply systems. The testing procedures to be followed are the migration test procedures prescribed by the European Committee for Standardization (CEN). This should ensure that when the EAS comes into force, organic coatings which were successfully assessed pursuant to the present Guideline, will already fulfil a substantial part of the new requirements.

1.1 Legal status of the Guideline

This Guideline is not a legal instrument and is therefore non-binding. It represents the current state of scientific and technical knowledge with regard to the sanitary requirements which should be met by coatings in contact with water intended for human consumption (drinking water) in the sense of the Drinking Water Regulation [*Trinkwasserverordnung, TrinkwV*] of 2001.

Article 17(1) of TrinkwV 2001 states that for the new construction or maintenance of installations for processing or distributing water for human consumption, "only those materials [*may*] be used which when in contact with water, do not release substances in concentrations which exceed limits that count as unavoidable according to generally acknowledged technical standards, or which directly or indirectly diminish the level of protection of human health provided for by this ordinance, or which alter the odour or flavour of the water;..."

It can therefore be assumed that coatings in contact with drinking water which comply with the requirements of this Guideline will also satisfy the sanitary requirements of the *TrinkwV 2001*.

1.2 Certification symbols and the tests on which they are based

Coating systems used in water supply installations shall be deemed to fulfil the requirements of Article 17(1) of the *TrinkwV 2001* if they are used in compliance with - at least - generally accepted technical standards.

For sanitary safety in terms of microbiological criteria, coating systems should, in addition to and independently of this Guideline, pass a test in accordance with DVGW Data Sheet W 270.

Generally accepted technical standards include, for instance, the Technical Rules of the German Technical Association for Gas and Water (DVGW).

The fact that a coating (process and material) or a coated product complies with generally accepted technical standards and with the requirements of the Drinking Water Regulation 2001, shall be indicated by means of a certification symbol issued by a certifying authority such as the DVGW.

2 Coating types

Coatings (in the general sense) are produced from coating substances by means of application (DIN 55945:1990). The process followed has a substantial effect on the properties of the manufactured coatings. There are cold- and hot-cured coatings, which are essentially quite distinct in character.

Cold-cured coatings should cure at environment temperatures, and are typically not heated (or forcibly dried using heated air) after application; hot-cured coatings are additionally heated or annealed. The curing time of cold-cured coatings depends on composition and environment temperature during the curing process, and may last up to two weeks or more until the product is ready for use. Hot-cured coatings are ready for use after the annealing time, typically less than an hour.

A further distinction is made between solvent-based and solvent-free coatings. Solvent-free coating substances may be used to produce thicknesses of up to 2 000 µm in a single application. Solvent-based coating substances may only be applied in thin layers, since the solvent contained in them needs to evaporate to the surface via the shortest possible path through the coating, before this is prevented by the physical drying process and/or the ongoing reaction of the reactive components.

Coating substances are usually processed by means of procedures such as spreading, immersing, filling, spraying etc.

Coating substances are applied on different materials, such as steel, aluminium, or concrete. Depending on the substrate, coating structures made up of several layers may be necessary to ensure a durable coating (primer, intermediate and finish coat). Before the finish coat has cured completely, or in case of faults or damaged spots, substances could migrate from underlying layers into the drinking water. Therefore, these underlying layers should also be subjected to a sanitary assessment.

3 Composition of organic coatings

Coating substances are typically composed of the following main components:

- Binding agents (resins and any curing agents),
- Pigments and fillers,
- Organic modifying agents,
- Solvents and thinners,
- Additives and accessory agents.

The binding agent of a coating substance is considered to be the non-volatile component of the binding agent solution or dispersion, which forms the coating (DIN EN 941-1: 1996).

Binding agents are polymer components of coatings and determine the type of coating.

Various chemical compounds can be used as binding agents, such as epoxy resins, polyurethanes, polyesters etc. The major types of binding agents are described in brief below.

Organic coatings contain resins and curing agents as binding agents.

Polymers based on Bisphenol A diglycidyl ether; Bisphenol F diglycidyl ether and other glycidyl ethers with various molecular weights are used as resins.

Curing agents may be amines, amido-amines and amine adducts, whose amine hydrogens react with the epoxy groups, as well as isocyanates. Other compounds, such as acids or other H-active compounds, can also be used as curing agents.

In polyurethane coatings, isocyanates and compounds containing hydroxyl groups (polyols) may be used as binding agents. The combination of isocyanates with amino-functional compounds produces polypolycarbamide coatings.

Polyester coatings contain polyester compounds as their binding agents, which are produced through esterification of polyvalent alcohols and polycarbonic acids, and may be cross-linked with e.g. isocyanates.

All the aforementioned types of binding agents are also found in combination with other types or with softening agents, polymeric resins (e.g. polyacrylates) or modifying agents.

Pigments and fillers provide mechanical stabilisation and colouration of the coating. Fillers enhance the protective function. Through giving the coating substance a viscous consistency, they enhance its applicability.

Organic modifying agents serve among other things to enhance the usability and/or drying properties.

Solvents are used to lower viscosity in order to enhance applicability. They should not remain present after the curing process. In aqueous or water-dilutable coatings, water is used as a solvent or thinner.

Additives and accessory agents are used to increase:

- the storage stability of the coating substances,
- the performance characteristics (e.g. rheological additives to enhance flow properties such as runoff behaviour and smoothness),
- film quality (e.g. anti-foam additives to prevent formation of bubbles, pores and craters),
- moistening the surface to be coated,
- the surface structure of the coating.

4 Composition of the Positive List for organic coatings

The Positive List is divides into two parts (Annex 1). Part 1 contains all substances which have been toxicologically assessed. The assessments were either borrowed from the **European Food Safety Authority** (EFSA), previously the Scientific Committee on Food (SCF), or conducted by BfR (formerly the Plastics Commission, now BfR Commission for Consumer Products). Part 2 describes examples of possible intermediate coat products.

The starting substances for the manufacture of organic coatings should be of good technical quality in terms of purity. The intermediate products (oligomers, intermediate reaction products) should be manufactured in accordance with Good Manufacturing Practice (GMP).

The "Monomers and other starting substances" of the Plastics Directive 2002/72/EC in this Positive List correspond to the "Starting substances for resins and curing agents".

They can be divided into phenolic compounds, aldehydes, oxirane and glycidyl compounds, amines, isocyanates, diols/polyols, monoalcohols, oils and acids.

Novolak and blocked isocyanates may only be used in powder coatings.

In accordance with the SCF Guidelines ("Note for guidance"), substances of higher molecular weight which are composed of listed monomers (e.g. mannich bases), count as intermediate reaction products. They do not need to be listed separately. Smaller molecules of toxicological significance which could migrate into the drinking water (e.g. reactive thinners such as n-butyl glycidyl ethers) are classified as starting substances and should be assessed.

Polymeric additives (molecular weight > 1000), which are listed as monomers in Part 1, are also not listed (e.g. polybutyl acrylate).

In addition, the Positive List contains the other components of the relevant formulations: pigments and fillers, organic modifying agents, solvents, additives and accessory agents.

The Positive List is provided in tabular form. Column 1 contains the "Packing material reference number" derived from 2002/72/EC. Column 2 contains the CAS (Chemical Abstracts Service) number. The descriptions of substances are given in Column 3.

Column 4 contains the "provisional drinking water limits for material-specific substances (DWPLL: Drinking Water Positive List Limits)", which should be used by the test laboratory to calculate the applicable test requirement/ limit (maximum tolerable migration period M_{max}) for the relevant coating product group.

Toxicologically, the DWPLL value can be considered to be the maximum tolerable concentration in drinking water from the tap. The DWPLL value is derived from the Tolerable Daily Intake (TDI) or Acceptable Daily Intake (ADI), assuming a daily intake of 2 l of drinking water, a body weight of 60 kg and a 10% share of the drinking water in the total exposure for the respective substance (WHO concept). The designation "TOC" implies that the substance cannot be specifically determined, but is instead covered by the basic requirement for the TOC parameter.

In Column 5, the restriction "QM" means the determination of the residual concentration in the finished coating, and "QMA" means a determination of the residual concentration in the finished coating per 6 dm^2 of surface area (residual concentration per unit of area).

5 Inclusion of new substances in the Positive List, Part 1

Requests for inclusion of new substances in Part 1 of the Positive List should be submitted to the Federal Environmental Agency.

Submission of these requests shall be pursuant to the requirements of the questionnaire of the "Note for guidance" (http://ec.europa.eu/food/food/chemicalsafety/foodcontact/documents_en.htm), which contains in Chapter III the European Community questionnaire, subdivided into items 1 to 8.

Item 8 of the questionnaire describes the requirements for the toxicological data to be submitted, whose extent is determined by the level of migration of the requested substance in deionized water. In addition, all available toxicological data should be submitted.

In requests pertaining to substances which have already been subjected to a toxicological assessment, the requirements of Points 1 to 4 are adequate. In addition, a suitable analytic procedure for the maximum tolerable migration period shall be submitted.

The Positive List will be updated at least once a year with the newly included substances.

6 Requirements for organic coatings

Only the substances included in the Positive List may be used for the manufacture of organic coatings in contact with drinking water (cf. Annex 2). Substrate structures may also contain only assessed substances.

6.1 Basic requirements

The external characteristics of odour, taste, clarity, colour and foaming of the test water may not be changed. For cold-water testing, the threshold odour number TON and the threshold flavour number TFN should be TON, TFN < 2, for warm-water testing TON, TFN ≤ 4.

The release of organic substances, measured as the total organic carbon (TOC) may not exceed the maximum tolerable migration period $M_{max, TOC}$ in mg/(dm^{2}d) of the proposed product group (see 6.4).

6.2 Additional requirements

For the substances and substance groups listed in the following table, the maximum tolerable migration rates for the proposed product group, calculated from the DWPLL values, should be examined (see 6.4), depending on the type of coating.

In case of combinations of different types of binding agents, the additional requirements should be met for all types of binding agents included.

Table 1: List of additional requirements for the different binding agent systems

Substances/substance groups	DWPLL in µg/l	Analytic method
a) Coatings containing epoxy resins		
Bisphenol A	30	DIN EN 13130-13:2005
BADGE including its hydrolysis products	450	Official method[2] L 00.00-51
BFDGE including its hydrolysis products	Not demonstrable[3]	Official method L 00.00-51
NOGE- isomers with mol.wt<1000 D including their hydrolysis products	2.5	pr EN 15137:2004
Epichlorohydrin and 3-Mono-chloro-1,2-propanediol (hydrolysis product)	0.1 6	DIN EN 14207, 2003 Official method B80.56-2
Formaldehyde	750	50. Communication (Bundesgesundhbl. 30(1987)368)
Primary aromatic amines	2	Official method L 00.00-6
b) Coatings containing polyurethanes		
Isocyanates	QM= 1mg/kg	DIN V ENV 13130-8: 1999
Alternatively, the hydrolysing amines in the migration may be determined		
Primary aromatic amines	2	Official method L 00.00-6
c) Coatings containing polyesters		
d) Coatings containing polyacrylates		

[2] Official methods for the inspection of foodstuffs: Official Compilation of inspection procedures pursuant to Section 64, LFGB (formerly Section 35, LMBG): www.methodensammlung-lmbg.de.

[3] If a different analytic method is used, the DWPLL should be set at 2.5 µg/l.

Acrylates	300 as acrylic acid	

6.3 Formulation-dependent requirements for individual substances

The assessment of the maximum tolerable migration rates should be done for all substances with a restriction in Column 4 of the Positive List (see 6.4). The migration rates may be determined either experimentally or by means of modelling.

Compliance with the specific migration test requirements may also be assessed by determining the quantity of a substance in the product under review ($c_{P,0}$), provided the ratio between this quantity and the specific migration rate of the relevant substance was determined by means of generally accepted, scientifically proven diffusion models and characteristic values.

For materials in contact with foodstuffs, the migration for individual substances may now be modelled pursuant to EU Directive 2002/72.

The Practical Guide (Annex 1) contains the required specific characteristic values for important organic materials (http://ec.europa.eu/food/food/chemicalsafety/foodcontact/practical guide en.pdf).

For other organic materials used in contact with drinking water, modelling can be undertaken after the relevant material- or product-specific characteristic values have been determined. The necessary tests are also described in the Practical Guide (Annex 1).

For epoxy resins, the polymer-specific constant A_P value was determined for different paint formulations (Modelling Guideline). For other binding agent systems, these polymer-specific constants should be determined in order to use the mathematical modelling.

The method of analysis for the determination of $c_{P,0}$ for the polymer shall be submitted by the raw material manufacturer, unless a method validated by the Community Reference Laboratory for Food Contact Materials (http://crl-fcm.jrc.it/index.php?option=com_methods&Itemid=80) or a DIN standard is already available. Alternatively, the $c_{P,0}$ of the application quantity may be used, provided the $c_{P,0}$ does not change during manufacture and/or processing of the product.

Modelling shall be based on the migration found during single test periods and under the relevant test conditions (test temperature and test cycle) as stipulated in this Guideline (see 7.4). For the calculation of the migration in the following test period, the concentration profile of the preceding test period shall be used. The Modelling Guideline contains a description of the modelling process with a flow diagram, and is intended to integrate proper modelling into the sanitary assessment of products as referred to in this Guideline.

Validated software shall be used for modelling. The requirements for the software solutions to be used have been included in the Modelling Guideline.

If, after modelling, a product does not fulfil the requirements of the Guideline with respect to individual substances, proof may still be produced through experimental testing, since the results of experiments should always be given more weight than those of modelling.

For substances with the designation "TOC" in Column 4 of the Positive List, the individual substance requirement may be considered to have been met if the maximum tolerable migration period for the TOC (basic requirement for the proposed product group) has been fulfilled (see 6.4).

For substances with the designation QM or QMA in Column 5, the residual concentration of the substance in the finished coating should be examined. The QM and QMA limits apply independently of the coating product group.

6.4 Calculation of the maximum tolerable migration rates M_{max}

The conversion factors to be used for the various product groups are the maximum tolerable migration rates ($M_{max,\ product\ group}$), to be calculated referring to the table below, according to the formula:

$$M_{max,\ product\ group} = DWPLL/F_c$$

Table 2: List of product groups with associated conversion factors

Product group	**Conversion factor F_C in d/dm**
Pipes with DN < 80 mm (domestic installation)	20
Pipes of diameter 80 mm ≤ DN < 300 mm (supply pipes)	10
Pipes of diameter DN ≥ 300 mm (main pipes)	5
Fittings for pipes with DN < 80 mm	4
Fittings for pipes with 80 mm ≤ DN < 300 mm	2
Fittings for pipes with DN ≥ 300 mm	1
Fittings for pipes with DN < 80 mm	0.4
Sealings for pipes with 80 mm ≤ DN < 300 mm	0.2
Sealings for pipes with DN ≥ 300 mm	0.1
Tanks in domestic installations including repair systems	4
Tanks other than in domestic installations including repair systems	1
Repair systems for tanks in domestic installations with $^1/_{100}$ of the area of the tank	0.04
Repair systems for tanks other than in domestic installations with $^1/_{100}$ of the area of the tank	0.01

Table 2 lists the product groups of pipes, tanks and fittings, where the requirements are further differentiated according to their place of use within the water distribution system. The sealings product group has only a secondary role in coating systems, e.g. for adhesives to make connections in overlapping areas. Adhesives for relining processes should be assessed on the same basis as the corresponding inliners.

For the TOC parameter of the basic requirements, a value of $DWPLL_{TOC}$ = 0.5 mg/l should be used.

The DWPLL values for substances and substance groups listed in the additional requirements should be taken from Table 1 in Paragraph 6.2.

The DWPLL values for individual substances should be taken from the Positive List.

For instance, for coatings of tanks other than in domestic installations, the maximum tolerable migration rate M_{max} is found to be 0.5 mg/dm^{2}d for the TOC parameter, 30 µg/dm^{2}d for bisphenol A, 0.1 µg/dm^{2}d for epichlorohydrin, etc.

7 Requirements for issuance of a test certificate

7.1 Application

To obtain a test certificate for coatings in contact with drinking water, the applicant should submit the complete recipe for the coating, listing all components of its formulation, not including weight proportions, but including CAS numbers and group classification as per the Guideline) to the test laboratory (Annex 2). These data are used to determine the scope of the assessment of the maximum tolerable migration rates ($M_{max,}$) or the residual concentrations (QM, QMA) for individual substances in the finished coating.

For coating systems made up of several layers, recipes should be submitted for each individual layer (e.g. primer).

The recipe data as per Annex 2 may be submitted separately by both the manufacturer of the coating substance and the manufacturer of the raw material, provided an exact description of the relevant products allows the unequivocal classification of the coating to which the application applies.

The proposed product group (in accordance with 6.4) for the coating should be indicated in any case. The above data are used to calculate the maximum tolerable migration rates for the product group, which shall be entered by the test laboratory in the table of Annex 2 (e.g. M_{max} for tank coatings other than in domestic installations).

7.2 Test laboratory

Testing in accordance with this Guideline shall be done by an accredited test laboratory. In addition, the test laboratory should be recognised by a certification body (e.g. the DVGW certification body) which is itself accredited for the certification of products in contact with drinking water.

7.3 Sample taking

The requirements described below for the samples, the sample taking process and the record to be kept thereof (Annex 4 to the test report, cf. 7.4) can be derived from the standards for the migration test DIN EN 12873-1: 2004, DIN EN 12873-2: 2005 and DIN EN 1420-1: 1999.

Testing should normally be undertaken on products with a finished coating.

Where testing finished products is not possible, production of the samples should be coordinated with the test laboratory, normally by the manufacturer/ applicant or his representative, and in accordance with the application instructions given by the manufacturer.

The chosen substrate should correspond to the practical use of the coating. Substrate treatments required by the application instructions (e.g. primer, sublayers) should also be applied to test samples.

Regardless of whether the coating is produced by the manufacturer or the applicant, samples should always follow the usual practical mode of application (e.g. curing conditions).

A detailed record should be kept of the production of samples. The record becomes part of the test report as Annex 4. It should contain the data corresponding to the form (Annex 4 to the Guideline).

7.4 Testing

Testing should commence immediately following the prescribed curing time. In case of test pieces produced by the manufacturer, testing may also be commenced later, provided the curing process is demonstrably complete after the minimum curing time indicated by the manufacturer.

For multilayer products where the manufacture process, composition, mixing ratio etc. of the combined layers produce other migration properties than those of the individual layers, the assessment may be conducted on the entire coating structure instead.

Testing should be done in accordance with DIN EN 1420-1: 1999 and DIN EN 12873-1: 2004 or DIN EN 12873-2: 2005, taking account of the experience gained with the KTW Recommendations. Annex 3 to the Guideline contains the test requirements in abbreviated form. The test procedure and results should be recorded in detail (Annex 3 to the test report).

The test laboratory should examine whether the basic requirements, additional requirements and recipe-dependent requirements for individual substances for the proposed product group have been fulfilled.

In the migration test at (23 ± 2)°C and the odour/flavour test at (23 ± 2)°C, the test water samples from the first three test periods should be examined. In the migration test and the odour/flavour test at higher temperatures, the test water samples from the first, sixth and seventh test periods should be examined. The TOC parameter, however, should be determined in first, second, third, sixth and seventh test periods.

The test results should not exhibit any rising trend, and the test results from the last period should fulfil the applicable requirements for the proposed product group.

If the migration rate from the third migration period (cold-water test) or the seventh migration period (warm-water test) complies with the applied Specific Migration Limit

(SML) as defined in Directive 2002/72/EC[4] for the relevant substance, but the calculated DWPLL value is exceeded, a test certificate with a limited 5-year validity (without extensions) may be issued.

Standardised analytic procedures should normally be followed in testing the migration samples. Where no suitable analytic method currently exists for a particular substance, an analytic method of suitable accuracy, which enables an assessment of the migration period to be made, may be applied until a standardised method is developed. Any hitherto unavailable analytic methods for substances in list 1 of the Positive List (list of assessed substances in Annex 1) should be developed by the manufacturer and test laboratories and notified to the Federal Environmental Agency. The test laboratory should enter the analytic procedures applied in the table in Annex 2 to the Guideline.

The complete test results should be entered in tables as defined in DIN EN 12873-2, Paragraph 11.5 (Test Results) and attached to the test report as Annex 1.

Instead of analytical proof of compliance with the DWPLL values, mathematical methods may be used to estimate the migration rate of individual component substances of organic coatings into the drinking water. In case of modelling, corresponding documentation should be submitted.

7.5 Test report and test certificate

If the test is passed, a test report should be prepared by the test laboratory which should include the information specified in DIN EN 12873-1 and -2, Paragraph 11. This consists of the test certificate and the following Annexes:

Annex 1: Table with the complete test results (cf. 7.3), documentation of the modelling procedure where applicable

Annex 2: Recipe statement (Annex 2 to the Guideline, completed and signed by the manufacturer/applicant and the test laboratory),

Annex 3: Record of the testing procedure followed (cf. 7.3),

Annex 4: Record of the manufacture of the sample in accordance with form (cf. 7.2)

Annex 5: Selection and characteristics of the analytic procedure followed,

Annex 6: Application instructions with curing conditions (data from the manufacturer for its coating, temperature and duration until the product is ready for use).

The test certificate should contain the following concluding sentences:

[4] Directive 2002/72/EC of the Commission and its amendments, relating to plastic materials and articles intended to come into contact with foodstuffs contains in its Annex II the List of monomers and other starting substances, and in Annex III the Incomplete list of additives which may be used in the manufacture of plastic materials and articles. The Annexes formulate limitations on the use of these substances in articles intended to come into contact with foodstuffs that depend on their toxicological assessment.

"The coating system... (exact description, batch number, coating composition) has been tested in accordance with the Guideline for sanitary assessment of organic coatings made of... in contact with drinking water, issued by the Federal Environmental Agency, and has passed the test for the proposed product group(s)... at temperatures of up to... °C."

A copy of the test certificate, including all annexes, has been filed with the Federal Environmental Agency."

Test certificates issued in accordance with this Guideline are valid for a period of five years.

Test certificates for products from the same manufacturer which are produced in accordance with this Guideline may, if they comply with all the requirements listed in 7.4 in the initial test, be extended for five years without further experimental testing, providing that there has been no change in their formulation, in the relevant substance assessments (restrictions in the Positive Lists) or in the manufacturing process.

If the test certificate was issued pursuant to an exception (SML values), and may therefore not be extended, this should be clearly marked on the certificate.

8 Feedback to the Federal Environmental Agency

Until a national certifying body within the framework of the European Acceptance System (EAS) has been created, the test report prepared by the test laboratory after completion of the test, including all the annexes listed under 7.4, should be sent to the Federal Environmental Agency. The test report is used by the Federal Environmental Agency for scientific evaluation with a view to further development of the Positive List, preparation of the EAS and improvements in hygienic safety of the drinking water supply. The recipe statement (Annex 2 to the test report) and the test results (Annex 1 to the test report) will be kept confidential.

Any scientific publications or compilations of test results produced by the Federal Environmental Agency for the purpose of further development of the testing procedure will be made anonymous and will not contain the corresponding recipes.

The manufacturer/applicant shall submit a valid test certificate in accordance with DVGW W 270 (A), including a test report, to the Federal Environmental Agency. The requirements described under 7.2 apply equally to the test laboratory. The Federal Environmental Agency maintains a list of coatings which have been found to comply with the requirements of this Guideline and those of DVGW W 270 (A). The list of Annex 5 to the guideline will be supplemented with the minimum possible delay after verification of the documents as referred to under 7.5 and submission of the test certificate according to DVGW W 270 (A), but at least once a year.

Annex 1: Positive List for coatings in drinking water

Part 1:

1 LIST OF ASSESSED SUBSTANCES

1.1 STARTING SUBSTANCES FOR RESINS AND CURING AGENTS

1.1.1 PHENOLIC COMPOUNDS

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
13480/13607	80-05-7	2,2- Bis(4-hydroxphenyl)propane	30	
14020 / 40850	98-54-4	p-tert-Butylphenol	2.5	
14710	108-39-4	m-Cresol		
14740	95-48-7	o-Cresol		
14770	106-44-5	p-Cresol		
14841	599-64-4	4-Cumylphenol	2.5	
15880 / 24051	120-80-9	1,2-Dihydroxybenzene	300	
15910 / 24072	108-46-3	1,3-Dihydroxybenzene	120	
15940 / 18867 /48620	123-31-9	1,4-Dihydroxybenzene	30	
16000	92-88-6	4,4'-Dihydroxybiphenyl	300	
16360	576-26-1	2,6-Dimethylphenol	2.5	
22960	108-95-2	Phenol	TOC	
25927	27955-94-8	1,1,1-Tris(4-hydroxyphenyl)-ethane	0,25	
-	8007-24-7	Cashew Nut Shell liquid (>90 % 3-(n-Penta-8'-decenyl)phenol)*	2.5	

1.1.2 ALDEHYDES

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
10060	75-07-0	Acetaldehyde	300	
14110	123-72-8	Butyraldehyde		
17260 / 54880	50-00-0	Formaldehyde	750	
23860	123-38-6	Propionaldehyde		

1.1.3 OXIRANE AND GLYCIDYL COMPOUNDS

PMN REF No.	CAS No.	Name.	DWPLL in µg/l	QM or QMA
13160/ 22552 /68200	28064-14-4, 9003-36-5	Novolac Glycidyl ether, Phenolic Novolac resin (NOGE)**; only for powder paints	2.5	
13460 / 12976	54208-63-8, 39817-09-9, 2095-03-6	Bisphenol-F-diglycidylether**	2.5	
PMN REF No.	**CAS No.**	**Name**	**DWPLL in µg/l**	**QM or QMA**
13510 / 13610	1675-54-3	Bisphenol-A-diglycidylether	450	
13780	2425-79-8	1,4-Butanedioldiglycidylether	0,1	Qm = 1 mg/kg
16750 / 14570	106-89-8	Epichlorohydrin	0.1	
17020	75-21-8	Ethylene oxide	0,1	Qm = 1 mg/kg
21823	598-09-4	2-Methylepichlorohydrin	0.1	
24010	75-56-9	Propylene oxide	0,1	Qm = 1 mg/kg
25360	26761-45-5	Trialkyl(C5-C15)acetic acid glycidylester	0,1	Qm = 1 mg/kg
88640	8013-07-8	Soyabean oil, epoxidized	TOC	

1.1.4 AMINES

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
12670	2855-13-2	1-Amino-3-aminomethyl-3,5,5-trimethylcyclohexane	300	
12761	693-57-2	12-Aminododecanoic acid	2.5	
12763 / 35170	141-43-5	2-Aminoethanol	2.5	
12788	2432-99-7	11-Aminoundecanoic acid	250	
12789/35320	7664-41-7	Ammonia	500 as NH4+	
13000	1477-55-0	1,3-Benzenedimethanamine	2.5	
13075 / 15310	91-76-9	2,4-Diamino-6-phenyl-1,3,5-triazin	250	
13210	1761-71-3	Bis(4-aminocyclohexyl)methane	2.5	
13250	101-77-9	Bis(4-aminophenyl)methane	0.1	
15250	110-60-1	1,4-Diaminobutane		
47440	461-58-5	Dicyanodiamide		
15790	111-40-0	Diethylenetriamine	250	
16145 / 49225	124-40-3	Dimethylamine**	3	
16150	108-01-0	Dimethylaminoethanol	900	
16960 / 15272	107-15-3	Ethylenediamine	600	
17005	151-56-4	Ethyleneimine	0.1	
18460 / 15274	124-09-4	Hexamethylenediamine	120	
18670 / 59280	100-97-0	Hexamethylenetetramine	750 as formaldehyde	
21754	15520-10-2	2-Methyl-1,5-diaminopentane*	5	

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
21765	106246-33-7	4,4'-Methylenbis(3-chloro-2,6-diethylaniline)	2,5	
22331/15355	25513-64-8, 25620-58-0	Mixture of (40%) 1,6-Diamino-2,2,4-trimethylhexane and (60%) 1,6-Diamino-2,4,4-trimethylhexane	2,5	
23050	108-45-2	1,3-Phenylenediamine	0.1	
23505	110-85-0	Piperazine**		
25180 / 92640	102-60-3	N,N,N,N-Tetrakis(2-hydroxypropyl)-ethylenediamine		
25420/19975/93720	108-78-1	2,4,6-Triamino-1,3,5-triazine	1500	
25960/95630	57-13-6	Urea		
45760	108-91-8	Cyclohexylamine		
94560	122-20-3	Triisopropanolamine	250	
-	936-49-2	2-Phenylimidazoline*	2.5	

1.1.5 ISOCYANATES

PMN REF No.	CAS-No.	Name	DWPLL in µg/l	QM or QMA
14877	2556-36-7	1,4-Cyclohexanediisocyanate**		QM(T) = 1 mg/kg as NCO
14950	3173-53-3	Cyclohexyl isocyanate		QM(T) = 1 mg/kg as NCO
15700	5124-30-1	Dicyclohexylmethane-4,4-diisocyanate		QM(T) = 1 mg/kg as NCO
16240	91-97-4	3,3-Dimethyl-4,4-diisocyanatobiphenyl		QM(T) = 1 mg/kg as NCO
16570	4128-73-8	Diphenylether-4,4-diisocyanate		QM(T) = 1 mg/kg as NCO
16600	5873-54-1	Diphenylmethane-2,4-diisocyanate		QM(T) = 1 mg/kg as NCO
16630	101-68-8	Diphenylmethane-4,4-diisocyanate		QM(T) = 1 mg/kg as NCO
16920	87057-87-2	2-Ethylbutane-1,4-diisocyanate**		QM(T) = 1 mg/kg as NCO
18640	822-06-0	Hexamethylene diisocyanate		QM(T) = 1 mg/kg as NCO
19110 / 19147	4098-71-9	1-Isocyanato-3-isocyanatomethyl- 3,5,5-trimethylcyclohexane		QM(T) = 1 mg/kg as NCO
22065	34813-62-2	2-Methylpentane-1,5-diisocyanate**		QM(T) = 1 mg/kg as NCO
22420	3173-72-6	1,5-Napthalene diisocyanate		QM(T) = 1 mg/kg as NCO
22570	112-96-9	Octadecyl isocyanate		QM(T) = 1 mg/kg as NCO
23060	104-49-4	1,4-Phenylene diisocyanate**		QM(T) = 1 mg/kg as NCO
23125	103-71-9	Phenylisocyanate**		QM(T) = 1 mg/kg as NCO
25208	26471-62-5	Toluene diisocyanate**		QM(T) = 1 mg/kg as NCO

PMN REF No.	CAS-No.	Name	DWPLL in µg/l	QM or QMA
25210	584-84-9	2,4 Toluene diisocyanate		QM(T) = 1 mg/kg as NCO
25240	91-08-7	2,6-Toluene diisocyanate		QM(T) = 1 mg/kg as NCO
25270	26747-90-0	2,4-Toluene diisocyanate dimer		QM(T) = 1 mg/kg as NCO
25445	28807-72-9	Tricyclodecane diisocyanate**		QM(T) = 1 mg/kg as NCO
25573	16938-22-0	2,2,4-Trimethylhexane-1,6-diisocyanate**		QM(T) = 1 mg/kg as NCO
25574	15646-96-5	2,4,4-Trimethylhexane-1,6-diisocyanate**		QM(T) = 1 mg/kg as NCO

1.1.6 DIOLS/POLYOLS

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
13390 / 14880	105-08-8	1,4-Bis(hydroxymethyl)-cyclohexane		
13690	107-88-0	1,3-Butanediol		
13720 / 40580	110-63-4	1,4-Butanediol	250	
14500 / 43280	9004-34-6	Cellulose		
15760 / 13326 / 47680	111-46-6	Diethyleneglycol	TOC	
16390 / 22437	126-30-7	2,2-Dimethyl-1,3-propanediol, Neopentylglycol	2.5	
16480 / 51200	126-58-9	Dipentaerythritol		
16660 / 13550 / 51760	110-98-5 25265-71-8	Dipropyleneglycol		
16925 / 53280	9004-57-3	Ethylcellulose**		
16990 / 16778 / 53650	107-21-1	Ethyleneglycol, 1,2-Ethanediol	TOC	
17530	50-99-7	Glucose		
18100 / 55920	56-81-5	Glycerol		
18700	629-11-8	1,6-Hexanediol	2.5	
65520	87-78-5	Mannitol		
22190	2163-42-0	2-Methyl-1,3-propandiol**	250	
22840 / 71600	115-77-5	Pentaerythritol		
23590 / 76960	25322-68-3	Polyethyleneglycol		
23650 / 23651 / 80800	25322-69-4	Polypropyleneglycol		
23740 / 81840	57-55-6	1,2-Propanediol		
23770	504-63-2	1,3-Propanediol	2.5	
24490 / 88320	50-70-4	Sorbitol		
24880 / 91185	57-50-1	Sucrose		
25090 / 92350	112-60-7	Tetraethyleneglycol		
25510 / 94320	112-27-6	Triethyleneglycol		
25600 / 13380 / 94960	77-99-6	1,1,1-Trimethylolpropane	300	
25910	24800-44-0	Tripropyleneglycol		

1.1.7 MONOALCOHOLS

PMN REF No.	CAS No.	Name	DWPLL in g/l	QM or QMA
12375 / 33120	-	Alcohols, aliphatic, monohydric, saturated, linear, primary (C4-C22)		
13150	100-51-6	Benzylalkohol	TOC	
13840	71-36-3	1-Butanol		
13845 / 40594	75-65-0	tert-Butanol**	500	
15100 / 46050	112-30-1	1-Decanol		
16701 / 51945	112-53-8	1-Dodecanol**		
16780/52800	64-17-5	Ethanol		
17050	104-76-7	2-Ethyl-1-hexanol	TOC	
17160	97-53-0	Eugenol	0.1	
18150	111-70-6	1-Heptanol**		
18310	36653-82-4	1-Hexadecanol		
18780	111-27-3	1-Hexanol**		
21550 / 65960	67-56-1	Methanol		
22480	143-08-8	1-Nonanol**		
22555 / 68225	112-92-5	1-Octadecanol**		
22600 / 68750	111-87-5	1-Octanol		
69760	143-28-2	Oleyl alcohol		
22870	71-41-0	1-Pentanol		
23800/81880	71-23-8	1-Propanol		
23830 / 62480 / 81882	67-63-0	2-Propanol	TOC	
25070 / 92300	112-72-1	1-Tetradecanol**		

1.1.8 OILS and ACIDS

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
10030	514-10-3	Abietic acid	TOC	
10090 / 30000	64-19-7	Acetic acid		
10150 / 30280	108-24-7	Acetic anhydride		
10599 / 90A / 10599 / 91	061788-89-4	Acids, fatty, unsaturated (C18), dimers, distilled and non distilled, not hydrogenated	2,5	
10599 / 92A / 10599 /93	068783-41-5	Acids, fatty, unsaturated (C18), dimers, hydrogenated, distilled and non distilled		
10690	00079-10-7	Acrylic acid	300	
12130 / 31730	124-04-9	Adipic acid		
12280	2035-75-8	Adipic anhydride	TOC	
12810 / 35840	506-30-9	Arachidic acid**		
12813 / 35845	7771-44-0	Arachidonic acid**		
12820	123-99-9	Azelaic acid		
12970	4196-95-6	Azelaic anhydride		
12980	8015-74-5	Beechnut oil**		
12990 / 37040	112-85-6	Behenic acid**		
13090 / 37600	65-85-0	Benzoic acid		
13620 / 40320	10043-35-3	Boric acid	1000 as Boron	
14140	107-92-6	Butyric acid		
14320 / 41960 / 68560	124-07-2	Caprylic acid		

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
42960	64147-40-6	Castor oil, dehydrated		
14445	-	Castor oil fatty acids**		
14450/1	-	Castor oil fatty acids, dehydrated**		
14453	61790-39-4	Castor oil fatty acids, hydrogenated**		
14470 / 43120	8001-78-3	Castor oil, hydrogenated**		
14680 / 44160	77-92-9	Citric acid		
14685	8001-31-8	Coconut oil**		
14693	8001-30-7	Corn oil**		
14695/1	-	Corn oil fatty acids**		
14698	8001-29-4	Cottonseed oil**		
14700/1	-	Cottonseed oil fatty acids**		
15095 / 45940	334-48-5	n-Decanoic acid		
16697	693-23-2	Dodecanedioic acid		
52730	112-86-7	Erucic acid		
17170	61788-47-4	Fatty acids, coco		
17175	68938-15-8	Fatty acids, coco, hydrogenated**		
17200 / 88650	68308-53-2	Fatty acids, soya		
17215	-	Fatty acids, sunflower oil		
17230	61790-12-3	Fatty acids, tall oil		
17236	61790-37-2	Fatty acids, tallow**		
17245	8016-13-5	Fish oil**		
17247/1	-	Fish oil fatty acids**		
55040	64-18-6	Formic acid		
17290 / 55120	110-17-8	Fumaric acid		
17510 / 55190	29204-02-2	Gadoleic acid		
18010 / 55680	110-94-1	Glutaric acid		
18070	198-55-4	Glutaric anhydride		
18124	8016-24-8	Hempseed oil**		
18126/1	-	Hempseed oil fatty acids		
18250 / 14527	115-28-6	Hexachloroendomethylene-tetrahydrophthalic acid	0.1	
18280	115-27-5	Hexachloroendomethylene-tetrahydrophthalic anhydride		
59360	142-62-1	n-Hexanoic acid, caproic acid		
18880	99-96-7	4-Hydroxybenzoic acid	TOC	
61840	106-14-9	12-Hydroxystearic acid		
19150	121-91-5	Isophthalic acid	250	
19270	97-65-4	Itaconic acid		
19460 / 62960	50-21-5	Lactic acid		
19470 / 63280	143-07-7	Lauric acid		
19515	557-19-5	Lignoceric acid**		
64015	60-33-3	Linoleic acid		
64150	28290-79-1	Linolenic acid		
19532/64160	8001-26-1	Linseed oil**		
19534/1	68424-45-3	Linseed oil fatty acids**		
19540 / 64800	110-16-7	Maleic acide	TOC	
19960 / 64900	108-31-6	Maleic anhydride	TOC	
65020	6915-15-7	Malic acid		
19965 / 65040	141-82-2	Malonic acid		
22350 / 67891	544-63-8	Myristic acid		
22763 / 69040	112-80-1	Oleic acid		
22769/1	-	Olive oil fatty acids**		
22775 / 69920	144-62-7	Oxalic acid	300	
22780 / 70400	57-10-3	Palmitic acid		

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
22785 / 71020	-	Palmitoleic acid**		
22790/1	-	Palm kernel oil fatty acids		
22795/1	-	Palm oil fatty acids**		
22867	109-52-4	Pentanoic acid**		
22945	68132-21-8	Perilla oil**		
22950/1		Perilla oil fatty acids**		
23170/72640	7664-38-2	Phosphoric acid		
23173	1314-56-3	Phosphoric anhydride**		
23200 / 74480	88-99-3	o-Phthalic acid		
23380 / 76320	85-44-9	Phthalic anhydride		
23730	8002-11-7	Poppyseed oil**		
23733/1		Poppyseed oil fatty acids**		
23890 / 82000	79-09-4	Propionic acid		
23950	123-62-6	Propionic anhydride		
24045	8016-49-7	Pumpkinseed oil**		
24047/1		Pumpkinseed oil fatty acids**		
24055 / 13040	89-05-4	Pyromellitic acid**	2,5	
24057	89-32-7	Pyromellitic anhydride		
24065/1	-	Rapeseed fatty acids**		
24070 / 83610	73138-82-6	Resin acids and rosin acids		
83700	141-22-0	Ricinoleic acid	TOC	
24078	-	Ricinoleic acid, dehydrated**		
24100 / 24130 / 24190 / 83840	8050-09-7	Rosin		
24160	8052-10-6	Rosin tall oil		
24260	8001-23-8	Safflower oil**		
24262/1	-	Safflower oil fatty acids**		
24270 / 84640	69-72-7	Salicylic acid		
24280 / 85030	111-20-6	Sebacic acid		
24430	2561-88-8	Sebacic anhydride	TOC	
24435	8008-74-0	Sesame oil**		
24437/1	-	Sesame oil fatty acids**		
24520 / 88630/0 / 88630/1	8001-22-7	Soybean oil		
24550 / 89040	57-11-4	Stearic acid		
24820 / 90960	110-15-6	Succinic acid		
24850 / 91170	108-30-5	Succinic anhydride		
24895	8001-21-6	Sunflower oil**		
24900/1	-	Sunflower oil fatty acids**		
24905	8002-26-4	Tall oil**		
24910	100-21-0	Terephthalic acid	325	
24940	100-20-9	Terephthalic acid dichloride		
25540 / 13050	528-44-9	Trimellitic acid	250	
25550	552-30-7	Trimellitic anhydride		
26340	8024-09-7	Walnut oil**		
26345/1		Walnut oil fatty acids**	TOC	
36000	50-81-7	Ascorbic acid		
52000	27176-87-0	Dodecylbenzenesulphonic acid	TOC	
80720	8017-16-1	Polyphosphoric acids		
83440	2466-09-3	Pyrophosphoric acid		
92160	87-69-4	Tarttaric acid	TOC	

1.1.9 Other monomers

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
10630	79-06-1	Acrylamide	0,1	
10660	15214-89-8	2-Acrylamido-2-methylpropanesulphonic acid	2,5	
10690	79-10-7	Acrylic acid	300	
10780	141-32-2	Acrylic acid, n-butyl ester		
11470	140-88-5	Acrylic acid, ethyl ester		
11500	103-11-7	Acrylic acid, 2-ethylhexyl ester	2,5	
11710	96-33-3	Acrylic acid, methyl ester	300	
12100	107-13-1	Acrylonitrile	0,1	
13630	106-99-	Butadiene	0,1	QM= 1mg/kg
19490	947-04-6	Laurolactam	250	
20020	79-41-4	Methyacrylic acid	300	
20110	97-88-1	Methylic acid, butyl ester		
20440	97-90-6	Methacrylic acid, diester with ethyleneglycol	2,5	
20530	2867-47-2	Methacrylic acid, 2-(dimethylamino)ethylester	0,1	
20590	106-91-2	Methacrylic acid, 2,3-epoxypropyl ester	1	
21130	80-62-6	Methacrylic acid, methyl ester	300	
21190	868-77-9	Methacrylic acid, monoester with ethyleneglycol		
25150	109-99-9	Tetrahydrofuran	30	
26050	75-01-4	Vinyl chloride	0,1	QM= 1mg/kg
26110	75-35-4	Vinylidene chloride	0,1	

1.1.10 Blocking agents (only for hot-cured coatings)

PMN REF No.	CAS no.	Name	DWPLL in µg/l	QM or QMA
-	96-29-7	2-Butanoneoxime		
14200 / 41480	105-60-2	Caprolactam	750	

1.2 Fillers / pigments[5]

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
86160	409-21-2	Silicon carbide		
96180	-	Zinc dust**	3000	

Additionally all colourants complying with BfR Recommendation IX and all fillers complying with BfR Recommendation LII.

(BfR Recommendations may be downloaded from under www.bfr.bund.de under "Datenbank-Kunststoffempfehlung")

[5] Puritity requirements according to BfR-recommendation IX and LII

The relevant requirements follow from this (method: DIN 53770)

1.3 Modifying agents, organic

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
13150/38400	00100-51-6	Benzyl alcohol		
47520	-	Dicyclopentadiene-Indene-Styrene-alpha-Methyl-styrene-Vinyl-toluene-Isobuty-lene-Copolymer, hydrogenated**	250	
74560	00085-68-7	Phthalic acid, benzyl butyl ester	1500	
74640	00117-81-7	Phthalic acid, bis(2-ethylhexyl)ester	75	
74880	0084-74-2	Phthalic acid, dibutyl ester	15	
75105	-	Phthalic acid, diesters with primary saturated C9-C11 branched alcohols, more than 90% C10	450	

1.4 Solvents

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
13840/40590	71-36-3	1-Butanol		
15780/48050	111-90-0	Diethyleneglycol monoethylether**	150	
49540	67-68-5	Dimethyl sulfoxide		
16780/52800	64-17-5	Ethanol		
16993/53765	111-76-2	Ethyleneglycol monobuthylether, Butylglykol**	150	
16996/53820	110-80-5	Ethyleneglycol monoethylether**	150	
16999	112-25-4	Ethyleneglycol monohexylether**	150	
17002/53860	109-86-4	Ethyleneglycol monomethylether	150	
21827/66655	78-93-3	Methyl ethyl ketone**	250	
23830 / 81882	67-63-0	2-Propanol, Isopropanol		
25150/92430	109-99-9	Tetrahydrofuran	30	
25205/93540	108-88-3	Toluene**	60	
30045	123-86-4	Acetic acid, butyl ester	TOC	
30140	141-78-6	Acetic acid, ethyl ester		
30295	00067-64-1	Acetone		
48030	112-34-5	Diethyleneglycol monobutylether**	150	
53255	100-41-4	Ethylbenzene**	30	
66725	108-10-1	Methyl isobutyl ketone**	250	
95855	7732-18-5	Water	nach TWV	
95945/26370	01330-20-7	Xylene**	60	

1.4.1 Blowing Agents

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
	115-10-6	Dimethyl ether*	<1	

1.5 Additives and accessory agents

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
10120	108-05-4	Acetic acid, vinyl ester	600	
10780	141-32-2	Acrylic acid, n-butyl ester	300	
11510/11830	818-61-1	Acrylic acid, hydroxyethylester	300	
11530	999-61-1	Acrylic acid, 2-hydroxypropyl ester	2,5	
12786	919-30-2	3-Aminopropyltriethoxysilane	2,5	
13870	106-98-9	Butene		
14380/23155	75-44-5	Carbonyl chloride	0.1	QM=1 mg/kg in FP
14470/43120	8001-78-3	Castor oil, hydrogenated		
14530	7782-50-5	Chlorine		
16950	74-85-1	Ethylene		
18115/57520	31566-31-1	Glycerol monostearate**		
19960/64900	108-31-6	Maleic anhydride	TOC	
22660	111-66-0	1-Octene	TOC	
69760	143-28-2	Oleyl alcohol		
23590/76960	25322-68-3	Polyethylenglycol		
23740 / 81840 / 82065	57-55-6	1,2-Propanediol	TOC	
23980	115-07-1	Propylene		
24610	100-42-5	Styrene		
25960	57-13-6	Urea		
10150 / 30280	108-24-7	Acetic anhydride		
34230	-	Alkyl (C8-C22) Sulphonic acids	300	
33801	-	n-Alkyl (C10-C13) benzene sulphonic acid	1500	
35600	1336-21-6	Ammonium hydroxide	500 as NH4+	
37280	1302-78-9	Bentonite		
37520	2634-33-5	1,2-Benzothiazolin-3-one**	25	only can preservation
39090	-	N,N-Bis(2-hydroxyethyl)alkyl(C8-C18)amine	60 as tert. amin	
42500	-	Carbonic acid, salts		
42720	8015-86-9	Carnauba wax		
43730	55965-84-9	Mixture of 5-Chloro-2-methyl-2H-isothiazol-3-one and 2-Methyl-2H-isothiazol-3-one 3:1**	QMA=25 µg/dm²	only can preservation
45640	95232-99-5	2-Cyano-3,3-diphenylacrylic acid, ethyl ester	2,5	
45705	166412-78-8	1,2-Dicyclohexyldicarboxylic acid, diisononyl ester	TOC	
46640	128-37-0	2,6-Di-tert.-butyl-p-cresol	150	
50640	3648-18-8	Di-n-octyltin dilaurate	0,3 as tin	
53520	110-30-5	N,N'-Ethylene-bisstearamide		

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
58960	57-09-0	Hexadecyltrimethylammonium bromide	300	
59120	23128-74-7	1,6-Hexamethylene-bis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionamide	TOC	
60560	9004-62-0	Hydroxyethylcellulose		
61600	1843-05-6	2-Hydroxy-4n-octyloxybenzophenone	300	
62140	6303-21-5	Hypophosphorous acid		
63760	8002-43-5	Lecithin		
64270	7447-41-8	Lithium chloride**	30 as lithium	
66715	693-98-1	2-Methylimidazole*	2.5	
66755	2682-20-4	2-Methyl-4-isothiazolin-3-one	25	
67850	8002-53-7	Montan wax		
68320	2082-79-3	Octadecyl 3-(3,5-di-tert.-butyl-4-hydroxyphenyl) propionate	300	
71680	6683-19-8	Pentaerythritol tetrakis[3-(3,5-di-tert.-butyl-4-hydroxyphenyl)propionate		
74240	31570-04-4	Phosphorous acid, tris(2,4-di-tert.-butylphenyl)ester		
77360	9005-07-6	Polyethyleneglycol dioleate**	TOC	
77520	61791-12-6	Polyethyleneglycol ester of castor oil		
77600	61788-85-0	Polyethyleneglycol ester of hydrogenated castor oil		
77702		Polyethyleneglycol esters of aliph. monocarb. acids (C_6-C_{22}) and their ammonium and sodium sulphates		
77895	68439-49-6	Polyethyleneglycol (EO=2-6) monoalkyl (C16-C18) ether	2.5	
78160	9004-96-0	Polyethyleneglycolmonooleate**	TOC	
80000	9002-88-4	Polyethylen wax		
80077	68441-17-8	Polyethylene waxes, oxidised	TOC	
80480	82451-48-7	Poly(6-morpholino-1, 3, 5-triazine-2,4-diyl)-[*(2, 2, 6, 6-tetramethyl-4-piperidyl)imino*]-hexamethylene-[*(2, 2, 6, 6-tetramethyl-4-piperidyl)-imino*]	250	
80640	-	Siliconpolyether, Polyoxyalkyl(C2-C4)di-methyl-polysiloxane		
85360	109-43-3	Sebacic acid, dibutyl ester	TOC	
86000	67762-90-7	Silicic acid, silanated		
86240/85580	7631-86-9	Silicon dioxide		
87680	01338-43-8	Sorbitan monooleate		
80720	8017-16-1	Polyphosphoric acids		
87760	26266-57-9	Sorbitan monopalmitate	TOC	
26320	2768-02-7	Vinyltrimethoxysilane	2.5	
95020	6846-50-0	2,2,4- Trimethyl-1,3-Pentanediol diisobutyrate	250	
95859	-	Waxes, refined, derived from petroleum based or synthetic hydrocarbon feedstocks (spezification V0 10/2011)		

PMN REF No.	CAS No.	Name	DWPLL in µg/l	QM or QMA
95883	-	white mineral oils, paraffinic, derived from petroleum based hydrocarbon feedstocks (spezification V0 10/2011)		
95935	11138-66-2	Xanthan gum		

1.5.1 Photo initiators for adhesives

PMN REF No.	CAS-Nr.	Name	DWPLL in µg/l	QM oder QMA
38240	119-61-9	Benzophenon	30	
48640	131-53-3	2,4-Dihydroxy-benzophenon	300	
15970 / 48720	611-99-4	4,4'-Dihydroxy-benzophenon	300	
92470	106990-43-6	N,N',N'',N'''-Tetrakis(4,6-bis-(N-butyl-(N-methyl-2,2,6,6-tetramethyl-piperidin-4-yl)amino)triazin-2-yl-4,7-diazadecane-1,10-diamine	2,5	
94000	102-71-6	Triethanolamin	2,5	
94560	122-20-3	Triisopropanolamin	250	

1.6 Aids to polymerisation

PMN REF No.	CAS-Nr.	Name	DWPLL in µg/l	QM oder QMA
	7727-54-0	Ammonium persulphate*	500 as NH_4^+	
	7727-54-0	Potassium persulphate*		
94000	102-71-6	Triethanolamine	2,5	

Additionally, all substances listed under Solvents, Organic modifying agents, Binding agents or Fillers/pigments as well as Silicons, which comply with BfR Recommendation XV. Silicons

(BfR Recommendations may be downloaded from under www.bfr.bund.de under "Datenbank-Kunststoffempfehlung")

Footnote:

*: Substances which have been assessed in the context of this Guideline.

** Substances which have been assessed by SCF/EFSA

Part 2:

2 INTERMEDIATE COAT PRODUCTS

Note: The smallest components susceptible to migration have been included in the Positive List according to their toxicological assessment

Some examples are given below:

German designation	English designation	Components
Intermediate products with epoxy groups		
BPA-Harze	Bisphenol A resins	Epichlorohydrin, bisphenol A
BPF-Harze	Bisphenol F resins	Epichlorohydrin, bisphenol F
Phenol-Novolak-Harze (only for powder paints)	Phenol novolak resins	Bisphenol F diglycidyl ether
Epoxyesterharze	Epoxyester resins	Epoxy resins, fatty acids
Intermediate products with amines		
Kondensationsprodukt von Aldehyd und Polyamin	Condensation product of aldehyd and polyamine	Aldehydes, amines
Mannich Basen und Salze hiervon	Mannich base and salts out of these	Phenols, formaldehyde, amines
Michael Additions Produkte	Michael addition products	Unsaturated compound such as unsaturated acid, amines
Polyaminoamide	Polyaminoamides	Monomeric fatty acids, dimeric fatty acids, amines
Intermediate products with isocyanates		
Urethanpolyamine	Urethane polyamines	Isocyanates, amines
Poly-/Oligomere von Isocyanaten (Uretdion, Isocyanurat, Biuret)	Polymers or Oligomers of Isocyanates	Isocyanates
Blockierte Isocyanate (only for hot-cured coatings)	blocked Isocyanates	Isocyanates, caprolactam, butanonoxim
Prepoymere	Prepolymers	Isocyanates, alcohols, amines
Various types of polymers		
Polyacrylate		
e.g. Copolymer aus Ethylacrylat und Ethylhexylacrylat	Ethylacrylat - Ethylhexylacrylat, copolymer	Ethyl acrylate, ethyl hexyl acrylate
e.g. Polybutylacrylate	Polybutylacrylate	Butyl acrylate
Polymethacrylate	Polymethacrylate	
Poly(meth)acrylatpolyole	Poly(meth)acrylate polyole	Acrylic acid, mathacrylic acid, alcohols
e.g. Polyethylenglykol-1000-diacrylat		Polyethylene glycol, acrylic acid
e.g. Ethoxyliertes Bisphenol A-diacrylat	Ethoxylated Bisphenol A-diacrylate	Bisphenol A, ethyl acrylate

German designation	English designation	Components
Polyacrylnitrilpolyole	Polyacrylonitrile Polyols	Acrylic acid, mathacrylic acid, acryl nitril, alcohols
Polyetherpolyole	Polyether Polyols	Oxirane compounds, alcohols, tetrahydrofurane, amines
Polyesterpolyole	Polyester Polyols	Carbonic acids, alcohols
Phenol-Formaldehydharze Harnstoff-Formaldehydharze Copolymer aus Vinylidenchlorid	Phenol formaldehyde resin Urea formaldehyde resin Vinylidene chloride copolymer	Phenol, formaldehyde Formaldehyde, urea Vinylidene chlorid, other monomers

Annex 2: Recipe statement

Address of manufacturer:.....

Annex to the test application dated... from the company...

Product or trade name:....

Statement on the recipe of the coating in accordance with the Guideline for sanitary assessment of organic coatings in contact with drinking water, issued by the Federal Environmental Agency, as well as the base and intermediate coat (primer) to the test laboratory... and the Federal Environmental Agency

This statement shall be used by the test laboratory to determine the scope of testing and the requirements for individual substances.

Until a national regulatory group within the framework of the EAS has been created, this statement shall be submitted to the Federal Environmental Agency together with the complete test results and a copy of the test certificate (test report).

The following table contains all formulation components (without the quantities used), which

- are used to manufacture the proposed coating (cf. Template 1 for the manufacturer of the coating material)*,
- are contained in our product..., which is processed further by the company... to manufacture their coating... (cf. Template 2 for the manufacturer of the raw material)*,
- are contained in our product..., which is processed further by the company... as a base/intermediate coat* to manufacture their coating...,
- is additionally added by us to the product... of the company... for the manufacture of the coating..., (cf. Template 3 for coating manufacturer, user)*.

Information on the recipe ***					**Assessment acc. to Guideline ******		
Recipe component**		**Monomeric component**			**M_{max} (↔g/dm² d) for the product group**	**Analytic method**	**Detection threshold (↔g/l)**
Chemical name	**CAS No.**	**Chemical name**	**CAS No.**	**Group acc. to Guideline**			

* use the applicable phrase

** When a component is used which is obtained from a raw materials manufacturer, the latter's name (trade name, code) should be recorded.

*** to be completed by the applicant/ raw materials manufacturer/ base or intermediate coat manufacturer

**** to be completed by the test laboratory

Signature of manufacturer, date:.....

Signature of test laboratory, date:.....

Template 1

Address of manufacturer: Example Coating Ltd., Anytown, Template Street

Annex to the test application dated 20 January 2004 by the company Example Coating Ltd

Product or trade name: Sample Paint M1

Statement on the recipe of the coating

Sample Paint M1

according to the Guideline for sanitary assessment of organic coatings in contact with drinking water, issued by the Federal Environmental Agency

to the test laboratory: Example Laboratory, Anytown, Template Street

and the Federal Environmental Agency

This statement shall be used by the test laboratory to determine the scope of testing and the requirements for individual substances.

Until a national regulatory group within the framework of the EAS has been created, this statement shall be submitted to the Federal Environmental Agency together with the complete test results and a copy of the test certificate (test report).

The following table contains all formulation components (without the quantities used), which are used to manufacture the proposed coating.

Information on the recipe ***					**Assessment acc. to Guideline ******		
Recipe component		**Monomeric component**			**M_{max} (↔g/dm² d) Tanks in domestic installations**	**Analytic method**	**Detection threshold (↔g/l)**
Chemical name	**CAS No.**	**Chemical name**	**CAS No.**	**Group acc. to Guideline**			
Bisphenol A resin		BADGE	1675-54-3	1.1.3 oxirane/glycide.	112.5	L 00.00-51	
Talc	14807-96-6	-	-	1.2 Fillers/ pigments	Purity requirements in accordance with BfR Recommendation, analysis according to DIN 53770		
Sample curing agent H1 (Mannich base)	-	Supplemented by raw materials manufacturer (cf. Template 2)					
Polybutyl acrylate	9003-49-0	Butyl acrylate	141-32-2	1.5 Additives and accessory agents.	75	as acrylic acid	

Signature of manufacturer, date:.....

Signature of test laboratory, date:.....

Template 2

Address of raw materials manufacturer: Raw Coating Ltd., Anytown, Template Street

Annex to the test application dated 20 January 2004 by the company Example Coating Ltd

Product or trade name: Sample curing agent H1

Statement on the recipe of the coating

Sample Paint M1

according to the Guideline for sanitary assessment of organic coatings in contact with drinking water, issued by the Federal Environmental Agency

to the test laboratory: Example Laboratory, Anytown, Template Street

and the Federal Environmental Agency

This statement shall be used by the test laboratory to determine the scope of testing and the requirements for individual substances.

Until a national regulatory group within the framework of the EAS has been created, this statement shall be submitted to the Federal Environmental Agency together with the complete test results and a copy of the test certificate (test report).

The following table contains all formulation components (without the quantities used), which are contained in our product Template Curing Agent H1, which is further processed by the company Example Coating Ltd for the manufacture of their coating Sample Paint M1.

Information on the recipe ***					**Assessment acc. to Guideline ******		
Recipe component**		**Monomeric component**			**M_{max} (↔g/dm² d) Tanks in domestic installations**	**Analytic method**	**Detection threshold (↔g/l)**
Chemical name	**CAS No.**	**Chemical name**	**CAS No.**	**Group acc. to Guideline**			
Sample curing agent H1 (Mannich base)	-	4-tert. Butyl phenol	98-54-4	1.1.1 Phenolic compounds	0.625	ISO 8165	0.1
		1,3-Benzene dimethane amine	1477-55-0	1.1.4 Amines	0.625	Webpack method: HPLC	4
		Hexamethylene diamine	124-09-4	1.1.4 Amines	30	Webpack method: Derivatization GC-FID	100
		Formaldehyde	50-00-0	1.1.2 Aldehydes	188	BgVV method	5

Signature of raw materials manufacturer, date:.....

Signature of test laboratory, date:.....

Template 3

Address of manufacturer: Example User Ltd., Anytown, Template Street

Annex to the test application dated 20 January 2004 by the company Example Coating Ltd

Product or trade name: Template Application EH1

Statement on the recipe of the coating

Template Application EH1

according to the Guideline for sanitary assessment of organic coatings in contact with drinking water, issued by the Federal Environmental Agency

to the test laboratory: Example Laboratory, Anytown, Template Street

and the Federal Environmental Agency

This statement shall be used by the test laboratory to determine the scope of testing and the requirements for individual substances.

Until a national regulatory group within the framework of the EAS has been created, this statement shall be submitted to the Federal Environmental Agency together with the complete test results and a copy of the test certificate (test report).

The following table contains all formulation substances (without the quantities used), *which are added by us to the product Template Resin A from the company Resin Manufacturer and the product Template Curing Agent H1 from the company Curing Agent Manufacturer to manufacture the coating Template Application EH1.*

Information on the recipe ***					**Assessment acc. to Guideline ******		
Recipe component		**Monomeric component**			**M_{max} (↔g/dm² d) Tanks in domestic installations**	**Analytic method**	**Detection threshold (↔g/l)**
Chemical name	**CAS No.**	**Chemical name**	**CAS No.**	**Group acc. to Guideline**			
Template Resin A		Supplemented by resin and curing agent manufacturer: Fa. Template Resin, Anytown, Template Street					
Sample curing agent H1		Supplemented by resin and curing agent manufacturer: Fa. Template Resin, Anytown, Template Street					
Benzyl alcohol	**100-51-6**	-	-	Modifying agents, organic		TOC (specific migration covered by TOC)	

Signature of user, date:.....

Signature of test laboratory, date:.....

Annex 3: Testing procedure

Procedure for migration testing and odour/ taste testing in the assessment of coating materials in contact with drinking water

The test for clarity, colour and foaming should be conducted visually on the undiluted test water samples.

Testing should be done in the following manner, in accordance with DIN EN 1420-1: 1999 and DIN EN 12873-1: 2004, DIN EN 12873-2: 2005, and taking account of the choices still left open in the relevant European standards and the experience gained with the KTW Recommendations:

I. Migration testing at (23 ± 2) °C in accordance with DIN EN 12873-1 and -2

1. The test pieces are not subjected to a disinfection pre-treatment (superchlorination).
2. The test pieces are pre-treated according to the following sequence:
   - 1 h of flushing with tap water,
   - 24 h of stagnation with test water at (23 ± 2)°C),
   - 1 h of flushing with tap water,
   - rinsing with test water.
3. Deionized water as defined in 5.1.2 DIN EN 12873-1 shall be used as test water.
4. At least two identical contact tests and two blank tests should be performed simultaneously.
5. Pipes with an internal diameter of DN < 80 mm should be tested by filling them. Pipes with an internal diameter of 80 ≤ DN < 300 mm are tested by inserting a glass cylinder with an A/V ratio of about 5 dm^{-1}. Pipes with an internal diameter ≥ 300 mm may be tested by inserting a glass cylinder, filling pipe segments or immersing coating plates at an A/V ratio of 5 dm^{-1}. Coatings of tanks and their repair systems should be tested using coated plates at an area-to-volume ratio of approximately 5 dm^{-1}. Fittings and other ancillaries should be tested by immersing the products or coated plates at an area-to-volume ratio of approximately 5 dm^{-1} (see table).
6. If pipes do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.
7. The test water samples from the first three test periods of three days contact time each shall be used for further analyses.
8. The three test results should not exhibit any rising trend, and the third test result should be below the maximum tolerable migration rate for the proposed area of use.

II. Migration testing at higher temperatures ((60 ± 2)°C and (85 ± 2)°C in accordancewith DIN EN 12873-1 and -2

1. The test pieces are not subjected to a disinfection pre-treatment (superchlorination).
2. The test pieces are pre-treated according to the following sequence:
   · 1 h of flushing with tap water,
   · 24 h of stagnation with reference test water at the test temperature
   · 1 h of flushing with tap water,
   · rinsing with test water.
3. Deionized water as defined in 5.1.2 DIN EN 12873-1 shall be used as test water.
4. At least two identical contact tests and two blank tests should be performed simultaneously.
5. Pipes with an internal diameter of DN < 80 mm should be tested by filling them. Pipes with an internal diameter of 80 ≤ DN < 300 mm are tested by inserting a glass cylinder with an A/V ratio of approximately 5 dm^{-1}. Pipes with an internal diameter ≥ 300 mm may be tested by inserting a glass cylinder, filling pipe segments or immersing coating plates at an A/V ratio of 5 dm^{-1}. Coatings of tanks and their repair systems should be tested using coated plates at an area-to-volume ratio of approximately 5 dm^{-1}. Fittings and other ancillaries should be tested by immersing the products or coated plates at an area-to-volume ratio of approximately 5 dm^{-1} (see table).
6. If pipes do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.
7. After pre-treatment, the test involves seven migration periods at the test temperature (cf. the diagram: Migration testing procedure at higher temperatures). The test water samples from the first three and last two test periods, each with a contact time of 24 hours, shall be used for the TOC parameter. The examination for relevant individual substances shall be done in the first, sixth and seventh test periods.
8. The test results should not exhibit any rising trend, and the result of the seventh test period should be below the maximum tolerable migration rate for the proposed area of use.

III. Odour and flavour testing at (23 ± 2)°C in accordance with DIN EN 1420-1: 1999 and DIN EN 1622: 2006

1. The test pieces are not subjected to a disinfection pre-treatment (superchlorination).
2. The test pieces are pre-treated according to the following sequence:
   · 1 h of flushing with tap water,

· 24 h of stagnation with reference water at (23 ± 2)°C,

· 1 h of flushing with tap water,

· rinsing with reference water.

3. The reference water should be in accordance with 6.3.1 DIN EN 1420.
4. At least two identical contact tests and two blank tests should be performed simultaneously.
5. Pipes with an internal diameter DN of < 80 mm should be tested by filling them. Pipes with an internal diameter DN of ≥ 80 mm may be tested by inserting a glass cylinder, by filling pipe segments or by immersing coating plates at a surface area-to-volume ratio of 2.5 dm^{-1}. Coatings of tanks should be tested using coated plates at an area-to-volume ratio of approximately 2.5 dm^{-1}. Fittings and other ancillaries should be tested by immersing the products or by immersing coated plates at an area-to-volume ratio of approximately 1.5 dm^{-1}, repair systems with a small area at an area-to-volume ratio of approx. 0.2 dm^{-1} (see table).
6. If pipes do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.
7. The test water samples from the first three test periods of three days contact time each shall be used to determine the threshold odour and flavour numbers. If the threshold odour number fails to meet requirements, the threshold flavour number need not be determined.
8. The threshold odour/ flavour number is determined according to DIN EN 1622: 2006 using one of the methods described there. The undiluted sample may still exhibit at most a slight odour or taste, but the next dilution step (1:1) may not (TON, TFN < 2).
9. A positive test result for unaffected odour/ taste is expressed as "nad" (no appreciable deterioration).

IV. Odour and flavour testing at higher temperatures ((60± 2) °C and (85± 2) °C) in accordance with DIN EN 1420-1: 1999 and DIN EN 1622: 2006

1. The test pieces are not subjected to a disinfection pre-treatment (superchlorination).
2. The test pieces are pre-treated according to the following sequence:

   · 1 h of flushing with tap water,

   · 24 h of stagnation with reference water at the test temperature

   · 1 h of flushing with tap water,

   · rinsing with reference water.
3. The reference water should be in accordance with 6.3.1 DIN EN 1420.
4. At least two identical contact tests and two blank tests should be performed simultaneously.

5. Pipes with an internal diameter DN of < 80 mm should be tested by filling them. Pipes with an internal diameter DN of ≥ 80 mm may be tested by inserting a glass cylinder, by filling pipe segments or by immersing coating plates at a surface area-to-volume ratio of 2.5 dm^{-1}. Coatings of tanks should be tested using coated plates at an area-to-volume ratio of approximately 2.5 dm^{-1}. Fittings and other ancillaries should be tested by immersing the products or by immersing coated plates at an area-to-volume ratio of approximately 1.5 dm^{-1}, repair systems with a small area at an area-to-volume ratio of approximately 0.2 dm^{-1} (see table).
6. If pipes do not differ in their material composition and process of manufacture, testing of the smallest diameter of the product range is sufficient.
7. The pre-treatment is followed by seven migration test periods at the test temperature (cf. the Diagram of the procedure for migration testing at higher temperatures). The migration water samples from the first, sixth and seventh test periods shall be used to determine the odour/ flavour threshold numbers. If the threshold odour number fails to meet requirements, the threshold flavour number need not be determined.
8. The threshold odour/ flavour number is determined according to DIN EN 1622 using one of the methods described there. The threshold odour and flavour number from the seventh period should be less than or equal to 4 (TON, TFN ≤ 4).
9. A positive test result for unaffected odour/ taste is expressed as "nad" (no appreciable deterioration).

Diagram to Annex 3:

Migration testing procedure at higher temperatures

Step	Sample	Day of the week
Rinsing Tap water, cold, 1 h		
		Monday
Stagnation Test water, 60/85 °C, 24 h		
	→ discard	
Rinsing Tap water, cold, 1 h		
		Tuesday
1. Migration Test water, 60/85 °C, 24 h		
	→ Sample 1	Wednesday
2. Migration Test water, 60/85 °C, 24 h		
	→ Sample 2	Thursday
3. Migration Test water, 60/85 °C, 24 h		
	→ Sample 3	Friday
4. Migration Test water, 60/85 °C, 72 h		
	→ Sample 4 discard	Monday
5. Migration Test water, 60/85 °C, 24 h		
	→ Sample 5 discard	Tuesday
6. Migration Test water, 60/85 °C, 24 h		
	→ Sample 6	Wednesday
7. Migration Test water, 60/85 °C, 24 h		
	→ Sample 7	Thursday

Test run / **Area of use**	**Migration at 23 °C**	**Migration at higher temperature**	**Odour/flavour at 23 °C**	**Odour/flavour at higher temperature**
Pipes DN < 80 mm	A/V $\geq$ 5 dm^{-1} (fill)	A/V $\geq$ 5 dm^{-1} (fill)	A/V > 5 dm^{-1} (fill)	A/V > 5 dm^{-1} (fill)
Pipes 80 mm $\leq$ DN < 300 mm	A/V = 5 dm^{-1} (fill, fill with cylinder inserted or fill pipe segment)	A/V = 5 dm^{-1} (fill, fill with cylinder inserted or fill pipe)	A/V $\geq$ 2.5dm^{-1} (fill)	A/V $\geq$ 2.5 dm^{-1} (fill)
Pipes DN $\geq$ 300 mm	A/V = 5 dm^{-1} (fill with cylinder inserted, fill pipe segment or immerse coated plates)	A/V = 5 dm^{-1} (fill with cylinder inserted, fill pipe segment or immerse coated plates)	A/V = 2.5 dm^{-1} (fill with cylinder inserted, fill pipe segment or immerse coated plates)	A/V = 2.5 dm^{-1} (fill with cylinder inserted, fill pipe segment or immerse coated plates)
Fittings	A/V = 5 dm^{-1} (immerse products or immerse coated plates)	A/V = 5 dm^{-1} (immerse products or immerse coated plates)	A/V = 1.5 dm^{-1} (immerse products or immerse coated plates)	A/V = 1.5 dm^{-1} (immerse products or immerse coated plates)
Sealings and adhesives	A/V = 5 dm^{-1} (immerse products or immerse coated plates)	A/V = 5 dm^{-1} (immerse products or immerse coated plates)	A/V = 0.2 dm^{-1} (immerse products or immerse coated plates)	A/V = 0.2 dm^{-1} (immerse products or immerse coated plates)
Tanks and repair systems	A/V = 5 dm^{-1} (immerse coated plates)	A/V = 5 dm^{-1} (immerse coated plates)	A/V = 2.5 dm^{-1} (immerse coated plates)	A/V = 2.5 dm^{-1} (immerse coated plates)
Small-area repair systems for tanks	A/V = 5 dm^{-1} (immerse coated plates)	A/V = 5 dm^{-1} (immerse coated plates)	A/V = 0.2 dm^{-1} (immerse coated plates)	A/V = 0.2 dm^{-1} (immerse coated plates)

Annex 4: Record of sample production

Form for recording the production of the sample

1. The following data should be included:
2. Address of the applicant,
3. Accurate description of the coating substance (for unequivocal classification in terms of application, recipe statement, test record and test certificate),
4. Place of manufacture of the sample (e.g. climatic chamber, production plant, laboratory, construction site),
5. Address of manufacturer, name of responsible employees,
6. Date of manufacture of the sample,
7. Substrate (test plate, sample with dimensions),
8. Surface pre-treatment of the substrate,
9. Coating structures (base, intermediate, finish coat),
10. Mixing ratios and mixing procedures,
11. Application method, application technology, application temperature, environment temperature, air humidity etc.,
12. Curing temperatures and times (including those of intermediate layers),
13. Special curing conditions, e.g. air humidity, temperature-time curve etc.,
14. Film thickness of each layer and total strength of the finished coating,
15. Deviations from the application instructions issued by the manufacturer in the manufacture of the sample.