Czech Republic – Collection of Law

DECREE

No. 409/2005 Coll. of 30th September 2005

on the hygiene requirements for products coming into direct contact with water and for water treatment

Pursuant to Section 108(1) of Act No. 258/2000 Coll. on protection of public health and amending certain associated Acts, as amended by Act No. 320/2002 Coll. (hereinafter "the Act"), in application of Section 5(1),(2), (5) to (9) of the Act, the Ministry of Health hereby provides:

Section 1

Scope

(1) This Decree lays down the hygiene requirements for:

a) the composition and marking of products intended for direct contact with drinking or hot water or raw water and surface treatment of them,
b) the composition and marking of chemical products intended for water treatment for drinking or hot water,
c) a method for verifying that there are no undesirable effects on drinking or hot water and requirements for record keeping,
d) water supply technology for treatment of raw water,
e) requirements for applications for permission for other water supply treatments,
f) applications for permission for differing composition, and possibly determination of migration limits for substances not covered by this Decree, of products coming into direct contact with drinking, hot or raw water (hereinafter "water"),
g) applications for permission for other chemical products intended for water treatment.

(2) This Decree does not relate to:

a) packaged water packaging, equipment for racking packaged water, equipment for heating, cooling or tapping packaged water; equipment for storing, cooling, heating or tapping drinking water in consumers' premises, in the foodstuffs industry during the manufacture of foodstuffs or in mass catering establishments during the preparation of meals, which are not permanently built into internal water piping or not connected to it at all.
b) products for health equipment for buildings, as shown in Annex 2, Table 12, Item 1 of special legislation.[1)]

Section 2

Explanation of terms

For the purposes of this Decree, the following definitions shall apply:

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1) Government Decree No. 163/2002 Coll., laying down the technical requirements for selected construction products.

a) expert opinion – set of activities directed towards a statement of conformity of test results with the various technical requirements pursuant to this Decree,
b) verification – product testing and formulation of an expert opinion pursuant to this Decree carried out by a test centre,
c) verification record – document issued by a test centre in the form of a test report containing test results and a determination of conformity or non-conformity of test results with the various technical requirements pursuant to this Decree,
d) test – set of specialist activities consisting in determining one or more characteristics of a specimen of a given product,
e) test method – specified test procedure pursuant to this Decree leading to a determination of the value of a characteristic of the specimen product being examined,
f) test centre (laboratory) – authorised (Section 83c of the Act) or accredited centre carrying out product testing and formulating expert opinions,
g) product – manufactured object in final form or part of a manufactured object which comes into contact with water; particularly it concerns the products used for collection, abstraction, transport, treatment, distribution, accumulation and measurement of drinking, hot or raw water supplied,
h) heterogeneous product – product, the surface of which coming into contact with water is made from one or more materials which differ from the materials forming the rest of the product and which it is not technically possible to test separately and independently,
i) test specimen – product, set of products or part of a product taken for testing and satisfying the test conditions,
j) test water or treated test water - water meeting the technical requirements pursuant to this decree for the conduct of tests,
k) extraction – procedure for the migration of components from a test specimen using test water and under specified conditions,
l) extract – test water after subjecting a test specimen to extraction,
m) migration - movement of a substance or substances from a test specimen product into test water,
n) migration number – number indicating the mass of a component or components migrating from a test specimen of a defined area into a defined volume of test water in a defined period of time and at a defined temperature,
o) conversion factor – factor used to convert a migration number to a modified concentration taking account of the conditions of use of a product in construction,
p) TOC – total organic carbon content,
q) CHSK-Mn – chemical oxygen demand by permanganate,
r) short-term contact with water - situation whereby, under normal conditions, the total volume of water inside a product is changed at least once over 24 hours or a product is not in contact with water for 24 hours; products for short-term contact with water may be deemed to be water pipe fixtures, assembly materials, sealing rings and water meters. Products for short-term contact with water shall not include internal linings for distribution pipes or pipes in an internal water main, linings for water reservoirs and other storage tanks and permanently immersed products,
s) raw water – water taken from surface water sources or underground water sources for the purposes of treatment as drinking water and water undergoing treatment,
t) chemical product – chemical substance or mixture of chemical substances in final form intended for use,
u) fitting – component of piping excluding pipes, providing for branching, changes in direction or diameter also including flanged items with necks and spigots and sleeves,

v) fixture – component providing for closure or regulation of water flow and pressure e.g. closing fixture, regulating fixture, reducing valve, air inlet and air bleed valves, clap valve, and hydrant,

w) plastics – organic macromolecular compounds obtained by polymerisation, polycondensation, polyaddition or another similar process from molecules of low molecular mass or by chemical conversion of natural macromolecules. Plastics shall also include polymer materials occurring on the basis of elements other than carbon (e.g. silicons). Further substances may be added to such macromolecular compounds,

x) good production practice – observance of a set of hygiene, technical and technological procedures essential to ensure the harmlessness to health, safety and functionality of products in view of their type, properties and purpose.

Section 3

General hygiene requirements for products coming into direct contact with water

(1) Products coming into direct contact with water shall be manufactured in compliance with good manufacturing code of practice, so that, under normal and foreseeable usage conditions, none of their component substances pass into the water in a quantity which might be hazardous for human health or give rise to any undesirable changes in the composition of the water or affect its sensory properties; they shall not contain any pathogenic micro-organisms, be the source of microbial or other water pollution or contain radioactive substances over the limits laid down by special legislation.[2)]

(2) An extraction test carried out under the conditions and according to the procedure laid down in Annex 1 shall reveal a proportion of water pollution caused by a product coming into direct contact with the water, which is intended for permanent contact with drinking water, reaches a maximum of 10 % of the hygiene limit for the relevant parameter or indicator for drinking water laid down by special legislation,[3)] except for the TOC and CHSK-Mn indicators, where the proportion shall reach a maximum of 20 % for TOC and maximum of 30 % for CHSK-Mn of the hygiene limit, and the aluminium indicator for products based on cement, where the proportion shall not exceed the hygiene limit. Proportion shall mean the contribution of the product to water pollution in the 3rd extract, expressed as Concentration of migrated component K_{72}, or the contribution of the product to water pollution in the 3rd extract modified by a conversion factor pursuant to Annex 1 point 11, expressed as modified concentration C_3. For colour, odour and taste indicators, the hygiene limit laid down in special legislation[3)] shall be observed.

(3) The proportion of water pollution determined by an extraction test carried out under the conditions and according to the procedures laid down in Annex 1 and caused by

a) a product coming into direct contact with water intended for short-term contact with drinking water,

b) a product coming into direct contact with water, the surface of which in contact with drinking water does not exceed 100 cm^2 or the ratio of its surface to the surface of all other products (materials) in a water reservoir or water distribution network is less than 1:1000, or less than 1:100 for internal main, or

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2) Decree No. 307/2002 Coll. on radiation protection.

3) Decree No. 252/2004 Coll., laying down hygiene requirements for drinking and hot water and the frequency and extent of drinking water checks.

c) a product coming into direct contact with water intended for direct contact with hot or raw water,

shall reach not more than the maximum hygiene limit for the drinking water parameter or indicator being monitored, as laid down by special legislation.[3)] Proportion shall mean the contribution of the product to water pollution in the 3rd extract, expressed as concentration of migrated substance K_{72}, or the contribution of the product to water pollution in 3rd extract modified by a conversion factor pursuant to Annex 1 point 11, expressed as modified concentration C_3. For colour, odour and taste indicators, the hygiene limit laid down in special legislation[3)] shall be observed.

(4) Extracts shall be used to determine the presence and concentration of components which are characteristic as natural ingredients or possible impurities for the test product and present a risk with regard to protecting the health of the population. The minimum extent of components to be monitored for the different groups of products is given in Annex 1 point 15. The presence and concentration of other components shall be determined on the basis of the precise chemical composition of the product, or a list of all the chemical substances used in the manufacture of the product submitted by the person requesting an extraction test.

(5) When verifying a product, a testing laboratory shall take account of the results of extraction tests performed in accredited test laboratory in other Member State of the European Union, of the EEC of the EFTA or in Turkey, and not make determinations of those components for which it is clear from the laboratory result report submitted that, using comparable extraction methods under the extraction test conditions given in Annex 1, the requirements of this decree were fulfilled.

(6) For the purpose of this decree, for parameters (indicators) which are not stated in the implementing regulation[3)], the following hygiene limits shall be laid down for drinking water:

a) phthalates (DEHP)	0.008 mg/l;
b phenols (volatilised with water vapour):	0.05 mg/l;
c) barium	0.7 mg/l;
d) tin (inorganic)	3.0 mg/l;
e) tin (tributyltin oxide):	0.002 mg/l;
f) zinc	3.0 mg/l;
g) compounds with NH_2 group	0.3 mg/l;
h primary aromatic amines	0.03 mg (aniline hydrochloride)/l;
i) styrene	0.02 mg/l;
j) ethyl benzene	0.02 mg/l;
k) xylenes	0.2 mg/l;
l) toluene	0.2 mg/l;
m) vanadium	0.05 mg/l.

Section 4

Requirements for analytic methods and testing for heterogeneous products and products intended for contact with drinking and hot water

(1) When determining the concentration of the indicators to be measured in extracts for comparison with the hygiene limits laid down by this Decree and special legislation[3)], use shall only be made of methods which meet the requirements for methods laid down in special legislation[3)] (except for detection limits which have to be at a maximum level of

10 % of the hygiene limit for the indicators in question, as laid down in special legislation[3)]), and which are sufficiently sensitive for given substances and for the method of interpreting the results of extraction tests arising out of Annex 1.

(2) Heterogeneous products intended for contact with water shall be assessed as a whole in the state intended for end use, while extraction shall only be applied to those surfaces of the product which come into direct contact with water.

(3) If a product is intended for contact with drinking and hot water, extraction tests shall be performed in test water at temperatures of (23 ± 2) °C and (60 ± 2) °C. Exceptions to this shall be water mains batteries and water meters, which shall only be tested at a temperature of (23 ± 2) °C.

Section 5

Product marking

(1) Products intended for contact with water shall be marked with the following when put on the market:

a) business name and address of the manufacturer, distributor, authorised representative or importer, if a legal entity is involved, full name and place of business, if a natural business person is involved,
b) statement of its purpose in the words "for permanent contact with drinking water", "for short-term contact with drinking water", "for contact with hot water" or "for contact with raw water" pursuant to Section 3 (2) or Section 3 (3a),
c) conditions required with respect to the specific nature of the product and its use for example, restrictions on the use of the product to a certain type of water pursuant to Section 9.

(2) Markings pursuant to paragraph 1 shall be implemented so that the data given is clearly visible, and easily legible, i.e.

a) on the product or its packaging,
b) on a label attached to the product or its packaging, or
c) on a package insert giving a clear identification of the product.

(3) Packaging for chemical products shall be marked with the data pursuant to paragraphs 1(a) and (c). Markings for chemical products determined by special legislation[4)] are not covered by this.

Section 6

Application for permission for admissibility, content and migration limit for substances

An application pursuant to Section 5(5)(a) of the Act on permission for admissibility, content and migration limit for substances in products intended for contact with water and not included in this Decree shall contain:

a) business name and address of the manufacturer, distributor, authorised representative or importer, if a legal entity is involved, full name and place of business, if a natural business person is involved; if a product made up of several materials from different manufacturers is involved, also the business names and addresses of the suppliers of such components,

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4) For example, Act No. 356/2003 Coll. on chemical substances and chemical products and amending certain Acts, as amended by Act No. 186/2004 Coll.

b) product type marking, its trade name,
c) brief description of the production technology and a list of all the raw materials and additive substances used in manufacture,
d) data on the concentration of the substance which is the subject of the application in the end product and justification of the technical need to use it,
e) known data on decomposition products originating from the proposed substance during production, processing or ageing of the material or occurring as products of interactions during these processes,
f) data on the proposed method of using the product,
g) data on the strength and suitability of the product or additives in relation to the proposed method of use,
h) data on the extractability of the different substances from the product in the form of a test report giving the composition of the test product and the test conditions modelling the intended usage,
i) methods for determining proposed additives, impurities in them and any products of interactions and decomposition,
j) available foreign documentation on whether the product or proposed additive has been approved in other countries,
k) data on the toxicity of the proposed substance.

Section 7

Colouring, printing and decoration

(1) Colouring, printing and decoration of products for contact with water shall only involve dyes and pigments which are firmly integrated into the products and meet the purity requirements governed by special legislation.[5)]

(2) Products for contact with water shall only be printed on surfaces which do not come into contact with water. For products made up of several layers, printing may be on an intermediate layer, but shall not penetrate surfaces which come into contact with water. Products, however, which have no visible surfaces not coming into contact with water may indeed be printed on surfaces coming into contact with water if the printing inks used meet the requirements of Section 3(2) or 2(3) and Section 7(1), (3) and (4). Ink solvents shall be properly ventilated.

(3) For colouring and printing products for contact with water, use shall not be made of colouring agents based on compounds of antimony, arsenic, hexavalent chromium, cadmium, lead, mercury and selenium.

(4) For colouring and printing products for contact with water, use shall not be made of azo-dyes, the decomposition of which produces the following aromatic amines: 4-amino-biphenyl; benzidine; 4-chloro-o-toluidine; 2-naphthylamine; o-aminoazotoluene; 2-amino-4-nitrotoluene; p-chloroaniline; 2,4-diaminoanisole; 4,4'-diaminodiphenylmethane; 3,3'-dichlorobenzidine; 3,3'-dimethoxybenzidine; 3,3'-dimethylbenzidine; 3,3'dimethyl-4,4'-diaminodiphenylmethane; p-cresidine; 4,4'-methylene-bis(2-chloroaniline); 4,4'oxydianiline; 4,4'-thiodianiline; o-toluidine; 2,4-toluylenediamine; 2,4,5-trimethylaniline; 4-aminoazo-benzene; o-anisidine.

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5) Decree No. 38/2001 Coll. on hygiene requirements for products intended for contact with foodstuffs and foods, as amended by Decree No. 186/2003 Coll.

(5) Carbon black used as an additive in products for contact with water shall meet the purity requirements governed by special legislation.[5)]

Section 8

Surface treatment of products

(1) The surface treatment of products in particular painting, tinning, or plastic coating shall be continuous, uniformly applied with a minimum quantity of microscopic pores and adhering well to the product and shall, throughout the service life of the equipment, safely protect the surface which is in contact with drinking water. Throughout the period of use of a product for contact with water under the prescribed usage conditions, the surface treatment shall not peel off or have obvious scratches, cracks, bubbles or other defects.

(2) The only following ways may be used for the surface treatment of products coming into direct contact with water pursuant to this Decree:

a) metallisation with metal or alloy under the conditions given in Section 9,
b) surface tinning of products assuming the tin used does not contain more than 0.01 % lead, 0.01 % arsenic, 0.01 % bismuth, 0.01 % antimony, 0.01 % cadmium, 0.01 % chromium and 0.01 % nickel, that the product meets the requirements of Section 3(2) or (3)(a) to (c) and that the layer of tin is ≥ 1 μm (for chemical tinning) or ≥ 4 μm (for hot tinning),
c) surface coating with titanium nitride or zirconium oxide,
d) chromium plating,
e) plastics meeting the hygiene requirements pursuant to Section 10.
f) rubber and elastomers meeting the hygiene requirements pursuant to Section 11.
g) paints meeting the requirements of Section 3(2) or (3)(a) to (c) and Section 7,
h) cementing (surface coating with mortar based on sand and cement) meeting the requirements of Section 3(2) or (3)(a) to (c).

Section 9

Products made from metal materials

(1) For the manufacture of products made from metal materials coming into direct contact with water, metals and alloys meeting the following requirements may be used for the following different types of products:

a) corrosion-proof steels (“stainless steel”): 1.4401 (X5CrNiMo17-12-2), 1.4404 (X2CrNiMo17-12-2), 1.4571 (X6CrNiMo17-12-2), 1.4521 (X2CrMoTi18-2), 1.4462 (X2CrNiMoN22-5-3), 1.4301 (X5CrNi18-10), 1.4307 (X2CrNi18-10), 1.4510 (X3CrTi17), 1.4520 (X2CrTi17), 1.4539 (X1NiCrMoCu25-20-5),
b) silver, gold, platinum, iridium, rhodium, titanium and mutual alloys of them,
c) copper containing at least 99.90 % Cu+Ag and phosphorus (P) in a range of 0.015 – 0.040 %. Products made from copper shall only be used if the water being distributed has a stable pH in a range of 6.5 to 9.5 and is not otherwise aggressive – it shall at least meet a value for acid neutralisation capacity of $KNK_{4.5} \geq 1.0$ mmol/l, CO_2 (total) ≤ 44 mg/l, as demonstrated by a statistical analysis of an appropriate point on the network in the form of minimum, maximum and average data from at least six

analyses uniformly distributed over one year or a report on the quality of water from an individual source,

d) copper alloys: brass and dezincification resistant brass, such as CuZn39Pb3 (CW614N), CuZn40Pb2 (CW617N), CuZn36Pb2As (CW602N) not containing more than 2.2 % lead and 0.1 % arsenic; also bronze, such as CuSn10-C (CC480K), CuSn3Zn8Pb5-C (CC490K), CuSn5Zn5Pb5-C (CC491K) not containing more than 3.0 % lead and 0.6 % nickel, which, however, shall only be used for the manufacture of fittings and fixtures,

e) zinc alloys, providing they do not contain greater quantities of additives (elements) than 0.0l % arsenic, 0.01 % antimony, 0.005 % beryllium, 0.01 % bismuth, 5 % chromium, 0.0l % cadmium, 2.5% copper, 1 % nickel, 0.25 % lead, 5 % aluminium, other elements individually up to 0.1 %, but in total up to 0.8 %. Magnesium, calcium, silicon, titanium, silver, gold, iridium and rhodium may be present without restriction as to quantity.

(2) Extraction tests need not be performed for products meeting the conditions given in paragraph 1. Manufacturers, importers or distributors of these products shall have verification of the chemical composition in the form of a test report issued by a test centre.

(3) In the event of higher contents of substances in products given in paragraph 1 or a different composition of a product, it shall be vital to meet the requirements laid down in Section 3(2) or 3(3). Extraction tests may use test water pursuant to Annex 1(3)(b) or treated test water pursuant to Annex 1(3)(c). If using only treated test water and meeting the requirements given in Section 3(2) or 3(3), such products shall only be marketed with the restricting conditions given in paragraph 4.

(4) These products shall only be used if the drinking water being distributed:

a) has a stable pH in a range of 7.0 to 9.5 (as demonstrated by a report on the quality of water from a given area of supply or an individual source) and

b) is not otherwise aggressive with respect to the product according to the manufacturer’s specification.

(5) Cast irons, steels except for corrosion-proof steels and iron alloys shall be provided with appropriate surface treatment preventing corrosion pursuant to Section 8, which conform the requirements of Section 3(2) or 3(3).

(6) The surfaces of products coming into direct contact with water shall have no macroscopically identified damage such as cracks, stains, and obvious scratches, signs of corrosion, flashes, embedded objects, dents, cavities, burrs or clear over-presses. Only a degree of deformation of metal products which has no adverse effect on their functions shall be permissible.

Section 10

Plastic products

For the manufacture of plastics and products made from plastics for contact with water, use shall only be made of the monomers and other initial substances and additives included in the list of monomers and other initial substances in special legislation,[5)] and only up to the limit quantities laid down by that legislation. In the event of a higher content of the substances given in this list in a product, it shall be vital to meet the requirements given in Section 3(2) or 3(3).

Section 11

Products made from rubber and elastomers

Products made from rubber and elastomers intended for contact with water shall meet the requirements given in Section 3(2) or 3(3). In the event of sealing with a total surface area of less than 100 cm^2, products corresponding to categories I to III pursuant to Section 15 and 16 of special legislation[5)] may also be used for contact with water.

Section 12

Water piping and water reservoirs fitted in situ with internal lining based on cement

(1) Water piping with diameters up to DN 300 inclusive which has been fitted in situ with internal lining based on cement shall only be put into operation after it has been in contact for 7 days with drinking water which has been changed at least three times following minimum stagnation of 24 hours and if, after at least 24 hours stagnation of the drinking water in the piping, it has been verified by testing that the quality of the water corresponds to drinking water,[3)] the water has been analysed to the extent of an abridged analysis, as shown in Annex 5 of special legislation[3)] and a value has been determined for the concentration of aluminium.

(2) Water piping with diameters greater than DN 300 which has been fitted in situ with internal lining based on cement shall only be put into operation after rinsing and verifying that the quality of the drinking water following 24 hours stagnation corresponds to drinking water,[3)] the water has been analysed to the extent of an abridged analysis, as shown in Annex 5 of special legislation[3)] and a value has been determined for the concentration of aluminium.

(3) A new or reconstructed water reservoir with wall surfaces made from concrete or covered with a lining based on cement coming into contact with drinking water shall only be put into operation after the walls have been adequately rinsed with drinking water and if, after at least 24 hours stagnation of the drinking water in the water reservoir, it has been verified by testing that the quality of the water corresponds to drinking water,[3)] the water has been analysed to the extent of an abridged analysis, as shown in Annex 5 of special legislation[3)] and a value has been determined for the concentration of aluminium.

Section 13

Chemical products intended for water treatment for drinking or hot water

(1) Chemical products intended for water treatment for drinking or hot water shall not, in quantities exceeding the detection limits for the methods given in Annex 6(B) of special legislation[3)], contain any foreign substances of the type of pesticides, polyaromatic hydrocarbons, or cyanides, which are not natural components of the initial raw materials or do not originate from the raw materials during the manufacture of the chemical products. Nor shall chemical products contain pathogenic micro-organisms, be the source of microbial or other water pollution or contain radioactive substances over the limits laid down by special legislation.[2)] The purity and safety requirements for the major chemical products used in water treatment for drinking water or hot water are given in Annex 2.

(2) For the application of other chemical products for water treatment, for the importation or manufacture of which the manufacturer, seller, authorised representative

or importer has obtained the approval of a public health protection body pursuant to Section 5(5) and (6) of the Act, it is essential to adhere to the conditions given in Annex 3. The same conditions shall also apply for the natural additives to chemical products given in Annex 2.

(3) The efficacy of disinfectant and algicidal chemical products[6)] intended for water treatment for drinking or hot water shall be verified using the procedure given in Annex 4.

(4) An application pursuant to Section 5(5)(b) of the Act on permission for the admissibility of chemical products intended for water treatment for drinking or hot water not governed by this Decree shall contain:

a) business name and address of the manufacturer, seller, authorised representative or importer,
b) chemical product type marking, its trade name, chemical composition,
c) brief description of the production technology and a list of all the raw materials and additive substances used in manufacture,
d) data on the concentration of the active ingredient in the end chemical product,
e) evidence of purity pursuant to the relevant Czech technical standard, if any,
f) known data on decomposition products originating from the chemical product during production, processing or ageing and application to water or occurring as products of interactions during these processes,
g) instructions for use (IFU) of the chemical product, including data on the proposed method of use and maximum proposed application dose,
h) methods for determining the chemical product in water, including any products of interactions and decomposition,
i) available foreign documentation on whether the chemical product has been approved for use in water in other countries,
j) data on the toxicity of the proposed chemical product.

Section 14

Water supply technology

(1) The technological water treatment process shall correspond to the water quality and shall not be the cause of the introduction of foreign substances which are harmful to health into drinking water. It shall as far as possible respect the natural composition of the water and retains the biological value of drinking water.

(2) The introduction of a new water treatment technology shall not directly or indirectly result in deterioration in the existing chemical, physical or microbiological quality of the water and its organoleptic properties. Such deterioration shall be considered to be an increase in the original values for the concentration of chemical indicators by more than 10 %, exceeding 50 % of the hygiene limit laid down by special legislation[3)]. Technology reducing the content of dissolved substances or the content of calcium and magnesium shall only be used in cases when the content of calcium and magnesium in the water is higher than the recommended value laid down in special legislation,[3)] and when the water, following treatment, does not have a content of these elements lower than the lower limit of the recommended value and the content of dissolved substances is not lower than 150 mg/l. If an increase in the value for the concentration of a chemical

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6) Act No. 120/2002 Coll. on the conditions for the marketing of biocidal products and active ingredients and amending certain associated Acts, as amended by Act No. 186/2004 Coll.

indicator is an integral component of the technology intended to reduce the concentration of another component of drinking water, a public health body shall assess the acceptability of the proposed technology on the basis of an evaluation of the health risks and taking account of other available technologies.

(3) Depending on the quality of the raw water in an actual location, it shall be essential to apply an appropriate treatment process verified by a test on the treatability of the water based on a laboratory or pilot plant process. The following technological process may be used for water treatment:

a) mechanical aeration of water,
b) sand filtration,
c) stabilisation of water by filtering through limestone or a deacidifying material or by dosing lime or by dosing carbon dioxide,
d) single- or two-stage removal of iron and manganese from water,
e) single-stage clarification (coagulation filtration),
f) two-stage treatment by clarification,
g) sedimentation,
h) adsorption on powdered or granulated activated carbon,
i) oxidation of the inorganic (exceptionally organic) components using chlorine, sodium hypochlorite, calcium hypochlorite, chlorine dioxide, potassium permanganate, hydrogen peroxide and ozone,
j) slow biological filtration (slow sand filtration),
k) removal of organisms on microstrainers,
l) adjustment of pH,
m) disinfection of water using chlorine, sodium hypochlorite, calcium hypochlorite, chlorine dioxide, chloramines and ozone, or
n) irradiation with ultra-violet radiation at a wavelength of 250 – 270 nm and a minimum dosage of 400 J/m^2 throughout the entire volume of water, while 85 % of the radiation power shall be at a wavelength of 253.7 nm (monochromatic low-pressure lamps) or at a wavelength in a range of 200 – 400 nm and a minimum dosage of 400 J/m^2 (polychromatic medium-pressure lamps).

(4) If a person given in Section 3(2) of the Act intends to use technologies other than those given in paragraph 3, it shall submit an application to a public health body on the basis of Section 5(8) of the Act, containing:

a) business name and address of the manufacturer or author, seller, authorised representative or importer of the technology, for legal entity, name, and/or names and sure name, additional information if necessary, and place of business – for natural persons of the business
b) technology type marking and/or its trade name,
c) description of the purpose of the technology (justification of usage), instructions for use,
d) detailed description of the principle of the treatment technology, including the radiation used and the precise chemical composition of the substances, if the addition of them to water forms part of the technology,
e) evidence that the radiation or chemical products used correspond to the requirements of this Decree,
f) data on changes in the quality of treated water (microbiological, chemical and physical), including side and decomposition products occurring as a result of the application of the proposed technology,
g) evidence that the hygiene requirements laid down by special legislation[3)] are met,

h) methods for monitoring the operation and efficacy of the technology during normal operations,
i) evidence of the safety to health of the treated water during long-term use, if a technology is involved which proposes a change in the physical properties of the water or the introduction of chemical substances not governed by an implementing regulation,[3)]
j) available foreign documentation on whether and under what conditions the technology has been approved for the treatment of drinking water in other countries.

(5) For the treatment of hot water, but never drinking water, magnetic and electro-magnetic water treatment may also be used in addition to the technological processes given in paragraph 3.

Section 15

Verification record

(1)A test centre performing tests and formulating an expert opinion shall issue a verification record on its findings, stating whether the properties of the product, the properties of the chemical product or the water supply technology subjected to testing correspond to the requirements for such properties pursuant to the Act and this Decree. A test verification record shall comprises two parts:

a) information on the tests and test results: title of the test report; name and address of the centre performing the tests and formulating an expert opinion, clear identification of the report on each page; name and address of the client, address of the manufacturer and its country of origin or authorised representative or the address of the seller or importer; trade name of the product, description of it and type designation; materials used for the assembly of the product including their manufacturers; outline chemical composition of the product; declared use of the product particularly for short-term contact with drinking water, for contact with hot water; sampling method and marking of specimens; description of test specimen or test assembly; identification and description of the test method; statement of test results; statement of uncertainties in determinations; name, position and signature of the person responsible for performing the test. The actual technical data are given in Annex 1. and
b) expert opinion, and statement of conformity or non-conformity of the test results with the different technical requirements pursuant to the Act and the Decree: list of all the bases used in formulating the opinion; assessment of test results; statement of requirements for values for properties and identification of the regulations laying down the requirements; statement of restrictive conditions for interpretation and stated conformity or non-conformity; statement of investigation results - declaration of conformity or non-conformity of certain properties of the product subject to testing with the requirements for such properties pursuant to the Act and the Decree; name, position and signature of the person responsible for interpretation and determination of conformity.

(2) Apart from a verification record pursuant to paragraph 1, a test centre performing tests and formulating an expert opinion may, at the request of the client, issue an abridged test report on its findings, which shall be a brief summary of the findings of the test centre and shall contain at least the following data:

a) title of test result report;
b) name and address of the laboratory performing the tests and formulating an expert remark,

c) clear identification of the report on each page;
d) name and address of the client, address of the manufacturer and its country of origin or authorised representative or the address of the seller or importer;
e) trade name of the product, brief description of it and type designation; declared use of the product (e.g. for short-term contact with drinking water, for contact with hot water);
f) reference to unabridged report pursuant to paragraph 1,
g) statement of restrictive conditions for interpretation and stated conformity or non-conformity;
h) statement of investigation results - declaration of conformity or non-conformity of certain properties of the product subject to testing with the requirements for such properties pursuant to the Act and the Decree;
i) name, position and signature of the person responsible for performing the test and interpretation and determination of conformity.

Section 16

Repealing provisions

Decree No. 37/2001 Coll. on hygiene requirements for products coming into direct contact with water and for water treatment shall be repealed.

Section 17

Entry into force

This Decree shall enter into force on the fifteenth day following its announcement.

The Decree shall enter into force on the fifteenth day of November, of the year two thousand five,

Minister

Doc. MUDr. Emmerová, CSc. v. r

Annex 1 to Decree No. 409/2005. Coll.

Extraction test

1. This annex specifies the procedure for determining the migration of substances from industrially manufactured or used products coming into direct contact with water, e.g. piping, small assembly materials (e.g. fittings), sealing rings, paints, coatings, membranes, etc.

2. Principle of the extraction test: following preliminary cleaning of the test specimen using a precisely specified procedure pursuant to point 8, the surface of the test specimen coming into direct contact with water shall be brought into contact with the test water for the following three successive time periods:

   a) a test specimen of a product intended for contact with drinking water shall be tested progressively in three successive 72-hour periods at a test water temperature of (23 ± 2) °C,

   b) a test specimen of a product intended for contact with hot water shall be tested progressively in three successive 24-hour periods at a test water temperature of (60 ± 2) °C.

   Chemical analyses shall be performed on extracts for each time period separately and the values for the concentrations of the indicators being monitored shall be determined.

3. Reagents used:

a) fresh water from the mains or other water meeting the following requirements – drinking water[3)] containing less than 0.2 mg/l of free chlorine, more than 30 mg/l of calcium and more than 10 mg/l of magnesium; this shall be used to verify the operation of equipment for the treatment of drinking water at the point of consumption. For preliminary cleaning of test specimens pursuant to point 8, use may also be made of fresh water from the mains with a lower content of calcium and magnesium,

b) test water: water without chlorine with conductivity of less than 2 mS/m and TOC content of less than (0.2 ± 0.1) mg/l expressed as carbon, prepared using reverse osmosis, deionisation or distillation with subsequent filtration using activated carbon; this shall be used for extraction tests,

c) treated test water: test water pursuant to sub-point b) with the addition of 50 mg of NaCl, 50 mg of Na_2SO_4 and 37 mg of $Ca(OH)_2$ per litre of test water (the solution shall be acidified until clarification by bubbling through carbon dioxide at a pH value of less than 5 and then treated by bubbling through air purified through a suitable filter capturing the substances being subjected to the extraction test to a pH value of (7.5 ± 0.1)); this shall be used for extraction tests for selected metal products of limited use (e.g. copper products).

4. Laboratory equipment:

   a) laboratory glassware suitable for chemical tests, including trace analyses, for microbiological tests and for determining odour and flavour,

   b) vessels, tanks, stoppers and connectors shall be made from materials which are stable during tests, such as glass, PET, PTFE or stainless steel,

c) equipment capable of ensuring the required test temperature for extraction at (23 ± 2) °C or (60 ± 2) °C for the duration of testing without changes in the volume of the test water or treated test water.

5. Preparation of test specimens and test requirements:

a) test specimens shall be prepared so that only the surface intended for contact with water is exposed to test water (point 3(b) or (c)). For completely homogeneous test specimens, the entire test specimen may be exposed to test water, including surfaces not intended for direct contact with water,

b) test specimens of products based on cement shall be prepared in the form of small bars (40 x 40 x 160 mm) and stored using the method laid down in standard ČSN EN 196-1 Methods of testing cement - Part 1: Determination of strength; the maximum ageing time (unless a shorter ageing time is stipulated by the manufacturer) shall be 28 days; testing of the specimens shall be commenced immediately after the expiry of this period; test samples of filler materials based on cement shall be prepared by applying the filler material to small bars prepared pursuant to the above mentioned ČSN standard or small plates made from sand-blasted glass or compact cast plates made from filler material; additives in products based on cement shall be tested so that the value for the concentration of components of reference specimens prepared pursuant to the above mentioned ČSN standard is compared with the value for the concentration of components of specimens prepared in the same way to which an additive has been added,

c) test specimens of adhesives and solders for connecting pipes shall not be tested separately, but following application pursuant to the instructions for use; specimens for testing shall be prepared so that two (or more) sections of pipe are bonded (jointed) by means of connections (fittings) made form the same material and the test specimen of pipe prepared in this way, after preliminary cleaning pursuant to point 8, is filled with test water and extraction of the internal part of the test specimen is carried out (the column of water in the pipe shall reach a maximum of 5 cm to each side of the extreme joints); the diameter of the pipe used shall be selected so that the S : V ratio is as close as possible to 1 cm^2 / 1 cm^3; the distance between the different joints on the test specimen shall be a maximum of 5 cm; the test shall use a number of joints achieving a suitable volume of test liquid for determining all the indicators to be assessed; the results of the values for concentrations of the indicators in question determined from 3 extracts shall be compared with the results of a similar extraction of a reference test specimen forming part of the same pipe without any adhesive (solder) applied; the volume of water in both types of test specimens shall be the same,

d) test specimens of paints or coatings shall be prepared by painting or applying the test paint or coating to plates of stainless steel or sand-blasted glass using a procedure specified by the manufacturer; industrially applied pipe paints or coatings, including coatings based on cement, shall be tested pursuant to point 7(d) or (e),

e) test specimens of filtration fabrics and membranes shall contain all the materials used for the end product,

f) test specimens of heterogeneous products or products with surface treatment shall have the same composition as the end products; the specimens shall be tested by exposing only those parts of the products whose surface comes into direct contact with water to the test water (point 3(b)),

g) if there is no procedure for a specific type of product or if the test specimen cannot be tested under the specified conditions for technical reasons, deviations from the test procedure shall be possible; such exceptions shall be duly justified and indicated in the test report.

6. Transportation and storage of specimen products:

Specimen products shall be transported and stored so that, during transportation and storage, there are no negative effects on the specimen products. Storage shall be out of the light and at a temperature of (21 ± 4) °C, except in cases when the supplier of the products provides different instructions for storage, i.e. observing conditions to which the product is exposed in practice.

7. Determination of the ratio of the surface of the test specimen to the volume of test water:

a) the surface area of the test specimen to come into contact with the test water shall be in a ratio of 1 : 1 (1 cm^2 / 1 cm^3) with respect to the volume of test water, but, if so required by the technical parameters of the test specimen, other ratios of the surface area of the test specimen to the volume of test water may also be accepted, providing this fact is taken into account when evaluating the test; the size of the surface of the test specimen and the resultant volume of test water shall be selected so that the requirements for the quantity of extract required for chemical analysis are met,

b) if the test specimen does not have a smooth surface coming into contact with water or the shape of the test specimen is such that it is not possible to calculate precisely the surface coming into contact with test water, then the estimated surface area of the test specimen together with a sufficiently detailed description of the product (products) shall be used to determine the volume of the test water, so that it is possible to prepare further test specimens within ± 10 % of the surface area of the original test specimen; the ratio of the surface of the test specimen in contact with water to the volume of the test water shall be close to a value of 1 : 1 (1 cm^2 / 1 cm^3), but shall not be less than 1 : 2 (1 cm^2 / 2 cm^3); the value for the ratio, including the estimated surface area of the specimen, shall always be recorded in the test report,

c) for specimens of internal cement linings in distribution pipes with a diameter greater than 300 mm applied in situ or internal cement linings in water reservoirs, the ratio shall be 1 : 4 (1 cm^2 / 4 cm^3),

d) products in loose state (except for activated carbon) for which it is not possible precisely to define the size of the surface coming into contact with water shall be extracted in a ratio of 100 ml of test specimen to 1 litre of test water; activated carbon shall be tested in accordance with the methods given in standard ČSN EN 12902,

e) the migration of certain substances from an inlet pipe and pipes for internal distribution (pipes with a diameter of ≤ 80 mm) shall be determined using test specimens of a length providing a sufficient volume of extract for chemical analysis; the test specimens shall be filled with test water (point 3(b)) and closed at both ends with stoppers (point 4(c)); if the technical parameters of the piping make it impossible to use a test specimen pipe with an internal diameter of 40 mm (S : V = 1 : 1), other ratios of the surface area of the test specimen coming into contact with water to the volume of test water may also be accepted, providing this fact is taken into account when evaluating the extraction test,

f) the migration of certain substances from an inlet pipe and distribution piping (pipes with a diameter of > 80 mm), if no small diameter piping is available, shall be

determined by immersing segments of the piping in the test water (point 3(b)) in glass vessels (point 4(b)); the ratio of the surface of the test specimen pipe in contact with water to the volume of test water shall be 1 : 1 (1 cm^2 / 1 cm^3),

Note: If it is not possible to immerse segments of the whole pipe, then the test specimen shall be tested in accordance with alternative test arrangements, e.g. pursuant to standard ČSN EN ISO 8795 Plastics piping systems for the transport of water intended for human consumption - Migration assessment - Determination of migration values of plastic pipes and fittings and their joints.

g) the migration of certain substances from paints or coatings shall be determined by immersing plates painted with the test paint or coating (point 5(d)) in the test water (point 3(b)) in the tops of closed vessels (point 4(b)); the plates shall not touch one another during extraction or be placed on the bottom of the vessels or with the entire surface touching the vessel walls; a volume of test water shall be selected so as to meet the requirement that S : V = 1 cm^2 : 1 cm^3.

8. Preliminary cleaning of test specimens:

If the manufacturer gives a pre-treatment method in the instructions for use, the test specimen shall be treated in this way by the testing laboratory prior to the actual preliminary cleaning of the specimen. If the test specimen is greasy or its surface is contaminated in another way and this is not a natural property, it shall be treated against the action of stagnant water using a non-aggressive degreasing agent. Then the specimen gradually exposed for the action of stagnant water and preliminary rinsing as follow:

a) Action of stagnant water:

Test specimens intended for contact with drinking water shall be immersed in fresh water from the mains and left to stand for a period of (24 ± 0.5) hours at an ambient temperature of (23 ± 2) °C.

Test specimens intended for contact with hot water shall be immersed in fresh water from the mains kept at a test temperature of (60 ± 2) °C and left to stand for a period of (7.5 ± 0.5) hours at an ambient temperature of (60 ± 2) °C. After this period, the water shall be removed and replaced with fresh water from the mains kept at a temperature of (60 ± 2) °C and the specimens shall be left to stand (16 ± 0.5) hours at an ambient temperature of (60 ± 2)°C.

Test specimen products based on cement used for internal lining in mains distribution pipes or water reservoirs shall, before starting testing, be rinsed with test water and subsequently, while maintaining the prescribed ratio of surface area to volume, be placed three times for 24 hours, once for 72 hours and once for 24 hours in fresh water from the mains at an ambient temperature of (23 ± 2) °C. After completing this preliminary treatment and after rinsing pursuant to point 8(b), the test shall be started immediately for test specimens based on cement.

In all cases, the water shall then be removed and the test specimens shall be rinsed as follows:

b) Preliminary rinsing:

The test specimens shall be either placed in a suitable vessel, through which fresh water from the mains flows (point 3(a)) from the bottom of the vessel up for a period of (60 ± 10) minutes so that the rate at the upper open surface of the vessel is (5 ± 2) cm/s, or the test specimens shall be attached by a suitable connector to the mains so that, when

rinsing with fresh water from the mains (point 3(a)) for a period of (60 ± 10) minutes, the test surface is completely covered with water and is rinsed under a constant current of water at a rate of (5 ± 2) cm/s. The test samples are then rinsed with test water or treated test water (point 3(b)) at a temperature of (23 ± 2) °C for at least 2 minutes.

Note: If it is not possible for time reasons to carry out the test procedures at the centre without interruption, it shall be permissible to interrupt the work during the specimen preparation process, except for test specimens of products based on cement. The migration intervals shall, however, succeed one another without interruption.

9. Test procedure:

a) each test shall be performed in duplicate, i.e. in parallel with two identical test specimens of the product. Extraction shall be performed immediately after preliminary cleaning of the test specimens by immersing the surface of the test specimen intended for contact with water (or whole test specimens) in the test water at the prescribed test temperature under static conditions (without agitating the test water). Extraction shall take place either at (23 ± 2) °C – products for contact with drinking water, or (60 ± 2) °C - products for contact with hot water. Extraction shall take place three times successively, each time for a period of (72 ± 1) hours, if a product intended for contact with drinking water is involved, or for a period of (24 ± 1) hours, if it is a product intended for contact with hot water. It shall be essential to maintain the test temperature. After the first and second extraction periods, all the extract shall be poured off into suitable vessels (in accordance with the analytic requirements) and immediately replaced with the same volume of fresh test water at the prescribed test temperature. Analysis shall be carried out using the extracts from each extraction period separately. The specific conditions for testing certain types of products are described in points 5 and 7,

b) the vessels or tanks in which extraction is carried out shall be sealed so that there is no escape of volatile liquids or contamination of the extract.

10. Analysis:

a) the concentration of the indicators in question in the extract shall be determined at the end of each extraction period in the two parallel extracts; the vinyl chloride, epichlorohydrin and acrylamide indicators shall only be determined after the third extraction; odour and flavour shall only be determined on the third extract (determination shall not be carried out on the first and second extracts),

b) a control test (blind trial) shall also be conducted with each test specimen using the same test conditions (test water, test temperature, extraction time, stoppers, etc.) as described in point 9, but leaving out the test specimen. At the end of each extraction period, concentration $K_{0,n}$ shall be determined (n is a serial number for the extraction periods) for each specified component (or interfering substances) with the required sensitivity and accuracy. If any of the results of the control tests is higher than the lowest concentration determined in a specified component in the extract, it shall be necessary to ascertain the source of the contamination, remove it and repeat the entire test process with a new test specimen.

Note: Control tests shall be performed in duplicate but, with simultaneous testing of larger quantities of test specimens (i.e. more than 2), one pair of blind trials with a sufficient quantity of test water shall be enough to perform all

the analyses, providing one batch of test water is used. Value $K_{0;n}$ shall be determined at the end of each extraction period for the two parallel control tests.

Statement of results: Calculations and evaluation shall make use of mean values from the measured values for the concentrations of migrated components K_n reduced by the mean value of the values for the concentrations obtained by analysis of the control test $K_{0,n}$ for each extraction period separately. Migration number M_{24} for a migrated component shall be calculated from the resultant mean value for the concentration of the migrated component in the third extract using one of the following equations:

a) for extraction performed at a temperature of (23 ± 2) °C

$M_{24} = 1/3 \cdot K_{72} \cdot V/S$ [mg/dm^2/24 h]

b) for extraction performed at a temperature of (60 ± 2) ˚C

$M_{24} = K_{24} \cdot V/S$ [mg/dm^2/24 h]

where:

M_{24} is the migration number in milligrams per square decimetre over 24 hours,

K_{72} is the concentration of a defined component in the extract in milligrams per litre over a period of 72 hours (when testing with test water at a temperature of (23 ± 2) °C); $K_{72} = K_n - K_{0;n}$,

K_{24} is the concentration of a defined component in the extract in milligrams per litre over a period of 24 hours (when testing with test water at a temperature of (60 ± 2) ^{o}C/; $K_{24} = K_n - K_{0;n}$,

V is the volume of extract in litres,

S is the surface area of the test specimen coming into direct contact with the test water in square decimetres.

The resultant migration numbers for the migrated components shall be expressed as $M^T_{t,n}$ and the resultant concentrations of migrated components shall be expressed as $K^T_{t;n}$, while:

T is the test temperature in degrees Celsius,

t is the extraction period in hours,

n is the serial number of the extraction period.

Note: For practical reasons, it shall be assumed that the migration of a defined component is linear with time. As a result of this, a factor of 1/3 is used in equation a) in order to calculate migration number M_{24} over 24 hours from the value for the concentration determined for a 72-hour extraction period.

11. Modification using a conversion factor

A conversion factor (F) shall be used to convert the migration number for a modified concentration taking account of the conditions for the use of a product in a building.

Modified concentration (C) shall be calculated according to the following equation:

$$C^T_{t,3} = F \times M^T_{t,3}$$

where:

F is the conversion factor,

$M^{T}_{t,3}$ is the migration number (in milligrams per square decimetre over 24 hours) calculated from the resultant mean value for the concentration of a migrated component in the third extract using one of the equations in point 10(b),

T is the test temperature in degrees Celsius,

t is the extraction period in hours.

Conversion factor (F) shall be calculated according to the following equation:

$$F = F_g \cdot F_o$$

where:

F_g is the geometric factor (relationship between the surface area of a product which is in contact with water and the volume of water contained in the product in practice),

F_o is the operating factor (hypothetical time for which water is held in a product in practice).

Geometric factor (F_g) shall be calculated according to one of the following equations:

(a) $F_g = S/V$

where:

S is the internal surface of piping, fitting, fixture or water meter (in dm^2) which is in practice in contact with water in relation to a unit of length,

V is the volume of water in the piping, fitting, fixture or water meter (in litres) in relation to a unit of length in practice

(b) $F_g = 400/DN$

where:

DN is the nominal diameter of the piping, fitting, fixture or water meter (in millimetres).

Operating factors (F_o)[7)] for the different categories of products are given in the following table:

Product category	Operating factor (in days)
fitting, fixture, water meter	0.05
piping – internal water pipes with a diameter of 12 – 25 mm	0.5
piping – connectors with a diameter of 32 – 90 mm	0.5
piping – reserve with a diameter of 100 – 280 mm	1.5
piping – main and distribution	1.5

7) Operating and geometric factors are taken from ENV 852, which also gives the methods for calculating them.

with a diameter of 300 mm and over	

12. Evaluation of results:

The following shall be used to evaluate the safety of the test product as regards health pursuant to Section 3(2) or (3)(a) to (c) of the Decree:

A) for piping systems (and linings), fittings, fixtures and water meters, the calculated modified concentration of migrated components $C^{23}_{72.3}$ ($C^{60}_{24.3}$) pursuant to point 11.

B) for other products, for which it is not possible in practice unambiguously to determine the relationship between the surface area of the product and the volume of water in contact with the product, the resultant mean concentration of migrated components in the 3rd extract $K^{23}_{72.3}$ ($K^{60}_{24.3}$).

The measurement uncertainty shall not be included in the evaluation. It shall also be essential to take account of the values for the concentrations of a given component in the first to third extracts if there is no increase in migration. If there is an increase, in the third extract, in the concentration of a defined component of more than 20 % of the hygiene limit with respect to the value in the first extract and it exceeds 75 % of the hygiene limit, the result of the extraction test shall be considered unsatisfactory. If, when testing a product, a precisely known ratio of the surface of a test specimen to the volume of water other than 1 : 1 (1 cm^2/1 cm^3) is used for objective reasons (this shall not relate to products based on cement, for which a different ratio is prescribed), for the purposes of evaluation the result for the concentration of migrated component shall be converted to a ratio of S : V = 1 cm^2 : 1 cm^3 using the formula for calculating migration number M_{24} (see point 10). Odour and flavour shall be determined using the method laid down in standard ČSN EN 1622 Water analysis – Determination of the threshold odour number (TON) and threshold flavour number (TFN). Odour units (TON) shall be given as threshold numbers (No. 1. 2, 3, ...) and the requirements of the Decree shall be satisfied by threshold numbers 1 and 2. Flavour numbers (TFN) shall be given verbally, TFN 1 and 2 being said to be acceptable and higher TFNs unacceptable.

13. The report shall include the following details:

a) name and address of the centre performing the test and formulation the expert opinion,

b) identification number (symbol) and date of the report,

c) business name (name) and residence of the applicant for verification,

d) trade name of the product,

e) name of the manufacturer of the product, registered office, if a legal person or place of business, if a natural person, and date of manufacture (if necessary),

f) number allocated to each test specimen,

g) date of receipt of test specimen,

h) date of start of test,

i) preliminary cleaning of test specimen (test assembly) pursuant to point 8,

j) complete description of test specimen, including size of surface coming into contact with water and volume of test water,

k) for paints, the detailed description shall include:

ka) names of primers and undercoats used,

kb) complete description of preparation and application of paints, including methods of application) on test plates and conditions for complete drying / hardening,

l) data on the number of test specimens of the product, the number of extractions carried out on each test specimen and the type of test water,

m) any deviation from the test procedure with justification,

n) analysis method, the source, including measurement uncertainty,

o) values for concentrations $K^{T}_{t;n}$ and $K^{T}_{0;n}$ in milligrams per litre of test water for each defined component determined for the first, second and third extraction periods for each of a pair of test specimens and mean value $K^{T}_{t;n}$ reduced by the mean value for control test $K^{T}_{0;n}$,

p) for piping systems (and linings), fittings, fixtures and water meters, also the values for modified concentration $C^{T}_{t,3}$ of migrated components in the 3rd extract, migration number $M^{T}_{24;3}$ and the conversion factor, geometric factor and operating factor used, a

q) for the vinyl chloride, epichlorohydrin and acrylamide indicators, value for migration number $M^{T}_{24;3}$ in milligrams per square decimetre over 24 hours (mg/dm^2/24 h) for the third extraction period; the data may be used by the people shown in Section 3(2) of the Act to calculate the concentration of these substances in drinking water and to verify whether the hygiene limit laid down by special legislation[3)] is satisfied.

14. Equipment for the treatment of drinking water at the point of consumption shall be tested and assessed as follows:

a) individual materials which are in contact with water shall meet the requirements of special legislation,[5)]

b) equipment shall also be tested as a whole during operation (water through-flow under conditions laid down by the manufacturer; testing shall be carried out with fresh water from the mains pursuant to point 3(a), in order to verify whether:

ba) the equipment does not adversely affect the quality of the incoming water in microbiological and basic chemical indicators – for this purpose, the quality of the incoming and outgoing water shall be compared and the test shall be carried out on equipment after at least two weeks operation; in order to determine silver (or another bacteriostatic agent), the first treated batch of water shall be taken (about 100 ml) after the equipment has been out of operation for 16 hours; in order to determine the number of colonies at 22 ºC and 36 ºC, the first treated batch of water shall be taken (100 ml) after the equipment has been out of operation for 16 hours and, immediately after this, the water shall be run off for a period of 1 minute and the equipment shall be left out of operation for 2 hours and then the first batch of treated water shall again be taken (100 ml) in order to determine the number of colonies at 22 ºC and 36 ºC – the method of sampling described shall be carried out on the discharge equipment but, if one component of the equipment is a tank in which treated water accumulates and from which it is taken as required, samples of water shall be taken at the outlet from the accumulation tank after the equipment has been out of operation for 16 hours,

bb) the equipment has the required 99.99 % disinfectant effect (only verified if the disinfectant effect is declared by the manufacturer).

Evaluation: The number of colonies at 22 ºC and 36 ºC after 16 hours stagnation of water in the equipment shall not be more than one order of magnitude higher with respect to the inlet water. If the number of colonies in the discharge equipment (excluding accumulation tank) after 16 hours stagnation is higher, but, after one minute's discharge and two hours of stagnation is not more than one order of magnitude higher with respect to the inlet water, it shall only be possible to consider the result to be acceptable on condition that the instructions for use expressly include provision that, after eight hours and longer stagnation (equipment not being used), it is essential to draw off the water before use for a period of at least one minute. The admixture of foreign substances shall not be greater than 10 % of the hygiene limit of the defined indicator for drinking water laid down by special legislation[3)]. The content of calcium and magnesium shall not be more than 10 % lower with respect to the value in the inlet water. If technology is used which reduces the content of dissolved substances and the hardness (Σ Ca + Mg) of the water, which shall only be used when the content of calcium and magnesium is markedly higher than the upper boundary of the recommended limit for the values laid down by special legislation,[3)] the minimum value for the content of Ca and Mg in water laid down in special legislation[3)] shall be observed and the content of dissolved substances shall be greater than 150 mg/l.

15. Minimum range of defined indicators for different groups of the most commonly used types of materials (other defined indicators shall be selected on the basis of the proposed specific composition of each product; if the centre does not include any of the components from the minimum range in the investigation, the report shall give the reason):

Cast iron, iron:
Cr, Ni, Mn, Fe, Pb, As, Cd, pH, colour, cloudiness

Galvanised (zinc-coated) steel:
Pb, Cr, Cd, Ni, Zn, pH, colour, flavour

Stainless steel:
Pb, Cr, Cd, Ni, Mn, pH, flavour

Copper:
Pb, As, Cu, Cr, pH, flavour, TOC (for copper pipes)

Brass:
Pb, Zn, Cd, Sb, Cu, Ni, Sn, pH, flavour

Bronze:
Pb, Zn, Cu, Cr, Cd, Ni, Sn, pH, flavour, Al (for aluminium bronze)

Rubber:
TOC, CHSK-Mn, Cd, Pb, Zn, Ba, phenols, pH, primary aromatic amines, PAU, odour, flavour, colour, cloudiness

Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polyethylene:
TOC, CHSK-Mn, pH, Pb, Cd, Ni, V, phenols, odour, flavour, colour, further indicators according to additives (for coloured materials, metals according to pigments used), PAU if carbon black is used as a filler
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polyurethane:
TOC, primary aromatic amines, CHSK-Mn, pH, flavour, odour, colour, Cr, Pb, Cd, Ni, phenols, further indicators according to additives (for coloured materials, metals according to pigments used)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polystyrene:
TOC, CHSK-Mn, flavour, odour, colour, styrene, Pb, Cd, pH, further indicators according to additives (for coloured materials, metals according to pigments used)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polypropylene:
TOC, CHSK-Mn, pH, Pb, Cd, flavour, odour, colour, further indicators according to additives (for coloured materials, metals according to pigments used), PAU if carbon black is used as a filler
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polyvinyl chloride:
TOC, CHSK-Mn, pH, Pb, Cd, vinyl chloride, phthalates (for plasticised PVC), flavour, odour, colour, further indicators according to additives (for coloured materials, metals according to pigments used)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Polyamide:
TOC, CHSK-Mn, Pb, Cd, primary aromatic amines, pH, flavour, odour, colour further indicators according to additives (for coloured materials, metals according to pigments used)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Epoxy resin:
TOC, CHSK-Mn, primary aromatic amines, Cd, Pb, Ba, Hg, PAU, phenols, pH, epichlorohydrin, colour, cloudiness, flavour, volatile organic substances (mainly benzene, toluene, styrene, ethyl benzene, xylenes)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Paint materials:
TOC, CHSK-Mn, Cd, Pb, phenols, pH, colour, cloudiness, odour, flavour, volatile organic substances (mainly benzene, toluene, styrene, ethyl benzene, xylenes)
Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation.

Cement materials:
Cr, Pb, pH, Cd, Al, As, TOC, CHSK-Mn, nitrites, ammonium ions, conductivity, cloudiness, colour, odour, flavour

Ceramics, silicates:
pH, colour, odour, flavour, cloudiness, Pb, Cd, As, Ni, Cr, Al, TOC

Ion exchangers:

- in extract: pH, conductivity, CHSK-Mn, TOC, Pb, Cd, Cr, odour, flavour, colour, epichlorohydrin, styrene,
- Recommendation: verify the presence of other organic substances by qualitative GC/MS investigation,
- verification of microbiological purity,
- test with water flowing through water piping (comparison of values in inlet water and values in water after passing through filter bed): hardness, chlorides, sodium, nitrates, nitrites, pH, CHSK-Mn.

Note: For products intended for contact with hot water, flavour shall not be determined. The pH shall be determined in order to check that there has been no external effect on the test water during extraction.

Annex 2 to Decree No. 409/2005. Coll.

Purity requirements and safety of basic chemical products used in water treatment for drinking or hot water.

A. COAGULANTS BASED ON ALUMINIUM

1. Aluminium chloride, aluminium chloride hydroxide, aluminium chloride hydroxide sulphate (monomers)

Relative molecular mass: 133.3 ($AlCl_3$)

Chemical formula:

a) $AlCl_3$

b) $Al(OH)_aCl_b$, (a+b)=3

c) $Al(OH)_aCl_b\,(SO_4)_c$, (a+b+2c)=3

CAS No.: $AlCl_3$ 7446-70-0

$Al(OH)_aCl_b$, (a+b)=3 1327-41-9, 14215-15-7

$Al(OH)_aCl_b\,(SO_4)_c$, (a+b+2c)=3 39290-78-3

Description: solid substance: white to slightly brownish powder, crystals, pellets or nodules; solution: viscous, colourless to yellowish liquid, typical values for the concentration of Al in a product may be between 42 g and 124 g of Al per kilogram of product.

Use: for coagulation, as a precipitating agent

Maximum dosage: up to 15 mg expressed as Al per litre of treated water

Note: The concentration of aluminium in treated drinking water shall not exceed a value of 0.2 mg/l.

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Al contained in a product:

As	14	Cd	3	Cr	30	Hg	4
Ni	20	Pb	40	Sb	20	Se	20

2. Aluminium sulphate

Synonym: industrial aluminium sulphate

Chemical formula: $Al_2(SO_4)_3 \cdot n\,H_2O$ Relative molecular mass: 342.14 ($Al_2(SO_4)_3$)

CAS No.: $Al_2(SO_4)_3$ 10043-01-3

$Al_2(SO_4)_3 \cdot 16\,H_2O$ 16828-11-8

$Al_2(SO_4)_3 \cdot 18\,H_2O$ 7786-31-8

Description: Produced in solid hydrated form with variously sized particles or as an aqueous solution; slightly acidic salt or solution, aggressive to metals, (especially Al, Cu, Zn and alloys of these metals). The concentration in used in products expressed in Al is usually from 10 g/l to 40 g/l. Can be used in various types, covering the type with simple iron and the type with a low iron content.

Use: for coagulation

Note: The concentration of aluminium in treated drinking water shall not exceed a value of 0.2 mg/l

Maximum dosage: up to 15 mg expressed as Al per litre of treated water

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Al contained in a product:

As	14	Cd	3	Cr	30	Hg	4
Ni	20	Pb	40	Sb	20	Se	20

iron: 1.6 g/kg Al (simple iron)

115 g/kg Al (low iron content)

of undissolved substance: 23 g/kg Al

3. Aluminium iron chloride (monomer), aluminium iron chloride-hydroxide (monomer)

Chemical formula: variable Relative molecular mass: variable

CAS No.: $AlCl_3$ 7446-70-0

$FeCl_3$ 7705-08-0

$Al(OH)Cl_2$ 14215-15-7

$Al(OH)_aCl_b$, where $(a+b)=3$ and where a is less than 1.05 1327-41-9

Description: yellow to brown solution

Use: for coagulation, as a precipitating agent

Maximum dosage: from 1.0 mg/l to 15 mg/l of treated water expressed as Al + Fe

Note: The concentration of aluminium in treated drinking water shall not exceed a value of 0.2 mg/l.

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Al contained in a product:

As	14	Cd	3	Cr	30	Hg	4
Ni	20	Pb	40	Sb	20	Se	20

of undissolved substance: 25 g/ kg (Al + Fe)

4. Aluminium iron sulphate

Relative molecular mass: variable

Chemical formula: $x\ Al_2(SO_4)_3 \cdot (1\text{-}x)\ Fe_2(SO_4)_3 \cdot n\ H_2O$, where *n* is variable and *x* varies from 0.70 to 0.95

CAS No.: $Al_2(SO_4)_3$ 10043-01-3

$Fe_2(SO_4)_3$ 10028-22-5

Description: granular substance or aqueous solution, from yellow to brown in colour. In products, the concentration of active ingredient expressed in grams of aluminium and grams of iron per kilogram of product shall vary within a range of ± 3 % from the value declared by the manufacturer.

Use: for coagulation

Maximum dosage: from 1.0 mg/l to 15 mg/l of treated water expressed as Al + Fe

Note: The concentration of aluminium in treated drinking water shall not exceed a value of 0.2 mg/l.

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Al contained in a product:

As	14	Cd	3	Cr	30	Hg	4
Ni	20	Pb	40	Sb	20	Se	20

of undissolved substance: 25 g/kg (Al + Fe)

B. COAGULANTS BASED ON IRON

1. Iron chloride

Chemical formula: $FeCl_3$ Relative molecular mass: 162.21

CAS No.: $FeCl_3$ 7705-08-0

$FeCl_3 \cdot 6\ H_2O$ 10025-77-1

Description: crystalline powder: dark grey with green lustre, hygroscopic, products shall contain 99 % $FeCl_3$ (i.e. 34 % expressed as Fe (III))

crystalline granules: yellow, hygroscopic, products shall contain 59 % $FeCl_3$ (i.e. 20.3 % expressed as Fe (III))

aqueous solutions: dark brown liquid, the usual product concentration shall be 40 % $FeCl_3$ (i.e. 13.7 % expressed as Fe (III))

Use: for coagulation.

Maximum dosage: the dosage shall correspond to a concentration of iron 2 to 10 mg expressed as Fe per litre of treated water

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Fe (III):

As	20	Cd	1	Cr	50	Hg	0.3
Ni	60	Pb	35	Sb	10	Se	10

% content of Fe (III):

Fe (II)	2.5	Mn	0.5	of undissolved substance	0.2

2. Ferric sulphate

Chemical formula: $Fe_2(SO_4)_3$ Relative molecular mass: 399.87

CAS No.: 10028-22-5

Description: red-brown solution with various concentrations of iron and acidity, solutions designated A, B, C, D, E, F (with differing iron concentration and alkaline neutralisation capacity); products shall contain at least 30 % iron sulphate.

Use: for coagulation

Maximum dosage: the dosage shall correspond to an iron concentration of 4 to 10 mg expressed as Fe per litre of treated water. If a product contains nickel at less than 150 mg/kg Fe (III), a dosage of up to 20 mg may be used (expressed as Fe per litre of treated water).

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Fe (III):

As	1	Cd	1	Cr	100	Hg	0.1
Ni	300	Pb	10	Sb	10	Se	1

% content of Fe (III):

Fe (II)	2.5	Mn	0.5	of undissolved substance	0.3

3. Ferrous sulphate

Chemical formula: $Fe\,SO_4 \cdot 7\,H_2O$ Relative molecular mass: 278.02

CAS No.: $FeSO_4$ 7720-78-7

$FeSO_4 \cdot 7\,H_2O$ 7782-63-0

Description: blue-green crystals or granules; in moisture and in air, they oxidise to produce brown-green salts; products shall contain at least 82.1 % $FeSO_4 \cdot 7\,H_2O$ (i.e. at least 16 % Fe).

Use: for coagulation.

Maximum dosage: the dosage shall correspond to an iron concentration of 4 to 10 mg expressed as Fe per litre of treated water

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of Fe (II):

As	1	Cd	1	Cr	100	Hg	0.1
Ni	300	Pb	10	Sb	10	Se	1

% content of Fe:

Mn 0.5

of undissolved substance: 0.6 (moist crystals);

3 (freely flowing crystals)

4. Ferric chloride sulphate

Chemical formula: $FeClSO_4$ Relative molecular mass: 187.36

CAS No. 12410-649-0

Description: dark brown solution containing from 39 % to 41 % $FeClSO_4$; products shall contain at least 36.9 % $FeClSO_4$ (i.e. at least 11 % Fe)

Use: for coagulation

Maximum dosage: the dosage shall correspond to an iron concentration of 4 to 10 mg expressed as Fe per litre of treated water

Purity requirements: maximum concentration of impurities (in mg) per kg of Fe (III):

As	1	Cd	1	Cr	100	Hg	0.1
Ni	300	Pb	10	Sb	l0	Se	1

% content of Fe (III):

Mn 0.5

of undissolved substance 0.2

Fe (II) 2.5

C. CHEMICAL PRODUCTS TO ADJUST THE pH OF WATER

1. Calcium hydroxide

Chemical formula: $Ca(OH)_2$

CAS No.: 1305-62-0 Relative molecular mass: 74.09

Description: white powder containing at least 90 % $Ca(OH)_2$; the solubility in water is approximately 1.6 g/l at 20 °C.

Use: to adjust the pH and hardness of water

Maximum dosage: 135 mg expressed as Ca (250 mg $Ca(OH)_2$) per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of calcium hydroxide:

As	5	Cd	2	Cr	20	Hg	0.3
Ni	20	Pb	25	Se	4	Sb	4

% of dry product: SiO_2 2.0; Al_2O_3 0.5; Fe_2O_3 0.5; MnO_2 0.15; $CaCO_3$ 7.0.

2. Calcium oxide

Chemical formula: CaO

CAS No.: 1305-78-8 Relative molecular mass: 56.08

Description: white pellets or powder containing at least 87 % CaO;

Use: to adjust the pH and hardness of water

Maximum dosage: 135 mg expressed as Ca (189 mg CaO) per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg), which may be contained in 1 kg of calcium oxide:

As	5	Cd	2	Cr	20	Hg	0.3
Ni	20	Pb	25	Sb	4	Se	4

% of dry product: SiO_2 2.0; Al_2O_3 0.5; Fe_2O_3 0.5; MnO_2 0.15; $CaCO_3$ 7.0.

3. Calcium carbonate

Chemical formula: $CaCO_3$

CAS No. 471-34-1 Relative molecular mass: 100.09

Description: white or grey granules, flakes or pellets; commercial form: non-porous (more than 98 % $CaCO_3$), porous (more than 97 % $CaCO_3$); solubility in water 0.014 g /l at 10 °C, reacts alkalinically.

Use: to adjust the pH and hardness of water and as a filling for filters to remove aggressive CO_2

Purity requirements: maximum concentration of impurities (in mg), which may be contained in 1 kg of calcium carbonate:

As	3	Cd	2	Cr	10	Ni	10
Pb	10	Sb	3	Se	3	Hg	0.5

4. Semi-fired dolomite

Chemical formula: $CaCO_3 \cdot MgO$

CAS No.: $CaCO_3$ 471-34-1 Relative molecular mass: 140.39

MgO 1309-48-4

Description: white or grey granular material, specific density 2.4 g/cm^3. Commercial products shall contain more than 23 % magnesium oxide and hydroxide, expressed as MgO and at least 68 % calcium carbonate; solubility in water 0.02 g/l at 10 °C

Use: to adjust the pH and hardness of water

Purity requirements:
- maximum content of 2 % calcium oxide and hydroxide expressed as CaO
- maximum content of silicon expressed as SiO_2 2 %

- maximum content of Al_2O_3 2 %
- maximum content of Fe_2O_3 2 %
- maximum content of sulphates expressed as SO_4^{2-} 1 %

- maximum concentration of impurities (in mg), which may be contained in 1 kg of product:

As	3	Cd	2	Cr	10	Ni	10
Pb	15	Se	5	Sb	3	Hg	0.5

5. Hydrochloric acid

Chemical formula: HCl

CAS No.: 7647-01-0 Relative molecular mass: 36.46

Description: colourless to yellow solution, slightly to strongly fuming depending on the concentration; products shall contain 25 % to 38 % (concentrated acid) of hydrochloric acid.

Use: to adjust pH.

Note: The concentration of chlorides shall not exceed 100 mg/l of treated drinking water.

Purity requirements: maximum concentration of impurities (in mg), which may be contained in 1 kg of hydrochloric acid (100 %):

As	3	Cd	1	Cr	3	Hg	0.5
Ni	3	Pb	3	Sb	1	Se	5
Fe	170						

halogen organic compounds (as Cl) 17

6. Sulphuric acid

Chemical formula: H_2SO_4

CAS No.: 7664-93-9 Relative molecular mass: 98

Description: clear to slightly cloudy liquid, highly miscible with water; usual concentration 96 % or 98 %, (other concentrations available from 25 % to 80 %). Products shall contain the stated mass concentration of sulphuric acid with an accuracy of ± 1 %.

Properties: Strongly oxidising agent. Concentrated acid reacts sharply with hydroxides, water, reducing agents and flammable materials; the acid must always be added to water, never the opposite.

Note: The maximum concentration of sulphates shall never exceed 250 mg/l of treated drinking water.

Use: to adjust the pH of water, to regenerate ion exchangers

Purity requirements: maximum concentration of impurities (in mg), which may be contained in kg H_2SO_4:

As	0.4	Cd	0.1	Cr	4	Hg	0.1
Ni	4	Pb	4	Sb	1	Se	1
Fe	100	SO_2	100				

7. Sodium hydroxide

Chemical formula : NaOH

CAS No.: 1310-73-2 Relative molecular mass: 40

Description: solid: white pellets or powder, products shall contain at least 96 % NaOH
solutions: colourless or slightly cloudy, slightly viscous, typical product concentration either 30 % or 50 % NaOH

Easily soluble at temperatures over 20 °C, strongly exothermic, solutions strongly alkaline.

Use: to adjust alkalinity and OH, to regenerate ion exchangers

Purity requirements: maximum concentration of impurities (in mg), which may be contained in kg of pure NaOH:

As	2	Cd	1	Cr	1	Hg	0.1
Ni	2	Pb	5	Sb	5	Se	5
NaCl		2.4 %					
Na_2CO_3		0.4 %					
$NaClO_3$		0.7 %					

8. Sodium carbonate

Synonym: anhydrous soda

Chemical formula of active ingredient: Na_2CO_3

CAS No.: 497-19-8 Relative molecular mass: 105.99

Description: white, crystalline powder, granules or crystals containing at least 99.0 % Na_2CO_3, moderately hygroscopic, solubility 212 g/l at 20 °C.

Use: to adjust alkalinity and pH.

Maximum dosage: 60 mg Na_2CO_3 per litre of treated water.

Note: The concentration of sodium shall not exceed 200 mg/l of treated drinking water

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of sodium carbonate:

As	2	Cd	2	Cr	2	Fe (II)	20
Hg	0.1	Ni	2	Pb	2		
of undissolved substance		200					

9. Sodium hydrogen carbonate

Synonyms: acidic sodium carbonate, sodium bicarbonate, digestive soda

Chemical formula: $NaHCO_3$

CAS No.: 144-55-8 Relative molecular mass: 84.01

Description: white powder or crystals, moderately hygroscopic, solubility 95 g/l of water at 20 °C, decomposes at 50 °C. Products shall contain at least 98.5 % $NaHCO_3$.

Use: to stabilise pH and increase alkalinity

Note: The concentration of sodium shall not exceed 200 mg/l of treated drinking water.

Purity requirements: maximum concentration of impurities (in mg), which may be contained in 1 kg $NaHCO_3$:

As	2	Cd	2	Cr	2	Fe (II)	5
Hg	0.1	Ni	2	Pb	2		
of undissolved substance		200					

10. Carbon dioxide

Chemical formula: CO_2

CAS No.: 124-38-9 Relative molecular mass: 44.011

Description: in gaseous, liquid or solid state, the gas is colourless. The solid form shall not be used for treating water. Solubility 1.72 g/l at 20 °C. Products shall contain at least 99.7 % by volume of CO_2.

Use: to stabilise packaged water, to increase hardness and alkalinity, to adjust pH values, to regenerate anion ion-exchange resins

Purity requirements: determined by Decree No. 54/2002 Coll., which lays down the health requirements for the identity and purity of additive substances (E 290). There are no inorganic toxic substances in gaseous phase.

D. ACTIVATED CARBON

1. Granulated activated carbon

Chemical formula: C

CAS No.: 7440-44-0 Molecular mass: 12.0

EINECS: 231-153-3

Description: granulated (irregular) or formed (rolled, extruded), black, insoluble in water, granulated contains particles generally sized 0.25 mm to 5.0 mm, formed contains particles generally sized 0.5 mm to 4.0 mm in diameter and less than 10.0 mm long, iodine number at least 600 mg/g of product.

Use: to adsorb mainly organic substances, filtration, to break down strongly oxidising agents (chlorine, chlorine dioxide, ozone), to improve the organoleptic properties of water

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 litre of special extraction water (standard ČSN EN 12902: Products used for treatment of water intended for human consumption – Inorganic supporting and filtering materials – Test methods):

As	10	Cr	5	Hg	0.3	Pb	5
Cd	0.5	Ni	15	Sb	3	Se	3
PAH	0.02	total cyanides (CN)		5			

Content of impurities in products: ash 15 %; water when packaged 5 %; soluble substances 3 %; zinc 0.002 %

The purity requirements shall also relate to re-activated (re-processed) granulated activated carbon (standard ČSN EN 12915-2: Products used for treatment of water intended for human consumption – Granulated activated carbon – Part 2: Re-activated granulated activated carbon).

2. Powdered activated carbon

Chemical formula: C

CAS No.: 7440-44-0 Molecular mass: 12.0

EINECS: 231-153-3

Description: black powder insoluble in water, at least 95 % shall comprise particles smaller than 150 μm, iodine number at least 600 mg/g of product.

Use: to adsorb mainly organic substances, to improve the organoleptic properties of water

Maximum dosage: 200 mg of activated carbon per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of powdered activated carbon during extraction into

special extraction water (standard ČSN EN 12902: Products used for treatment of water intended for human consumption – Inorganic supporting and filtering materials – Test methods):

As	10	Cr	50	Hg	1	Pb	10
Cd	5	Se	10	Ni	20	Sb	5
PAH	0.2	total cyanides (CN)		50			

Content of impurities in products: ash 15 %; water when packaging 5 %; soluble substances 3 %; zinc 0.002 %.

E. DISINFECTANT AND OXIDISING AGENTS

1. Chlorine

Synonym: liquid chlorine

Chemical formula: Cl_2

CAS No.: 7782-50-5 Relative molecular mass: 70.91

Description: liquid chlorine is a clear, amber liquid; gaseous chlorine is yellow-green, 2.5 times heavier than air and has an overpowering odour. Solubility 7.26 g/l at 20°C. Products shall contain at least 99.5 % chlorine.

Use: for oxidation and disinfection, to remove ammonium compounds

Note: in treated water, the content of free chlorine shall not exceed a value of 0.3 mg/l

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of product:

Hg	0.1	Br	450

2. Calcium chlorate

Chemical formula: $Ca(ClO)_2$

CAS No.: 7778-54-3 Relative molecular mass: 142.99

Description: white granules or tablets smelling strongly of chlorine. Products shall contain at least 65.55 % of calcium chlorate (equivalent to a content of usable active chlorine of at least 65 %). Solubility 180 g/l of water at 25 °C. Solutions are alkaline.

Use: for oxidation and disinfection, to remove ammonium compounds

Note: in treated water, the content of free chlorine shall not exceed a value of 0.3 mg/l

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of active chlorine:

As	5	Cd	5	Cr	15	Hg	5
Ni	8	Pb	15	Sb	15	Se	20

sodium chloride 18 % of product

of undissolved substance 4 % of product

3. Sodium hypochlorite

Chemical formula: NaClO

CAS No.: 7681-52-9 Relative molecular mass: 74.44

Description: yellow-green solution with slight odour of chlorine, easily miscible with water, reacts with acids and salts, forming chlorine. Products shall contain up to 160 g of active chlorine per litre of solution.

Use: for oxidation and disinfection, to remove ammonium compounds

Note: in treated water, the content of free chlorine shall not exceed a value of 0.3 mg/l

Purity requirements: maximum concentration of impurities (in mg) per 1 kg of active chlorine:

As	1	Cd	2.5	Cr	2.5	Hg	3.5
Ni	2.5	Pb	15	Sb	20	Se	20
$NaClO_3$		5.4 % active chlorine					
bromates		30 mg/kg of product					

4. Sodium chlorite

Chemical formula: $NaClO_2$

CAS No.: 7758-19-2 Relative molecular mass: 90.44

Description: yellow-green aqueous solution, supplied as an aqueous solution with a sodium chlorite from 24.5 to 35 % . Powerful oxidising agent.

Use: for oxidation, in water treatment to produce chlorine dioxide through the action of chlorine or hydrochloric acid.

Note: in treated water, the content of free chlorine shall not exceed a value of 0.3 mg/l

Purity requirements: maximum concentration of impurities (in mg) per kg of 100 % sodium chlorite:

As	1.1	Cd	1.5	Cr	1.1	Hg	1.1
Ni	1.1	Pb	1.1	Sb	1.1	Se	1.1

Maximum concentration of impurities (in g) per kg of 100 % sodium chlorite:

$NaClO_3$	40	$NaNO_3$	1

5. Ammonium chloride

Synonym: sal ammoniac

Chemical formula: NH_4Cl

CAS No.: 12125-02-9 Relative molecular mass: 53.5

Description: white powder or crystals, odourless; solubility in water: 374 g/l at 20 ºC, 504 g/l at 50 °C. Products shall contain at least 99 % ammonium chloride.

Note: dissolution in water is a strongly endothermic reaction. Reactions with powerful acids may form gaseous hydrogen chloride; reactions with powerful alkalis may form gaseous ammonia.

Use: for disinfection of water (formation of chloramines)

Maximum dosage: 0.5 mg expressed as NH_3 per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg) per kg of ammonium chloride:

As	5	Cd	0.5	Cr	5	Fe	5
Hg	0.1	Ni	5	Pb	5	Sb	1
Se	1	SO_4^{2-}	100				

6. Ammonium sulphate

Chemical formula: $(NH_4)_2SO_4$

CAS No.: 7783-20-2 Relative molecular mass: 132.14

Description: fine white crystalline powder; characteristic odour; solubility in water: 767 g/l at 25 ºC. Products shall contain at least 99 % ammonium sulphate.

Note: Over 235 ºC, breaks down into gaseous ammonia and sulphur oxides.

Use: for disinfection of water

Maximum dosage: 0.5 mg expressed as NH_3 per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg) per kg of ammonium chloride:

As	5	Cd	0.5	Cr	5	Fe	10
Hg	0.1	Ni	5	Pb	5	Sb	1
Se	2						
sulphuric acid (free)	200						

7. Ozone

Chemical formula: O_3

CAS No.: 10028-15-6 Relative molecular mass: 48

Description: bluish gas, dark blue in colour when liquefied; powerful oxidising agent.

Use: for disinfection or oxidation of water, to remove iron, manganese and undesirable colouring in drinking water.

Purity requirements: toxic substances shall not be found in gaseous form

Maximum dosage: 2 to 4 mg O_3 per litre of treated water when acting for 4-6 minutes. Residual concentration 0.4 mg O_3 per litre of treated water.

8. Hydrogen peroxide

Chemical formula: H_2O_2

CAS No.: 7722-84-1 Relative molecular mass: 34.02

Description: colourless liquid, moderately irritant odour, easily miscible with water. Products shall contain 20 - 70 % of hydrogen peroxide.

Use: as oxidising and disinfectant agent.

dosage: 17 mg/l of treated water (expressed as 100 % hydrogen peroxide)
Note: maximum residual concentration in treated water 0.1 mg/l.

Purity requirements: maximum concentration of impurities (in mg) per kg of 100 % H_2O_2 :

As	0.5	Cd	0.5	Cr	0.5	Hg	0.5
Ni	1	Pb	0.5	Sb	0.5	Se	0.5

9. Potassium permanganate

Chemical formula: $KMnO_4$

CAS No.: 7722-64-7 Relative molecular mass: 158.04.

Description: dark violet crystals with blue metallic lustre, containing at least 97.5 % $KMnO_4$. Solubility in water 6.28 g per 100 ml at 20 °C.

Use: as oxidising agent, to remove Fe, Mn, unacceptable flavour and odour in water, to regenerate filtration material.

Maximum dosage: 10 mg per litre of treated water.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of potassium permanganate:

Cd	50	Hg	10	Cr	50	Sb	50
As	20	Ni	50	Pb	50	Se	50

F. CORROSION INHIBITORS

1. Sodium phosphate

Chemical formula: Na_3PO_4

CAS No.: 7601-54-9 Relative molecular mass: 164.0

Description: solid: white powder or granules, liquid: clear aqueous solution, solubility in water approximately 120 g/l at 25 °C. Solutions have an alkaline reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain (41 ± 1) % phosphates, expressed as P_2O_5 and (53 ± 1) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration impurities (mg/l) which may be contained in 1 kg dry product of sodium phosphate:

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3
Cyanide	5	sulphate	500	Fluoride	10		

2. Sodium hydrogen phosphate

Chemical formula: Na_2HPO_4

CAS No.: 7558-79-4 Relative molecular mass: 142.0

Description: solid: white powder or granules, liquid: clear solution. Solubility in water approximately 80 g/l at 25 °C. Solutions have an alkaline reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain (50 ± 1.0) % phosphates, expressed as P_2O_5 and (43 ± 0.5) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry sodium hydrogen phosphate

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3
Cyanide	5	Sulphate	500	Fluoride	10		

3. Sodium dihydrogen phosphate

Chemical formula: NaH_2PO_4

CAS No.: 7558-80-7 Relative molecular mass: 120.0

Description: solid: white powder, crystals or granules, liquid: clear solution. Solubility in water approximately 850 g/l at 25 °C. Solutions have an acidic reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain at least (59 ± 2) % phosphates, expressed as P_2O_5 and (26 ± 1) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry sodium hydrogen phosphate

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3
Cyanidy	5	Sulphate	500	Fluoride	10		

4. Sodium diphosphate

Chemical formula: $Na_4P_2O_7$

CAS No.: 7722-88-5 Relative molecular mass: 266.0

Description: solid: white powder or granules, liquid: clear solution. Solubility in water approximately 850 g/l at 25 °C. Solutions have an alkaline reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain at least (53 ± 1.0) % phosphates, expressed as P_2O_5 and (46.5 ± 1.0) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry sodium diphosphate

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3

Cyanidy	5	Sulphate	500	Fluoride	10		

5. Sodium dihydrogen diphosphate

Chemical formula: $Na_2H_2P_2O_7$

CAS No.: 7758-16-9 Relative molecular mass: 222,0

Description: solid: white powder or granules, liquid: clear solution. Solubility in water approximately 130 g/l at 25 °C. Solutions have an acidic reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain at least (64 ± 1.0) % phosphates, expressed as P_2O_5 and (28 ± 0.5) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry dihydrogen diphosphate

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3
Cyanide	5	Sulphate	500	Fluoride	10		

6. Sodium polyphosphate

Chemical formula: $(NaPO_3)_n$; where *n* is mainly in a range of 4 to 40

CAS No.: 10361-03-02 Relative molecular mass: variable

Description: solid: white powder, granules or vitreous, liquid: clear solution. Solubility in water approximately 1000 g/l at 25 °C. Solutions have an acidic reaction.

Use: to inhibit corrosion of cast-iron, steel, galvanised and coppered pipes. Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain 64 % to 69 % phosphates, expressed as P_2O_5 and 34.5 % to 29 % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry sodium poliphosphate

Cd	3	Hg	1	Cr	10	Sb	3

As	3	Ni	10	Pb	10	Se	3
Cyanide	5	Sulphate	500	Fluoride	10		

7. Sodium tripolyphosphate

Chemical formula: $Na_5P_3O_{10}$

CAS No.: 7758-29-4 Relative molecular mass: 368.0

Description: solid: white powder or granules, liquid: clear solution. Solubility in water approximately 850 g/l at 25 °C. Solutions have an alkaline reaction.

Use: to inhibit the formation of boiler scale or corrosion of cast-iron, steel, galvanised and coppered pipes.

Maximum dosage: 5 mg per litre of treated water, expressed as P_2O_5.

Note: may be used for hot water providing its use does not prevent achievement of the hygiene limits for microbiological quality indicators for hot water and providing the water authorities have no objections with regard to protection of waste water receiving bodies; use for drinking water is only possible in justified and time-limited cases on the basis of approval by a local competent public health body and also with the approval of the water authorities.

Product requirements: Products shall contain at least (57 ± 2) % phosphates, expressed as P_2O_5 and (42 ± 1) % sodium, expressed as Na_2O.

Purity requirements: maximum concentration of impurities (in mg) which may be contained in 1 kg of dry sodium tripolyphosphate

Cd	3	Hg	1	Cr	10	Sb	3
As	3	Ni	10	Pb	10	Se	3
Cyanide	5	Sulphate	500	Fluoride	10		

Annex 3 to Decree No. 409/2005. Coll.

Calculation of permissible concentration of impurities for the application of other chemical water treatment products

The following formula shall be used to calculate the permissible concentration of impurities or the maximum permissible dosages :

$$PC = \frac{LC\ (mg/l) . 10^6 (mg/kg)}{MDCH\ (mg/l) . 10}$$, where

- PC is the permissible concentration of impurities in mg/kg of chemical product,
- LC is the limit value of the impurity in question for drinking water in mg/l of water laid down by special legislation or by this Decree or by decision of a public health body pursuant to Section 5(5) of the Act,
- MDCH is the maximum permissible dosage of chemical product in mg/l of treated water (see Annex 2) or pursuant to Section 5,
- 10 is the safety factor.

Annex 4 to Decree No. 409/2005. Coll.

Method for verifying the efficacy of disinfectant and algicidal chemical products intended for the treatment of water for use as drinking or hot water

A. Disinfectant products

1. Principle:

In order to test the disinfectant effect of chemical products, use shall be made of *Escherichia coli* (*E. coli*) CCM 3954 and *Enterococcus faecalis* CCM 4224 strains in view of their hygiene significance and morphological characteristics. Tests shall be performed in undisinfected groundwater with physico-chemical quality corresponding to the requirements of special legislation.[3)] With disinfectant products intended for special circumstances (floods, local contamination, accidents, etc.), it is essential to perform tests on the disinfectant effect of the products in undisinfected water with increased loading of usual organic substances with CHSK-Mn (chemical consumption of oxygen by permanganate) of 10 mg/l of water with a tolerance of ± 15 %. This water shall not, however, be contaminated by biocidal substances in the sense of Act No. 120/2002 Coll.

When testing the disinfectant effect of products, the instructions for use by consumers shall be used and these shall be unambiguous and show, among other things, the content of active ingredient(s) in concentrated disinfectant products and in the recommended effective quantities of them. Testing shall be carried out using the manufacturers' recommended effective quantities (concentrations) of disinfectant products; if a wide range of effective quantities is given for a disinfectant product, then the lowest recommended quantity (concentration) (or several concentrations including the lowest recommended one) shall be used.

2. Requirements:

E. coli CCM 3954 strain, *Enterococcus faecalis* CCM 4224 strain, lactose-TTC agar with Tergitol 7, Slanetz-Bartley agar, undisinfected groundwater (see point 1), pipettes, sterile glass sample bottles (Petri dishes with a diameter of 90 or 100 mm), test tubes, Erlenmeyer flasks (volume 2-3 litres), thermostat. Apart from accessories supplied in sterile state, laboratory glassware shall also be sterilised in accordance with the instructions given in standard ČSN ISO 8199:1994 Water quality – General guidance on the enumeration of micro-organisms by culture.

3. Test procedure:

A measured volume (e.g. 1 litre) of undisinfected groundwater or water loaded with organic substances (see point 1) shall be poured into two Erlenmeyer flasks. The water at a temperature of (23 ± 2) ºC in the two flasks shall be artificially contaminated with the *E. coli* and *Enterococcus faecalis* strains so that the initial number of colony-forming units (CFU) of the two strains achieves a value of 1000 - 3000 CFU/ml (preparation using RM materials). Prior to the actual test, the contaminated water shall be thoroughly mixed (e.g. by shaking), so as to achieve regular distribution of the micro-organisms.

The appropriate effective quantity of disinfectant product shall be added to the first flask and the content of the flask is again thoroughly mixed so as to achieve regular distribution of the disinfectant product. At the test intervals - 0 min (i.e. immediately before adding the disinfectant product to the flask), 5 min, 10 min, 15 min, 20 min and 30 min, 1 ml of sample solution prepared in this way shall be inoculated onto the surface of a solid culture medium

(plate) and, after cultivation for a period of 24 and 48 hours at a temperature of (36 ± 2) ºC, the colonies growing on the surface shall be counted. During the test period, the test solution in the flask shall be constantly mixed. The incubation duration and temperature shall be selected in accordance with the references to standardised methods (standard ČSN EN ISO 7899-2 Water quality – Detection and enumeration of intestinal enterococci - Part 2: Membrane filtration method; standard ČSN EN ISO 9308-1 Water quality – Detection and enumeration of *Escherichia coli* and coliform bacteria – Part 1: Membrane filtration method). The testing shall be performed in parallel.

The second flask shall be used as a control. At the test intervals - 0 min and 30 min, 1 ml of the control sample of contaminated water shall be inoculated onto the surface of a solid culture medium (plate) at a dilution of 10^{-1} and 10^{-2} and, after cultivation for a period of 24 and 48 hours at a temperature of (36 ± 2) ºC, the colonies growing on the surface shall be counted. During the test period, the test solution in the flask shall be constantly mixed. The testing shall be performed in parallel. The number of colony-forming units (CFU) at the test interval of 30 min shall not, after cultivation, differ from the initial number of colony-forming units (CFU) by more than 10 %.

4. Evaluation:

The plates shall be evaluated immediately after cultivation. The result shall be expressed as a percentage from the relationship between the number of colony-forming units (CFU) of the test *E. coli* and *Enterococcus faecalis* strains and the number of colony-forming units (CFU) for each test interval separately.

The requirement for the efficacy of disinfectant products intended for the treatment of drinking or hot water shall be given by the number of colony-forming units after a test interval of 30 min (or after a shorter test period, if so stipulated by the manufacturer in the instructions for use). For both of the *E. coli* CCM 3954 and *Enterococcus faecalis* CCM 4224 strains, a requirement of 0 CFU/ml shall be satisfied.

B. Algicidal products

1. Principle:

In order to test algicidal products, use shall be made of the standard test in ISO 8692 "Freshwater algal growth inhibition with *Scenedesmus subspicatus* and *Selenastrum capricornutum*". The test organisms used shall be green plankton algae belonging to the Chlorococcales order, either *Scenedesmus subspicatus* Chodat (86.81 SAG) or *Selenastrum capricornutum* Printz (ATCC 22 662 or CCAP 278/4).

2. Test procedure:

After several generations, single-strain algae shall be cultivated in a defined medium containing a concentration range of the test product and prepared by mixing the appropriate volumes of a stock solution of nutrients, water, a stock solution of the test product and the inoculum – exponentially growing algal cells. The test solutions shall be incubated under constant physical conditions for at least 72 hours. In the incubation period, the density of the cells in them shall be measured at least once every 24 hours. The test algicidal products shall be added in the proportions given in the manufacturers' instructions for use.

3. Evaluation:

Inhibition shall be measured as a reduction in growth or growth rate in relation to the growth of control cultures grown under the same conditions. A positive result, indicating the efficacy of a test product, shall be inhibition of the intensity of growth of a test culture by more than 30 % in comparison with the control.