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## XXXVI/2. Paper and Paperboard for Baking Purposes

As of 01.08.2024

### Preamble

1. This Recommendation applies to paper and paperboard<sup>1</sup>, that comes into contact with or affects foodstuffs during baking. The paper and paperboard must be such that they are able to withstand a temperature of at least 220 °C for the intended period of heating without decomposing<sup>2</sup> (see V., Finished products). To the extent that this Recommendation restricts the use of certain production aids, the limits given, if not explicitly based on surface area, are based on dry fibre. This Recommendation applies to raw materials (section I), production aids (section II), and special raw materials and special paper refining agents (section III) used in the production process for paper, paperboard and board that comes into contact with foodstuffs, and finished products (section V). Moreover, in the paper production process substances are used to keep manufacturing devices clean and to protect them from corrosion. This Recommendation shall not apply for these substances. The manufacturer or distributor of the paper is responsible to comply to food regulations (especially Regulation (EU) No. 1935/2004) for these substances<sup>3</sup>. However, substances listed in this Recommendation subject to the above stated applications were listed before 2013. Substances that are used for manufacturing of paper raw materials listed in section I or substances that are used for formulation of active ingredients listed in section II and III (e.g. emulsifiers, solvents, set-up chemicals, stabilizer, pH modifiers) are not subject to this BfR-Recommendation. For their application requirements of article 3 of the Regulation (EU) No. 1935/2004 shall be used<sup>3</sup>. However, substances listed in this Recommendation subject to the above stated applications were listed before 2013. Preservatives that are used to prevent microbial spoilage of formulations and slimicides are still covered by this Recommendation.
2. For paper and paperboard (including cardboard) which is used in microwave ovens the substances listed under section IV may be used in addition to the substances listed under sections I, II, and III.
3. If in the production of a certain paper or paperboard a particular production aid, on account of its wide spectrum of use, is listed more than once in the Recommendation, the largest maximum amount given is to be taken as the "in total" maximum. Adding the different maximum amounts together is not permissible.
4. The finished paper or paperboard must have no preserving effect on the foodstuffs with which they come into contact<sup>4</sup>.

<sup>1</sup> Compare Recommendation XXXVI "Paper and paperboard (including cardboard) as food-contact materials"

<sup>2</sup> The testing method or methods are published in the collection of testing methods given above in the preamble under No. 5.

<sup>3</sup> For guidance on compliance of the manufacturer's responsibility the following guidelines and assessments of substances may be used exemplarily: other Recommendations of the BfR, assessments of the European Food Safety Authority or the Scientific Committee on Food (SCF), Regulation (EU) No. 10/2011, European rules on food additives and drinking water. Moreover, an assessment can be made by the manufacturer on his own responsibility.

<sup>4</sup> Determination of transfer of antimicrobial constituents according to DIN EN 1104

5. Methods for testing commodities (materials and articles) made of paper or paperboard are available under [http://www.bfr.bund.de/de/methodensammlung\\_papier\\_\\_karton\\_und\\_pappe-32620.html](http://www.bfr.bund.de/de/methodensammlung_papier__karton_und_pappe-32620.html).
6. No more than 10 µg/l lead and 5 µg/l cadmium must be detectable in the hot water extract of the finished product.
7. The migration of aluminium into foodstuffs must not exceed 1 mg/kg<sup>6,7</sup>. Compliance with this requirement can be checked in the hot water extract.<sup>8</sup>
8. The limit values for 1,3-dichloro-2-propanol and 3-monochloro-1,2-propanediol need to be determined in the cold water extracts of paper products despite intended use.

There are no objections to the use of paper and paperboard, that come into contact with or act upon foodstuffs during baking, as commodities in the sense of § 2, Para. 6, No. 1 of the Food and Feed Code (Lebensmittel- und Futtermittelgesetzbuch (LFGB)), provided they are suitable for their intended purpose and comply with the following conditions:

## I. Raw materials

The following raw materials may be used:

### A. Fibrous materials

1. Cellulose fibres obtained by chemical means, unbleached or bleached.
2. Cellulose fibres obtained by mechanical means, unbleached or bleached.
3. Artificial fibres made from cellulose, unbleached or bleached.
4. Fibres of diol esters of polyterephthalic acid and polyamides<sup>9</sup>, provided they comply with the prevailing requirements of food law and provided that they also meet the requirements described in "Prüfung von Brat- und Backfolien aus Polyterephthalsäuredioleestern auf flüchtige organische und wasserlösliche Bestandteile" and "Prüfung von Brat- und Backfolien aus Polyamid auf Bildung von flüchtigen und von wasserlöslichen Bestandteilen bei thermischer Beanspruchung"<sup>10</sup>.

### B. Fillers

1. Silicon dioxide
2. Silicates or mixed silicates of aluminium, calcium, magnesium and sodium, including kaolin and talcum, excluding asbestos.

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<sup>6</sup> Testing is not necessary for paper and paperboard intended for contact with exclusively fatty foodstuffs, such as butter or vegetable fats, as well as for foodstuffs which, according to Table 2 of Regulation (EU) No 10/2011, are to be tested exclusively with food simulant E.

<sup>7</sup> If the actual use is not known, migration into food shall be tested with a surface area to packed food ratio of 13.3 dm<sup>2</sup>/kg food under the worst foreseeable conditions of use regarding type and duration of contact, contact temperature and food.

<sup>8</sup> For additional information on the determination of aluminium in water extract, see: Method collection paper and paperboard ([https://www.bfr.bund.de/de/methodensammlung\\_papier\\_\\_karton\\_und\\_pappe-32620.html](https://www.bfr.bund.de/de/methodensammlung_papier__karton_und_pappe-32620.html)).

<sup>9</sup> In the manufacture of polyamides for fibre or as surface refining agents in the sense of this Recommendation, copolymers of ethylene, propylene etc. according to Recommendation XXXV, and polyethylene according to Recommendation III must not be used.

<sup>10</sup> See the 36th and 44th Communications on testing of plastics, Bundesgesundheitsblatt 19 (1976) 12 and 23 (1980) 183

3. Calcium sulfate
4. Barium sulfate, free from soluble barium compounds
5. Titanium dioxide
6. Calcium and magnesium carbonate

The fillers (extenders) listed above must comply with the purity requirements stipulated under No. 3 in Recommendation LII. "Fillers". Filler additives according to this Recommendation must not be used, except for the sodium, polyacrylic acid, which may be used as a dispersing agent for calcium carbonate, max. 0.5 %, based on this filler.

## II. Production aids

The following production aids may be used:

### A. Sizing and fibre binding agents

1. Colophony, addition products of maleic and fumaric acid and/or of formaldehyde with colophony. In hot water extract from the finished product no more than 1.0 mg formaldehyde/dm<sup>2</sup> must be detectable<sup>2</sup>.
2. Natural and degraded starch, starch esters of phosphoric acid  
For crosslinking of natural starch, sodium tetraborate, max. 1 mg/dm<sup>2</sup> (calculated as boron), may be used.
3. Starch, treated with 3-chloro-2-hydroxypropyl trimethyl ammonium chloride or glycidyl trimethyl ammonium chloride (specification of starch: epichlorohydrin<sup>11</sup>, max.1 mg/kg; nitrogen, max. 4.0 %).
4. Sodium salt of carboxymethyl cellulose, technically pure<sup>12</sup>
5. Alginates<sup>13</sup>, xanthane<sup>13</sup>, galactomannans<sup>13</sup>
6. Galactomannan ethers
  - 6.1 Carboxymethylgalactomannan, residual content in sodium glycolate max. 0.5 %
  - 6.2 Galactomannan, treated with 3-Chlor-2-hydroxypropyl-trimethylammonium chloride or Glycidyl-trimethylammonium chloride (specification: epichlorohydrin<sup>11</sup> max.1 mg/kg, nitrogen max. 4.0 %)
7. Di-alkyl(C<sub>10</sub>-C<sub>18</sub>)diketenes, max. 0.5 %.<sup>14</sup> The transfer of dialkylketones, that are produced by hydrolysis, into foodstuff may not exceed 5 mg/kg foodstuff.
8. Copolymer of acrylamide and acrylic acid, cross-linked with N-methylene-bis(acrylamide), max. 1.0 %
9. Copolymer of acrylamide, (2-(methacryloyloxy)ethyl)trimethylammonium chloride, N,N'-methylene-bis-acrylamide and itaconic acid, max. 1.0 %, based on the dry fibre.
10. Copolymer of acrylamide, (2-(methacryloyloxy)ethyl)trimethylammonium chloride, N,N'-methylene-bis-acrylamide, itaconic acid and glyoxal, max. 1.0 %, based on the dry fibre.

<sup>11</sup> 1,3-Dichloro-2-propanol must not be detectable in water extract from the finished product (detection limit 2 µg/l). The transfer of 3-monochloro-1,2-propanediol into the water extract of the finished products must be as low as technically achievable, a limit of 12 µg/l must not be exceeded in any case.

<sup>12</sup> The Sodium glycolate content must not exceed 12 %.

<sup>13</sup> These (except for sodium chloride) must meet the purity requirements of Regulation (EU) No. 1333/2008 as well as: Arsenic, max. 3 mg/kg; lead, max. 10 mg/kg; zinc, max. 25 mg/kg; copper and zinc combined, max. 50 mg/kg.

<sup>14</sup> The production aids bind firmly to the cellulose fibres. On method, see footnote 3.

11. Sucrose esters of natural fatty acids (C<sub>16</sub> or higher)<sup>15</sup> and/or sucroglycerides of natural fatty acids with (C<sub>16</sub> or higher)<sup>15</sup>, max. 1.5 % based on the dry fibre. The content of sucrose esters with a fatty acid chain length of C<sub>14</sub> or lower must not exceed 1 % in the formulation.
12. Mono- and diglycerides of fatty acids (C<sub>14</sub> or higher)<sup>15</sup>
13. Sodium, potassium or calcium salts of natural fatty acids (C<sub>14</sub> or higher)<sup>15</sup>

#### **B. Precipitating, fixing and parchmentisation agents**

1. Aluminium sulfate
2. Sodium sulfate
3. Sodium aluminate
4. Aluminium formate
5. Sulfuric acid
6. Ammonia
7. Sodium carbonate
8. Sodium hydrogen carbonate
9. Sodium hydroxide
10. Aluminium chloride hydroxide, max. 0.09 %, based on the dry fibres weight.

#### **C. Retention agents**

1. Polyacrylamide and/or polyacrylic acid, provide that the monomer content does not exceed 0.2 %, in total, max. 0.3 %
2. Polyethyleneimine, max. 0.5 %<sup>11, 16, 17</sup>
3. Cross-linked, cationic polyalkylene amines<sup>16</sup>, in total max. 4.0 %, i.e.
  - a) Polyamine-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup> and diaminopropyl methylamine, max. 0.5 %
  - b) Polyamide-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup>, adipic acid, caprolactam, diethylenetriamine and/or ethylenediamine
  - c) Polyamide-epichlorohydrin resin, produced from adipic acid, diethylenetriamine and epichlorohydrin or from a mixture of epichlorohydrin with ammonia<sup>11</sup>
  - d) Polyamide-polyamine-dichloroethane resin, produced from 1,2-dichloroethane and of adipic acid amide, caprolactam and diethylenetriamine, max. 0.5 %
  - e) Polyamide-polyamine-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup>, adipic acid amide and diaminopropyl-methylamine
  - f) Polyamide-epichlorohydrin resin, produced from epichlorohydrin, diethylenetriamine, adipic acid and ethyleneimine, max. 0.5 %<sup>11, 17</sup>
  - g) Polyamide-epichlorohydrin resin, produced from epichlorohydrin, diethylenetriamine, adipic acid, ethyleneimine and polyethylene glycol, max. 0.2 %<sup>11, 17</sup>
4. Copolymer of acrylamide and (2-(methacryloyloxy)ethyl)trimethylammonium chloride<sup>18</sup>, max. 0,1 %. The polymer may contain no more than 0.1 % monomeric acrylamide and no more than 0.5 % (2-(methacryloyloxy)ethyl)trimethylammonium chloride.

<sup>15</sup> The substance must comply with the relevant purity requirements of Regulation (EU) No. 231/2012.

<sup>16</sup> The production aids bind to the cellulose fibres.

<sup>17</sup> Ethyleneimine must not be detectable in the resin (detection limit: 0.1 mg/kg).

<sup>18</sup> Hydrocarbon solvents (paraffinic, naphthenic, with a carbon number from C<sub>10</sub> to C<sub>20</sub>) can be used as formulating agents. These solvents must comply with the "Purity requirements for liquid paraffin" in the 155th Communication of Bundesgesundheitsblatt 25 (1982) 192. The transfer of the fraction with a carbon number of C<sub>10</sub> to C<sub>16</sub> into food shall not exceed

5. Copolymer of acrylamide and (2-(acryloyloxy)ethyl)trimethylammonium chloride<sup>18</sup>, max. 0.1 %. The polymer may contain no more than 0.1 % monomeric acrylamide and no more than 0.5 % (2-(acryloyloxy)ethyl)trimethylammonium chloride
6. Copolymer of acrylamide and acrylic acid<sup>18</sup>, max. 0.1 %. The polymer may contain no more than 0.1 % monomeric acrylamide and no more than 0.5 % acrylic acid.
7. Polydimethyldiallyl ammonium chloride, max. 0.15 %
8. Copolymer of acrylamide and diallyldimethyl ammonium chloride, max. 0.02 %.

#### D. Dewatering accelerators

1. Polyethyleneimine, max. 0.5 % (comp. II C 2)<sup>11, 16, 17</sup>
2. Silicone-containing paraffin dispersions, provided that the silicones and paraffins comply with amended Recommendations XV and XXV, Part I, max. 0.5 % (based on dry substance of the dispersion)
3. Cellulase<sup>19</sup>

#### E. Dispersion and flotation agents

1. Polyvinyl pyrrolidone (mol. wt. min. 11 000)
  2. Alkyl(C<sub>10</sub>-C<sub>20</sub>)sulfonates
  3. Alkali salts of mainly linear-condensed polyphosphates. The content of cyclic-condensed metaphosphates must not exceed 8.0 %
  4. Polyethylene glycol (EO = 1-20) ethers of linear and branched primary (C8-C26) alcohols, max. 0.3 mg/dm<sup>2</sup> and Polyethylene glycol (EO > 20) ethers of linear and branched primary (C8-C26) alcohols, max. 5 mg/dm<sup>2</sup>
  5. Alkylphenol polyglycol ether with 6 - 12 ethylene oxide groups
  6. Sulfonated castor oil
  7. Condensation products of aromatic sulfonic acids with formaldehyde. Hot water extract from the finished product must not contain more than 1.0 mg formaldehyde per dm<sup>2</sup>.<sup>2</sup>
- Of the production aids 1. - 7. listed above up to 1 % of each may be used, but in total they must not amount to more than 3.0 %.
8. Polyethyleneimine, max. 0.5 % (comp. II C2 and II D 1)<sup>11, 16, 17</sup>
  9. Sodium, polyacrylic acid, max. 0.5 %.
  10. 1-Amino-2-propanol. The substance may not contain more than 10 % of 2-amino-1-propanol. The transfer into foodstuff may in sum not exceed 5 mg/kg.

#### F. Defoamers

1. Organopolysiloxanes with methyl and/or phenyl groups after Section I of amended Recommendation XV. Kinematic viscosity of the silicone oils, determined according to DIN 51562 at 20 °C, min. 100 mm<sup>2</sup>·s<sup>-1</sup>.
2. Linear primary alkan-1-oles/alken-1-oles with 8-26 carbon-units (fatty alcohols), also in emulsified form<sup>20</sup>

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12 mg/kg foodstuff (preliminary limit). For the fraction with a carbon number of C<sub>16</sub> to C<sub>20</sub> the transfer into food shall not exceed 4 mg/kg foodstuff (preliminary limit).

<sup>19</sup> There must be no detectable residual activity of this enzyme in the finished product.

<sup>20</sup> Max. 2 % liquid paraffin, sodium monoalkyl-dialkylphenoxybenzene-disulfonate, max. 2 %, and a total of max. 2 % alkyl and alkyaryloxethylates and their esters with sulfuric acid (as emulsifiers) may be added to 20 - 25 % aqueous solutions of this antifoam agent. The liquid paraffins must comply with the "Purity requirements for liquid paraffins" in the 155th Communication of Bundesgesundheitsblatt 25 (1982) 192.

3. Fatty acid esters of mono and polyhydric aliphatic alcohols (C<sub>1</sub>-C<sub>22</sub>)
4. Fatty acid esters with polyethylene glycol and/or polypropylene glycol
5. Alkylsulfonamides (C<sub>10</sub>-C<sub>20</sub>)

Of each of the production aids listed under 1. - 5. above no more than 0.1 % may be used.

6. N,N'-Ethylene-bis-stearamide.
7. a) 2,4,7,9-tetramethyl-5-decyne-4,7-diol  
b) 3,6-dimethyl-4-octyne-3,6-diol  
c) 2,5,8,11-tetramethyl-6-dodecyne-5,8-diol

The transfer of these three substances from the final product (in)to foodstuff may not exceed 0.05 mg/kg (sum of the three substances).

#### G. Slimicides:

1. Enzymatic agents
  - a) Fructose polysaccharide (levan)-hydrolase, 12.5 mg dry substance per kg paper. No more than one unit of levanase activity per gram paper must be detectable.
2. Antimicrobial agents
  - a) Hydrogen peroxide
  - b) 1,4-Bis(bromoacetoxy)butane  
Substance must not be detectable in the hot water extract of the finished product (detection limit: 0.01 mg bromine per dm<sup>2</sup>)<sup>2</sup>
  - c) 3,5-Dimethyltetrahydro-1,3,5-thiadiazine-2-thione  
Substance must not be detectable in the hot water extract of the finished product<sup>2</sup>
  - d) Methylene-bis-thiocyanate  
Substance must not be detectable in the hot water extract of the finished product<sup>2</sup>
  - e) Glutaraldehyde, max. 2.5 %, based on the dry fibre. No more than 2 mg glutaraldehyde must be detectable in 1 kg of finished product<sup>2</sup>
  - f) Chlorine dioxide
  - g) Mixture of<sup>2</sup> 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one in the ratio of 3 : 1<sup>21</sup>. No more than 0.5 µg/dm<sup>2</sup> of the sum of the mentioned isothiazolinones must be detectable in the hot water extract from the finished product.
  - h) 1,2-Benzisothiazolin-3-one<sup>21</sup>. No more than 10 µg/dm<sup>2</sup> must be detectable in the hot water extract from the finished product.
  - i) 1,6-dihydroxy-2,5-dioxahexane, max. 0.029 %, based on the dry fibres weight. No more than 1.0 mg/dm<sup>2</sup> of formaldehyde must be detectable in the hot water extract of the finished product.
  - j) 2-Bromo-2-nitropropane-1,3-diol, max. 0.003 %, based on the dry fibres weight. The substance must not be detectable in the hot water extract of the finished articles.
  - k) 2-Methyl-4-isothiazolin-3-one<sup>21</sup> (No more 1 µg/dm<sup>2</sup> must be detectable in the hot water extract from the finished product.)
  - l) Ammonium bromide/sodium hypochlorite adduct, ammonium sulfate/sodium hypochlorite adduct or ammonium chloride/sodium hypochlorite adduct, max. 0.02 % (active substance determined and calculated as Cl<sub>2</sub>), based on the dry fibres weight.

<sup>21</sup> The restrictions refer to the application of these substances as slimicides and preservatives, respectively during the manufacture of paper. Contributions from other applications (e. g. in dispersions according to Recommendation XIV or in printing inks) must comply with the restrictions laid down for these areas. In the extracts of the final products the following levels must not be exceeded in total:

Mixture of 5-chloro-2-methyl-4-isothiazolin-3-one (approx. 3 parts) and 2-methyl-4-isothiazolin-3-one (approx. 1 part): 25 µg/dm<sup>2</sup>

1,2-Benzisothiazolin-3-one: 80 µg/dm<sup>2</sup>

2-Methyl-4-isothiazolin-3-one: 80 µg/dm<sup>2</sup>

- m) Sodium hypochlorite, max. 0.028 %, based on dry fibres weight.
- n) 2,2-Dibromo-3-nitrilopropionamide, max. 0.0045 %, based on dry fibres weight. This substance must not be detectable in the extract of the finished products.
- o) Peroxyacetic acid, max. 0.1 %, based on dry fibres weight.
- p) Performic acid, max. 0.064 %, based on the dry fibres weight.

#### H. Preservatives

- 1. Sorbic acid and sodium, potassium, calcium and magnesium sorbate
- 2. 2-Methyl-1,2-benzothiazol-3(2H)-one, max. 15 µg/dm<sup>2</sup>.

Preservatives must only be used in amounts necessary to protect the raw materials, processing aids and paper refining agents from deterioration and decay.<sup>2</sup>

#### III. Special paper refining agents

The following paper refining agents may be used:

##### A. Wet-strength agents

- 1. Urea-formaldehyde resins. Hot water extract from the finished products must contain no more than 1.0 mg formaldehyde per dm<sup>2</sup>.<sup>2</sup>
- 2. Melamine-formaldehyde resins. Hot water extract from the finished products must contain no more than 1.0 mg formaldehyde per dm<sup>2</sup>.<sup>2</sup>
- 3. Cross-linked, cationic polyalkylene amines<sup>16</sup> in total max. 4.0 %, i.e.
  - a) Polyamine-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup> and diaminopropyl methylamine, max. 0.5 %
  - b) Polyamide-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup>, adipic acid, caprolactam, diethylenetriamine and/or ethylenediamine
  - c) Polyamide-epichlorohydrin resin, produced from adipic acid, diethylenetriamine and epichlorohydrin, or from a mixture of epichlorohydrin with ammonia<sup>11</sup>
  - d) Polyamide-polyamine-dichloroethane resin, produced from 1,2-dichloroethane and an amide of adipic acid, caprolactam and diethylenetriamine
  - e) Polyamide-polyamine-epichlorohydrin resin, produced from epichlorohydrin<sup>11</sup>, an adipic acid amide and diaminopropyl methylamine
  - f) Polyamide-epichlorohydrin resin, produced from diethylenetriamine, adipic acid, glutaric acid, succinic acid and epichlorohydrin<sup>11</sup>
  - g) Polyamide-epichlorohydrin resin, produced from diethylenetriamine, triethylenetetramine, adipic acid and epichlorohydrin<sup>11</sup>
  - h) Polyamide-epichlorohydrin resin, produced from adipic acid, diethylenetriamine, aminoethylpiperazine and epichlorohydrin<sup>11</sup>, max. 1.0 %. In the resin the proportion of aminoethylpiperazine in relation to adipic acid must not exceed 10 mol%
- 4. Copolymer of hexamethylenediamine and epichlorohydrin<sup>11</sup>, max. 2.0 %
- 5. Copolymer of diethylenetriamine, adipic acid, 2-aminoethanol and epichlorohydrin<sup>11, 16</sup>, max. 0.1 %, based on the dry fibres weight.
- 6. Copolymer of acrylamide and diallylamine, max. 1.0 % based on the dry fibres weight

7. Microfibrillated Cellulose formed by grinding of cellulose pulp and a mineral according to section A.II (Fillers), max. 5 % Microfibrillated Cellulose by weight, based on the dry fibres weight of the paper. The fibre content of the ground mixture is 17-50% by weight. 70-80% of fibril diameters by number are less than 100 nm, the mean fibril diameter by number is 20-40 nm.

## B. Humectants

1. Sorbitol
2. Saccharose, glucose, glucose syrup
3. Sodium chloride, calcium chloride

Of these substances, 1 - 3 above, in total, max. 7 % may be used<sup>13</sup>.

## C. Colorants and optical brighteners

For baking paper produced in accordance with this recommendation only the following colorants and optical brighteners must be used:

### a) Colorants

1. Iron oxides and Iron hydroxides (E 172) after specifications of amended food additive law
2. Additionally whitening colorants may be used for the manufacture of multi-layer/-coating paper or paperboard provided that they are only used in the outside layer or coating, which does not come in contact with the foodstuff and that from proper use of the commodity no colorant can migrate to the foodstuff<sup>2</sup>.

### b) Optical brighteners

(have not been applied)

## D. Surface refining agents for the food-contact surface<sup>22</sup>

1. Polyvinyl alcohol (viscosity of 4 % aqueous solution at 20 °C, min. 5 mPa·s)
2. Sodium alginate<sup>13</sup>
3. Sodium salt of carboxymethyl cellulose, technically pure<sup>12</sup>
4. Silicone resins and silicone elastomers (silicone rubber), provided they comply with Sections II and III of amended Recommendation XV<sup>23</sup>.
5. Chromium(III)chloride complexes with saturated straight-chain fatty acids of chain length C<sub>14</sub> and longer, max. 0.4 mg chromium (Cr) per dm<sup>2</sup>.<sup>2</sup> The hot water extract must contain no more than 4.0 µg chromium(III) per dm<sup>2</sup>; chromium(VI) must not be detectable.
6. Diol esters of polyterephthalic acid according to Recommendation XVII as well as polyamides according to Recommendation X<sup>9</sup>, provided that they also meet the requirements described in "Prüfung von Brat- und Backfolien aus Polyterephthalsäuredioleestern auf flüchtige organische und wasserlösliche Bestandteile" and "Prüfung von Brat- und Backfolien aus Polyamid auf Bildung von flüchtigen und von wasserlöslichen Bestandteilen bei thermischer Beanspruchung"<sup>10</sup>.
7. Aluminium foils, provided they are suitable for their intended use<sup>24</sup>

<sup>22</sup> Colorants for colouring the surface refining agents listed in this section must not be used.

<sup>23</sup> Di-n-octyltindimaleinate und Di-n-octyltindilaurate must not be used as hardeners.

<sup>24</sup> Only aluminium foils may be used that are coated exclusively with paper or paperboard that complies with this Recommendation. The aluminium foil must comply with DIN EN 602 (Aluminium and aluminium alloys - Wrought products - Chemical composition of semi-finished products used for the fabrication of articles for use in contact with foodstuff; German version EN 602:2004). The rolling oil which is used for the production of the foil must comply with the Code of Federal Regulations, Title 21 - Food and Drugs, § 178.3910.



8. Copolymer of vinyl alcohol and isopropenyl alcohol. Viscosity of 4 % aqueous solution at 20 °C, min. 5 mPa·s.
9. Phosphoric acid ester of ethoxylated perfluoropolyetherdiol, max. 1.5 %, based on the dry fibres weight.
10. Copolymer with 2-diethylaminoethylmethacrylate, 2,2'-ethylenedioxydiethyldimethacrylate, 2-hydroxyethylmethacrylate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate, acetate and/or malate, max. 1.2 %, based on the dry fibres weight.
11. Copolymer with methacrylic acid, 2-hydroxyethylmethacrylate, polyethylene glycol monoacrylate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl acrylate, sodium salt with a fluorine content of 45.1 %, max. 0.8 %, based on the dry fibres weight.
12. Modified polyethylene terephthalates, manufactured from polyethylene terephthalate and one or more of the following substances or substance classes: Ethylene glycol and/or diethylene glycol, trimethylolpropane, pentaerythritol, C<sub>16</sub>-C<sub>22</sub> fatty acids and their triglycerides, isophthalic acid and trimellitic acid anhydride, max. 0.1 g/dm<sup>2</sup>.
13. Galactomannans<sup>13</sup>
14. Sucrose esters of natural fatty acids (C<sub>16</sub> or higher)<sup>15</sup> and/or sucroglycerides of natural fatty acids with (C<sub>16</sub> or higher)<sup>15</sup>, max. 1.5 % based on the dry fibre. The content of sucrose esters with a fatty acid chain length of C<sub>14</sub> or lower must not exceed 1 % in the formulation.
15. Mono- and diglycerides of fatty acids (C<sub>14</sub> or higher)<sup>15</sup>
16. Sodium, potassium or calcium salts of natural fatty acids (C<sub>14</sub> or higher)<sup>15</sup>
17. Starch sodium octenyl succinate<sup>15</sup>, max. 0.04 g/dm<sup>2</sup>

#### IV. Paper and paperboard (including cardboard) which is used in microwave ovens

In addition to the substances listed above, the following substances may be used:

##### A. Retention agents

1. Copolymer of dimethylamine and epichlorohydrin<sup>11</sup>, max. 0.25 %<sup>25</sup>
2. Copolymer of dimethylamine ethylenediamine and epichlorohydrin<sup>11</sup>, max. 3 %<sup>25</sup>

##### B. Surface refining and coating agents

1. Copolymer of dimethyl terephthalate, ethylene glycol, propane-1,2-diol, pentaerythritol, polyethylene glycol and polyethylene glycol monomethyl ether with a terephthalic acid content of 24 %, max. 0.05 mg/dm<sup>2</sup>
2. Microfibrillated Cellulose formed by grinding of cellulose pulp and a mineral according to section A.II (Fillers), max. 8% Microfibrillated Cellulose by weight based on the dry fibres weight of the paper. The fibre content of the ground mixture is 17-50% by weight. 70-80% of fibril diameters by number are less than 100 nm, the mean fibril diameter by number is 20-40 nm.
3. Sucrose esters of natural fatty acids (C<sub>16</sub> or higher)<sup>15</sup> and/or sucroglycerides of natural fatty acids with (C<sub>16</sub> or higher)<sup>15</sup>, max. 1.5 % based on the dry fibre. The content of sucrose esters with a fatty acid chain length of C<sub>14</sub> or lower must not exceed 1 % in the formulation.
4. Mono- and diglycerides of fatty acids (C<sub>14</sub> or higher)<sup>15</sup>
5. Sodium, potassium or calcium salts of natural fatty acids (C<sub>14</sub> or higher)<sup>15</sup>

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<sup>25</sup> Dimethylamine must not be detectable in the aqueous extract (detection limit: 0.002 mg/dm<sup>2</sup>).

## V. Finished products

Paper and paperboard produced in accordance with this Recommendation must not be used at temperatures greater than 220 °C<sup>26</sup>. For the use in microwave ovens a temperature of 150 °C must not be exceeded. This must be clearly indicated by labelling the outer packaging. Further relevant instructions for the proper use of the finished product must be given in suitable form.

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<sup>26</sup> Where moist foodstuff comes into contact with the baking paper the temperature can be no more than 100 °C.