This is an unofficial translation. Only the German version is binding.

XIV. Polymer Dispersions

As of 01.04.2022

There are no objections to the use of plasticizer-free polymer dispersions for coating commodities in the sense of § 2, Para. 6, No. 1 of the Food and Feed Code (Lebensmittel- und Futtermittelgesetzbuch) (refer to part A of this Recommendation) and for cheese coatings not meant to be eaten (refer to part B of this Recommendation), provided that the coated commodities and cheese coatings are suitable for their intended purpose and the following conditions are met:

Part A: Polymer dispersions for coating commodities intended to come into contact with foods (e.g. adhesives or paper coatings)

The aforementioned restrictions of this Recommendation do not apply to container sealing material, which when properly used does not come into contact with foodstuffs (double-fold seals).

A number of the dispersions manufactured in accordance with this Recommendation can be cross-linked via vulcanisation, in which case Recommendation XXI[1] applies.

Linear polyurethanes, provided they comply with amended Recommendation XLI[2], may be mixed with polymer dispersions, whereby the proportion of polymer dispersion in the total mixture must predominate.

This Recommendation is valid for coatings that are intended to be used at temperatures up to 90 °C.

If slimicides and preservatives are used that have limit values according to (EG) Nr. 396/2005, these values are also valid for the migration from paper.

1. The following monomers for polymer dispersions may be used:

Monomers or other starting substances listed in the Commission Regulation (EU) No. 10/2011 may be used. Specific limits have to be obeyed.
In addition, the following substances may be used:

a) Acrylic and methacrylic acid esters of alcohols of chain length C_1-C_{18} which are monohydric saturated and linear (H-$(CH_2)_{1-18}$-OH), and ether alcohols of chain length C_1-C_{18}, which are monohydric saturated and linear (H-$(CH_2)_{1-18}$-O-$(CH_2)_{1-18}$-OH)
b) Vinyl esters of aliphatic saturated carboxylic acids of chain length C_1-C_{18}
c) Esters of maleic acid and fumaric acid with monohydric aliphatic saturated alcohols of chain length C_1-C_{18} or with monohydric aliphatic unsaturated alcohols of chain length C_3-C_{18}
d) Esters of aliphatic carboxylic acids of chain length C_3-C_{12} with unsaturated alcohols of chain length C_3-C_{18},
e) Esters of unsaturated aliphatic dicarboxylic acids with polyethylene glycols and/or poly-

[1] Recommendation XXI. "Commodities based on natural and synthetic rubber"
[2] Recommendation XLI. "Linear polyurethanes for paper coatings"

propylene glycols

f) Vinyl ethers of monohydric aliphatic saturated alcohols of chain length C_1-C_{18}

g) Vinylsulfonic acid. Commodities which shall comply with this Recommendation have to meet the following recommended migration limit: 0.05 mg/kg foodstuff or food simulant.

h) Half-esters of maleic acid or fumaric acid and itaconic acid with monohydric aliphatic saturated alcohols of chain length C_1-C_{18}, max. 8 %, if cross-linking in the film is assured through subsequent treatment, the proportion may be increased to max. 25 %.

i) Esters of acrylic acid and methacrylic acid with dihydric aliphatic alcohols of chain length C_2-C_{18}

j) Divinyl and diallyl esters of saturated and unsaturated aliphatic dicarboxylic acids of chain length C_3-C_{18}

k) Vinyl ester of acrylic acid

l) Allyl ester of acrylic acid

m) Vinyl ester of crotonic acid

n) Allyl ester of crotonic acid

o) Triallyl cyanurate

p) 2-Sulfoethylmethacrylate, max. 1.5 %.
Coatings made using this monomer must not be used for in the packaging of liquid foodstuffs. The specific limit laid down in the Commission Regulation (EU) No 10/2011 has to be obeyed.

q) 2-(Dimethylamino)ethyl acrylate with a residual content in the finished coating of max. 0.01 mg/dm^2.

r) N-[3-(Dimethylamino)propyl]methacrylamide

s) (2-(Methacryloyloxy)ethyl)trimethylammonium chloride

t) N,N,N',N'-tetrakis(2-hydroxypropyl)adipamide, max. 6 %, migration into foodstuff or food simulants, respectively must not exceed 5 mg/kg (sum of the substance itself and their impu-rities 6-[bis(2-hydroxypropyl)amino]-6-oxohexanoic acid and diisopropylamine). Migration of the impurities/ reaction products 1-[(2-hydroxypropyl)amino]-2-propanyl 6-[bis(2-hydroxypropyl)amino]-6-oxohexanoate and bis{1-[(2-hydroxypropyl)amino]-2-propanyl} adipate must not exceed 0,1 mg/kg (sum of the substances).

If single subtances that are listed in Commission Regualtion (EU) 10/2011 are included in the generic terms stated above specific limits for these substances of the Commission Regulation (EU) 10/2011 have to be obeyed.

2. The following production aids may be used:

Additives already permitted by the Commission Regulation (EU) No 10/2011 may be used in accordance with the restrictions laid down therein. In addition to these, the
following substances may also be used, but only in the maximum amounts given:

a) Catalysts:
Hydrogen peroxide
Benzoyl peroxide
Cyclohexanone peroxide
Isopropylcumyl hydroperoxide
Peroxysulfates of potassium, sodium and ammonium
Peroxides of straight-chain saturated aliphatic monocarboxylic acids of chain length C_8-C_{12}
tert-Butyl-hydroperoxide
Di-tert-butyl peroxide
Diisopropyl-peroxycarbonate
Azobisisobutyronitrile

Acetylcyclohexane sulfonyl peroxide
tert-Butyl-peroxybenzoate
tert-Butylperoxy-(2-ethylhexanoate)
Bis-(3,5,5-trimethyl)-hexanoylperoxide
tert-Butyl perpivalate, max. 0.15 %; using max. 0.05 % dibutyl phthalate as pasting agent
Hydroperoxypinane, max. 0.2 %
Iron-III-chloride, max. 0.06 %
p-Menthane hydroperoxide, max. 0.1 %
tert-Butyl peroxyacetate, max. 0.2 %
Mixture of

2-Hydroxy-2-sulfinato acetic acid, di-sodium salt	35 - 60 %
2-Hydroxy-2-sulfonatoacetic acid, di-sodium salt	10 - 60 % and
Sodium sulfite	0 - 40 %,
max. 0.5 %.	

The commodities must not test positively for peroxides[3].

b) Polymerisation regulators:
Normal and tertiary mercaptanes of chain length C_{10}-C_{14}[4]
Butene-(1)-ol-(3)
Hydroxylamine salts
Sodium dialkyldithiocarbamate
Sodium bisulfite
Ammonium bisulfite
Sodium dithionite
Isoascorbic acid
Urea[5]
Propionaldehyde[5]
Dispersion films must not contain more than 0.7 % residue or conversion products from a polymerisation regulator, and no detectable levels of butene-(1)-ol-(3) or salts of hydroxyl amine.
Alkali metal salts of oxymethane sulfinic acid, max. 0.5 %, based on the dispersion film.
Diisopropylxanthogene disulfide, max. 0.5 %, however, only for dispersions of poly-vinylidene chloride.
Boric acid, max. 0.07 %[6]
2,2'-Dibenzamido-diphenyl-disulfide, max. 3.0 % in the dispersion
1-Methyl-4-(1-methylethylidene)-cyclohexene. Commodities which shall comply with this Recommendation have to meet the following recommended migration limit: 0.05 mg/kg foodstuff or food simulant

c) Protective colloids and thickening agents for further processing:
Polyvinyl alcohol (viscosity of 4 % aqueous solution at 20 °C when used as a protective colloid, min. 2 cP; when used as a thickening agent, min. 4 cP).
Polymers and copolymers of monomers listed under No. 1, the restrictions set out therein have to be complied with.
Polyacrylic acid, modified with isopropanol.

d) Emulsifying agents:
Sodium hydroxyoctadecane sulfonate

[3] Test method: 58th Communication on the testing of plastics in Bundesgesundheitsblatt 40 (1997) 412
[4] These substances are completely incorporated into the polymer during polymerisation.
[5] The specific limits laid down in the Commission Regulation (EU) No 10/2011 apply to the use of this substance.
[6] For the purpose of reducing residual monomer content. Only in dispersions based on N-hydroxymethyl acrylamide used in the manufacture of material for wiping cloths that may come into contact with foodstuffs.

Sodium, potassium and ammonium salts of hydroxy fatty acids of chain length C_{12}-C_{20} and their sulfation or acetylation products
Alkyl sulfates, also as salts of triethanolamine
Alkyl(C_{10}-C_{20}) sulfonates
Alkyl(C_{10}-C_{20})-aryl sulfonates[7]
Dimethyldialkyl(C_8-C_{18}) ammonium chloride, max. 0.005 %, based on the dispersion film
Acyl-, alkyl-, oleyl- and alkylaryloxethylates and their sulfation products[7]
Sulfosuccinic acid-4-esters with polyethylene glycol nonylphenyl ether (di-sodium salt)
Lignosulfonic acid, as well as its calcium, magnesium, sodium and ammonium salts, in total, max. 0.04 mg/dm^2
Disodium dodecyl diphenylether disulfonate
Copolymers of ethylene oxide and propylene oxide with a minimum ethylene oxide content of 10 %
Lecithine, max. 1 %
Disodium-4-[1-methyl-2-[(1-oxo-9-octadecenyl)amino]ethyl]-2-sulfosuccinate, max. 0.8 mg/dm².
Sulfosuccinic acid-4-esters with polyethylene glycol ethers of mononhydric aliphatic alcohols of chain length C_{10}-C_{12} (di-sodium salt). Migration into foodstuff or food simulants, respectively must not exceed 2 mg/kg.
Sulfosuccinic acid-bis-cyclohexylester, sodium salt. Migration into foodstuff or food simulants, respectively must not exceed 5 mg/kg.
Alkali metal salts of esters of sulfosuccinic acid with aliphatic saturated monohydric alcohols of chain length C_4-C_{20}. Migration into foodstuff or food simulants, respectively must not exceed 5 mg/kg.
Migration of emulsifying agents from the coating of the finished product under normal condition of use must not exceed 5 mg/dm^2.

e) Stabilisers (neutralising agents and complexing agents):
Alkali metal salts of N-(2-hydroxyethyl)ethylenediamine-triacetic acid, in total max. 0.4 % in the dispersion film
Homopolymer of 2-acrylamido-2-methylpropanesulfonic acid and its sodium, potassium and ammonium salts, max. 2 % in the dispersion film

f) Substances which protect the dispersion against putrefaction:
The use of these substances must not result in the finished dispersion film having a preserving effect on foodstuffs.
o-Phenylphenol and its sodium and potassium salts, max. 0.3 %
3,5-Dimethyl-tetrahydro-1,3,5-thiadiazine-2-thione, max. 0.05 %.
1-(3-Chloroallyl)3,5,7-triazo-1-azonia-adamantane chloride[8]; no more than 0.05 mg/dm^2 of this substance may be present in the dispersion film.
2-Bromo-2-nitropropane-1,3-diol, max. 0.032 mg/dm^2 in dispersion film, this substance must not be detectable in extract of the finished product.
p-Chloro-m-cresol, max. 0.2 %
Titanium dioxide/silver chloride with 80 % titanium dioxide and 20 % silver chloride, max. 0.005 %
Adduct of 70 % benzyl alcohol and 30 % formaldehyde, max. 0.4 mg/dm²
3-Iodine-2-propinyl-butyl-carbamate, max. 0.02 %
1,2-Dibromo-2,4-dicyanobutane, max. 0.058 %
2,2-Dibromo-3-nitrilo-propionamide, max. 0.02 mg/dm²
Dodecylguanidine-hydrochloride, max. 0.03 %.

[7] In part permitted as an additive in accordance with the Commission Regulation (EU) No 10/2011.
[8] Migration of this substance into foodstuffs and aqueous simulants is regulated by the Commission Regulation (EU) No 10/2011

1,2-Benzisothiazolin-3-one[9]. No more than 80 µg/dm² of this substance may be present in the dispersion film.

As pasting agent no more than 0.6 mg/dm² 1,2-propandiole and dipropylene glycol together, and no more than 0.005 mg/dm² xanthane, may be used.

Mixture of 5-chloro-2-methyl-4-isothiazolin-3-one (3 parts) and 2-methyl-4-isothiazolin-3-one (1 part)[9], in total max. 4 µg/dm² in dispersion film

2-Methyl-4-isothiazolin-3-one[9], max. 40 µg/dm² in dispersion film

1,6-dihydroxy-2,5-dioxahexane, max. 29 µg/dm²,

Besides the aforementioned restrictions, in total dispersion films must contain no more than 0.5 % of these substances.

Tetrahydro-1,3,4,6-tetrakis-(hydroxymethyl)-imidazo(4,5-d)imidazole-2,5(1H,3H)-dione as formaldehyde donator system with an average ratio of formaldehyde: acetylene diurea of 3.1:1 to 3.5:1, max. 0.5 mg/dm² dispersion film, equivalent to a total formaldehyde content of 0.22 mg/dm².[10]

Zinc pyrithione, max. 8 µg/dm²

N-(3-Aminopropyl)-N-dodecylpropane-1,3-diamine. No more than 10 µg/dm² of this substance must be detectable in the extract of the finished product.

2,2'-dithiobis[N-methylbenzamide][9], max. 30 µg/dm²

2-Methyl-1,2-benzothiazol-3(2H)-one[9], max. 25 µg/dm².

g) Slip agents:

Paraffin DAB

Polyethylene, provided that it complies with Recommendation III[11].

Butyl stearate

Altogether, the aforementioned slip agents present in dispersion films must not exceed 1.0 %.

h) Defoaming agents:

Triisobutyl phosphate

Organopolysiloxanes with methyl and/or phenyl groups (silicone oil), inasmuch as their viscosity at 20 °C is no less than 100 Centistokes.

Condensation product of linear or branched organopolysiloxane polyalkyleneglycol monoalkyl ethers according to Section I, No. 1 of amended Recommendation XV, max. 0.04 %.

Bis-stearoyl ethylene diamine may be used up to a maximum of 0.015 mg/dm² in the dispersion film as stabiliser for the aforementioned defoaming agents.

The dispersion films must not contain in total more than 0.1 % of the above defoaming agents.

i) Antioxidants:

Bis-[(3-cyclohexyl-5-methyl-2-hydroxy)phenyl]-methane

Bis-[3-(1-methylcyclohexyl)-5-methyl-2-hydroxy-phenyl]-methane

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[9] The restrictions refer to the application in dispersions. An additional contribution from other applications (e. g. as slimicide or as preservative in the paper production or in printing inks) must comply with the restrictions laid down for these fields. In the extracts of the final products the following levels must not exceeded:
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/dm²
1,2-Benzisothiazolin-3-one: 80 µg/dm²
2-methyl-4-isothiazolin-3-one: 80 µg/dm²
2,2'-dithiobis[N-methylbenzamide] and its hydrolysis products 2-methyl-1,2-benzothiazol-3(2H)-one and 2-mercapto-N-methylbenzamide in total no more than 30 µg/dm², determined in dimethyl sulfoxide extract.

[10] brief description: Tetramethylolacetylenediurea (tetramethylolglycoluril) in chemical equilibrium with trimethylolacetylenediurea, dimethylolacetylenediurea, monomethylolacetylenediurea and formaldehyde.

[11] Recommendation III. "Polyethylene"

2,6-Di-tert-butyl-4-methylphenol
2,2'-Methylene-bis-(4-ethyl-6-tert-butylphenol)
Phenol and/or cresols, converted with styrene or methylstyrene and/or olefins of chain length C_3-C_{12}
Styrenated diphenylamine
Tris(nonylphenyl)phosphite[8], i.e. tris-(mono-nonylphenyl)-phosphite[8], also mixed with tris-(di-nonylphenyl)-phosphite[8, 12]
Triethyleneglycol-bis[3-(3-tert-butyl-4-hydroxy-5-methyl-phenyl)propionate], max. 0.25 %
The dispersion films must not contain in total more than 1.0 % of the above antioxidants.

j) Antistatic agents:
N,N-Bis(2-hydroxyethyl)alkyl-(C_{12}-C_{18})amines[8], max. 2.0 mg/dm^2 coated commodity surface made from dispersions of vinylidene chloride copolymer. Commodities treated with this antistatic agent must not come into contact with liquid foodstuffs.

Part B: Polymer dispersions for the manufacture of cheese coatings not meant to be eaten

If the following Recommendations are fully complied with, it may be assumed that the obligatory care necessary in the manufacture, treatment and putting into circulation of polymer dispersions for cheese coatings has been taken.
It is recommended that only the following substances be used in the manufacture of polymer dispersions:

1. Monomers

Ethylene
Vinyl esters of saturated fatty acids of chain length C_2-C_{18}
Esters of maleic acid and fumaric acid with monohydric aliphatic saturated alcohols of chain length C_4-C_8
Acrylic acid esters of monohydric aliphatic saturated alcohols of chain length C_4-C_8
Mixture of α-olefins C_{14}-C_{16}

2. Catalysts

Hydrogen peroxide
Potassium, sodium and ammonium peroxydisulfate
Peroxides of even-numbered saturated aliphatic monocarboxylic acids of chain length C_8-C_{12}
tert-Butyl-hydroperoxide
Di-tert-butyl peroxide
Diisopropyl peroxycarbonate
tert-Butylperoxy-(2-ethylhexanoate)
Iron-III-chloride, max. 0.06 %
The finished cheese coating material must not test positively for peroxides[3].

3. Emulsifying agents

Sodium lauryl sulfate

[12] Purity requirements for tris(nonylphenyl)phosphite: see 76th Communication in Bundesgesundheitsblatt 15 (1972) 139.

Sodium laurylethersulfate, ethoxylated (3 ethylene oxide groups)
Polyethylene glycol ether of oleylalcohol (4 - 20 ethylene oxide groups)

4. **Defoaming agents**

   Dimethylpolysiloxanes (Mw > 6,800 D)

5. **pH regulator and polymerisation aids**

   Alkali metal salts of oxymethane sulfinic acid, max. 0.25 %
   Sodium and ammonium bisulfite
   Sodium dithionite
   Isoascorbic acid
   Urea, max. 0.75 %
   Formic acid
   Acetic acid
   Citric acid
   Tartaric acid
   Hydrochloric acid
   Ascorbic acid
   Ammonia
   Sodium hydroxide
   Potassium hydroxide
   Sodium and potassium carbonate and hydrogencarbonate

6. **Protective colloids and thickening agents**

   Lactose
   Silicon dioxide
   Hydroxyethyl cellulose
   Methylcellulose
   Hydroxyethylmethyl cellulose
   Carboxymethyl cellulose
   Polyvinyl alcohol (viscosity of 4 % aqueous solution at 20 °C, when used as a protective colloid, min. 2 cP; when used as a thickening agent, min. 4 cP)
   Polyvinyl pyrrolidone
   Xanthane

7. **Dyes**, alone or in combination, which are permitted in the Regulation on Food Additives (Verordnung zur Neuordnung lebensmittelrechtlicher Vorschriften über Zusatzstoffe), as well as naturally coloured foodstuffs.

8. **Preserving agents**, which are permitted in the Regulation on Food Additives (Verordnung zur Neuordnung lebensmittelrechtlicher Vorschriften über Zusatzstoffe).