German Federal Institute for Risk Assessment

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XLIV. Artificial Sausage Casings

As of 01.10.2014

Artificial sausage casings[1], not intended to be eaten, are commodities in the sense of § 2, Para. 6, No 1 of the Food and Feed Code (Lebensmittel- und Futtermittelgesetzbuch). There are no objections to their use, provided they are suitable for their intended purpose and comply with the following conditions[2]:

I. Artificial casings of cellulose hydrate (cellophane)

A. Base film

1. Base substances
Only the following base substances may be used:
   a) Regenerated cellulose
   b) Regenerated cellulose strengthened with natural or synthetic fibres based on cellulose, or with wet-strengthened fibres based on cellulose, provided they comply with amended Recommendation XXXVI/1[3,4].

2. Moisturisers
Only the following moisturisers may be used:
   a) Glycerol
   b) Tri- and polyethyleneglycol with a monoethyleneglycol content of no more than 0.2 %; however, only in association with a coating after Section B, No 1, in total, max. 27.5 %
   c) 1,2-Propanediol[5], max. 6.0 %

3. Opacifiers and lubricants
Only the following opacifiers and lubricants may be used:
   a) Titanium dioxide, max. 10 %
   b) Liquid paraffin[6], max. 10 %

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[1] In DIN 55 405 "artificial casing" is defined as "ein zur Aufnahme von Lebensmitteln ohne Freiraum vorgesehener Schlauch bestimmter Länge aus umgeformtem Natur- oder Kunststoff oder aus Kombinationen beider, der nach Abdrillen oder Falzen durch Kordel, Clip oder Abnähen verschlossen wird und zum Mitverzehr weder bestimmt noch geeignet ist".
Artificial casing that is virtually air-tight must also have an air-tight seal.

[2] The quantities given in this Recommendation, if not otherwise stated, refer to artificial casings that have been conditioned for at least 72 hours under normal climatic conditions (50 ± 5 % relative humidity and 23 ± 2 °C) to constant weight. (50 % relative humidity is achieved in the atmosphere of a desiccator in equilibrium with a solution of 43 % sulfuric acid). If the manufacturer's instructions prescribe soaking the artificial casings before they are filled with sausage mixture, the analytical tests must be conducted on the artificial casings after they have been soaked in accordance with these instructions and subsequently conditioned as described above.

[3] Recommendation XXXVI/1. "Cooking Paper, Hot Filter Paper and Filter Layers"

[4] Polyvinyl alcohol (viscosity of 4 % aqueous solution at 20 °C, min. 10 cP) can be used as binding agent for wet-strengthened, cellulose-based fibres that comply with Recommendation XXXVI/1.

[5] 1,2-Propanediol must meet the purity requirements of Regulation (EU) No. 1333/2008.

[6] The liquid paraffins must comply with the "Purity requirements for liquid paraffins" in the 155th Communication of Bundesgesundheitsblatt 25 (1982) 192.

c) Triglyceride mixtures of saturated vegetable fatty acids of medium chain length, max. 10 %.

The following processing aids (emulsifiers) may be added:

Polyoxyethylene-(20)-sorbitan monolaurate
Polyoxyethylene-(20)-sorbitan monooleate
Sorbitan monolaurate
} in total max. 0.2 mg/dm^2

4. Residues of production aids

a) Ash content of the films must not exceed 0.5 %. For films opacified with titanium oxide (compare No 3a), this limit is increased by the amount of titanium oxide added.
b) or content of the films must not exceed 0.15 %.
c) Copper content of films must not exceed 0.015 %.

5. Surface refining agents

Only the following substances may be used as surface refining agents; however, those listed under a) – d), may only be used in conjunction with a coating after Section B, No 1:

a) Melamine-formaldehyde resins, provided that in the extract from the finished artificial casing in total no more than 0.5 mg of chemically not bounded formaldehyde per dm^2 of exposed surface area are detectable.[7]
b) Urea-formaldehyde resins, provided that in the extract from the finished artificial casing in total no more than 0.5 mg of chemically not bounded formaldehyde per dm^2 of exposed surface area are detectable.[7]
c) Cross-linked cationic polyalkylene amines (polyamine or polyamide-epichlorohydrin resins), provided that their harmlessness to health has been demonstrated
d) Polyalkyleneimines (ethyleneimine-free)
e) Maleic acid, lactic acid, formic acid, citric acid[8] and their alkali metal salts. Formic acid and its compounds must not be detectable in the finished product.
f) Saturated and unsaturated fatty acids of chain length C_{16}-C_{30} and their aluminium, calcium and magnesium salts.

} in total max. 0.5 mg/ dm^2

g) Plasticizer-free polyvinyl chloride and plasticizer-free copolymers of vinyl chloride, provided they comply with amended Recommendation II[9].
h) Aluminium oxide, calcium carbonate, silicic acid (SiO_2), kaolin
i) Hard paraffins, microcrystalline waxes and mixtures of these with waxes, resins and plastics, provided they comply with amended Recommendation XXV, Part I[10].
j) Carboxymethyl cellulose
k) Methyl cellulose
l) Hydroxyethyl cellulose
m) Mixed ethers of substances listed under k) and l)
n) Alginates

} in total max. 5 mg/dm^2

o) Silicone oils and resins, provided they comply with Sections I and II of amended Recommendation XV[11], max. 5 mg per dm^2

[7] In the production of artificial casings made of cellulose hydrate, from all the production aids and additives based on formaldehyde condensation products that are used, including those possibly contained in coatings after Section I B, No 1, in total, no more than 0.5 mg formaldehyde per dm^2 of exposed surface area must transfer to the extract.

[8] These acids act as catalysts in the manufacture of formaldehyde condensation products.

[9] Recommendation II. "Plasticizer-free Polyvinyl chloride, Plasticizer-free Copolymers of Vinyl Chloride and Mixtures of these Polymers with other Copolymers and Chlorinated Polyolefins Containing Mainly Vinyl Chloride in the Total Mixture"

[10] Recommendation XXV. " Hard Paraffins, Microcrystalline Waxes and Mixtures of these with Waxes, Resins and Plastics ".

p) Chromium(III) chloride complex with stearic or myristic acid, max. 0.3 mg chromium (Cr) per dm^2. The aqueous migration solution must contain no more than 1.5 µg chromium (Cr) per dm^2.

6. Preservatives:
Potassium sorbate, max. 0.03 %
Peroxyacetic acid in 0.05 % aqueous solution
Artificial casings made of cellulose hydrate and treated with the aforementioned substances must have no preserving effect on the foodstuffs.

B. Coatings

The following may be used to coat the base film:

1. Plastics (films, molten masses, solutions, varnishes, dispersions), provided they comply with the corresponding BfR Recommendations.

2. Protein, hardened with max. 5 % glyoxal. One kilogram of finished artificial casing, coated with hardened protein, must contain no more than 100 mg of chemically unbound glyoxal. Extract from the finished artificial casing must contain no more than 0.1 mg of chemically unbound glyoxal per dm^2 surface area.

3. Dispersions of polyvinylidene chloride after Recommendation XIV[13] with an acetyltributyl citrate content of max. 10 %, based on solids content of the coating. Weight of the coating must not exceed 100 mg/dm^2.

II. Artificial casings made of real parchment

A. Base materials

Only the following may be used in producing the base materials:

1. Fibres:
Bleached fibres of natural cellulose

2. Fillers:
a) Silicates of aluminium, calcium and magnesium } in total
b) Titanium dioxide } max. 5 %

3. Inorganic production aids:
a) Aluminium sulfate
b) Sodium aluminate
c) Sulfuric acid
d) Ammonia

[11] Recommendation XV. "Silicones"
[13] Recommendation XIV. "Plastics Dispersions "

e) Sodium carbonate

The pH of extract from 5 g of the base material in 100 ml of water must be no greater than 8.

B. Coatings

Plastics (films, molten masses, solutions, varnishes, dispersions), may be used to coat the base material, provided they comply with the corresponding BfR Recommendations.

III. Artificial casings made of protein-coated woven fabric

A. Base material

Only the following fibres may be used as base material:

1. Filaments of regenerated cellulose
2. Filaments of polyamides, provided they comply with Recommendation X[14]; however, the additives listed under No 3 of Recommendation X must not be used.
3. Silk filaments
4. Cotton filaments

B. Coating:

The following substances may be used to produce the coating:

1. Protein (collagen)

2. Production aids and additives:
   a) Glycerol
   b) Sorbitol
   c) Carboxymethyl cellulose
   d) Polyvinyl alcohol (viscosity of 4 % aqueous solution at 20 °C, min. 10 cp)

   } in total max. 30 %, based on finished product

   e) Sorbitan monolaurate and/or polyoxyethylene(20) sorbitan monostearate, in total, max. 20 mg/dm^2
   f) Glycerol esters of natural fatty acids, max. 200 mg/dm^2
   g) Chromium(III) chloride complex with stearic or myristic acid, max. 0.05 mg Chromium(Cr) per dm^2. In the aqueous migration solutions no more than 1.5 µg chromium (Cr) per dm^2 must be detectable.
   h) Formaldehyde, provided 1 kg of finished artificial casing contains no more than 1 g of chemically unbound formaldehyde. The transfer of formaldehyde to foodstuffs is subject to the Commission Regulation (EU) No 10/2011.
   i) Glyoxal, provided 1 kg of finished artificial casing contains no more than 1.5 g of chemically unbound glyoxal. Extract from the finished artificial casing must contain no more than 4.0 mg of chemically unbound glyoxal per dm^2 of surface area.
   j) Aqueous solution of condensates obtained by carbonising sawdust in the presence of air and condensing the reaction products, provided that 1 kg of the finished artificial casing contains no more than 1.0 g of chemically unbound condensate components. Extract from the finished arti-

[14] Recommendation X. "Polyamides"

ficial casing must contain no more than 0.5 mg of chemically unbound condensate components per dm^2 of surface area.

k) Hydrochloric acid
l) Acetic acid
m) Ammonia
n) Ammonium chloride
o) Ammonium sulfate
p) Ammonium aluminium sulfate
q) Calcium chloride
r) Sodium chloride

} in total max. 50 g/kg artificial gut

The pH of extract from 5 g of the finished (smoked) artificial casing in100 ml of water must be between 2.5 and 8.0.

IV. Artificial casings made of hardened protein

A. Base film

1. Base substances

Only the following base substances may be used:

a) Hardened collagen
b) Hardened collagen with cellulose fibres, provided they comply with amended Recommendation XXXVI/1[3].
c) Hardened collagen with polyamide fibres, provided they comply with Recommendation X[14]; however, the additives listed under No 3 of Recommendation X must not be used.
d) Hardened collagen with fibres of polyterephthalic acid diol esters, provided they comply with Recommendation XVII[15].

2. Moisturisers

Only the following may be used as moisturisers:

a) Glycerol
b) Sorbitol

In total max. 20 %

3. Production aids

The following production aids may be used to produce the base film:

a) Formaldehyde
   The transfer of formaldehyde to foodstuffs is subject to the Commission Regulation (EU) No 10/2011.
b) Aqueous solution of condensates obtained by carbonising sawdust in the presence of air and condensing the reaction products, provided that 1 kg of the finished artificial gut contains no more than 1.0 g of chemically unbound condensate components. Extract from the finished artificial casing must contain no more than 0.5 mg of chemically unbound condensate components per dm^2 of surface area
c) Glutaraldehyde, max. 0.1 %, as hardening or cross-linking agent. One kilogram of finished product must contain no more than 50 mg glutaraldehyde.

[15] Recommendation XVII. "Poly(terephthalic acid diol esters)".

B. Coatings

The following may be used to coat the base film; in total, max. 20 g/kg artificial casing:
1. Calcium alginate
2. Polyvinyl pyrrolidone (mol. wt. 20 000 – 200 000). The polyvinyl pyrrolidone must not contain more than 0.8 % monomeric vinyl pyrrolidone.
3. Carboxymethyl cellulose

V. Artificial casings made from plastic-coated woven fabric

A. Base material

1. Filaments of regenerated cellulose
2. Opacifiers and lubricants
   a) Titanium dioxide, max. 10 %
   b) Liquid paraffin[6]
3. Cotton fibres

B. Coatings

Plastics (films, molten masses, solutions, varnishes, dispersions), may be used to coat the base film, provided they comply with the Commission Regulation (EU) No 10/2011 and with the corresponding BfR Recommendations.

VI. Artificial casings made from protein-coated woven fabric of polyamide or polyterephthalic acid diol esters

A. Base material

Base material must comply with Commission Regulation (EU) No 10/2011 and with Recommendation X and XVII.

B. Coating

Only the following substances may be used to produce the coating:
1. Protein (gelatine)
2. Production aids and additives
   a) Glycerol
   b) Carboxymethyl cellulose
   c) Glyoxal

General requirements
If colorants are used to colour the artificial casings, they must comply with the requirements of amended Recommendation IX[16].

[16] Recommendation IX. "Colorants for Plastics and other Polymers Used in Commodities".