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(2) *Thermogravimetry.* Perfluorocarbon cured elastomers have a major decomposition peak occurring at 490 ° ±15 °C (914 °F). Less than 1.5 percent of the elastomers will volatilize below 400 °C (752 °F) when run under nitrogen at a 10 °C or 18 °F per minute heating rate using a Du Pont Thermal Analyzer Model 1099 with Model 951 TGA unit or the equivalent.

(d) *Extractive limitations.* Articles fabricated from perfluorocarbon cured elastomers having a thickness of at least 1.0 millimeter (0.039 inch) when extracted at reflux temperatures for 2 hours separately with distilled water, 50 percent ethanol, and *n*-heptane, shall meet the following extractability limits:

(1) Total extractives not to exceed 3.1 milligrams per square decimeter (0.2 milligrams per square inch).

(2) Fluoride extractives calculated as fluorine not to exceed 0.47 milligram per square decimeter (0.03 milligram per square inch).

(e) *Conditions of use.* In accordance with current good manufacturing practice, finished food contact articles containing the perfluorocarbon cured elastomers shall be thoroughly cleaned prior to their first use in contact with food.

[49 FR 43050, Oct. 26, 1984]

§177.2410 Phenolic resins in molded articles.

Phenolic resins identified in this section may be safely used as the food-contact surface of molded articles intended for repeated use in contact with nonacid food (pH above 5.0), in accordance with the following prescribed conditions:

(a) For the purpose of this section, the phenolic resins are those produced when one or more of the phenols listed in paragraph (a)(1) of this section are made to react with one or more of the aldehydes listed in paragraph (a)(2) of this section, with or without aniline

and/or anhydro-formaldehyde aniline (hexahydro-1, 3,5-triphenyl-s-triazine):

(1) *Phenols:*

- p*-*tert*-Amylphenol.
- p*-*tert*-Butylphenol.
- o*-, *m*-, and *p*-Cresol.
- p*-Octylphenol.
- Phenol.
- o*- and *p*-Phenylethylphenol mixture produced when phenol is made to react with styrene in the presence of sulfuric acid catalyst.

(2) *Aldehydes:*

- Acetaldehyde.
- Formaldehyde.
- Paraldehyde.

(b) Optional adjuvant substances employed in the production of the phenolic resins or added thereto to impart desired technical or physical properties include the following:

Asbestos fiber.	
Barium hydroxide	For use as catalyst.
Calcium stearate	For use as lubricant.
Carbon black (channel process).	
Diatomaceous earth.	
Glass fiber.	
Hexamethylenetetramine	For use as curing agent.
Mica.	
Oxalic acid	For use as catalyst.
Zinc stearate	For use as lubricant.

(c) The finished food-contact article, when extracted with distilled water at reflux temperature for 2 hours, using a volume-to-surface ratio of 2 milliliters of distilled water per square inch of surface tested, shall meet the following extractives limitations:

(1) Total extractives not to exceed 0.15 milligram per square inch of food-contact surface.

(2) Extracted phenol not to exceed 0.005 milligram per square inch of food-contact surface.

(3) No extracted aniline when tested by a spectrophotometric method sensitive to 0.006 milligram of aniline per square inch of food-contact surface.

(d) In accordance with good manufacturing practice, finished molded articles containing the phenolic resins shall be thoroughly cleansed prior to their first use in contact with food.

§177.2420 Polyester resins, cross-linked.

Cross-linked polyester resins may be safely used as articles or components

of articles intended for repeated use in contact with food, in accordance with the following prescribed conditions:

(a) The cross-linked polyester resins are produced by the condensation of one or more of the acids listed in paragraph (a)(1) of this section with one or more of the alcohols or epoxides listed in paragraph (a)(2) of this section, followed by copolymerization with one or more of the cross-linking agents listed in paragraph (a)(3) of this section:

(1) Acids:

- Adipic.
- Fatty acids, and dimers thereof, from natural sources.
- Fumaric.
- Isophthalic.
- Maleic.
- Methacrylic.
- Orthophthalic.
- Sebacic.
- Terephthalic.
- Trimellitic.

(2) Polyols and polyepoxides:

- Butylene glycol.
- Diethylene glycol.
- 2,2-Dimethyl-1,3-propanediol.
- Dipropylene glycol.
- Ethylene glycol.
- Glycerol.
- 4,4'-Isopropylidenediphenol-epichlorohydrin.
- Mannitol.
- α*-Methyl glucoside.

- Pentaerythritol.
- Polyoxypropylene ethers of 4,4'-isopropylidenediphenol (containing an average of 2-7.5 moles of propylene oxide).
- Propylene glycol.
- Sorbitol.
- Trimethylol ethane.
- Trimethylol propane.
- 2,2,4-Trimethyl-1,3-pentanediol.

(3) Cross-linking agents:

- Butyl acrylate.
- Butyl methacrylate.
- Ethyl acrylate.
- Ethylhexyl acrylate.
- Methyl acrylate.
- Methyl methacrylate.
- Styrene.
- Triglycidyl isocyanurate (CAS Reg. No. 2451-62-9), for use only in coatings contacting bulk quantities of dry food of the type identified in §176.170(c) of this chapter, table 1, under type VIII.
- Vinyl toluene.

(b) Optional adjuvant substances employed to facilitate the production of the resins or added thereto to impart desired technical or physical properties include the following, provided that the quantity used does not exceed that reasonably required to accomplish the intended physical or technical effect and does not exceed any limitations prescribed in this section:

List of substances	Limitations (limits of addition expressed as percent by weight of finished resin)
1. Inhibitors: Benzoquinone <i>tert</i> -Butyl catechol TBHQ. Di- <i>tert</i> -butyl hydroquinone. Hydroquinone.	Total not to exceed 0.08 percent. 0.01 percent.
2. Accelerators: Benzyl trimethyl ammonium chloride Calcium naphthenate. Cobalt naphthenate. Copper naphthenate. <i>N, N</i> -Diethylaniline <i>N, N</i> -Dimethylaniline Ethylene guanidine hydrochloride	Total not to exceed 1.5 percent. 0.05 percent. 0.4 percent. Do. 0.05 percent.
3. Catalysts: Azo-bis-isobutyronitrile. Benzoyl peroxide. <i>tert</i> -Butyl perbenzoate. Chlorbenzoyl peroxide. Cumene hydroperoxide. Dibutyltin oxide (CAS Reg. No. 818-08-6)	Total not to exceed 1.5 percent, except that methyl ethyl ketone peroxide may be used as the sole catalyst at levels not to exceed 2 percent.
Dicumyl peroxide. Hydroxybutyltin oxide (CAS Reg. No. 2273-43-0)	For use in the polycondensation reaction at levels not to exceed 0.2 percent of the polyester resin. For use in the polycondensation reaction at levels not to exceed 0.2 percent of the polyester resin.
Lauroyl peroxide. <i>p</i> -Menthane hydroperoxide. Methyl ethyl ketone peroxide.	

List of substances	Limitations (limits of addition expressed as percent by weight of finished resin)
Monobutyltin tris(2-ethylhexoate) (CAS Reg. No. 23850-94-4). 4. Solvents for inhibitors, accelerators, and catalysts: Butyl benzyl phthalate (containing not more than 1.0 percent by weight of dibenzyl phthalate). Dibutyl phthalate. Diethylene glycol Dimethyl phthalate. Methyl alcohol. Styrene. Triphenyl phosphate. 5. Reinforcements: Asbestos. Glass fiber. Polyester fiber produced by the condensation of one or more of the acids listed in paragraph (a)(1) of this section with one or more of the alcohols listed in paragraph (a)(2) of this section. 6. Miscellaneous materials: Castor oil, hydrogenated. α-Methylstyrene. Polyethylene glycol 6000. Silicon dioxide. Wax, petroleum	For use in the polycondensation reaction at levels not to exceed 0.2 percent of the polyester resin. As a solvent for benzyl trimethyl ammonium chloride or ethylene guanidine hydrochloride only. Complying with § 178.3710 of this chapter.

(c) The cross-linked polyester resins, with or without the optional substances described in paragraph (b) of this section, and in the finished form in which they are to contact food, when extracted with the solvent or solvents characterizing the type of food and under the conditions of time and temperature characterizing the conditions of their intended use, as determined from tables 1 and 2 of §176.170(c) of this chapter, shall meet the following extractives limitations:

(1) Net chloroform-soluble extractives not to exceed 0.1 milligram per square inch of food-contact surface tested when the prescribed food-simulating solvent is water or 8 or 50 percent alcohol.

(2) Total nonvolatile extractives not to exceed 0.1 milligram per square inch of food-contact surface tested when the prescribed food-simulating solvent is heptane.

(d) In accordance with good manufacturing practice, finished articles containing the cross-linked polyester resins shall be thoroughly cleansed prior to their first use in contact with food.

[42 FR 14572, Mar. 15, 1977, as amended at 48 FR 37618, Aug. 19, 1983; 54 FR 48858, Nov. 28, 1989]

§177.2430 Polyether resins, chlorinated.

Chlorinated polyether resins may be safely used as articles or components of articles intended for repeated use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food, in accordance with the following prescribed conditions:

(a) The chlorinated polyether resins are produced by the catalytic polymerization of 3,3-bis(chloromethyl)oxetane, and shall contain not more than 2 percent residual monomer.

(b) In accordance with good manufacturing practice, finished articles containing the chlorinated polyether resins shall be thoroughly cleansed prior to their first use in contact with food.

§177.2440 Polyethersulfone resins.

Polyethersulfone resins identified in paragraph (a) of this section may be safely used as articles or components of articles intended for repeated use in contact with food in accordance with the following prescribed conditions:

(a) For the purpose of this section, polyethersulfone resins are:

(1) Poly(oxy-*p*-phenylenesulfonyl-*p*-phenylene) resins (CAS Reg. No. 25667-42-9), which have a minimum number average molecular weight of 16,000.