SRI LANKA STANDARD 871 : PART 6 : 1992

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CODE FOR USE OF PLASTIC MATERIALS FOR FOOD CONTACT APPLICATIONS

PART 6 : POLYSTYRENE (PS)

SRI LANKA STANDARDS INSTITUTION

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PART 6 : POLYSTYRENE (PS)

SLS 871 : 1992

Gr. 7

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

WORKING GROUP ON FOOD PACKAGING MATERIALS

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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

CODE FOR USE OF PLASTIC MATERIALS FOR FOOD CONTACT APPLICATIONS

PART 6 : POLYSTYRENE (PS)

FOREWORD

This standard was approved by the Sectoral Committee on Plastics was authorized for adoption and publication as a Sri Lanka Standard by the council of the Sri Lanka Standards Institution on 1993-06-17.

Plastics are widely used in the manufacture of food packaging materials, food utensils and components of food processing equipment. The plastic materials used for food contact aplications are referred to as "food grade" plastics. It is generally accepted that the high molecular weight of polymers make them essentially inert and insoluble in food and therefore do not pose toxic hazards. However, polymers may contain residues of monomers, low molecular weight polymers, processing aids and substances which are added to the polymer to modify its physical, mechanical or other properties during, processing or usage. These residues may migrate into the food which is in contact with the polymer. Therefore, it is essential that the plastic materials and other additives used be such that any migration into food from such materials is minimized.

The extent to which the migration occurs is dependent on the type of plastic, contact area, rate of transfer of compounds, duration of contact and the type of food which is in contact with the plastic materials.

Good manufacturing practices should be followed throughout the manufacturing process, supply and usage of plastic materials for food contact applications.

This part is one of a series of standard codes for use of plastic materials for food contact applications. Other parts in this series are :

Part 1 : General guidlines for manufacture;
Part 2 : Polyvinyl chloride (PVC);
Part 3 : Polyethylene (PE);
Part 4 : Polypropylene (PP); and
Part 5 : Polyethylene phthalate (PET).

This part covers polymers, processing aids and additives permitted for use in the manufacture and processing of polystyrene plastics for food contact applications. All permitted substances used should be of high standard of purity.

The users of polystyrene plastics for food contact applications are advised that a written assurance or where necessary a test report be requested from the suppliers to ensure that the material contains only the permitted ingredients specified in this code. It should be noted that substances specified under permitted additives may have been incorporated in the polymer as supplied by the manufacturer in compliance with the specified levels. Therefore, formulators or processers intending to use additives in the polymers should take care not to exceed the maximum level of use specified in this code.

Inclusion of additional substances to be used in the manufacture and processing of polystyrene would be considered as and when required provided that the safe use of such substances is established by the toxicological and migration studies.

In the preparation of this code the assistance derived from the following publication is gratefully acknowledged :

Plastics for Food Contact Applications, Revised edition 1986, The British Plastic Federation and The British Industiral Biological Research Association.

1 SCOPE

1.1 This code prescribes the polymers, manufacturing aids and additives permitted in polystyrene (PS) used for food contact applications.

1.2 The permissible limits for residual monomers, manufacturing aids and additives present in the finished polymer/final compounds are also specified.

1.3 Polystyrene plastics intended for use in drug contact applications, medical preparations and toiletry products and pipes and fittings for water supply and expanded polystyrene (EPS) plastics are not covered by this code.

2 REFERENCES

SLS 616 Glossary of terms for plastics.
SLS 871 Code for use of plastic materials for food contact applications
Part .....Colorants.*

3 DEFINITIONS

For the purposes of this code, the definitions given in SLS 616 shall apply.

* *(under preparation)*

4 REQUIREMENTS

4.1 Composition of polystyrene

Polystyrene shall be manufactured from polymers specified in 4.2 such that the finished polymer conforms to the requiremets given in 4.1.1, and 4.1.2.

4.1.1 The finished polymer shall not contain ingredients or residues of ingredients other than those specified in 4.3 and 4.4.

4.1.2 The total content of residual styrene and substituted styrene monomers shall be not more than 0.5 per cent by mass of the finished polymer and total content of other residual monomers and non-polymerisable volatile organic constituents of the monomers shall be not more than 0.2 per cent by mass of the finished polymer.

4.2 Permitted basic homopolymers and copolymers

4.2.1 *Homopolymers of styrene*

4.2.2 Copolymers of styrene containing not less than 50 per cent by mass styrene or substituted styrene with one or more of the following:

a) Styrene substituted in benzene ring or the vinyl group by alkyl groups;
b) Acrylic, fumaric, itaconic, maleic or methacrylic acid;
c) Esters of the acid given in c) with saturated monohydric aliphatic alcohols (C_1 - C_8);
d) Vinyl esters of monobasic aliphatic acids;
e) Butadiene;
f) Divinyl benzene;
g) Ethylene, propylene, butene or isobutene; and
h) Vinyl ethers of saturated monohydric aliphatic alcohols.

4.2.3 *Blends of the polymers specified in 4.2.1 and 4.2.2.*

4.2.4 Mixtures (see note) of the polymers specified in 4.2.1 and 4.2.2 with one or more of the following to a level of not more than 50 per cent by mass of the finished polymer :

a) Polybutadiene;
b) Butadiene copolymer rubbers;
c) Polyisoprene;
d) Ethylene/propylene copolymer rubbers;
e) Ethylene/propylene/non-conjugated diene terpolymer rubbers;
f) Homopolymer or copolymer rubbers of acrylic acid esters with monohydric saturated aliphatic alcohols;
g) Ethylene - vinyl acetate copolymer rubbers; and
h) Isobutene/isoprene copolymer rubbers.

NOTE
The term mixture refers solely to the two phase nature of the final composition.

4.3 Permitted manufacturing aids

4.3.1 *Catalysts*

The total residues of catalysts and their decomposition products unbound to polymer shall be less than 0.2 per cent by mass of the polymer. The residues of the following catalysts may be present :

a) Aliphatic acid peroxides (C_6 -C_{16});
b) Azo-bis-cyclohexanoyl carbonitrile;
c) Azo-bis-iso-butyronitrile;
d) Benzoyl peroxide;
e) 2,2 - Bis (tert.-butyl peroxy) butane;
f) 2,2 -Bis (tert.-butyl peroxy) hexane;
g) tert.-Butyl hydroperoxide;
h) tert.-Butyl peracetate;
j) tert.-Butyl perbenzoate;
k) tert.-Butyl peroxy diethyl acetate;
1) Cumine hydroperoxide;
m) Dicumyl peroxide;
n) Di-tert.-butyl peroxide; and
p) Potassium persulfate.

4.3.2 *Emulsifying agents*

The total residues of emulsifying agents shall be less than 0.2 per cent by mass of the finished polymer. The residues of the following emulsifying agents may be present.

a) Alkyl and alkylaryl sulfates of sodium, potassium and ammonium, the alkyl group containing C_{10} - C_{20} ;
b) Alkyl and alkylaryl sulfonates of sodium, potassium and ammonium, the alkyl group containing C_{10} - C_{20};
c) Products of condensation of ethylene oxide and monobasic aliphatic acids (C_{12} - C_{20}) and their sodium and ammonium sulfates;
d) Products of condensation of ethylene oxide and monohydric aliphatic alcohols (C_{12} - C_{20}) and their sodium and ammonium sulfates;
e) Products of condensation of ethylene oxide with phenols having alkyl groups C_7 and above and their sodium and ammonium sulfates;
f) Polyethylene glycol free of ethylene glycol and diethylene glycol and having a molecular weight not less than 300 ;
g) Polyethylene glycol mono-oleate;
h) Sodium stearate and stearic acid; and
j) Sodium salt of naphthalene sulfonic acid/formaldehyde condensate.

4.3.3 *Suspension agents*

The total residues of suspension agents shall be less than 0.2 per cent by mass of the finished polymer. The residues of the following suspension agents may be present :

a) Acetic acid;
b) Bentonite;
c) Calcium chloride;
d) Calcium and sodium phosphates;
e) Dicalcium hydrogen phosphate;
f) Gelatine;
g) Hydroxyethyl cellulose;
h) Magnesium sulfate;
j) Phosphoric acids
k) Polyacrilic acids and their sodium salts;
l) Poly-N-vinyl pyrrolidone;
m) Polyvinyl acetate;
n) Polyvinyl alchol having a minimum viscosity of 4 centipoise at 20°C in 4 per cent aqueous solution;
p) Potassium chloride;
q) Sodium acetate;
r) Sodium chloride;
s) Sodium dioctyl sulfo succinate;
t) Sodium nonyl phosphate;
u) Sodium sulfate; and
v) Tricalcium phosphate.

4.3.4 *Miscellaneous polymerisation additives*

The total residues of inhibitors, process antioxidants and chain transfer agents unbound to the polymer shall be less than 0.4 per cent by mass of the finished polymer. The residues of the following may be present:.

4.3.4.1 Inhibitors

4-tert.-Butyl catechol (maximum 0.08 per cent)

4.3.4.2 Process antioxidants

a) 2,6 Di-tert.-butyl-p-cresol;
b) 2,2 Methylene-bis (4 methyl 6-tert.-butyl phenol); and
c) Tri-(nonylphenyl) phosphite.

4.3.4.3 Chain transfer agents

The residues of the following chain transfer agents shall be reduced to the lowest level practically possible :

a) Alkyl mercaptans;
b) Alpha-methyl styrene dimer; and
c) Terpinolene.

4.4 Permitted additives

4.4.1 *Colorants*

Colorants used shall conform to SLS 871 : Part ..... Colorants (under preparation)

4.4.2 *Other additives*

Any additive given in Table 1 may be present upto the maximum limit specified in Column 3 of the table.

TABLE 1 - Additives that may be used in polystyrene

Sl. No.	Chemical name or type	Maximum level of use in final compound, %, m/m	Food type	Form or product	Limitations (see Notes)
(1)	(2)	(3)	(4)	(5)	(6)
i.	Aluminium silicate	50	All*	All**	
ii.	Aluminium stearate	3	All	All	
iii.	Behenic acid	1	All	All	
iv.	2,5-Bis (5'-tert.-butyl benzoxalyl (2)) thiophene	0.02	All	All	
v.	N,N-Bis (2-hydroxyethyl) alkyl (C_{12} - C_{18}) amine	0.1	All	All	
vi.	2,4-Bis (n-octylthio) -6-(4'hydroxy-3',5'-di-tert.-butylanilino) 1,3,5 -triazine	0.1	All	All	
vii.	Butylated hydroxyanisole	0.05	All	All	
viii	Butylated hydroxytoluene	0.2	All	All	1
ix.	Butyl lactate	5	All	All	
x.	n-Butyl stearate	5	All	All	
xi.	Calcium benzoate	2	All	All	

* *All indicates that additive may be used to formulate materials suitable for contact with all types of food stuffs.*

** *All indicates that additives may be used in formulation for the manufacture of all types of food contact products.*

NOTE

1. *This additives shall not be used in materials for packaging food intended for babies and young children unless it can be demonstrated that migration does not occur under the appropriate conditions of use.*

TABLE 1 - Continuted .....

Sl. No.	Chemical name or type	Maximum level of use in final compound, %, m/m	Food type	Form or product	Limitations (see Notes)
(1)	(2)	(3)	(4)	(5)	(6)
xii.	Calcium carbonate	25	All	All	
xiii.	Calcium chloride	GMP***	All	All	
xiv.	Calcium hydroxide	0.1	All	All	
xv.	Calcium octoate	1.5	All	All	
xvi.	Calcium oxide	10	All	All	
xvii.	Calcium oxide dispersion	20	All	All	
xviii.	Calcium palmitate	5	All	All	
xix.	Calcium stearate	5	All	All	
xx.	Carbon black	5	All	All	
xxi.	Citiric acid monohydrate	0.01	All	All	
xxii.	Coconut diethanolamide	2.6	All	All	
xxiii.	Diatomaceous earth	GMP	All	All	
xxiv.	Di-iso-butyl phthalate	2	All	All	2
xxv.	Di-iso-decyl phthalate	40	All	All	3
xxvi.	Di-(2-ethylhexyl) pthalate	40	non-fatty	All	3
xxvii.	Dilauryl thiodipropionate	1	All	All	
xxviii	2,4 Dimethoxy-6-(1-pyrenyl)-s-triazine	0.01	All	All	
xxix.	N,N'-Distearoyl ethylenediamine	5	All	All	
xxx.	Distearyl pentaerythritol diphosphite	0.25	All	All	
xxxi.	n-Dodecanol	2	All	All	
xxxii.	Dolomite	40	non-acidic	All	
xxxiii	Fumaric acid	2.5	All	All	
xxxiv.	Gelatin	GMP	All	All	

*** *"GMP" stands for good manufacturing practice and requires that the minimum amount of the additive be used to produce the desired effect.*

NOTES

2. *Total plasticisers in final product shall be not more than 35 per cent by mass.*

3. *Total plasticisers in final product shall be not more than 40 per cent by mass.*

TABLE 1 - continued .....

Sl No.	Chemical name or type	Maximum level of use in final compound, %, m/m	Food type	Form or product	Limitations (see Notes)
(1)	(2)	(3)	(4)	(5)	(6)
xxxv.	Glycerin	3.5	All	All	
xxxvi.	Glyceryl oleate	3	All	All	
xxxvii	Glyceryl ricinoleate	3	All	All	
xxxviii	Glyceryl stearate	3	All	All	
xxxix.	Glyceryl triacetate	30	All	All	
xl.	Heavy liquid paraffin	10	All	All	
xli.	-Hydro- -hydroxy poly(oxyethylene)poly (oxypropylene)	0.2	All	All	
xlii.	2(2'-Hydroxy-3'-tert. butyl -5' methyl phenyl) 5-chloro-benzotriazole	0.5	All	All	
xliii.	2(2'-Hydroxy-5' Methyl phenyl) benzotriazole	0.5	All	All	
xliv.	2-Hydroxy-4-n-octoxy-benzophenone	3.5	All	All	
xlv.	Lauric diethanolamide	2.5	All	All	
xlvi.	Liquid paraffin	GMP	All	All	
xlvii.	Magnesium benzoate	2	All	All	
xlviii	Magnesium stearate	1	All	All	
xlix.	Mannitol	2.5	All	All	
L.	2,2' Methylene bis (4 methyl-6-tert. butylphenol)	0.05	All	All	
Li.	7[2h Naphtho (1,2-d) triazol-2-yl]-3 phenylcoumarin	0.1	All	All	
Lii.	Oleamide	0.2	All	All	
Liii.	Pentaerythritol	3	All	All	
Liv.	Polydimethyl siloxane	5	All	All	
Lv.	Polyoxyethylene(20) sorbitan monolaurate	3	All	All	
Lvi.	Polyoxyethylene(20) sorbitan mono-oleate	3	All	All	
Lvii.	Polyoxyethylene (20) sorbitan monopalmitate	3	All	All	
Lviii.	Polyoxyethylene (20) sorbitan monostearate	3	All	All	
Lix.	Polyoxyethylene (20) sorbitan tristearate	3	All	All	
Lx.	Polyoxyethylene (8-9) stearate	0.75	All	All	
Lxi.	Propylene glycol	0.5	All	All	
Lxii.	Silicon dioxide	10	All	All	
Lxiii.	Sodium alkylsulfonate	2.5	All	All	

TABLE 1 - continued .....

Sl. No.	Chemical name or type	Maximum level of use in final compound, %, m/m	Food type	Form or product	Limitations (see Notes)
(1)	(2)	(3)	(4)	(5)	(6)
Lxiv.	Sodium bicarbonate	GMP	All	All	
Lxv.	Sodium bisulfite	GMP	All	All	
Lxvi.	Sodium carbonate	GMP	All	All	
Lxvii.	Sorbitan monolaurate	3	All	All	
Lxviii	Sorbitan mono-oleate	3	All	All	
Lxix.	Sorbitan monopalmitate	3	All	All	
Lxx.	Sorbitan monostearate	3	All	All	
Lxxi.	Sorbitan trioleate	3	All	All	
Lxxii.	Sorbitan tristearate	3	All	All	
Lxxiii	2 stearamido-ethyl stearate	3	All	All	
Lxxiv	Stearic/palmitic acid	5	All	All	
Lxxv	Styrenated p-cresol	3	All	All	
Lxxvi.	Tetrakis [methylene 3-(3', 5'-di-tert.-butyl-4'-hydroxyphenyl) propionate] methane	0.5	All	All	
Lxxvii	Thiodipropionic acid	0.1	All	All	
Lxxviii	Titanium dioxide	20	All	All	
Lxxix.	Triethylene-glycol bis-3-(3-tert.butyl -4-hydroxy-5-methyl phenyl) propionate	0.25	All	All	
Lxxx.	Tri (mixed mono-and di-nonyl phenyl phosphite	1	All	All	
Lxxxi.	1,3,5, - Tris (4-tert-butyl-3 hydroxy -2, 6-dimethyl benzyl)-1, 3,5-triazine-2,4,6 -(1h,3h,5h)-trione	0.1	All	All	
Lxxxii	Trisodium phosphate	0.1	All	All	
Lxxxiii	1,1,3 Tris (2-methyl-4-hydroxy-5 tert.-butyl phenyl) butane	0.25	non-fatty	All	
		0.1	fatty	All	
Lxxxiv	White soft paraffin	25	All	All	
Lxxxv	Zinc benzoate	2	All	All	
Lxxxvi	Zinc di(2-ethyl hexanoate)	1.5	All	All	
Lxxxvii	Zinc stearate	3	All	All	

5 MARKING

All packages containing polypropylene shall be marked legibly and indelibly with the following:

a) The words "Polystyrene" or "PS";
b) The words "Food Grade" ;
c) Any restriction for use ;
d) The name and address of the manufacturer and country of origin;
e) Trade mark and/or brand name if any; and
f) Batch or code number.

SRI LANKA STANDARDS INSTITUTION

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