

DRAFT UGANDA STANDARD

First Edition
2016-11-dd

Specification for Polyethylene for its safe use in contact with food stuffs, pharmaceuticals and drinking water



Reference number
WDUS 1668: 2016

Compliance with this standard does not, of itself confer immunity from legal obligations

A Uganda Standard does not purport to include all necessary provisions of a contract. Users are responsible for its correct application

© UNBS 2016

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilm, without prior written permission from UNBS.

Requests for permission to reproduce this document should be addressed to

The Executive Director
Uganda National Bureau of Standards
P.O. Box 6329
Kampala
Uganda
Tel: 256 414 505 995
Fax: 256 414 286 123
E-mail: info@unbs.go.ug
Web: www.unbs.go.ug

Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to coordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of representatives of consumers, traders, academicians, manufacturers, government and other stakeholders.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 19, *Packaging and Packaging products*

Specification for Polyethylene for its safe use in contact with food stuffs, Pharmaceuticals and drinking water

1 Scope

This standard specifies the requirements and methods of sampling and test for polyethylene plastic materials for the manufacture of plastic items used in contact with foodstuffs, pharmaceuticals and drinking water.

This standard does not cover requirements of a packaging media for a particular foodstuff and drinking water other than toxicological considerations.

2 Normative references

The following referenced documents referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

US 1659, *Packaging materials for food contact use – General requirements*

3 Terms and definitions

For the purposes of this document, the following terms apply.

3.1

low density polyethylene (LDPE)

a basic resin produced by the polymerisation of ethylene having nominal density in the range of 908 kg/m³ to 923 kg/m³ at 27 °C (910 kg/m³ to 925 kg/m³ at 23 °C)

3.2

medium density polyethylene (MDPE)

a basic resin produced by polymerisation of ethylene and having nominal density in the range of 924 kg/m³ to 938 kg/m³ at 27 °C (926 kg/m³ to 940 kg/m³ at 23 °C)

3.3

high density polyethylene (HDPE)

a basic resin produced by polymerization of ethylene and having nominal density in the range of 939 kg/m³ to 963 kg/m³ at 27°C (941 kg/m³ to 965 kg/m³ at 23°C). Copolymers of ethylene with I-alkenes containing up to 8 carbon atoms with minimum ethylene content of 85 % and having nominal density of 939 kg/m³ to 963 kg/m³ at 27°C (941 kg/m³ to 965 kg/m³ at 23°C) also come under this definition.

3.4

linear low density polyethylene (LLDPE)

A basic resin (co, ter, polymers or Quattro polymers of ethylene with polypropylene) produced by polymerization of ethylene with comonomers of I-alkene containing up to 8 carbon atoms with a minimum ethylene content of 85 percent by mass and having a nominal density in the range of 900 kg/m³ to 938 kg/m³ at 27°C.

4 Requirements

4.1 Basic resin

4.1.1 Homopolymers of ethylene, copolymers or terpolymers of ethylene with the 1-alkenes defined under 3, blend of homopolymers of ethylene with one or more of the copolymers/terpolymers/ quattropolymers and blend of several copolymers/ terpolymers/ quattropolymers of ethylene mentioned under this clause

4.1.2 Compliance with the list of polyethylene defined in 3 shall be made in such a way that it contains no residues or ingredients used in its manufacture other than those listed in 4.2, 4.3 and/ or 4.4.

4.2 Manufacturing residues

4.2.1 Polyethylene may contain a total of not more than 0.2 percent by mass of ethylene and other hydrocarbons originating from ethylene and comonomer feed stock, aldehydes, ketones and organic peroxides or their decomposition products. It may also contain a total of not more than 0.2 percent by mass, measured by standard assay technique, of calcium, aluminium, silicon, titanium, magnesium, chromium (maximum 50 ppm), sodium carbonate, potassium carbonate, sodium chloride, potassium chloride and petroleum hydrocarbon fractions.

4.2.2 The residues of the following products may constitute less than 0.3 percent by weight of the finished polymer:

- a) Alkyl, benzene, alkyl-benzene sulphates of sodium, potassium and ammonium, the alkyl group containing C₁₀ to C₂₀;
- b) Alkyl, benzene, alkyl-benzene sulphonates of sodium, potassium and ammonium, the alkyl group containing C₁₀ to C₂₀;
- c) Condensation products of ethylene oxide with monohydric aliphatic alcohols (C₁₂ to C₂₀) and their sodium sulphates;
- d) Condensation products of ethylene oxide with monobasic aliphatic acids C₁₂ to C₂₀ and their sodium and ammonium sulphates;
- e) Condensation products of propylene oxide with monobasic aliphatic acids (C₁₂ to C₂₀) and their sodium and ammonium sulphates;
- f) Polyvinyl alcohols (viscosity of a 4 % aqueous solution at 20 °C should be at least 0.004 N·s/m²);
- g) Magnesium; Zirconium; Vanadium; Ethoxides/Alcoxides; and C₁ to C₅ alcohols

4.2.3 The residues of the catalyst and their products of decomposition, measured by standard assay technique, shall not exceed 0.2 % by mass of the finished products.

4.3 Auxiliary items for working

The auxiliary items prescribed in Table 1 may be used to maximum level, percentage weight/weight, of the final product in polyethylene polymers given in 3.

Table 1 — Auxiliary items

Chemical name	Maximum level of use percentage weight/weight of final product
Aluminium silicate	50
Aluminium stearate	3
Behenic acid	1
Benzene propanoic acid 3-(1, 1-dimethyl ethyl)-β (3, 1-dimethylethyl)-4-hydroxyphenyl-4 hydroxy-β methyl-1, 2-ethanediyl ester	0.5
1, 4-Benzenedicarboxylic acid, bis [2-(1, 1-dimethyl ethyl)-6-[[3- (1, 1-dimethyl ethyl)-2-hydroxy-5-methyl phenyl] methyl]-4-methyl phenyl] ester	0.075
1,2-Bis(3,5-di-tert-butyl-4hydroxyhydrocinnamoy l)-hydrazine	-
β,3(or4)-Bis(octadecylthio)cyclohexylethane	0.3
2, 6 Bis (1-methyl heptadecyl)-p-cresol	0.3
3,9-Bis[2- (3-(3-tert-butyl 4-hydroxy-5-methylphenyl) propionyloxy)-1,1-dimethylethyl]-2,4,8,10 tetraoxaspiro[5,5]undecane	0.3
5,7-bis[1,1-dimethylethyl-3-hydroxi-2(3H)-benzofuranone, reaction products with o-xylene	0.02
Bis(p-ethylbenzylidene)sorbitol	0.3
2,5 bis 5'-tert-butylbenzoxalyl (2) thiophene	0.02 ¹⁾
Bis (2, 4-di-tert-butyl phenyl) pentaerythritol diphosphite with up to 1% tri-isopropanolamine	0.1
N,N-Bis (2-hydroxyethyl) alkyl (C ₁₂ -C ₁₈)amine	0.1
2-(3'-tert-Butyl-2'-hydroxy-5'-methyl-phenyl)-5-chlorobenzotriazole having melting range of 137-141°C	0.5
Bis [2,2' methylene bis 4 methyl - 6-tert butyl phenol] terephthalate	0.1
Butylated hydroxyanisole	0.05
Butylated hydroxytoluene	0.2
Butyl lactate	5
n-Butyl stearate	5
Butyric acid, 3,3-bis(3-tert-butyl-4-hydroxyphenyl)ethylene ester	0.5
Calcium benzoate	2
Calcium carbonate	25
Calcium bis [mono ethyl 3,5-di-tert-butyl-4-hydroxybenzyl phosphonate]	0.2 ²⁾
Calcium hydroxide	0.1
Calcium octoate	1.5
Calcium oxide	10

Calcium oxide dispersion	20
Calcium palmitate	5
Calcium stearate	5
Carbon black	5
Cyclic neopentantetrayl bis (octadecyl phosphite)	0.25
4,4' Cyclohexylidenebis (2-cyclohexyl phenol)	0.01 ³⁾
Citric acid monohydrate	0.2
Dibenzylidene sorbitol	0.5
2,6 Di-tert-butyl-4-ethylphenol	0.1
2,6-Di(α -methyl benzyl)-4-methyl phenol	0.3 ¹⁾
3,5-Di-tert-butyl-4-hydroxyhydrocinnamic acid tri-ester with 1,3,5-tris(2-hydroxyethyl)-5-triazine-2,4,6-(1h, 3h, 5h) trione	1.0
Di-tert-butylphenyl phosphonite condensation with biphenyl 2,4-Di-tert-butylphenyl-3,5-di-tert-butyl-4-hydroxy-benzoate	0.3 ¹⁾
Dilauryl thiodipropionate	1.0
Dimethyl dibenzylidene sorbitol	0.4
Dk+terylthiodipropionate	1.0
2,4-Dimethoxy-6-(1-pyrenyl)-s-triazine	0.01
Dimethyl succinate polymer with 4-hydroxy-2,2,6,6-tetramethyl 1-piperidine ethanol	0.3
Distearyl pentaerythritol diphosphite	0.3
N,N' Distearoyl ethylenediamine	5
n-Dodecanol	2
Dolomite	2 ⁴⁾
Di-tert-butylphenyl phosphonite condensation product with bisphenyl	0.1
Erucamide	0.2
Epoxidised soya bean oil	0.5
2,2'-Ethylidenebis (4, 6-di-tert-butylphenol)	0.05
Fluoroelastomer	-
Fumaric acid	2.5
Glycerine	3.5
Glyceryl oleate	3
Glyceryl monostearate	3
Glyceryl ricinoleate	3
Glyceryl triacetate	30
Heavy liquid paraffin	10
Hexadecyl 3,5-di-tert butyl-4-hydroxy benzoate	0.5
Hydrotalcite (basic magnesium aluminium carbonate hydrate)	0.3
2-Hydroxy-4-iso-octoxy-benzophenone	0.5
22'-Hydroxy-3'-tert-butyl-5'-methylphenyl-5-chloro-	0.5

benzotriazole (having melting range of 126-132)	
2(2'-Hydroxy 5'-methyl phenyl) benzotriazole	0.5
2-Hydroxy-4-n-octoxy-benzophenone	3.5
Lauric diethanolamide	0.5
n-lasroylsarcosine	0.4 ⁵⁾
Magnesium benzoate	2
Magnesium oxide	0.05
Magnesium stearate	1
Maleic anhydride grafted polyethylene	10
Mannitol	2.5
2,2'-Methylene bis (4-methyl-6-tert-butyl phenol)	0.01
2,2'-Methylene bis 6-(1-methylcyclo-hexyl)-p-cresol	0.2
4,4'-Methylene bis (2,6-di-tert-butyl-phenol)	0.5
Mono & di glycerides of fatty acids	3
7,[2 h Naphtho (1,2-d)triazol-2-yl] 3-phenylcoumarin	0.1
2:1 Nickel complex of 3,5-di-tert-butyl-4-hydroxy-benzylmonoethylphosphonate	0.3
Non-oxidised polyethylene wax	8
Oleamide	0.2
Octadecyl hydroxyhydrocinnamate	0.25
Oxidised bis(hydrogenated tallow alkyl) amine	0.05
2,2'-Oxamidobis[ethyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl) propionate]	0.5
Phosphorous acid, cyclic butylethyl propanediol, 2,4,6-tri-tert-butylphenyl ester	0.2
Phosphoric acid, cyclic neopentane tetrayl bis(2,4-di-tert-butylphenyl) ester	0.1
Poly[6-morpholino-s-triazine-2, 4-diyl [2,2,6,6 -tetramethyl-4-piperidyl-imino] hexamethylene[2,2,6,6-tetramethyl-4-piperidyl-imino]	-
Polyvinyl cyclohexane	0.1
Pentaerythritol	3
Polyisobutylene	5
Polydimethyl siloxane	5
Polyoxyethylene (20) sorbitan monolaurate	3
Polyoxyethylene (20) sorbitan monooleate	3
Polyoxyethylene (20) sorbitan monopalmitate	3
Polyoxyethylene (20) sorbitan monostearate	3
Polyoxyethylene (20) sorbitan tristearate	3
Polyoxyethylene (20) sorbitan trioleate	3
Poly 16(1,1,3,3 -tetramethyl butyl amino) 1,3,5 -triazine-2,4-diyl] [4-(2,2,6,6-tetramethyl-piperidyl) imino]-hexamethylene [4-(2,2,6,6-tetramethylpiperidyl) imino]	0.3

Polypropylene glycol	0.5
Silicon dioxide	10
Sodium alkylsulphonate	0.5
Sorbitan monolaurate	3
Sorbitan morsooleate	3
Sorbitan monopalmitate	3
Sorhitan monostearate	3
Sorbitturtrioleate	3
Sorbitan tristearate	3
Sodium di(p-tert-butylphenyl) phosphate	0.35
Sodium 2,2'-methylenebis(4,6-di-tert-butylphenyl) phosphate	0.3
2-Stearamido-ethyl stearate	5
Stearic/palmitic acid	0.2
Stearamide	0.2 ⁶⁾
Styrenated p-cresol	30
Talc	25
Terpolymer of ethylene propylene and 1,4 hexadiene	0.2
Tetrakis-(2,4-di-tert-butyl-phenyl)-4,4'-biphenylene diphosphonite	0.5
Tetrakis-[methylene-3-(3',5'-diferti-butyl-4'-hydroxyphenyl) propionate] methane	0.25
Thiodipropionic acid	0.1
Titanium dioxide	20
1,3,5-Trimethyl-2,4,6-tris(3,5-di-tert-butyl-4-hydroxybenzyl) benzene	1
Tri (mixed mono and dynonyl phenyl) phosphite	1
1,3,5-tris 4-tert-butyl-3-hydroxy-2,6-dimethyl-benzy 1,3,5-triazine-2,4,6 (1h,3h, 5h)- trione	0.1
1,3,5-tris(3,5-&-tert-butyl-4-hydroxyhydrocinnamoyl)hexafidm-s-triazine	0.1
1,3,5-Tris (3,5-di-tert-butyl-4-hydroxy-benzyl)-s triazine-2,4,6 (1b, 3h, 5h) trione	0.1
2-12,4,8,10-tetrakis(1,1-dimethyl) benzo [d,f] [1,3,2]-dioxaphosphepin-6-yl]-N,N-b[2[[2,4, 8, 10-tetrakis(1,1-dimethylethyl) dibenzo[d,f][1,3,2]dioxaphosphepin-6-yl]oxy]ethyl]ethanamine	0.075
Tris (2,4, di-tert-butylphenyl)phosphite	0.2
Trisodium phosphate	0.1
1,1,3-Tris(2-methyl-4-hydroxy-5-tert-butylphenyl) butane	0.25 ¹⁾
Vinylidene fluoride/hexa-fluoropropylene copolymer	0.05
Zinc benzoate	2)
Zinc di-(2-ethylhexanoate)	1.5
Zinc stearate	3

- 1) Non-fatty food only.
- 2) In polyethylene and its copolymers having density less than 940 kg/m³.
- 3) Maximum thickness of article in contact with foodstuff and pharmaceuticals shall be 0.0635 cm.
- 4) Non-acidic food only.
- 5) Film only.
- 6) Not for food contact above 65 °C.

4.4 Pigments and colorants

The pigments and colorants used shall comply with list and limits prescribed in US 1659.

5 Packing and marking

5.1 Packing

The material shall be suitably packed in Paper/Polythene/Plastic bags (with or without liner), as agreed between the purchaser and the supplier, in a manner so as to ensure that the items do not become contaminated during storage.

5.2 Marking

5.2.1 Each package shall be clearly marked with the name and type of the material, month and year of manufacture of the material, name of the manufacturer and manufacturer's trade mark, if any.

5.2.2 The packages shall also carry the symbol (Fig. 1) clearly embossed/printed on it



Figure 1 — Symbol

6 Sampling

6.1 Preparation of test samples

The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Annex B.

DRAFT UGANDA STANDARD FOR PUBLIC REVIEW

Annex B (normative) Sampling of Polystyrene

B.1 General

B.1.1 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

B.1.2 Samples shall not be taken in an exposed place.

B.1.3 The sampling instrument, wherever applicable, shall be made of stainless steel or any other suitable material on which the material shall have no action. The instrument shall be clean and dry.

B.1.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B.1.5 The samples shall be placed in a suitable, clean, dry, air-tight metal or glass containers on which the material has no action. The sample containers shall be of such a size that they are almost completely filled by the sample.

B.1.6 Each sample container shall be sealed air-tight with a stopper after filling and marked with full details of sampling, such as the date of sampling, the month and year of manufacture of the material, etc.

B.1.7 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

B.2 Scale of sampling

B.2.1 Lot

In a single consignment all the packages of the same class, same type, same form and belonging to the same batch of manufacture shall be grouped together to constitute a lot. If a consignment is known to consist of packages belonging to different batches of manufacture or different forms, the packages belonging to the same batch of manufacture and same form shall be grouped together and each such group shall constitute a lot

The packages may consist of containers of polystyrene materials, rolls, films, vials, etc.

B.2.2 Sample size

For ascertaining the conformity of the material to the requirements of this specification, samples shall be tested from each lot separately. The number of packages to be sampled shall depend on the size of the lot and shall be in accordance with Table B 1.

Table B2 — scale of sampling

Number of packages in the lot	Sample size
Up to 15	2
16 to 50	3
51 to 100	4
101 to 300	5
301 to 500	6
501 to 1000	8
1001 and above	10

NOTE When the number of packages in the lot is less than three, all the packages shall be sampled.

B.2.2.1 These packages shall be selected at random from the lot and in order to ensure the randomness of selection, procedures given in ISO 24153 may be followed.

B.3 Preparation of test samples

B.3.1 From each of the packages of material selected, small portions of material shall be drawn with the help of a suitable sampling instrument. The total quantity of material collected from each package shall be sufficient to test all the requirements given in 4.

B.3.2 In the case of packages consisting of containers, vials, rolls or films, the number of items to be selected from a package, for testing each of the requirements given in 4, shall be one.

B.4 Number of tests

Tests for determining all the requirements given in 4 shall be carried out on the individual test samples.

B.5 Criteria for conformity

The lot shall be declared as conforming to the requirements of this specification if all the test results on individual samples meet the relevant specification requirements

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

The use of the UNBS Certification Mark is governed by the Standards Act, and the Regulations made thereunder. This mark can be used only by those licensed under the certification mark scheme operated by the Uganda National Bureau of Standards and in conjunction with the relevant Uganda Standard. The presence of this mark on a product or in relation to a product is an assurance that the goods comply with the requirements of that standard under a system of supervision, control and testing in accordance with the certification mark scheme of the Uganda National Bureau of Standards. UNBS marked products are continually checked by UNBS for conformity to that standard.

Further particulars of the terms and conditions of licensing may be obtained from the Director, Uganda National Bureau of Standards.



DRAFT UGANDA STANDARD FOR PUBLIC REVIEW

ICS 71.100.01

Price based on **nn** pages