

Specification for

Flexible PVC sheeting for hospital use

UDC 678.743.22-415:615.47

Confirmed December 2011

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Cooperating organizations

- The Plastics Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:
- British Plastics Federation*
 - British Resin Manufacturers' Association
 - Chemical Industries Association
 - Department of Industry (Chemicals and Textiles)
 - Department of the Environment (Building Research Establishment)
 - Department of the Environment (PSA)
 - Department of Trade (Metrology, Quality Assurance, Safety and Standards Division)
 - Electrical and Electronic and Insulation Association (BEAMA)
 - Electrical Installation Equipment Manufacturers' Association (BEAMA)
 - Engineering Equipment Users' Association
 - ERA Technology Ltd.*
 - Institution of Production Engineers
 - Ministry of Defence*
 - Plastics and Rubber Institute
 - Post Office
 - Royal Institute of British Architects
 - Rubber and Plastics Research Association of Great Britain
 - Society of Chemical Industry
 - Society of Motor Manufacturers and Traders Limited

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- British Gas Corporation
- British Steel Industry
- Department of Health and Social Security
- Ductile Iron Producers' Association
- Furniture Industry Research Association
- Institution of Gas Engineers
- Packaging and Industrial Films Association
- Pira (The Research Association for the Paper and Board, Printing and Packaging Industries)
- Individual firm

This British Standard, having been prepared under the direction of the Plastics Standards Committee, was published under the authority of the Executive Board and comes into effect on 26 February 1982

© BSI 10-1999

First published March 1965
First revision February 1982

The following BSI references relate to the work on this standard:
Committee reference PLC/40
Draft for comment 78/55578 DC

ISBN 0 580 12175 5

Amendments issued since publication

Amd. No.	Date of issue	Comments
6283	November 1990	Indicated by a sideline in the margin

Contents

	Page
Cooperating organizations	Inside front cover
Foreword	ii
1 Scope	1
2 References	1
3 Definitions	1
4 Classification	1
5 Composition	1
6 Sampling	2
7 Dimensional stability	2
8 Tensile strength and elongation at break	2
9 Anti-static requirement	2
10 Tear strength	2
11 Low temperature extensibility	2
12 Resistance to extraction by an oily medium	2
13 Resistance to extraction by a soap solution	2
14 Adhesion of print	2
15 Thickness	2
16 Blocking	3
17 Colour bleeding	3
18 Colour fastness and light stability	3
19 Ply adhesion of laminated sheeting	3
20 Retention of embossed surface	3
21 Sulphur stain resistance	3
22 Visual examination	3
23 Requirements and testing for physical properties	4
24 Marking	4
Appendix A Recommended scheme for the selection of test pieces	7
Appendix B Method for determining dimensional stability	7
Appendix C Method for determining retention of embossed surface	8
Appendix D Method for determining surface resistance	9
Appendix E Method for determining resistance to extraction by an oily medium	9
Appendix F Method for determining resistance to extraction by soap solution	9
Appendix G Method for determining sulphur stain resistance	10
Appendix H Limiting values for statistical control	10
Appendix J Informative labelling	11
Figure 1 — Selection of test pieces	8
Table 1 — Limiting values for physical properties requiring frequent determination	4
Table 2 — Limiting values for physical properties requiring occasional determination	5
Table 3 — Requirements and determination frequencies for physical properties without limiting values	5
Table 4 — Maximum and minimum permissible values of average gravimetric thickness within a roll	6
Table 5 — Maximum and minimum permissible values of gravimetric thickness of sample	6
Publications referred to	Inside back cover

Foreword

This British Standard, first published in 1965, has been revised under the direction of the Plastics Standards Committee and is one of a series for flexible polyvinyl chloride materials. The 1965 edition is withdrawn.

The standard is based on technical data provided by the British Plastics Federation. Other standards in the series are as follows.

BS 1763, *Thin PVC sheeting (calendered, flexible, unsupported)*.

BS 2739, *Thick PVC sheeting (calendered, flexible, unsupported)*.

In this revision, only metric units have been used.

Performance requirements for tensile strength, elongation at break, dimensional stability, tear strength, and low temperature extensibility have been changed to bring the limits into line with those in BS 1763.

Consideration has been given to providing a means of assessing the readiness with which sheeting can be welded, but attempts to produce a laboratory test to measure this property have failed owing to the wide variation in electrode systems, machines and techniques in common usage.

The object of this standard is to cater for flexible, unsupported PVC sheeting suitable for hospital uses such as draw sheets, mattress covers, waterproof sheeting, aprons, pillow covers, protective clothing, curtains, screen covers, trolley covers, surgeons' stool tops, drapes and for certain packaging purposes.

Material complying with the requirements of BS 1763 and BS 2739 is likely to be suitable for a number of these applications and should be specified where resistance to soap and oil extraction is not required.

Four types of sheeting are specified in this standard. Types 1 and 2, having anti-static properties, are suitable for use in anaesthetizing areas while types 3 and 4 are for general purpose use.

Due consideration was given to the specification of limits for surface resistance for types 3 and 4 since this is desirable to reduce dust and bacterial attraction. At the present stage of development, sheeting manufactured with low surface resistance would be seriously affected in respect of other characteristics, e.g. translucency, and the capability for fabrication and colour printing. An amendment to this standard will be considered when it proves possible to produce "general purpose" material having this additional desired property.

The principle of statistical control (see Appendix H) of certain properties has been retained in this revision as it has been shown by experience that the variability of results, both within the material itself and from certain test methods, is such that very low quality single level limits (see **H.1.1**) would need to be specified to avoid rejection of satisfactory material.

By application of the statistical control principle, it is intended to bring about a general improvement in the quality of material complying with the requirements of this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for flexible unsupported PVC sheeting intended for use in hospitals, of nominal thickness up to and including 900 µm, and classified in accordance with clause 4.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

nominal thickness

the thickness of sheeting in micrometres as stated by the supplier

3.2

gravimetric thickness

the value of thickness derived from the mass of a known area of sheeting and its relative density as determined by BS 2782:Method 631A, except that it is normally expressed in micrometres.

3.3

limiting values, L and $\bar{X}$

in relation to statistical control, L is the specified lower quality limit for single samples and $\bar{X}$ is the specified average quality limit (see Appendix H)

3.4

micrometer thickness

the value of thickness obtained by direct measurement using a micrometer gauge in accordance with BS 2782:Method 630A, except that it is normally expressed in micrometres. This method is not suitable for embossed sheeting

3.5

printed sheeting

sheeting to which a continuous or discontinuous transparent or coloured surface coating has been applied and including all multitone effects and lacquered surfaces

3.6

embossed sheeting

printed or unprinted sheeting having a raised or indented pattern

NOTE 1 This is also known as textured sheeting.

NOTE 2 Plain frosted (matt) or polished PVC sheeting produced by an operation subsequent to the calendering process is, by convention, included in this definition.

3.7

anti-static sheeting

sheeting complying with the requirements for surface resistance in Table 1

3.8

laminated sheeting

superimposed plies (layers) of sheeting bonded together by any suitable process

3.9

roll of sheeting

sheeting in roll form, in length not less than 10 m as supplied by the manufacturer

3.10

sample of sheeting

a sample taken in accordance with clause 6

3.11

sequence of samples

all samples of sheeting tested by the manufacturer or the purchaser, and having been manufactured to comply with the requirements of this standard, during a period not exceeding six months

4 Classification

Sheeting shall be classified according to one of the following types.

- Type 1. Anti-static unprinted single ply or laminated sheeting with plain or embossed surface.
- Type 2. Anti-static printed single ply or laminated sheeting with plain or embossed surface.
- Type 3. Unprinted single ply or laminated ply sheeting with plain or embossed surface.
- Type 4. Printed single or laminated ply sheeting with plain or embossed surface.

NOTE Odd type numbers apply to unprinted sheeting and even type numbers to printed sheeting in this standard and in BS 1763 and BS 2739.

5 Composition

Sheeting shall be manufactured from a polymer of vinyl chloride and/or a copolymer, the major constituent of which shall be vinyl chloride. Such material shall be suitably compounded and converted to sheeting of nominal thickness up to and including 900 µm.

6 Sampling

A representative sample which is the full width of the sheeting, and is not less than 1 m² in area and not less than 1 m in length, shall be taken. The longitudinal direction of the sheeting shall be marked on the sample. The information given on the label (see 24.1) shall be supplied with the sample.

NOTE To avoid difficulties in subsequent testing, the sample should be rolled on a tube of adequate diameter.

The sample shall thereafter be kept out of contact with other plastics materials. When sheeting in roll form is being sampled, the sample shall be taken from a position in which no part of it is less than three layers from the ends of the roll.

For visual examination only, either a sample at least 3 m in length by the full width of the sheeting, or an equivalent uncut length of the roll, shall be examined by the method described in clause 22.

NOTE The preferred manner of selecting test pieces from the sample is given in Appendix A.

7 Dimensional stability

When tested in accordance with Appendix B, the maximum change in dimensions of laminated or unlaminated sheeting shall not exceed the values given in Table 1.

8 Tensile strength and elongation at break

When tested in accordance with method 301E¹⁾ of BS 2782:1970, the longitudinal and transverse tensile strength and elongation at break shall be not less than the limiting values given in Table 1.

9 Anti-static requirement

Sheeting types 1 and 2 shall comply with the surface resistance requirements shown in Table 1 when tested in accordance with Appendix D. In addition, material made anti-static by a conductive print on its surfaces shall not have an electrically insulating area on either surface greater than 35 mm² determined by visual inspection.

10 Tear strength

When tested in accordance with method 308B of BS 2782:1970, the tear strength of sheeting shall be not less than the limiting values given in Table 1.

NOTE In the higher thicknesses of the range covered by this standard, the apparatus described in method 308B of BS 2782:1970 may not be capable of tearing the sheeting, even with the augmenting weight fitted and using the half-size test piece. In this case, the average tear strength may be reported as follows:

“greater than 50 N”, or
“greater than $\frac{50\,000}{t}$ N/mm”

where

t is the gravimetric thickness of the sample in micrometres.

11 Low temperature extensibility

When tested in accordance with method 104C of BS 2782:1970 using test specimens cut so that their lengths are in the transverse direction of the sheeting, the limiting values for extension of the sheeting at – 5 °C shall be as given in Table 2.

12 Resistance to extraction by an oily medium

When tested in accordance with Appendix E, sheeting of thickness 100 µm and greater shall show a loss of mass on extraction by an oily medium of not greater than the limiting values given in Table 2.

13 Resistance to extraction by a soap solution

When tested in accordance with Appendix F, sheeting of thickness 100 µm and greater shall show a loss of mass on extraction by a soap solution of not greater than the limiting values given in Table 2.

14 Adhesion of print

When tested in accordance with method 310B of BS 2782:1970, visible damage shall not be produced on embossed or unembossed sheeting by fewer than the number of cycles given in Table 3.

15 Thickness

15.1 Average gravimetric thickness within a roll. Sheetting shall be tested in accordance with BS 2782:Method 632A. The average gravimetric thickness of the sheeting within a roll shall be within the limits shown for the appropriate nominal thickness in Table 4.

NOTE When agreed between purchaser and supplier, the average gravimetric thickness of the roll may be expressed in millimetres.

¹⁾ A revised method is in course of preparation. It should be noted that method 301E has been incorrectly and inadvertently recorded as withdrawn elsewhere.