

Specification for

**White PVC-U extruded
hollow profiles with
heat welded corner
joints for plastics
windows:
materials type A**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Elements and components (of Diverse Materials) for Buildings Standards Policy Committee (ECB/-) to Technical Committee ECB/46, upon which the following bodies were represented:

- Association of Builders' Hardware Manufacturers
- Association of Metropolitan Authorities
- British Board of Agrément
- British Plastics Federation
- Consumer Policy Committee of BSI
- Department of Health
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Property Services Agency)
- Flat Glass Manufacturers' Association
- Glass and Glazing Federation
- Institution of Fire Engineers
- London Housing Consortium
- Plastics Window Association Ltd.
- Royal Institute of British Architects

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Foreword

This British Standard has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee.

BS 7412 should be read in conjunction with this standard.

White PVC-U extruded hollow profiles with heat welded corner joints for plastics windows: materials type B, are specified in BS 7414.

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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 the raw materials and properties of the finished profile after manufacture for white PVC-U extruded hollow profiles with heat welded corner joints for plastics windows manufactured from materials type A.

Methods of test are given in Appendix A to Appendix K.

NOTE 1 Plastics windows made from PVC-U extruded hollow profiles are specified in BS 7412 and requirements for white PVC-U hollow profiles for plastics windows manufactured from materials type B are specified in BS 7414.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the definitions given in BS 6100-1.3.5 and BS 6100-1.5.1 apply together with the following.

2.1

die line

a continuous longitudinal mark on the external faces of a profile that originates during extrusion

2.2

face surface

a surface in a profile that is exposed to view when the window is closed

2.3

profile

a length of extruded material of defined cross section

2.4

sink mark

a depression on the surface of an extrusion

2.5

type A materials

materials complying with the requirements of Table 1

3 Raw materials

3.1 Composition

The profiles shall be made from type A materials consisting substantially of unplasticized polyvinyl chloride (PVC-U).

NOTE 1 Only those additives and pigments may be used that are necessary for the manufacture of the compound and for its subsequent conversion into sound, durable extrusions of good surface finish and mechanical strength as assessed by the requirements of Table 1 of this specification.

NOTE 2 Profiles may contain a percentage of reggranulated or repulverized material (up to 10 %).

If reworked material is added or used it shall comprise the manufacturer's own clean reworked material from products complying with this standard and the resulting profile shall comply with this standard.

3.2 Physical properties

The PVC-U material from which the profiles are made shall comply with the requirements given in Table 1.

The tests shall be carried out on samples cut from the face surfaces of extruded profile except on samples for the apparent modulus of elasticity test which shall be carried out on pressed plaques prepared from milled sheet under the conditions specified in ISO 1163-2.

Table 1 — Physical properties of PVC-U type A material

Test	Test method	Minimum value
Softening point	BS 2782:Method 120B	75 °C
Apparent modulus of elasticity	BS 2782:Method 335 A (Rate of strain = 5 mm/min)	2 250 MPa
Tensile yield stress at 23 °C	BS 2782:Method 320C (Rate of strain = 5 mm/min)	39 MPa
Heat stability	BS 2782:Method 130 A ^a	85 min
Impact strength	BS 2782:Method 359 (see Appendix A)	12 kJ/m ²
Tensile-impact strength at 23 °C at 0 °C	ISO 8256 Method A specimen type 5 (see Appendix B)	600 kJ/m ² 400 kJ/m ²
Retention of impact strength after artificial ageing	Appendix C	70 % of original value

^a This test is not suitable for all materials but it represents the best current available knowledge.

4 Profile properties

4.1 Storage and conditioning of test samples

All samples shall be stored at 20 ± 5 °C and shall not be tested sooner than 16 h after production. Samples shall be conditioned and tested in accordance with the requirements of the relevant appendix.

NOTE 1 For the purposes of quality control routine testing the storage time can be shorter than 16 h providing the final storage temperature of 20 ± 5 °C is obtained.

NOTE 2 The 20 ± 5 °C is a storage temperature not a conditioning temperature.

4.2 Appearance and finish

The colour of the profile shall be uniform when viewed by normal or corrected vision at a range of 1 m, in 45° north sky light viewing perpendicular to the surface as described in clause 14 of method A01 of BS 1006:1990. The external and internal face surfaces of the profile shall be free from foreign bodies, cracks, sink marks or die lines when similarly viewed.

In an assembled window unit the total colour difference (ΔE^*), measured to comply with BS 3900-D8, BS 3900-D9 and BS 3900-D10 between any one and any other of the lengths of profile used shall not exceed 1.0.

4.3 Manufacturing tolerances

4.3.1 The profiles shall be straight such that the longitudinal axis of the profile, as measured on the face surfaces, may deviate from the straight line by not more than 1 mm/m. The cross section of the profile shall conform in shape and dimensions to the manufacturer's drawing subject to the tolerances in **4.3.2**.

4.3.2 Tolerances on dimensions, outer wall thickness, surface flatness and on rebate grooves shall be as given in Table 2.

If internal webs are present they shall be controlled so that all times reinforcement and other hardware are able to be fitted freely without prior web machining.

4.3.3 The mass of the profile per metre shall not be more than 5 % below the nominated value.

4.4 Heat reversion

Main frame subsill and casement or sash profiles shall be tested in accordance with Appendix E. The mean maximum reversion shall be not greater than 2 %. There shall also be not more than a 0.4 % difference between the individual face sides of the same sample. Glazing beads shall also be tested in accordance with Appendix E. The mean maximum reversion shall be not more than 3 % and there shall be not more than a 0.6 % difference between the face side and the opposite side of the same sample.

4.5 Heat ageing

When tested in accordance with Appendix F the profile shall show no bubbles, cracks or delamination.

4.6 Impact resistance at low temperature

When main frame subsill and casement or sash profiles are tested in accordance with Appendix G, no sample shall exhibit cracking through the entire wall thickness of the profile.

Ten samples per main frame, casement or sash profile shall be tested (five samples being used for each face) and there shall be no failures. Five samples per subsill profile shall be tested on the upper visible surface and there shall be no failures.

4.7 Colour fastness

When tested in accordance with Appendix H the maximum colour change allowed is that rated 3-4 on the grey scale specified in method A03 of BS 1006.

The maximum colour difference when assessed by instrumental measurement in accordance with BS 3900-D8, BS 3900-D9 and BS 3900-D10 shall not exceed 7.0 CIELAB colour difference units (ΔE^*).

Any samples which, though they develop acceptable colour difference, show surface erosion with the development of loose pigment (chalking) shall be unacceptable.

4.8 Weld factor

When tested in accordance with the method given in Appendix J, the weld factor shall be not less than 0.7.

NOTE It is acknowledged that this test has some drawbacks but it is the best test that is currently available.

4.9 Corner strength

When tested in accordance with the method given in Appendix K the weld joint shall not fracture below a stress level of 20 MPa.

5 Profile marking

The main frame subsill and casement or sash profiles shall be indelibly marked at approximately 1 m intervals, in a position that will not be visible when the window is closed, with this British Standard number, i.e. BS 7413:1991¹⁾, and with a mark enabling the manufacturer's name and date of manufacture of the extrusion to be traced without removal of the window. Subsills shall be similarly marked in a position that will be subsequently concealed by the window.