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**Agrément
Certificate
No 90/2528**

Designated by Government
to issue
European Technical
Approvals

PROFILE 22 uPVC WINDOW SYSTEM

Fenêtre
Fenster

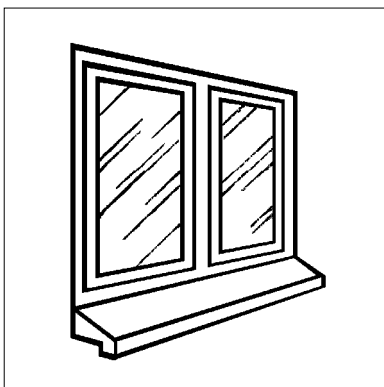
Product

• *THIS CERTIFICATE RELATES TO THE PROFILE 22 uPVC WINDOW SYSTEM COMPRISING THE WINDOW TYPES AND SIZES REFERRED TO IN THE ACCOMPANYING DETAIL SHEETS.*

• *The windows referred to in the Detail Sheets are marketed by The Windowstore Limited at the above address.*


• *The windows in the Profile 22 range are for use in the exposure situations described in the relevant Detail Sheets.*

• *It is essential that the windows are installed and used in accordance with the conditions set out in the Design Data and Installation parts of the Detail Sheets.*




Regulations


1 The Building Regulations (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the requirements of the Building Regulations to which windows can contribute in achieving compliance. In the opinion of the BBA, the position of the Profile 22 uPVC Window System under the Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

2 The Building Standards (Scotland) Regulations

 In the opinion of the BBA, the position of the Profile 22 uPVC Window System under these Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

3 The Building Regulations (Northern Ireland)

 In the opinion of the BBA, the position of the Profile 22 uPVC Window System under these Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

Conditions of Certification

4 Conditions

4.1 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided that:

- (a) the specification of the products is unchanged, and
- (b) the manufacturer continues to have the products checked by the BBA.

4.2 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

4.3 In granting this Certificate, the BBA makes no representation as to the presence or absence of patent rights subsisting in the products and/or as to the legal right of The Windowstore Limited to market, install or maintain the products.

4.4 It should be noted that any recommendations relating to the safe use of these products which are contained or referred to in this Certificate are the minimum standards required to be met when the products are used. They do not purport in any way to re-state the requirements of the Health and Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which may in the future exist; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any other present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage incurred in respect of personal injury arising as a direct or indirect result of the use of these products.



In the opinion of the British Board of Agrément, the Profile 22 uPVC Window System is satisfactory if installed and used as set out in this Certificate. Certificate No 90/2528 is accordingly awarded to The Windowstore Limited.

On behalf of the British Board of Agrément

Date of issue: 26th September 1990

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Director

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The Windowstore Limited

Certificate No 90/2528

DETAIL SHEET 1

PROFILE 22 uPVC WINDOW SYSTEM

Building Regulations

1 The Building Regulations 1985 (as amended) (England and Wales)



The Secretary of State has agreed with the British Board of Agrément the requirements of the Building Regulations to which windows can contribute in achieving compliance. In the opinion of the BBA, the Profile 22 uPVC Window System, if used in accordance with the provisions of this Certificate, will contribute to meeting the relevant requirements.

Requirement: B1

Means of escape in case of fire

Comment:

Where a window is required, in a dwelling, to provide a means of escape from a loft space converted into a habitable room, a Profile 22 window can meet the requirement when it incorporates an opening light providing a clear opening not less than 850 mm high by 500 mm wide and is positioned as required by Appendix B, clause B1(g) to *The Building Regulations 1985 – Mandatory rules for means of escape in case of fire*.

Requirement: F1

Means of ventilation

Comment:

In calculating the contribution of the product to natural ventilation, the area of opening should be calculated in accordance with section 6.1 in the relevant Detail Sheets and related to floor area and position in the wall as set out in Approved Document F1. Background ventilation can be provided as described in section 6.2 of the relevant Detail Sheets.

Requirement: L1

Conservation of fuel and power

Comment:

In calculating the heat loss through windows and comparing it with the cases given in the Regulations, the U values given in section 7 of the relevant Detail Sheets should be used.

Requirement: Regulation 7

Materials and workmanship

Comment:

The product is acceptable.

2 The Building Standards (Scotland) Regulations 1981 to 1987



In the opinion of the BBA, the Profile 22 uPVC Window System, if used in accordance with the provisions of this Certificate, will satisfy the various Regulations as listed below.

Regulation: B2

Selection and use of materials

Comment:

Profile 22 windows are acceptable. See section 1.3 of the relevant Detail Sheets.

Regulation: E20(3)

Construction of and access to windows

Comment:

Windows providing a clear opening of not less than 850 mm high by 500 mm wide meet the requirements of this Regulation when sited not more than 1.1 metres above floor level.

Regulation: G9

Resistance to moisture from rain or snow

Comment:

When installed and used in accordance with the provisions of this Certificate, Profile 22 windows can satisfy the relevant requirements of this Regulation.

Regulation: P5

Prevention of danger and obstruction – Cleaning windows

Comment:

Use of the Profile 22 uPVC Window System is restricted to installations which comply with paragraphs (2) and (3) of the Regulation.

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3 The Building Regulations (Northern Ireland) 1990



In the opinion of the BBA, the Profile 22 uPVC Window System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the various Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		Profile 22 windows are acceptable. See section 13 of the relevant Detail Sheets.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The windows are weathertight (see Table 3 of the relevant Detail Sheets) and can thus contribute to the ability of the wall to meet this Regulation.
Regulation:	EE2	Provision of means of escape
Regulation:	EE3	Deemed-to-satisfy provisions
Comment:		A Profile 22 window can contribute to meeting the requirements when it incorporates an opening light providing a clear opening not less than 850 mm by 500 mm and is positioned not more than 1.1 m above the floor.
Regulation:	F5	Area of window openings
Regulation:	FF3	Conservation of fuel and power
Comment:		In calculating the heat loss through windows, the U value given in section 7 of the relevant Detail Sheets should be used.
Regulation:	K2	Means of ventilation
Comment:		When calculating the area of window openings for ventilation purposes, see section 6.1 of the relevant Detail Sheets.



On behalf of the British Board of Agrément

Date of issue: 26th September 1990

Director

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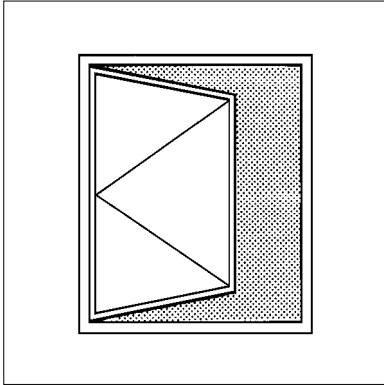


The Windowstore Limited

Certificate No 90/2528

**THE PROFILE 22 OUTWARD OPENING
uPVC WINDOW SYSTEM**
DETAIL SHEET 2

Product



• THIS DETAIL SHEET RELATES TO THE PROFILE 22 OUTWARD OPENING uPVC WINDOW SYSTEM.

• The system comprises single top-hung windows, single side-hung windows and multilight windows comprising opening lights and fixed lights, all framed in white uPVC and glazed externally or internally with sealed double-glazed units or single glass (see Figures 1, 2 and 3).

• The product is for use where the test pressure classes, defined in BS 6375 : Part 1 : 1989 and indicated in Table 3, are applicable.

• It is essential that the windows are installed and maintained in accordance with the conditions set out in the Design Data and Installation parts of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheet and Detail Sheet 1 which give Conditions of Certification and the product's position regarding the Building Regulations respectively.

Technical Specification

1 Description

1.1 The Profile 22 outward opening windows are fabricated from white uPVC profiles, produced by conventional extrusion techniques from material complying with Case B (uPVC with additional polymers), as defined in BBA MOAT No 17 : 1981 *UEAtc Directive for the Assessment of uPVC Windows*. The profiles covered by this Certificate are those listed in Table 1 and shown in Figures 2 and 3.

1.2 The methods of selection, machining and assembly of frame components are detailed in the *Profile 22 Product Manual*.

1.3 Multilight windows incorporate mullions and transoms which are connected to the outer frame and, where relevant, to each other by means of welded joints.

1.4 The uPVC extrusions are cut to length, and all holes routed or drilled. Where required, galvanized steel reinforcement sections are inserted in the uPVC sections before they are welded together. The welded joints are then cleaned off and polished, knifed or grooved using a purpose-made machine. The window is completed by fitting the weatherstripping and securing the furniture in position with screws.

Figure 1 Corner detail

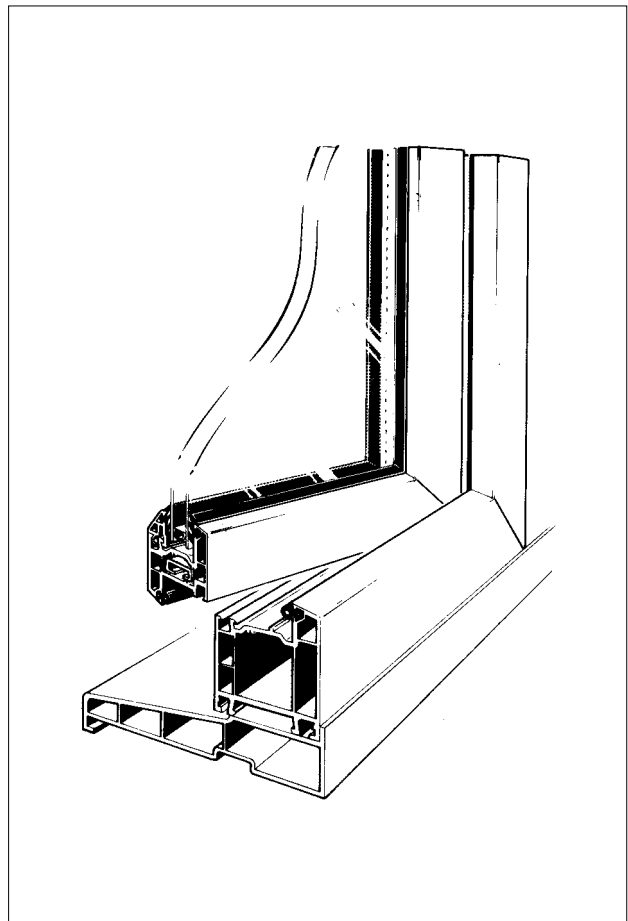


Figure 3 Sill profiles

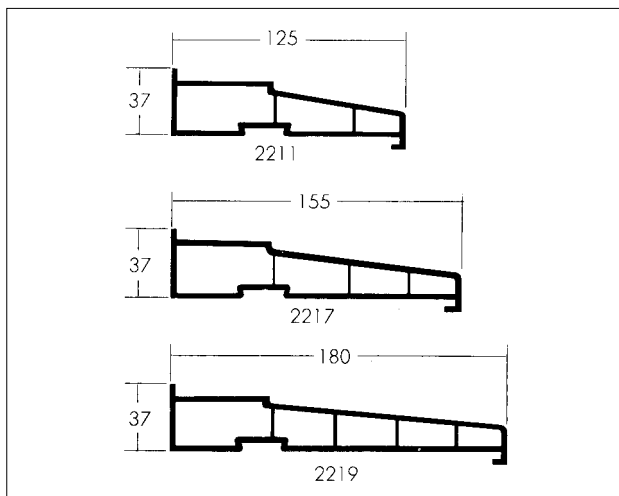


Table 2 Size restriction

	Dimension (mm)
<i>All windows</i>	
Maximum overall width or height of any outer frame	2400
Maximum length of any mullion with reinforcement	1600
Maximum length of any transom with reinforcement 2249	1650
with reinforcement 2244	1250
<i>Top-hung opening lights</i>	
Maximum size of top-hung opening light (separately or in a multilight) with reinforcement	1284 wide x 1284 high
without reinforcement	880 wide x 880 high
<i>Side-hung opening lights</i>	
Maximum size of side-hung opening light (separately or in a multilight) using outer frame 2201 with reinforcement	700 wide x 1350 high
without reinforcement	680 wide x 750 high
using outer frame 2207 with reinforcement	730 wide x 1380 high
without reinforcement	730 wide x 880 high

Notes:

One mullion or transom spanning the full height or width of a window up to 2400 mm is permissible but the window must be subdivided so that no glass edge supported by a mullion or transom exceeds 1600 mm (mullion) or 1650 (transom).

Furniture and fittings

1.11 Top-hung and side-hung windows covered by this Detail Sheet are fitted with friction hinges constructed from stainless steel type 430 to BS 1449 : Part 2 : 1983 *Steel plate, sheet and strip — Specification for stainless and heat-resisting steel plate, sheet and strip*. The hinges incorporate plastic friction pads which can be adjusted by means of a brass screw to provide the necessary braking action. The hinges are fixed to the frames with screws.

1.12 Opening windows are fastened by means of cockspur type handles manufactured from zinc alloy with an anodised or painted finish, or by

concealed espagnolette bolts operated by a handle having a similar specification to the zinc alloy cockspur handles.

1.13 Details of currently approved types of hinges and locking mechanisms can be obtained from the BBA. Additional components are available from the range of fittings to restrict the opening of the window to a maximum distance of 100 mm.

Glazing

1.14 Windows are supplied factory glazed or ready for glazing on site using single glass or double-glazed units with glass thicknesses in accordance with BS 6262 : 1982 *Code of practice for glazing for buildings*. All glass is positioned on Profile 22 plastic setting blocks.

Weatherstripping and gaskets

1.15 Weatherstripping, extruded from EPDM, is located in grooves around the periphery of the opening light and the fixed frame.

1.16 Gaskets, also formed from EPDM, are used to seal the double-glazed units or glass against the frame members and between the units or glass and the uPVC bead.

Quality control

1.17 Quality control includes checks on:

Raw materials

bulk density
pourability

Extruded profiles

dimensions
colourfastness
heat reversion
resistance to cold impact
acetone resistance

Fabrication procedures

extrusions and fittings (visual inspection)
overall dimensions
operation and opening of locking mechanisms
strength of welded corners.

2 Delivery and site handling

2.1 The windows are delivered to site glazed or ready for glazing on site. For transportation they are protected as necessary to avoid damage. External surfaces of the uPVC profiles are additionally protected with adhesive tape.

2.2 Each window has a label bearing the marketing company's mark and the BBA identification mark incorporating the number of this Certificate.

2.3 The windows should be stored under cover in a clean area, on edge and suitably supported to avoid distortion or damage.

3 General

3.1 Selected samples from the Profile 22 Outward Opening uPVC Window System covered by this Detail Sheet were tested in accordance with BBA MOAT No 1 : 1974 *Directive for the Assessment of Windows*. Assessment of these test results shows that the products, within the range described in section 1.10, are suitable for use where the test pressure classes, defined in BS 6375 : Part 1 : 1989 *Performance of windows – Classification for weathertightness (including guidance on selection and specification)* and indicated in Table 3, are applicable. The gradings are based on the assumption that the outer frame is supported on all four sides in accordance with the manufacturer's instructions.

3.2 For unusual building layouts, building shapes or ground topography, the designer will need to give particular consideration to the prevailing exposure conditions.

Table 3 Test pressure class

	BS 6375 : Part 1 : 1989 Test pressure class (Pa)	MOAT No 1 Grading
<i>Strength and stability</i>		
Double- and single-glazed multilight units with mullion or transom lengths not exceeding:		
1650 mm (transom) with 2249 reinforcement ⁽¹⁾	2300	V ₃
1250 mm (transom) with 2244 reinforcement ⁽²⁾	2000	V ₃
1600 mm (mullion) with 2249 reinforcement ⁽³⁾	1600	V ₂
1300 mm (mullion) with 2249 reinforcement ⁽⁴⁾	2700	V ₃
Individual opening lights:		
side-hung	2700	V ₃
top-hung	2000	V ₃
<i>Watertightness</i>		
Fixed lights	300	E ₄
Opening lights	300	E ₄
<i>Air permeability</i>		
Fixed or opening lights	600	A ₃

Notes:

- (1) Refers to a window with a full width transom of 1650 mm and a height of 1300 mm.
- (2) Refers to a window with a full width transom of 1250 mm and a height of 1300 mm.
- (3) Refers to a window with a full height mullion of 1600 mm and a width of 2400 mm.
- (4) Refers to a window with a full height mullion of 1300 mm and a width of 1800 mm.
- (5) Temperature differentials applied to the window to simulate winter and summer conditions did not affect operation or alter the air permeability characteristics.

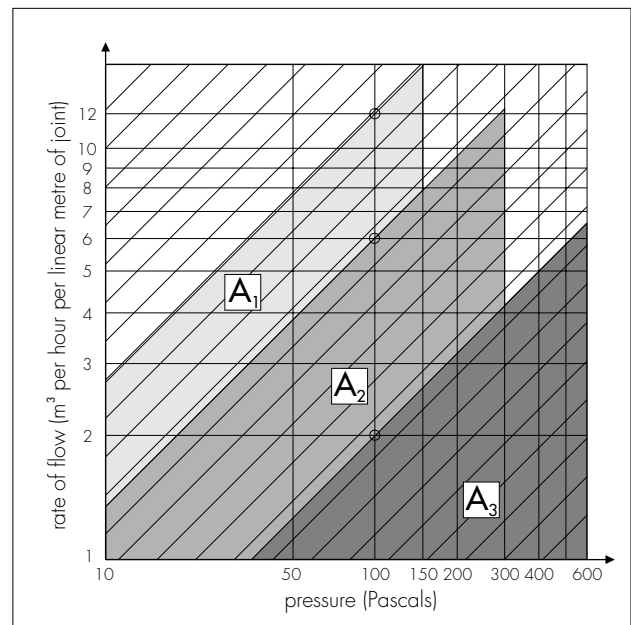
V₂ indicates that windows meet deformation requirements at 1000 Pa, a cycling test at 750 Pa and a safety test at 2000 Pa.

V₃ indicates that windows meet deformation requirements at 1750 Pa, a cycling test at 1250 Pa and a safety test at 3000 Pa.

E₄ indicates no water leakage occurring at a differential pressure of 500 Pa.

A₃ indicates an airflow rate below the line passing the point for a rate of flow of 2 m³h⁻¹m⁻¹ at 100 Pa pressure, when tested up to a pressure of 600 Pa (see Figure 4).

Figure 4 Air permeability grade



4 Practicability of installation

4.1 Installation does not present undue difficulty when fitting the windows in openings in new or existing walls provided the installation instructions are followed.

4.2 In common with other types of window fitted to prepared openings, Profile 22 windows must be correctly positioned in relation to vertical damp-proof courses to prevent water penetration to the internal reveal.

5 Glass area

The approximate unobstructed glass area of the windows can be determined by deducting from the overall height and width the dimensions given in Table 4.

Table 4 Determination of unobstructed glass area

Window feature	Deduction from overall height and width (mm)
Outer frame	52
Mullion or transom between fixed lights	57
Mullion or transom between opening lights	143
Mullion or transom between one opening and one fixed light	100
Outer frame and opening light	95

6 Natural ventilation area

6.1 The opening area for natural ventilation may be calculated by multiplying together the overall height and width dimensions reduced by the amount given in Table 5. In the case of opening lights abutting a mullion or transom, the overall width or height of that element will be given as the dimension from the edge of the outer frame to the centre line of the mullion or transom or, where relevant, between centres of the mullion or transom.



6.2 The background ventilation recommendations of Approved Document F1 Section 1.1 to the Building Regulations 1985 (as amended) can be met by the incorporation in the window of a suitably sized trickle ventilator. The ventilator may be glazed in, fitted in the outer frame or fitted by another method approved by the BBA for use with the Profile 22 system. The weathertightness of particular ventilators has not been assessed. Details of approved fitting methods can be obtained from the BBA.

Table 5 Natural ventilation dimension reductions

Frame member	Deduction from overall height or width (mm)
Outer frame	52
Mullion or transom	28.5

7 Thermal insulation



7.1 The thermal transmittance value (U value) of a fully reinforced Profile 22 window 1194 mm high by 1193 mm wide incorporating a 1000 mm x 1000 mm kitemarked standard 20 mm sealed double-glazed unit, when measured by the Guarded Hot Box Method complying with BS 874 : Part 3 : Section 3.1 : 1987 *Tests for thermal transmittance and conductance — Guarded hot-box method*, is $2.65 \pm 0.27 \text{ Wm}^{-2}\text{K}^{-1}$.

7.2 For design purposes, a representative value for the lineal thermal transmittance of the uPVC frame may be taken as 0.20 WK^{-1} per metre run of frame. The heat loss through the uPVC frame is the product of the lineal thermal transmittance value, the frame length and the temperature difference across the frame, ie the heat loss (in watts) through uPVC frame = $0.20 \times \text{total length of frame} \times \text{environmental temperature difference across the frame}$.

7.3 The overall thermal insulation of the window will be dependent on the performance of the double-glazed units. It is recommended that a type is specified which carries the British Standard kitemark to BS 5713 : 1979 *Specification for hermetically sealed flat double-glazing units*.

8 Condensation risk

8.1 Where a temperature differential exists between the interior and exterior surfaces of a Profile 22 uPVC window the frame members do not constitute a 'cold bridge'. Condensation will occur on the glass before it appears on the frame.

8.2 Measurements show that for a reinforced window, at an internal temperature of 20°C and an internal RH of 65%, the external temperature

must fall below -9.3°C before general condensation occurs on the visible interior surface of the uPVC frame, or below -1.4°C before condensation occurs at any point on this surface.

9 Safety

9.1 When fitted with a restrictor, movement of the opening light can be effectively limited to give an opening of not more than 100 mm as recommended for child safety in BS Code of Practice 153 : Part 1 : 1969 *Windows and rooflights — Cleaning and safety*.

9.2 The windows can comply with the recommendations of CP 153 : Part 1 : 1969 with regard to the positioning of hand operated controls.

9.3 Account must be taken of the recommendations given in BS 6262 : 1982 clauses 4.7 and 5.7 regarding glazing safety. The recommendations include the use of safety glass, complying with BS 6206 : 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*, under certain circumstances.

10 Security against intrusion

10.1 Profile 22 opening lights are fitted with a lock mechanism which is sufficiently strong to resist forcing. When fastened in the closed position the opening light cannot be opened from the outside, for example, by the insertion of a thin blade.

10.2 The removal of the externally fitted glazing beads is extremely difficult due to the security leg which locks the bead in place. If considered necessary, for additional security, the internal glazing gasket may be replaced by double-sided adhesive butyl glazing tape. On internally glazed windows the design is such that removal of the bead from the outside is impossible.

11 Ease of operation

The window can be operated without difficulty when correctly installed.

12 Maintenance

12.1 The window can be re-glazed and the gaskets and weatherstripping replaced, but these operations should be carried out by specialist operatives using the materials recommended by The Windowstore Limited and approved by the BBA.

12.2 If damage occurs, the furniture and fittings can be readily replaced by releasing the fixing screws and changing the fitting.

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12.3 The uPVC frame members can be cleaned using water containing household detergent. If dirt is allowed to build up on the members over long periods it may become more difficult to restore the surface appearance.

12.4 Care should be taken when using proprietary materials for cleaning the glass, to ensure that deposits are not allowed to remain on the uPVC where they may cause discolouration and damage to the surface. In addition, care must be taken to avoid damage to, or discolouration of, the members when stripping paint from adjacent timber, for example, by means of a blowlamp or paint stripper.

12.5 Paints can adversely affect the impact strength of the uPVC frame members and the application of dark colours could lead to a risk of thermal distortion. Painting is therefore not recommended.

12.6 The hinges and locking mechanism should be periodically lubricated to minimise wear and to ensure smooth operation. Care should be taken to

avoid applying lubricant to the friction pads as this will impair their braking action, which can be adjusted, if necessary, with the brass screws provided in each pad.

13 Durability



13.1 Evidence is available on the performance in the UK of uPVC similar to that used for the framing members, over a period of 15 years in windows and in excess of 20 years in other external applications. Such evidence, when compared with the results of tests on the Profile 22 uPVC, indicates that the windows will have a life of at least 25 years. Any slight colour change or surface dulling which might occur will be uniform over the visible surfaces of the windows.

13.2 Components, including the hinges, locking mechanism and operating handles as described in this Detail Sheet, will have similar durability.

13.3 The gaskets, weatherstripping and the mastic seal to the building structure may need to be replaced within the life of the window.

14 General

14.1 The windows must be fixed into the opening, in accordance with the recommendations in the *Profile 22 Product Manual*, by means of proprietary expanding anchors through the frame or by means of galvanized steel fixing lugs.

14.2 Openings in new walls should be formed using a suitable template 10 mm wider and higher than the window to be installed. The window should not be built in at the construction stage.

15 Procedure

15.1 After checking the dimensions of the window, the frame is de-glazed if necessary and

positioned in the opening. Holes are drilled through the outer frame and into the masonry to take fixing anchors. Alternatively, lugs are positioned on the frame and attached to the masonry by means of screws and plugs. In either case fixings must be positioned 150 to 250 mm from corners and at centres not exceeding 600 mm.

15.2 All glazing or re-glazing of the window is undertaken as required using the technique fully described in the *Profile 22 Product Manual*.

15.3 The installation is completed by application of a silicone or similar durable mastic to the perimeter and the fitting of trims and window board to the interior.

Technical Investigations

The following is a summary of the technical investigations carried out on the Profile 22 Outward Opening uPVC Window System.

16 Tests

16.1 Tests were carried out in accordance with the methods defined in MOAT No 1 : 1974 to determine:

resistance to air penetration
resistance to water penetration
effect of wind loads
effect of thermal differential
efficiency of window furniture
resistance to impact, racking and bending loads
ease of operation.

16.2 Tests in accordance with MOAT No 8 : 1973 *UEAtc Directive for Rigid PVC Products used Externally in Building* and MOAT No 17 : 1981 *Directive for the Assessment of uPVC Windows* gave the following results for the uPVC extrusions:

ash content (%)	5.8
Vicat softening temperature (°C)	82
ultimate tensile strength (MPa)	47.5
elongation at break (%)	194
modulus of elasticity (MPa)	2610
tensile impact (kJm ⁻²)	
new material	
at 23°C	700 ± 109
at 0°C	500 ± 97
aged material	
56 days heat aged	583 ± 124
500 hours UV aged	527 ± 187
induction time of dehydrochlorination (min)	
new material	96.6
56 days heat aged	83.5
500 hours UV aged	55.5
impact test at -10°C	all samples passed
shrinkage on heating at 100°C for 1 hr	<2%
acetone resistance	pass

16.3 The thermal transmittance value of a reinforced Profile 22 outward opening window was measured using the Guarded Hot Box Method.

17 Other investigations

The profile manufacturing process, and the window fabrication procedure including, in each case, the methods adopted for quality control, have been examined and found satisfactory by the BBA.



On behalf of the British Board of Agrément

Date of issue: 26th September 1990

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Director

Recreated in QX 3.7.01

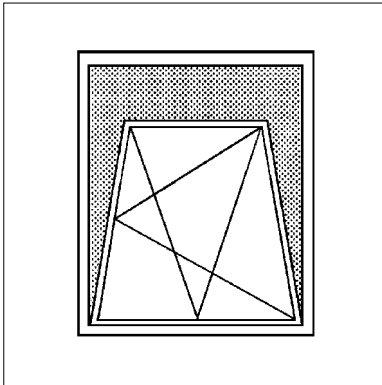


The Windowstore Limited

Certificate No 90/2528

**THE PROFILE 22 TILT AND TURN uPVC
WINDOW SYSTEM**
DETAIL SHEET 3

Product



- THIS DETAIL SHEET RELATES TO THE PROFILE 22 TILT AND TURN uPVC WINDOW SYSTEM.
- The system comprises single tilt and turn windows and multilight windows comprising opening lights and fixed lights, framed in white uPVC and glazed with single glass or sealed double-glazed units (see Figures 1 and 2).
- The product is for use where the test pressure classes, defined in BS 6375 : Part 1 : 1989 and indicated in Table 3, are applicable.
- It is essential that the windows are installed and maintained in accordance with the conditions set out in the Design Data and Installation parts of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheet and Detail Sheet 1 which give Conditions of Certification and the product's position regarding the Building Regulations respectively.

Technical Specification

1 Description

1.1 The Profile 22 tilt and turn windows are fabricated from white uPVC profiles, produced by conventional extrusion techniques from material complying with Case B (uPVC with additional polymers), as defined in BBA MOAT No 17 : 1981 *UEAtc Directive for the Assessment of uPVC Windows*. The profiles covered by this Certificate are those listed in Table 1 and shown in Figure 2.

1.2 The methods of selection, machining and assembly of frame components are detailed in the *Profile 22 Product Manual*.

1.3 Multilight windows incorporate mullions and transoms which are connected to the outer frame and, where relevant, to each other by means of welded joints.

1.4 The uPVC extrusions are cut to length, and all holes routed or drilled. Where required, galvanized mild steel reinforcement sections are inserted in the uPVC sections before they are welded together. The welded joints are then cleaned off and polished, knifed or grooved using a purpose-made machine. The window is completed by fitting the weatherstripping and securing the furniture in position with screws.

Figure 1 Corner detail

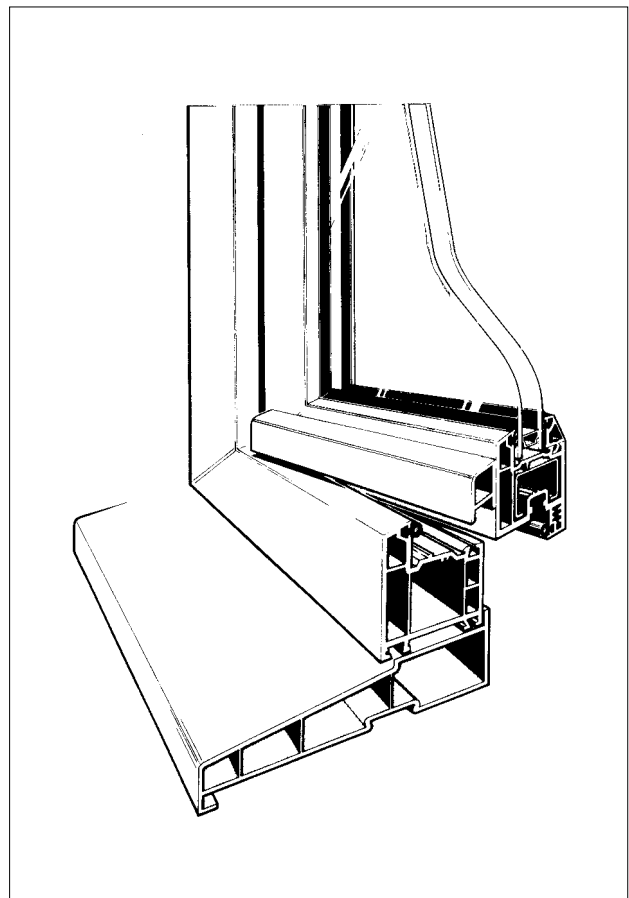


Table 1 Profiles

Manufacturer's designation	Profile type	Application
2201	L-section	outer frame
2207	L-section	outer frame
2202	T-section	transom/mullion
2212	T-section	transom/mullion
2206	Z-section	sash
2211	—	125 mm sill
2217	—	155 mm sill
2219	—	180 mm sill
2209	—	internal glazing bead (20/24 mm)
2228	—	internal glazing bead (28 mm)
2294	—	internal glazing bead (20/24 mm)
2215	—	single glazing bead (4/6 mm) ⁽¹⁾
2229	—	single glazing bead (4/6 mm) ⁽²⁾
2240	—	reinforcement for 2201, 2202
2242	—	reinforcement for 2206
2243	—	reinforcement for 2207, 2212
2244	—	reinforcement for 2201, 2202
2249	—	reinforcement for 2207, 2212
1808	—	glazing gasket (EPDM)
1822	—	glazing gasket (EPDM)
1971	—	glazing gasket (EPDM)
1810	—	weatherseal (EPDM)

Notes:

(1) with condensation channel

(2) without condensation channel

1.5 Drainage is provided by a series of slots, 25 mm x 5 mm, positioned in accordance with the *Profile 22 Product Manual*. On combination units each element is treated as a separate window and drainage slots cut accordingly.

Reinforcement

1.6 Outer frames are not normally reinforced unless specified.

1.7 Opening lights are reinforced with galvanized mild steel as detailed in the *Profile 22 Product Manual*.

1.8 Mullion or transom 2202 is reinforced using 2240 up to 1200 mm and 2244 over 1200 mm. Mullion or transom 2212 is reinforced using 2243 or 2249 over 800 mm. The reinforcement used is galvanized mild steel in accordance with the rules given in the *Profile 22 Product Manual* (see also Table 3 Test pressure class).

1.9 Galvanized steel reinforcement is roll-formed from material to BS 2989 : 1982 *Specification for continuously hot-dipped zinc coated and iron-zinc alloy coated steel — Wide strip, sheet/plate and slit wide strip* with a G275 coating.

Size range

1.10 This Detail Sheet covers Profile 22 tilt and turn, fixed-light windows and combinations of these within the limitations shown in Table 2.

Figure 2 Profiles

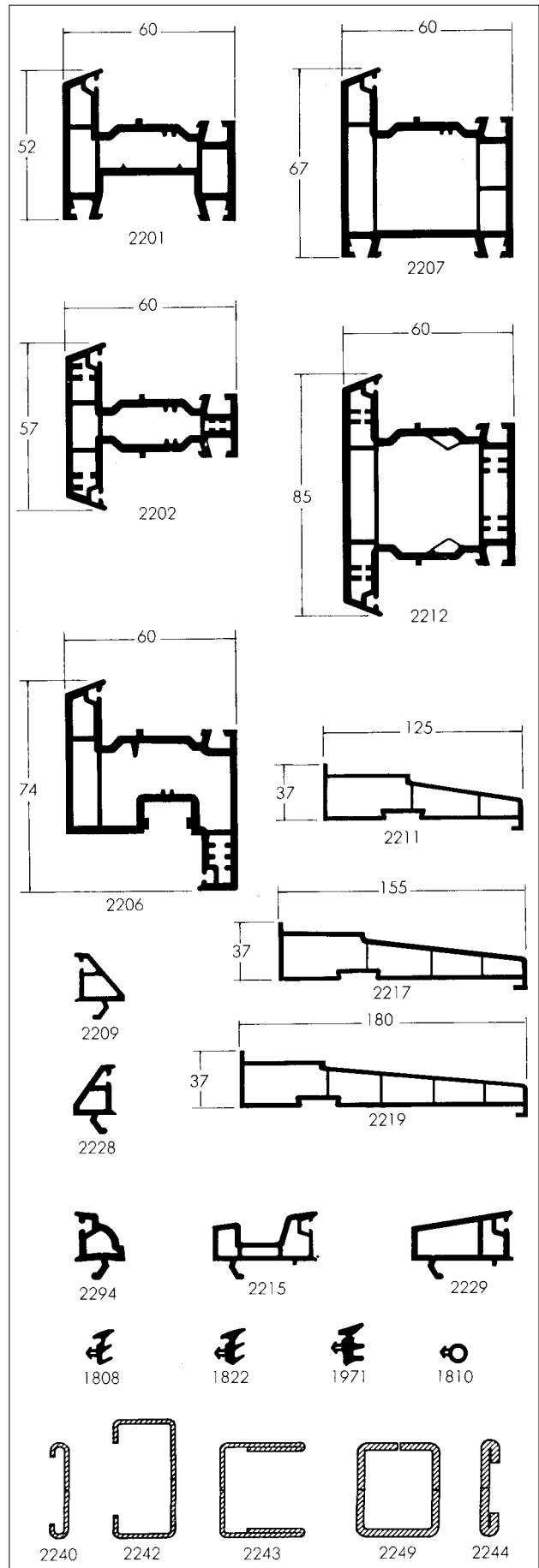


Table 2 Size restriction

	Dimension (mm)
Maximum overall width or height of any outer frame	1800
Maximum length of any mullion with reinforcement	1300
Maximum size of a single tilt and turn opening light	1000 wide x 1600 high
Maximum size of a tilt and turn opening light in a multilight	1000 wide x 1300 high

Furniture and fittings

1.11 The windows are fitted with specific types of tilt and turn mechanism, approved for the purpose by the BBA, comprising an espagnolette type locking system, hinges and tilt stay, all formed from passivated zinc-plated steel. The mechanism incorporates locking rollers which engage with keeps fixed to the outer frame and is operated with a handle formed from anodised or painted zinc alloy.

1.12 The tilt and turn mechanism locates in a purpose-made groove in the opening light profile. All furniture is screwed to the uPVC frame profiles using non-corrodible self-tapping screws which penetrate the reinforcement or two thicknesses of uPVC.

1.13 Details of currently approved fittings can be obtained from the BBA. Additional components are available from the range of fittings to restrict the opening of the windows to a maximum distance of 100 mm.

Glazing

1.14 Windows are supplied factory glazed, or ready for glazing on site using single glass or double-glazed units with glass thicknesses in accordance with BS 6262 : 1982 *Code of practice for glazing for buildings*.

Weatherstripping and gaskets

1.15 Weatherstripping, extruded from EPDM, is located in grooves around the periphery of the opening light and the fixed frame.

1.16 Gaskets, also formed from EPDM, are used to seal the double-glazed units or glass against the frame members and between the units or glass and the uPVC bead.

Quality control

1.17 Quality control includes checks on:

Raw materials

bulk density
pourability

Extruded profiles

dimensions
colourfastness
heat reversion
resistance to cold impact
acetone resistance

Fabrication procedures

extrusions and fittings (visual inspection)
overall dimensions
operation and opening of locking mechanisms
strength of welded corners.

2 Delivery and site handling

2.1 The windows are delivered to site glazed or ready for glazing on site. For transportation they are protected as necessary to avoid damage. External surfaces of the uPVC profiles are additionally protected with adhesive tape.

2.2 Each window has a label bearing the marketing company's mark and the BBA identification mark incorporating the number of this Certificate.

2.3 The windows should be stored under cover in a clean area, on edge and suitably supported to avoid distortion or damage.

3 General

3.1 Selected samples from the Profile 22 Tilt and Turn uPVC Window System covered by this Detail Sheet were tested in accordance with BBA MOAT No 1 : 1974 *Directive for the Assessment of Windows*. Assessment of these test results shows that the products, within the range described in section 1.10, are suitable for use where the test pressure classes, defined in BS 6375 : Part 1 : 1989 *Performance of windows – Classification for weathertightness (including guidance on selection and specification)* and indicated in Table 3, are applicable. The gradings are based on the assumption that the outer frame is supported on all four sides in accordance with the manufacturer's instructions.

3.2 For unusual building layouts, building shapes or ground topography, the designer will need to give particular consideration to the prevailing exposure conditions.

Table 3 Test pressure class

	BS 6375 : Part 1 : 1989 Test pressure class (Pa)	MOAT No 1 Grading
<i>Strength and stability</i>		
Multilights up to maximum size with mullions or transoms: up to max 1300 mm with reinforcement	2400	V ₃
Individual opening lights	2700	V ₃
<i>Watertightness</i>		
Fixed lights	300	E ₄
Opening lights	300	E ₄
<i>Air permeability</i>		
Fixed or opening lights	600	A ₃

Notes:

Temperature differentials applied to the window to simulate winter and summer conditions did not affect operation or alter the air permeability characteristics.

V₃ indicates that windows meet deformation requirements at 1750 Pa, a cycling test at 1250 Pa and a safety test at 3000 Pa.

E₄ indicates no water leakage at a differential pressure of 500 Pa.

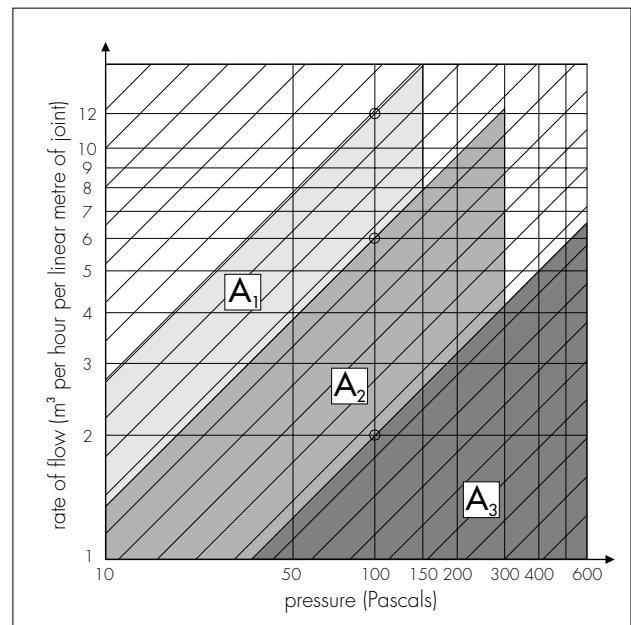
A₃ indicates an airflow rate below the line passing the point for a rate of flow of 2 m³h⁻¹m⁻¹ at 100 Pa pressure, when tested up to a pressure of 600 Pa (see Figure 3).

4 Practicability of installation

4.1 Installation does not present undue difficulty when fitting the windows in openings in new or existing walls provided the installation instructions are followed.

4.2 In common with other types of window fitted to prepared openings, Profile 22 windows must be correctly positioned in relation to vertical damp-proof courses to prevent water penetration to the internal reveal.

Figure 3 Air permeability grade



5 Glass area

The approximate unobstructed glass area of the windows can be determined by deducting from the overall height and width the dimensions given in Table 4.

Table 4 Determination of unobstructed glass area

Window feature	Deduction from overall height and width (mm)
Outer frame	67
Mullion or transom between fixed lights	85
Mullion or transom between opening lights	182
Mullion or transom between one opening and one fixed light	133.5
Outer frame and opening light	115.5

6 Natural ventilation area

6.1 The opening area for natural ventilation may be calculated by multiplying together the overall height and width dimensions reduced by the amount given in Table 5. In the case of opening lights abutting a mullion or transom, the overall width or height of that element will be given as the dimension from the edge of the outer frame to the centre line of the mullion or transom or, where relevant, between centres of the mullion or transom.

6.2 The background ventilation recommendations of Approved Document F1 Section 1.1 to the Building Regulations 1985 (as amended) can be met by the incorporation in the window of a suitably sized trickle ventilator. The ventilator may be glazed in, fitted in the outer frame or fitted by another method

approved by the BBA for use with the Profile 22 system. The weathertightness of particular ventilators has not been assessed. Details of approved fitting methods can be obtained from the BBA.

Table 5 Natural ventilation dimension reductions

Frame member	Deduction from overall height or width (mm)
Outer frame	67
Mullion or transom	42.5

7 Thermal insulation



7.1 The thermal transmittance value (U value) of a fully reinforced Profile 22 window 1205 mm high by 1205 mm wide incorporating a 1000 mm x 1000 mm kitemarked standard 20 mm sealed double-glazed unit, when measured by the Guarded Hot Box Method complying with BS 874 : Part 3 : Section 3.1 : 1987 *Tests for thermal transmittance and conductance — Guarded hot-box method*, is $2.67 \pm 0.27 \text{ Wm}^{-2}\text{K}^{-1}$.

7.2 For design purposes, a representative value for the lineal thermal transmittance of the uPVC frame may be taken as 0.23 WK^{-1} per metre run of frame. The heat loss through the uPVC frame is the product of the lineal thermal transmittance value, the frame length and the temperature difference across the frame, ie the heat loss (in watts) through the uPVC frame = $0.23 \times \text{total length of frame} \times \text{environmental temperature difference across the frame}$.

7.3 The overall thermal insulation of the window will be dependent on the performance of the double-glazed units. It is recommended that a type is specified which carries the British Standard kitemark to BS 5713 : 1979 *Specification for hermetically sealed flat double-glazing units*.

8 Condensation risk

8.1 Where a temperature differential exists between the interior and exterior surfaces of a Profile 22 uPVC window the frame members do not constitute a 'cold bridge'. Condensation will occur on the glass before it appears on the frame.

8.2 Measurements show that for a reinforced window, at an internal temperature of 20°C and an internal RH of 65%, the external temperature must fall below -9.1°C before general condensation occurs on the visible interior surface of the uPVC frame, or below 0.0°C before condensation occurs at any point on this surface.

9 Safety

9.1 When fitted with the optional restrictor, movement of the opening light can be effectively limited to give an opening of not more than 100 mm as recommended for child safety in BS Code of Practice 153 : Part 1 : 1969 *Windows and rooflights — Cleaning and safety*.

9.2 The windows can comply with the recommendations of CP 153 : Part 1 : 1969, with regard to the positioning of hand operated controls.

9.3 Account must be taken of the recommendations given in BS 6262 : 1982 clauses 4.7 and 5.7 regarding glazing safety. The recommendations include the use of safety glass, complying with BS 6206 : 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*, under certain circumstances.

10 Security against intrusion

10.1 Profile 22 opening lights are fitted with a lock mechanism which is sufficiently strong to resist forcing. When fastened in the closed position the opening light cannot be opened from the outside, for example, by the insertion of a thin blade.

10.2 The design of the glazing system is such that removal of the glazing, from outside, is impossible as all beads are fitted internally.

11 Ease of operation

The window can be operated without difficulty when correctly installed.

12 Maintenance

12.1 The window can be re-glazed and the gaskets and weatherstripping replaced, but these operations should be carried out by specialist operatives using the materials recommended by The Windowstore Limited and approved by the BBA.

12.2 If damage occurs, furniture and fittings can be readily replaced by releasing the fixing screws and changing the fitting.

12.3 The uPVC frame members can be cleaned using water containing household detergent. If dirt is allowed to build up on the members over long periods it may become more difficult to restore the surface appearance.

12.4 Care should be taken when using proprietary materials for cleaning the glass, to ensure that deposits are not allowed to remain on the uPVC where they may cause discolouration and damage to the surface. In addition, care must be taken to avoid damage to, or discolouration of, the members when stripping paint from adjacent timber, for example, by means of a blowlamp or paint stripper.

12.5 Paints can adversely affect the impact strength of the uPVC frame members and the application of dark colours could lead to a risk of thermal distortion. Painting is therefore not recommended.

12.6 The tilt and turn locking mechanism should be periodically lubricated to minimise wear and to ensure smooth operation.



13.1 Evidence is available on the performance in the UK of uPVC similar to that used for the framing members, over a period of 15 years in windows and in excess of 20 years in other external applications. Such evidence, when compared with the results of tests on the Profile 22 uPVC, indicates that the windows will have a life of at least 25 years. Any slight colour change or surface dulling which might occur will be uniform over the visible surfaces of the windows.

13.2 Components, including the hinges, locking mechanism and operating handles as described in this Detail Sheet, will have similar durability.

13.3 The gaskets, weatherstripping and the mastic seal to the building structure may need to be replaced within the life of the window.

14 General

14.1 The windows must be fixed into the opening, in accordance with the recommendations in the *Profile 22 Product Manual*, by means of proprietary expanding anchors through the frame or by means of galvanized steel fixing lugs.

14.2 Openings in new walls should be formed using a suitable template 10 mm wider and higher than the window to be installed. The window should not be built in at the construction stage.

15 Procedure

15.1 After checking the dimensions of the window, fixed lights are de-glazed and opening lights removed as necessary. The frame is

positioned in the opening and holes are drilled through the outer frame and into the masonry to take fixing anchors. Alternatively, lugs are positioned on the frame and attached to the masonry by means of screws and plugs. In either case fixings must be positioned 150 to 250 mm from corners and at centres not exceeding 600 mm.

15.2 Opening lights are then re-fitted and fixed lights re-glazed using the technique fully described in the *Profile 22 Product Manual*. Where a glazed opening light is re-fitted, care is required to ensure that the tilt and turn mechanism is correctly located and all fixing screws are replaced.

15.3 The installation is completed by application of a silicone or similar durable mastic to the perimeter and the fitting of trims and window board to the interior.

Technical Investigations

The following is a summary of the technical investigations carried out on the Profile 22 Tilt and Turn uPVC Window System.

16 Tests

16.1 Tests were carried out in accordance with the methods defined in MOAT No 1 : 1974 to determine:

resistance to air penetration
resistance to water penetration
effect of wind loads
effect of thermal differential
efficiency of window furniture
resistance to impact, racking and bending loads
ease of operation.

16.2 Tests in accordance with MOAT No 8 : 1973 *UEAtc Directive for Rigid PVC Products used Externally in Building* and MOAT No 17 : 1981 *Directive for the Assessment of uPVC Windows* gave the following results for the uPVC extrusions:

ash content (%)	5.8
Vicat softening temperature (°C)	82
ultimate tensile strength (MPa)	47.5
elongation at break (%)	194
modulus of elasticity (MPa)	2610
tensile impact (kJm ⁻²)	
new material	
at 23°C	700 ± 109
at 0°C	500 ± 97
aged material	
56 days heat aged	583 ± 124
500 hours UV aged	527 ± 187
induction time of dehydrochlorination (min)	
new material	96.6
56 days heat aged	83.5
500 hours UV aged	55.5
impact test at -10°C	all samples passed
shrinkage on heating at 100°C for 1 hr	<2%
acetone resistance	pass

16.3 The thermal transmittance value of a reinforced Profile 22 tilt and turn window was measured using the Guarded Hot Box Method.

17 Other investigations

The profile manufacturing process, and the window fabrication procedure including, in each case, the methods adopted for quality control, have been examined and found satisfactory by the BBA.



On behalf of the British Board of Agrément

Date of issue: 26th September 1990

A handwritten signature in black ink, appearing to read 'P. C. Newson'.

Director

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