



## Blair Neill Ltd

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**Agrément  
Certificate  
No 99/3613**

Designated by Government  
to issue  
European Technical  
Approvals

## VEKA PVC-U WINDOW SYSTEM

Fenêtre  
Fenster

## Product




• THIS CERTIFICATE RELATES TO THE VEKA PVC-U WINDOW SYSTEM COMPRISING THE WINDOW TYPES AND SIZES REFERRED TO IN THE ACCOMPANYING DETAIL SHEETS.


- The windows referred to in the Detail Sheets are fabricated and marketed by Blair Neill Ltd at the above address.
- The windows in the Veka 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 Veka PVC-U 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 Veka PVC-U 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 Veka PVC-U Window System under these Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

### 4 Construction (Design and Management) Regulations

In the opinion of the BBA, the position of the Veka PVC-U 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

### 5 Conditions

5.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is copyright of the BBA.

5.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

5.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;
- (b) continue to be checked by the BBA or its agents; and

(c) are reviewed by the BBA as and when it considers appropriate.

5.4 In granting this Certificate, the BBA makes no representation as to:

- (a) the presence or absence of any patent or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

5.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.



In the opinion of the British Board of Agrément, the Veka PVC-U Window System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 99/3613 is accordingly awarded to Blair Neill Ltd.

On behalf of the British Board of Agrément

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

Date of issue: 24th June 1999

Chief Executive


## Associated Detail Sheets

The following Detail Sheets are part of this Certificate:

Detail Sheet	Edition	Date of issue	No of pages	Imprint ref	Title	System status
1	6	26th March 1998	4	06BRW1	PVC-U Window System Building Regulations	Current
5	1	14th October 1998	8	01VPW5	The Veka Matrix Tilt and Turn PVC-U Window System	Current
6	1	14th October 1998	8	01VPW6	The Veka Matrix Outward Opening PVC-U Window System	Current

## Regulations

**1 The Building Regulations 1991 (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 PVC-U Window System specified on the Front Sheet, if used in accordance with the provisions of this Certificate, will contribute to meeting the relevant requirements.

Requirement:	<b>B1</b>	Means of escape
Comment:		Where a window is required, in a dwelling, to provide a means of escape from an inner room or a loft space converted into a habitable room, the window can meet this 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 set out in Approved Document B1. The obstruction caused by opening lights hung on projecting friction stays must be taken into account when the clear opening is determined.
Requirement:	<b>F1</b>	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 by the methods described in section 6.2 of the relevant Detail Sheets.
Requirement:	<b>K4</b>	Protection from collision with open windows etc
Comment:		In buildings other than dwellings, this Requirement can be met by installing windows so that projecting parts are kept away from people moving in and around the building; or by installing features which guide people away from any open window. Approved Document K4 sets out some ways of complying with this Requirement.
Requirement:	<b>L1</b>	Conservation of fuel and power
Comment:		In calculating the heat loss through windows the U values given in section 7 of the relevant Detail Sheets should be used. In new work, the guidance given in the Approved Document to Part L regarding positioning a window in the reveal must be taken into account.
Requirements:	<b>N1 and N2</b>	Protection against impact and Manifestation of glazing
Comment:		Glazing less than 800 mm above floor or ground level should meet the requirements of N1. Except where windows incorporate only small panes, glass and plastics sheet materials which satisfy the test requirements of BS 6206 should be used to meet the requirements of N1. See section 9.3 of the relevant Detail Sheets. To meet the requirements of N2, it may be necessary to incorporate features into glazing in non-domestic buildings to make its existence apparent to people using them.
Requirement:	<b>N3</b>	Safe opening and closing of windows etc
Comment:		In buildings other than dwellings, windows which can be opened by people in or about the building should be constructed or equipped so that they can be opened, closed or adjusted safely. See sections 9.1 and 9.2 of the relevant Detail Sheets.

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Requirement:	<b>N4</b>	Safe access for cleaning windows etc
Comment:		In buildings other than dwellings, this Requirement can be met where provision is made for safe means of access for cleaning both sides of glazed surfaces where there is danger of falling more than two metres. Approved Document N4 sets out some ways of complying with this Requirement.
Requirement:	<b>Regulation 7</b>	Materials and workmanship
Comment:		The product is acceptable.

## 2 The Building Standards (Scotland) Regulations 1990 (as amended)



In the opinion of the BBA, the PVC-U Window System specified on the Front Sheet, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	<b>10</b>	Fitness of materials
Standard:	B2.1	Selection and use of materials and components
Comment:		The PVC-U window system complies with the requirements of this Standard.
Regulation:	<b>13</b>	Means of escape from fire, facilities for fire-fighting and means of warning of fire in dwellings
Standard:	E8.3	Emergency escape windows
Standard:	E9.21	Emergency access windows
Comment:		Windows providing a clear opening of not less than 850 mm high by 500 mm wide are deemed to satisfy these Standards as emergency windows, when suitably located. The obstruction caused by opening lights hung on projecting friction stays must be taken into account when the clear opening is determined.
Regulations:	<b>17 and 18</b>	Preparation of sites and resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		Walls incorporating the product, installed and used in accordance with the provisions of this Certificate, can meet this Standard. See Table 3 of the relevant Detail Sheets.
Regulation:	<b>22</b>	Conservation of fuel and power
Standard:	Relevant technical standards within Part J2	Conservation of fuel and power: the building fabric
Comment:		In calculating the heat loss from a building in connection with the relevant sub-paragraphs of this Standard, the U values given in section 7 of the relevant Detail Sheets should be used.
Regulation:	<b>23</b>	Ventilation of buildings
Standard:	Relevant technical standards within Part K2	Ventilation of buildings other than garages
Standard:	Relevant technical standards within Part K4	General ventilation requirements
Comment:		In calculating the contribution of the product to natural ventilation in connection with the relevant sub-paragraphs of these Standards, the area of opening should be calculated in accordance with section 6.1 in the relevant Detail Sheets. Trickle ventilation can be provided by the methods described in section 6.2 of the relevant Detail Sheets.
Regulation:	<b>27</b>	Miscellaneous hazards
Standard:	P2.2	Collision with glazing
Comment:		Glazing must comply with the details in BS 6262 where accidental collision with it is likely. See section 9.3 of the relevant Detail Sheets.
Standard:	P2.3	Cleaning of windows and rooflights
Comment:		Windows installed in buildings in purpose group 1 situated more than 4 m above the adjacent ground must comply with Standard P2.3 regarding access.

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## 3 The Building Regulations (Northern Ireland) 1994 (as amended)



In the opinion of the BBA, the PVC-U Window System specified on the Front Sheet, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the various Regulations as listed below.

Regulation:	<b>B2</b>	Fitness of materials and workmanship
Comment:		The windows are acceptable. See section 13 of the relevant Detail Sheets.
Regulation:	<b>C5</b>	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:	<b>E2</b>	Means of escape
Regulation:	<b>E3</b>	Deemed-to-satisfy provisions for means of escape
Comment:		A window in a dwelling 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. The obstruction caused by opening lights hung on projecting friction stays must be taken into account when the clear opening is determined.
Regulation:	<b>F2</b>	Conservation of fuel and power
Regulation:	<b>F3</b>	Deemed-to-satisfy provision for 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 except where a deemed-to-satisfy solution is being adopted.
Regulation:	<b>K2</b>	Means of ventilation
Comment:		When calculating the area of window openings for ventilation purposes, see section 6.1 of the relevant Detail Sheets. Trickle ventilation can be provided by the methods described in section 6.2 of the relevant Detail Sheets.
Regulation:	<b>V1</b>	Glazing
Regulation:	<b>V2</b>	Deemed-to-satisfy provision for glazing
Comment:		Where people are likely to come into contact with glazing in a building the requirements of this Regulation shall be deemed to be satisfied if the glazing complies with DoE(NI) Technical Booklet V, Sections 1 and 2, June 1994.
Regulation:	<b>V3</b>	Transparent glazing
Regulation:	<b>V4</b>	Deemed-to-satisfy provision for transparent glazing
Comment:		In a building, other than in a dwelling, transparent glazing, of which people may be unaware and with which they are likely to collide, shall incorporate features which make it apparent. The requirements of this Regulation shall be deemed to be satisfied if the glazing complies with DoE(NI) Technical Booklet V, Section 3, June 1994.

## 4 Construction (Design and Management) Regulations 1994

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: *2 Delivery and site handling* of the relevant Detail Sheets.



On behalf of the British Board of Agrément

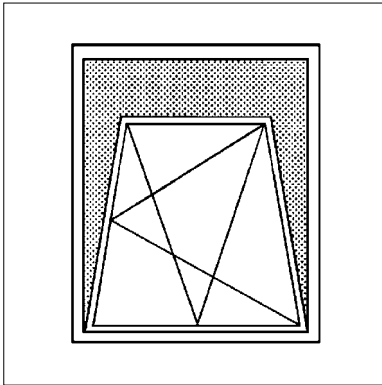
Date of Sixth issue: 26th March 1998

Director



## THE VEKA MATRIX TILT AND TURN PVC-U WINDOW SYSTEM

### Product



**CAUTION:** This Detail Sheet is not valid in isolation and must be read in conjunction with the Front Sheet and Detail Sheet 1, which give the Certificate holder's name, Conditions of Certification, and the product's position regarding the Building Regulations, respectively.

- *THIS DETAIL SHEET RELATES TO THE VEKA MATRIX TILT AND TURN PVC-U WINDOW SYSTEM.*
- *The system comprises single and multilight tilt and turn windows framed in white or woodgrain finish PVC-U and glazed internally with sealed double-glazed units.*
- *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.*

### Technical Specification

#### 1 Description

1.1 The Veka Matrix tilt and turn windows (see Figure 1) are fabricated from white or woodgrain finish unplasticized polyvinyl chloride (PVC-U) profiles, produced by conventional extrusion techniques from material complying with Case B (PVC-U with additional polymers), as defined in BBA MOAT No 17 : 1990. Woodgrain profiles are surface covered with PVC which incorporates a clear acrylic protective lacquer. Profiles are available with the foil applied to both visible faces of a brown PVC-U substrate or to one face only of a white PVC-U substrate. The profiles covered by this Certificate are those listed in Table 1. Typical examples are shown in Figure 2.

1.2 The methods of selection, machining and assembly of frame components are detailed in the *Veka Matrix Tilt and Turn Technical Manual*.

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

Figure 1 Corner detail

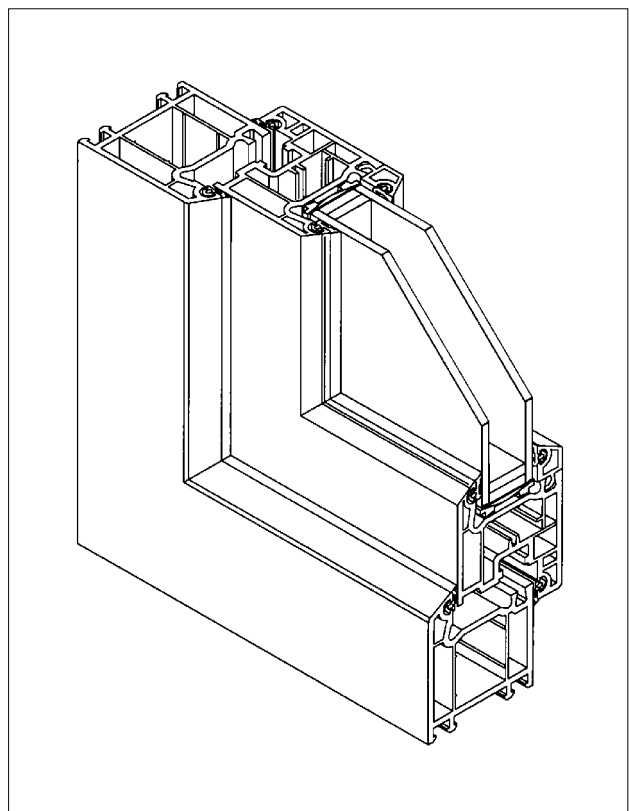
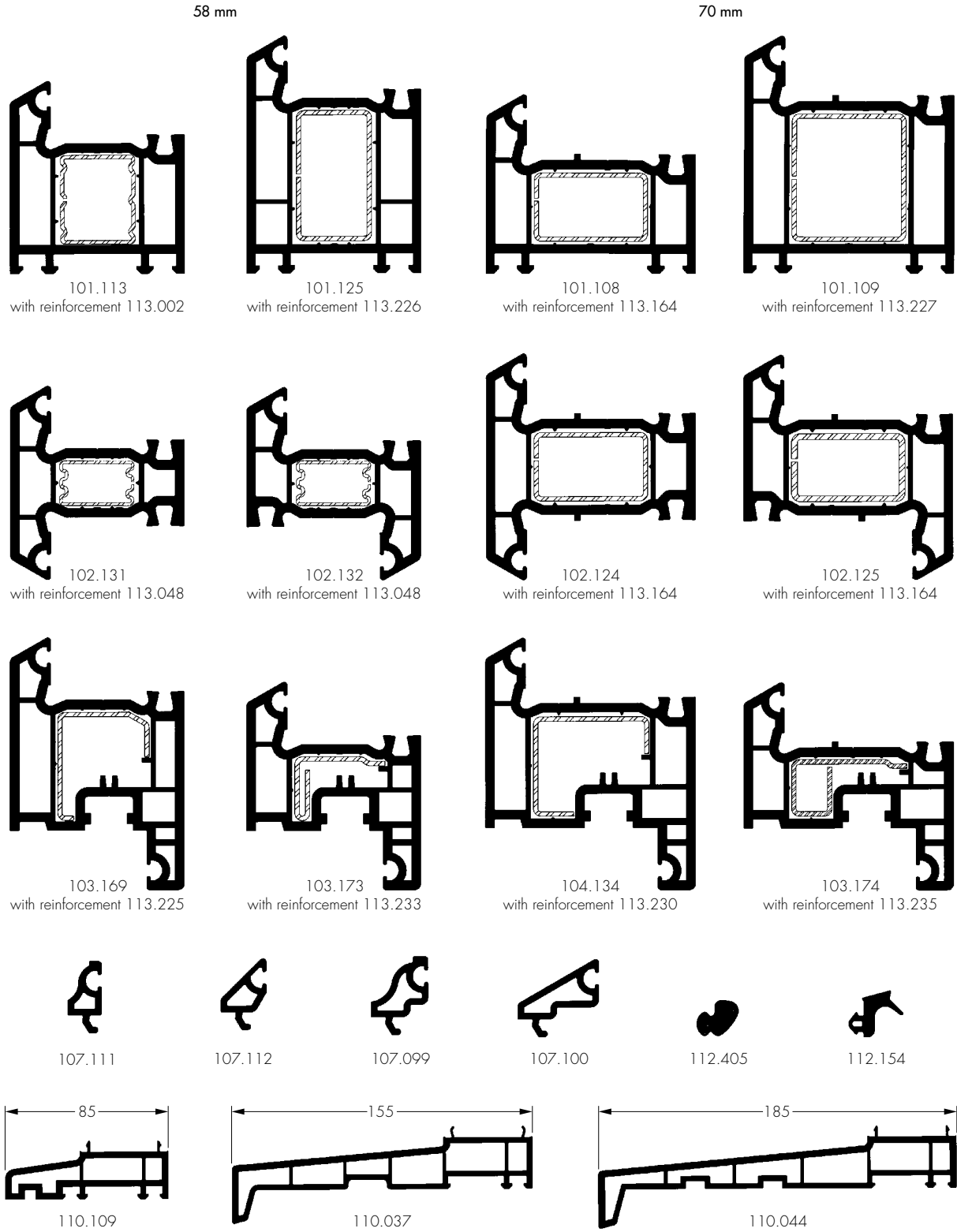


Figure 2 Typical profiles



For full reinforcement options, including Aluminium, see the VEKA Matrix Tilt & Turn Technical Manual.

**Table 1 Profiles**

Manufacturer's designation	Profile type	Application
<b>Veka Matrix 58 System</b>		
101.113	L-section	65 mm outer frame
101.125	L-section	80 mm outer frame
102.131	T-section	65 mm mullion/transom
102.132	Z-section	65 mm combi-mullion/transom
102.144	T-section	75 mm mullion/transom
102.145	Z-section	75 mm combi-mullion/transom
102.142	T-section	85 mm mullion/transom
102.147	Z-section	85 mm combi-mullion/transom
102.141	T-section	110 mm mullion/transom
103.173	Z-section	70 mm sash
103.169	Z-section	85 mm sash
107.102	—	11 mm sloped glazing bead (24/28 mm)
107.105	—	15 mm sculptured glazing bead (20/24 mm)
107.111	—	11 mm sculptured glazing bead (24/28 mm)
107.112	—	15 mm sloped glazing bead (20/24 mm)
113.002.0001	—	1.5 mm corrugated steel reinforcement (101.113)
113.040.0001	—	1.5 mm steel reinforcement (102.144, 102.145)
113.040.2001	—	2 mm steel reinforcement (102.144, 102.145)
113.040.3001	—	3 mm steel reinforcement (102.144, 102.145)
113.048.0001	—	1.5 mm corrugated steel reinforcement (102.131, 102.132)
113.048.2001	—	2 mm steel reinforcement (102.131, 102.132)
113.048.3001	—	3 mm steel reinforcement (102.131, 102.132)
113.222.2001	—	2 mm steel reinforcement (102.141)
113.224.0001	—	1.5 mm steel reinforcement (102.142, 102.147)
113.224.2001	—	2 mm steel reinforcement (102.142, 102.147)
113.224.3001	—	3 mm steel reinforcement (102.142, 102.147)
113.225.0001	—	1.5 mm steel reinforcement (103.169)
113.226.0001	—	1.5 mm steel reinforcement (101.125)
113.233.0001	—	1.5 mm steel reinforcement (103.173)
115.253.0001	—	2/3 mm aluminium reinforcement (102.131, 102.132)
115.254.0001	—	3/4 mm aluminium reinforcement (102.131, 102.132)
115.255.0001	—	2 mm aluminium reinforcement (101.113)
115.256.0001	—	3/4 mm aluminium reinforcement (102.142, 102.147)
115.257.0001	—	2/3 mm aluminium reinforcement (102.142, 102.147)
115.258.0001	—	3 mm aluminium reinforcement (102.141)
115.260.0001	—	aluminium reinforcement (103.169)
115.262.0001	—	2 mm aluminium reinforcement (101.125)
115.266.0001	—	2 mm aluminium reinforcement (102.144, 102.145)
115.267.0001	—	3 mm aluminium reinforcement (102.144, 102.145)
115.271.0001	—	aluminium reinforcement (103.173)
110.109	—	sill (85 mm)
110.037	—	sill (155 mm)
110.044	—	sill (185 mm)
112.131	—	5 mm glazing gasket (EPDM)
112.132	—	3 mm glazing gasket (EPDM)
112.133	—	3–5 mm glazing gasket (EPDM)
112.135	—	2.5 mm fold gasket (EPDM)
112.072	—	3.5 mm fold gasket (EPDM)
112.154	—	7 mm glazing gasket (EPDM)
112.156	—	Q-Lon glazing gasket
112.157	—	Q-Lon glazing gasket
112.406	—	Q-Lon glazing gasket
112.405	—	Q-Lon weatherseal

**Veka Matrix 70 System**

101.108	L-section	60 mm outer frame
101.109	L-section	80 mm outer frame
102.124	T-section	76 mm mullion/transom
102.125	Z-section	76 mm combi-mullion/transom
102.143	T-section	86 mm mullion/transom
102.148	Z-section	86 mm combi-mullion/transom
102.146	T-section	110 mm mullion/transom
103.174	Z-section	70 mm sash
103.134	Z-section	85 mm sash
107.099	—	19 mm sculptured glazing bead (28/32 mm)
107.100	—	27 mm sloped glazing bead (20/24 mm)
107.103	—	27 mm sculptured glazing bead (20/24 mm)
107.104	—	19 mm sloped glazing bead (28/32 mm)
113.164.0001	—	1.5 mm steel reinforcement (101.108, 102.124, 102.125)
113.164.2001	—	2 mm steel reinforcement (102.124, 102.125)
113.164.3001	—	3 mm steel reinforcement (102.124, 102.125)
113.227.0001	—	1.5 mm steel reinforcement (101.109)
113.228.2001	—	2 mm steel reinforcement (102.146)
113.230.0001	—	1.5 mm steel reinforcement (103.134)
113.231.0001	—	1.5 mm steel reinforcement (102.143, 102.148)
113.231.2001	—	2 mm steel reinforcement (102.143, 102.148)
113.231.3001	—	3 mm steel reinforcement (102.143, 102.148)
113.235.0001	—	1.5 mm steel reinforcement (103.174)
115.098.0001	—	2/3 mm aluminium reinforcement (101.108, 102.124, 102.125)
115.099.0001	—	4/5 mm aluminium reinforcement (102.124, 102.125)
115.261.0001	—	2 mm aluminium reinforcement (101.109)
115.263.0001	—	aluminium reinforcement (103.134.0001)
115.264.0001	—	3 mm aluminium reinforcement (102.146)
115.268.0001	—	2/3 mm aluminium reinforcement (102.143, 102.148)
115.269.0001	—	3/5 mm aluminium reinforcement (102.143, 102.148)
115.273.0001	—	aluminium reinforcement (103.174)
110.109	—	sill (85 mm)
110.037	—	sill (155 mm)
110.044	—	sill (185 mm)
112.131	—	5 mm glazing gasket (EPDM)
112.132	—	3 mm glazing gasket (EPDM)
112.133	—	3–5 mm glazing gasket (EPDM)
112.135	—	2.5 mm fold gasket (EPDM)
112.072	—	3.5 mm fold gasket (EPDM)
112.154	—	7 mm glazing gasket (EPDM)
112.156	—	Q-Lon glazing gasket
112.157	—	Q-Lon glazing gasket
112.406	—	Q-Lon glazing gasket
112.405	—	Q-Lon weatherseal

1.4 The PVC-U extrusions are cut to length, and all holes routed or drilled. Where required, galvanized steel or aluminium reinforcement sections are inserted in the PVC-U sections before they are welded together. The welded connections are then cleaned up by polishing, knifing or using a purpose-made machine which also forms a groove or raised pyramid at the weld. The window is completed by locating the weatherstripping in grooves and securing the fittings in position with screws.

1.5 Drainage is provided by a series of slots 5 mm by 30 mm, positioned in accordance with the *Veka Matrix Tilt and Turn Technical Manual*. On combination units each element is treated as a separate window and drainage slots cut accordingly. Woodgrain finished sills are vented, as described in the *Veka Matrix Tilt and Turn Technical Manual*, to prevent pressure changes causing distortion.

## Reinforcement

1.6 For white windows, outer frames are not normally reinforced unless specified. Windows with a woodgrain finish have a fully reinforced outer frame and sill.

1.7 Opening lights are reinforced with galvanized mild steel or aluminium, as detailed in the *Veka Matrix Tilt and Turn Technical Manual*, with woodgrain finish profiles always being fully reinforced.

1.8 Mullions and transoms are always reinforced with galvanized mild steel or aluminium, in accordance with the *Veka Matrix Tilt and Turn Technical Manual*.

1.9 Galvanized steel reinforcement is roll-formed from material with a G Z 275N coating complying with BS EN 10142 : 1991. Aluminium reinforcement is extruded from alloy type 6063-T6 to BS 1474 : 1987.

## Size range

1.10 This Detail Sheet covers Veka Matrix tilt and turn single and multilight windows within the limitations shown in Table 2.

Table 2 Size restriction	
	Dimension (mm)
<i>All windows</i>	
Maximum overall width or height of any outer frame	2400
Maximum size of tilt/turn opening light (separately or in a multilight)	1600 wide × 1600 high
Maximum length of mullions or transoms	
Matrix 58	1200
Matrix 70	1500

## 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 a tilt stay, all formed from zinc-plated steel. The mechanism incorporates locking rollers and, as an option, shootbolt locks which engage with keep fixed to the outer frame, and is operated with a handle manufactured from zinc alloy with various finishes.

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

1.13 Details of currently approved types of 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 using double-glazed units with

glass thicknesses in accordance with BS 6262 : 1982. All glass is positioned by plastic setting blocks and packing pieces.

## Weatherstripping and gaskets

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

1.16 Gaskets are formed from a similar material to the weatherstripping. Gaskets are fitted between the frame and the double-glazed unit. The unit is secured by conventional bead and gasket.

## Quality control

1.17 Quality control includes checks on all materials and components, in particular:

*PVC-U compound*

bulk density

*Extruded profiles*

dimensions

appearance and finish

colour and gloss

heat ageing

impact strength

profile weight and bore

colourfastness

tensile impact

retention of tensile strength after artificial ageing

heat reversion

resistance to cold impact

*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. For transportation they are suitably protected to avoid damage. Particular care is needed to avoid damaging woodgrain finishes, as it may be impossible to restore the appearance.

2.2 Each window has a label bearing the 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.

2.4 The weight of glazing can be calculated, where required for manual handling operations, by reference to the information contained in BS 952 : Part 1 : 1995. The weight of the unglazed frame, and its ease of handling, particularly by one person, must also be taken into account when planning site operations.

2.5 When selecting means of access, for example, use of scaffolding, the safety of the operatives, the occupants, and the passers-by, during the period of installation, should be considered.

### 3 General

3.1 Selected samples from the Veka Matrix Tilt and Turn PVC-U Window System were tested in accordance with BBA MOAT No 1 : 1974. Assessment of the 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 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>		
Single tilt/turn opening light	2400	V <sub>3</sub>
<i>Multilight up to maximum size</i>		
Matrix 58 (65 mm mullion/transom)	1200	V <sub>2</sub>
Matrix 70 (86 mm mullion/transom)	2400	V <sub>3</sub>
<i>Watertightness</i>		
All windows	300	E <sub>3</sub>
<i>Air permeability</i>		
All windows	600	A <sub>3</sub>

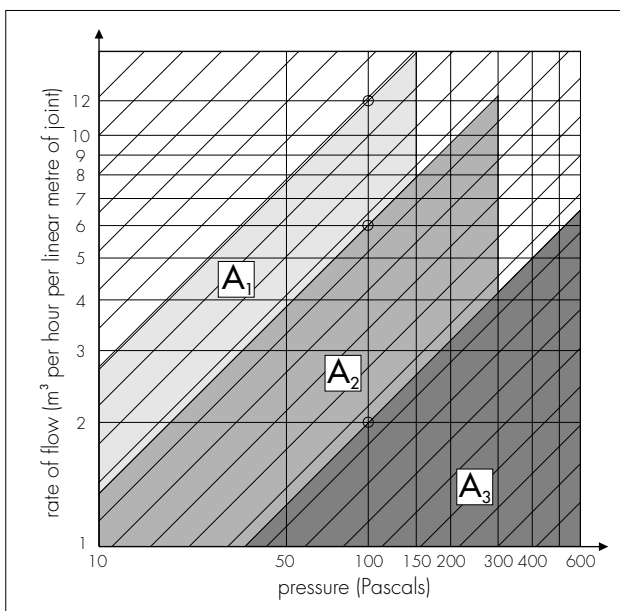
V<sub>2</sub> indicates that windows meet deformation requirements at 1000 Pa, a cycling test at 750 Pa and a safety test at 2000 Pa.

V<sub>3</sub> indicates that windows meet deformation requirements at 1750 Pa, a cycling test at 1250 Pa and a safety test at 3000 Pa.

E<sub>3</sub> indicates water leakage occurring between 300 Pa and 499 Pa.

A<sub>3</sub> indicates an airflow rate below the line passing the point for a rate of flow of 2 m<sup>3</sup>h<sup>-1</sup>m<sup>-1</sup> at 100 Pa pressure, when tested up to a pressure of 600 Pa (see Figure 3).

Figure 3 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, Veka Matrix 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 is determined by deducting from the overall width and height the appropriate profile dimensions. For each applicable feature, for example, a fixed light would require twice the outer frame dimension to be deducted from the overall width and overall height. Typical dimensions are given in Table 4.

Table 4 Typical dimensions for determining unobstructed glass area

Window feature	Dimensions (mm)
Outer frame (101.113)	65
Mullion or transom between fixed lights (102.131)	65
Mullion or transom between opening lights (102.142 and 103.169)	186.5
Mullion or transom between one opening and one fixed light (102.142 and 103.169)	144
Outer frame and opening light (101.108 and 103.174)	102

### 6 Ventilation

6.1 The opening area for natural ventilation may be calculated by multiplying together the overall width and height dimensions of opening lights reduced by the amounts given in Table 5. For 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 requirements of the various building regulations can be met by the incorporation in the window of a suitably sized trickle ventilator. The ventilator may be glazed in, fitted in a supplementary head member or fitted by another method approved by the BBA for use with the Veka Matrix system. Details of any such approved fitting methods can be obtained from the BBA. Ventilators covered by an Agrément Certificate are listed in the *Index of Current BBA Publications*.

Table 5 Natural ventilation dimension reductions

Frame member	Deduction from width or height (mm)
Outer frame (101.113)	65
Mullion or transom (102.131)	33

## 7 Thermal insulation



7.1 The thermal transmittance value (U value) of a fully reinforced Veka Matrix tilt and turn window 1188 mm wide by 1188 mm high incorporating a 1000 mm by 1000 mm standard kitemarked 4/12/4 mm sealed double-glazed unit of known thermal performance, when measured by the Guarded Hot Box Method according to BS 874 : Part 3 : Section 3.1 : 1987, is  $2.59 \pm 0.26 \text{ Wm}^{-2}\text{K}^{-1}$ .

7.2 For design purposes, a representative value for the linear thermal transmittance of the PVC-U frame may be taken as  $0.25 \text{ Wm}^{-1}\text{K}^{-1}$ . The heat loss through the PVC-U frame is the product of the linear thermal transmittance value, the frame length and the difference in environmental temperatures either side of the frame, ie the heat loss (in watts) through the PVC-U frame =  $0.25 \times \text{total length of frame} \times \text{the difference in environmental temperature either side of the frame}$ .

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 unit is specified that carries the BSI kitemark to BS 5713 : 1979.

## 8 Condensation risk

8.1 For condensation to occur on any surface the temperature of that surface must fall below the dew-point of the air adjacent to it. Where a temperature differential exists between the interior and exterior surfaces of a Veka Matrix tilt and turn window the frame members do not constitute a 'cold bridge' and condensation will occur on the glass before it appears on the frame.

8.2 Measurements show that for a fully reinforced window, subject to internal conditions of  $20^\circ\text{C}$  and 65% RH, the external temperature must fall below  $11^\circ\text{C}$  before condensation occurs at any point on the glass, below  $-1^\circ\text{C}$  before condensation occurs at any point on the visible interior surface of the PVC-U frame, or below  $-10^\circ\text{C}$  before condensation occurs on the majority of the frame 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 8213 : Part 1 : 1991.

9.2 The windows can comply with the recommendations of BS 8213 : Part 1 : 1991 with regard to the positioning of hand operated controls.



9.3 Account must be taken of the recommendations given in BS 6262 : Part 4 : 1994<sup>(1)</sup>, which include the use of

safety glass, complying with BS 6206 : 1981, under certain circumstances.

(1) Dealing with the safety of people upon impact with the glazing.

## 10 Security against intrusion

10.1 Veka Matrix opening lights are fitted with a lock mechanism as described in section 1.12. When fastened in the closed position the opening light cannot be opened by manipulation from the outside, for example, by the insertion of a thin blade. Key operated locks are required for certain windows to meet the security requirements of NHBC Standards Chapter 6.7 *Doors, windows and glazing* and the *Zurich Municipal Technical Manual*, Sections 6.12 and 12.16. It is vital that glass packing is carried out to the manufacturer's recommendations to prevent forced entry by flexing of the frame members allowing disengagement of the lock mechanism.

10.2 The design of the glazing is such that the removal of the glazing from outside is virtually 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 Certificate holder specified on the Front Sheet and approved by the BBA.

12.2 If damage occurs, the furniture and fittings can be replaced.

12.3 The PVC-U 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. Abrasive cleaners should not be used, particularly on woodgrain finishes as the loss of the acrylic lacquer will have a serious effect on durability.

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 PVC-U 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 PVC-U frame members and the application of dark colours could lead to a risk of thermal distortion. Therefore painting is not recommended.

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

## 13 Durability



13.1 Evidence is available on the performance in the UK and other Northern European countries of PVC-U similar to that used for the system over a period of 15 years for woodgrain windows and in excess of 20 years for white windows. Such evidence, when compared with the results of tests on the Veka Matrix PVC-U, indicates that the windows will have a life of at least 25 years. Any slight colour change or surface dulling that might occur will be uniform over the visible surfaces of the windows for both white and woodgrain finishes, assuming in the latter case that the acrylic lacquer is undamaged.

13.2 Fittings, including the hinges, locking mechanism and operating handles, as described in this Detail Sheet, will have similar durability except where windows are to be installed in areas subject to particularly aggressive conditions. These conditions can prevail in coastal locations or near sources of industrial pollutants and replacement of fittings may be necessary within the life of the window.

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

## Installation

### 14 General

14.1 The window must be fixed into the opening, in accordance with the recommendations in the *Veka Matrix Tilt and Turn Technical Manual*, using proprietary expanding anchors through the frame or galvanized steel fixing lugs. Replacement windows should be fitted in accordance with BS 8213 : Part 4 : 1990, in particular with reference to clause 9.3.1.

14.2 Openings in new walls should be formed using a suitable template 10 mm wider and higher than the window to be installed. Alternatively, window former and acceptor products are available. Systems covered by an Agrément Certificate are listed in the *Index of Current BBA Publications*. 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 between 150 mm and 250 mm from all corners (including Mullions/transoms) 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 *Veka Matrix Tilt and Turn Technical Manual*.

15.3 The installation is completed by application of a low-modulus PVC-compatible silicone sealant in conjunction with a foam-based bonding rod 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 Veka Matrix Tilt and Turn PVC-U Window System.

### 16 Tests

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

air permeability  
watertightness  
effect of wind loads  
effect of thermal differential  
efficiency of window fittings  
resistance to impact, racking and bending loads  
ease of operation.

16.2 Tests in accordance with MOAT No 8 : 1973 and MOAT No 17 : 1990 gave the results for the PVC-U extrusions as detailed in Table 6.

Table 6 PVC-U extrusion test results

Test	Results	
	White	Brown
ash content (%)	4.8	2.6
Vicat softening temperature (°C)	80.5	90.4
tensile strength (MPa)	47.0	43.0
modulus of elasticity (MPa)	2300	2820
tensile impact (kJm <sup>-2</sup> ):		
at 23°C	921	727
at 0°C	881	669
induction time of dehydrochlorination (min):		
new material	61	83
UV aged material	49	51
impact test at -10°C	pass	pass
shrinkage on heating at 100°C for 1 hour	<2%	<2%
acetone resistance	pass	pass

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

16.4 Additional test work in accordance with MOAT No 57 : 1995 and BS 7722 : 1994 was carried out on woodgrain finish windows and profiles to determine:

*Windows*  
effect of solar heat gain

## Profiles

colourfastness of surface foil  
adhesion to substrate profile  
abrasion and scratch resistance  
retention of impact strength  
corner finishing.

## 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.

## Bibliography

BS 874 *Methods for determining thermal insulating properties*

Part 3 *Tests for thermal transmittance and conductance*

Section 3.1 : 1987 *Guarded hot-box method*

BS 952 *Glass for glazing*

Part 1: 1995 *Classification*

BS 1474 : 1987 *Specification for wrought aluminium and aluminium alloys for general engineering purposes: bars, extruded round tubes and sections*

BS 5713 : 1979 *Specification for hermetically sealed flat double glazing units*

BS 6206 : 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*

BS 6262 : 1982 *Code of practice for glazing for buildings*

BS 6262 *Code of practice for glazing for buildings*

Part 4 : 1994 *Safety related to human impact*

BS 6375 *Performance of windows*

Part 1 : 1989 *Classification for weathertightness (including guidance on selection and specification)*

BS 7722 : 1994 *Specification for surface covered PVC-U extruded hollow profiles with heat welded joints for plastics windows*

BS 8213 *Windows, doors and rooflights*

Part 1 : 1991 *Code of practice for safety in use and during cleaning of windows and doors (including guidance on cleaning materials and methods)*

Part 4 : 1990 *Code of practice for the installation of replacement windows and doorsets in dwellings*

BS EN 10142 : 1991 *Specification for continuously hot-dip zinc coated low carbon steel sheet and strip for cold forming: technical delivery conditions*

MOAT No 1 : 1974 *Directive for the Assessment of Windows*

MOAT No 8 : 1973 *Directive for Rigid PVC Products Used Externally in Building*

MOAT No 17 : 1990 *UEAtc Technical Guide for the Agrément of Windows in PVC-U*

MOAT No 57 : 1995 *UEAtc Technical Report for the Assessment of windows in coloured PVC-U*



On behalf of the British Board of Agrément

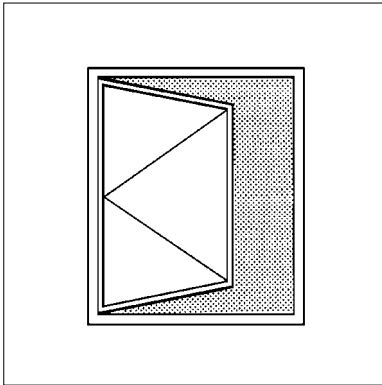
A handwritten signature in black ink, appearing to read 'P. C. Hewson'.

Date of issue: 14th October 1998

Director

## THE VEKA MATRIX OUTWARD OPENING PVC-U WINDOW SYSTEM

### Product



**CAUTION:** This Detail Sheet is not valid in isolation and must be read in conjunction with the Front Sheet and Detail Sheet 1, which give the Certificate holder's name, Conditions of Certification, and the product's position regarding the Building Regulations, respectively.

- THIS DETAIL SHEET RELATES TO THE VEKA MATRIX OUTWARD OPENING PVC-U 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 or woodgrain finish PVC-U and glazed internally or externally with sealed double-glazed units.
- 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.

### Technical Specification

#### 1 Description

1.1 The Veka Matrix outward opening windows (see Figure 1) are fabricated from white or woodgrain finish unplasticized polyvinyl chloride (PVC-U) profiles, produced by conventional extrusion techniques from material complying with Case B (PVC-U with additional polymers), as defined in BBA MOAT No 17 : 1990. Woodgrain profiles are surface covered with PVC which incorporates a clear acrylic protective lacquer. Profiles are available with the foil applied to both visible faces of a brown PVC-U substrate or to one face only of a white PVC-U substrate. The profiles covered by this Certificate are those listed in Table 1. Typical examples are shown in Figure 2.

1.2 The methods of selection, machining and assembly of frame components are detailed in the *Veka Matrix Casement Technical Manual*.

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

1.4 The PVC-U extrusions are cut to length, and all holes routed or drilled. Where required, galvanized steel or aluminium reinforcement sections are inserted in the PVC-U sections before they are welded together. The welded connections are then cleaned up by polishing, knifing or using a purpose-made machine which also forms a groove or raised pyramid at the weld. The window is completed by

locating the weatherstripping in grooves and securing the fittings in position with screws.

1.5 Drainage is provided by a series of slots 5 mm by 30 mm, positioned in accordance with the *Veka Matrix Casement Technical Manual*. On combination units each element is treated as a separate window and drainage slots cut accordingly. Woodgrain finished sills are vented, as described in the *Veka Matrix Casement Technical Manual*, to prevent pressure changes causing distortion.

Figure 1 Corner detail

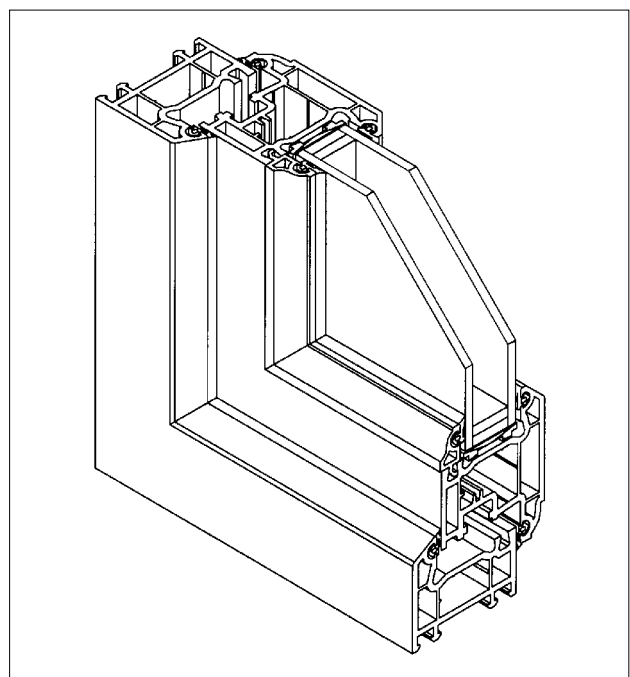
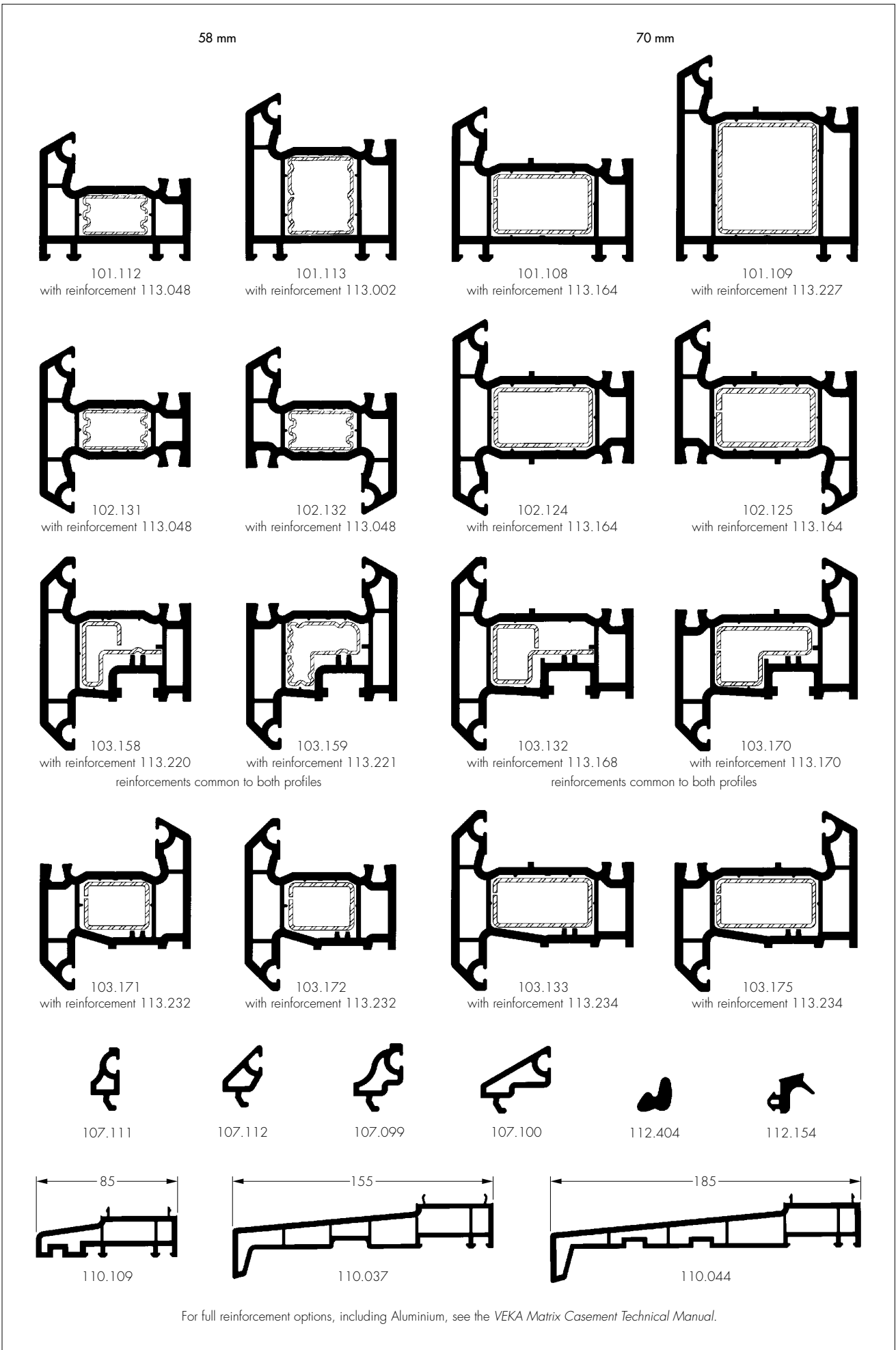


Figure 2 Typical profiles



For full reinforcement options, including Aluminium, see the VEKA Matrix Casement Technical Manual.

**Table 1 Profiles**

Manufacturer's designation	Profile type	Application
<b>Veka Matrix 58 System</b>		
101.112	L-section	50 mm outer frame
101.113	L-section	65 mm outer frame
101.125	L-section	80 mm outer frame
102.131	T-section	65 mm mullion/transom
102.132	Z-section	65 mm combi-mullion/transom
102.141	T-section	110 mm mullion/transom
102.142	T-section	85 mm mullion/transom
102.144	T-section	75 mm mullion/transom
102.145	Z-section	75 mm combi-mullion/transom
102.147	Z-section	85 mm combi-mullion/transom
103.158	T-section	75 mm internally beaded espagnolette sash with bevelled edge
103.159	Z-section	75 mm externally beaded espagnolette sash with bevelled edge
103.160	Z-section	75 mm externally beaded espagnolette sash with sculptured edge
103.171	Z-section	67 mm externally beaded cockspur sash
103.172	T-section	67 mm internally beaded cockspur sash
103.176	T-section	75 mm internally beaded espagnolette sash with sculptured edge
107.102	—	11 mm sloped glazing bead (24/28 mm)
107.105	—	15 mm sculptured glazing bead (20/24 mm)
107.111	—	11 mm sculptured glazing bead (24/28 mm)
107.112	—	15 mm sloped glazing bead (20/24 mm)
113.002.0001	—	1.5 mm corrugated steel reinforcement (101.113)
113.040.0001	—	1.5 mm steel reinforcement (102.144, 102.145)
113.040.2001	—	2 mm steel reinforcement (102.144, 102.145)
113.040.3001	—	3 mm steel reinforcement (102.144, 102.145)
113.048.0001	—	1.5 mm corrugated steel reinforcement (101.112, 102.131, 102.132)
113.048.2001	—	2 mm steel reinforcement (102.131, 102.132)
113.048.3001	—	3 mm steel reinforcement (102.131, 102.132)
113.220.0475	—	1.5 mm 475 mm long pre-cut steel reinforcement (103.158, 103.159, 103.160, 103.176)
113.220.0775	—	1.5 mm 775 mm long pre-cut steel reinforcement (103.158, 103.159, 103.160, 103.176)
113.220.1075	—	1.5 mm 1075 mm long pre-cut steel reinforcement (103.158, 103.159, 103.160, 103.176)
113.221.0001	—	1.5 mm corrugated steel reinforcement (103.158, 103.159, 103.160, 103.176)
113.222.2001	—	2 mm steel reinforcement (102.141)
113.224.0001	—	1.5 mm steel reinforcement (102.142, 102.147)
113.224.2001	—	2 mm steel reinforcement (102.142, 102.147)
113.224.3001	—	3 mm steel reinforcement (102.142, 102.147)
113.226.0001	—	1.5 mm steel reinforcement (101.125)
113.232.0001	—	1.5 mm steel reinforcement (103.171, 103.172)
115.251.0001	—	3/4 mm aluminium reinforcement (103.158, 103.159, 103.160, 103.176)
115.252.0001	—	2/3 mm aluminium reinforcement (103.158, 103.159, 103.160, 103.176)
115.253.0001	—	2/3 mm aluminium reinforcement (101.112, 102.131, 102.132)
115.254.0001	—	3/4 mm aluminium reinforcement (102.131, 102.132)
115.255.0001	—	2 mm aluminium reinforcement (101.113)
115.256.0001	—	3/4 mm aluminium reinforcement (102.142, 102.147)
115.257.0001	—	2/3 mm aluminium reinforcement (102.142, 102.147)
115.258.0001	—	3 mm aluminium reinforcement (102.141)
115.262.0001	—	2 mm aluminium reinforcement (101.125)
115.266.0001	—	2 mm aluminium reinforcement (102.144, 102.145)
115.267.0001	—	3 mm aluminium reinforcement (102.144, 102.145)
115.270.0001	—	2 mm aluminium reinforcement (103.171, 103.172)
110.109	—	sill (85 mm)
110.037	—	sill (155 mm)
110.044	—	sill (185 mm)
112.131	—	5 mm glazing gasket (EPDM)
112.132	—	3 mm glazing gasket (EPDM)
112.133	—	3–5 mm glazing gasket (EPDM)
112.135	—	2.5 mm fold gasket (EPDM)
112.154	—	7 mm glazing gasket (EPDM)
112.156	—	Q-Lon glazing gasket
112.157	—	Q-Lon glazing gasket
112.406	—	Q-Lon glazing gasket
112.404	—	Q-Lon weatherseal
112.405	—	Q-Lon weatherseal

112.135	—	2.5 mm fold gasket (EPDM)
112.154	—	7 mm glazing gasket (EPDM)
112.156	—	Q-Lon glazing gasket
112.157	—	Q-Lon glazing gasket
112.406	—	Q-Lon glazing gasket
112.404	—	Q-Lon weatherseal
112.405	—	Q-Lon weatherseal
<b>Veka Matrix 70 System</b>		
101.108	L-section	60 mm outer frame
101.109	L-section	80 mm outer frame
102.124	T-section	76 mm mullion/transom
102.125	Z-section	76 mm combi-mullion/transom
102.143	T-section	86 mm mullion/transom
102.146	T-section	110 mm mullion/transom
102.148	Z-section	86 mm combi-mullion/transom
103.132	T-section	75 mm internally beaded espagnolette sash with bevelled edge
103.133	T-section	70 mm internally beaded cockspur sash with bevelled edge
103.139	T-section	75 mm internally beaded espagnolette sash with sculptured edge
103.170	Z-section	75 mm externally beaded espagnolette sash with bevelled edge
103.175	Z-section	70 mm externally beaded cockspur sash with bevelled edge
107.099	—	19 mm sculptured glazing bead (28/32 mm)
107.100	—	27 mm sloped glazing bead (20/24 mm)
107.103	—	27 mm sculptured glazing bead (20/24 mm)
107.104	—	19 mm sloped glazing bead (28/32 mm)
113.164.0001	—	1.5 mm steel reinforcement (101.108, 102.124, 102.125)
113.164.2001	—	2 mm steel reinforcement (102.124, 102.125)
113.164.3001	—	3 mm steel reinforcement (102.124, 103.125)
113.168.0475	—	1.5 mm pre-cut 475 mm long steel reinforcement (103.132, 103.139, 103.170)
113.168.0775	—	1.5 mm pre-cut 775 mm long steel reinforcement (103.132, 103.139, 103.170)
113.168.1075	—	1.5 mm pre-cut 1075 mm long steel reinforcement (103.132, 103.139, 103.170)
113.169.3001	—	3 mm steel reinforcement (103.132, 103.139, 103.170)
113.170.0001	—	1.5 mm steel reinforcement (103.132, 103.139, 103.170)
113.227.0001	—	1.5 mm steel reinforcement (101.109)
113.228.2001	—	2 mm steel reinforcement (102.146)
113.231.0001	—	1.5 mm steel reinforcement (102.143, 102.148)
113.231.2001	—	2 mm steel reinforcement (102.143, 102.148)
113.231.3001	—	3 mm steel reinforcement (102.143, 102.148)
113.234.0001	—	1.5 mm steel reinforcement (103.133, 103.175)
115.098.0001	—	2/3 mm aluminium reinforcement (101.108, 102.124, 102.125)
115.099.0001	—	4/5 mm aluminium reinforcement (102.124, 102.125)
115.100.0001	—	2/3 mm aluminium reinforcement (103.132, 103.139, 103.170)
115.101.0001	—	3/4 mm aluminium reinforcement (103.132, 103.139, 103.170)
115.261.0001	—	2 mm aluminium reinforcement (101.109)
115.264.0001	—	3 mm aluminium reinforcement (102.146)
115.268.0001	—	2/3 mm aluminium reinforcement (102.143, 102.148)
115.269.0001	—	3/5 mm aluminium reinforcement (102.143, 102.148)
115.272.0001	—	2 mm aluminium reinforcement (103.133, 103.175)
110.109	—	sill (85 mm)
110.037	—	sill (155 mm)
110.044	—	sill (185 mm)
112.131	—	5 mm glazing gasket (EPDM)
112.132	—	3 mm glazing gasket (EPDM)
112.133	—	3–5 mm glazing gasket (EPDM)
112.135	—	2.5 mm fold gasket (EPDM)
112.154	—	7 mm glazing gasket (EPDM)
112.156	—	Q-Lon glazing gasket
112.157	—	Q-Lon glazing gasket
112.406	—	Q-Lon glazing gasket
112.404	—	Q-Lon weatherseal
112.405	—	Q-Lon weatherseal

## Reinforcement

1.6 For white windows, outer frames are not normally reinforced unless specified. Windows with a woodgrain finish have a fully reinforced outer frame and sill.

1.7 Side-hung opening light frame members are always reinforced with galvanized mild steel or aluminium. Top-hung opening light members are reinforced where their length exceeds 1000 mm, as detailed in the *Veka Matrix Casement Technical Manual*. Woodgrain finish profiles are always fully reinforced.

1.8 Mullions and transoms are always reinforced with galvanized mild steel or aluminium, in accordance with the *Veka Matrix Casement Technical Manual*.

1.9 Galvanized steel reinforcement is roll-formed from material with a G Z 275N coating complying with BS EN 10142 : 1991. Aluminium reinforcement is extruded from alloy type 6063-T6 to BS 1474 : 1987.

## Size range

1.10 This Detail Sheet covers Veka Matrix outward opening top-hung, side-hung and fixed-light windows and combinations of these within the limitations shown in Table 2.

Table 2 Size restriction	
	Dimension (mm)
<i>All windows</i>	
Maximum overall width or height of any outer frame	2400
Maximum length of mullions or transoms:	
Matrix 58	1200
Matrix 70	1500
<i>Top-hung opening lights<sup>(1)</sup></i>	
Maximum size of top-hung opening light (separately or in a multilight)	
Matrix 58	1200 wide × 1200 high
Matrix 70	1450 wide × 1375 high
<i>Side-hung opening lights<sup>(1)</sup></i>	
Maximum size of side-hung opening light (separately or in a multilight)	
Matrix 58	700 wide × 1200 high
Matrix 70	900 wide × 1500 high

(1) Opening light sizes refer to outer frame to outer frame, or outer frame to mullion/transom centre line dimension, and must not exceed limitations on weight or size imposed by the friction hinge manufacturer.

## 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. The hinges incorporate a plastic slider which can be adjusted by means of a brass screw or a die-cast, slot-headed cam 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 or aluminium alloy and available with various finishes or, alternatively, by concealed espagnolette or shootbolt locking systems constructed from chromated

zinc-plated mild steel, operated by a handle.

Cockspur, shootbolt and espagnolette handles are available, as an option, with a key locking facility. The keeps are made from zinc-based alloy or other materials approved by the BBA. The espagnolette and the keeps are fixed by means of self-tapping screws which penetrate a thickened area of the profile wall and/or reinforcement. The espagnolette handle is formed from zinc-based alloy with various finishes.

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 using double-glazed units with glass thicknesses in accordance with BS 6262 : 1982. All glass is positioned by plastic setting blocks and packing pieces.

## Weatherstripping and gaskets

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

1.16 Gaskets are formed from a similar material to the weatherstripping. On internally beaded windows gaskets are fitted between the frame and the double-glazed unit. On externally beaded windows gaskets or glazing tape are fitted between the frame and the double-glazed unit. The unit is secured by conventional bead and gasket.

## Quality control

1.17 Quality control includes checks on all materials and components, in particular:

*PVC-U compound*

bulk density

*Extruded profiles*

dimensions

appearance and finish

colour and gloss

heat ageing

impact strength

profile weight and bore

colourfastness

tensile impact

retention of tensile strength after artificial ageing

heat reversion

resistance to cold impact

*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. For transportation they are suitably protected to avoid damage. Particular care

is needed to avoid damaging woodgrain finishes, as it may be impossible to restore the appearance.

2.2 Each window has a label bearing the 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.

2.4 The weight of glazing can be calculated, where required for manual handling operations, by reference to the information contained in BS 952 : Part 1 : 1995. The weight of the unglazed frame, and its ease of handling, particularly by one person, must also be taken into account when planning site operations.

2.5 When selecting means of access, for example, use of scaffolding, the safety of the operatives, the occupants, and the passers-by, during the period of installation, should be considered.

## Design Data

### 3 General

3.1 Selected samples from the Veka Matrix Outward Opening PVC-U Window System were tested in accordance with BBA MOAT No 1 : 1974. Assessment of the 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 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>		
Single opening light	2400	V <sub>3</sub>
Multilight up to maximum size:		
Matrix 58 (65 mm mullion/transom)	1200	V <sub>2</sub>
Matrix 70 (86 mm mullion/transom)	2400	V <sub>3</sub>
<i>Watertightness</i>		
All windows	300	E <sub>3</sub>
<i>Air permeability</i>		
All windows	600	A <sub>3</sub>

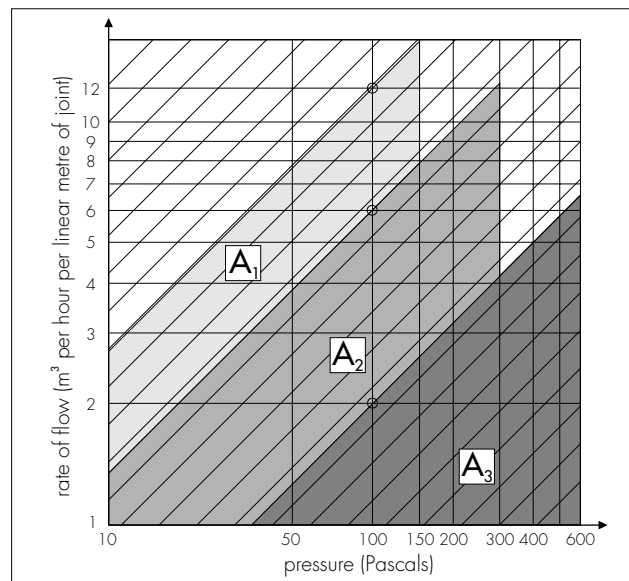
V<sub>2</sub> indicates that windows meet deformation requirements at 1000 Pa, a cycling test at 750 Pa and a safety test at 2000 Pa.

V<sub>3</sub> indicates that windows meet deformation requirements at 1750 Pa, a cycling test at 1250 Pa and a safety test at 3000 Pa.

E<sub>3</sub> indicates water leakage occurring between 300 Pa and 499 Pa.

A<sub>3</sub> indicates an airflow rate below the line passing the point for a rate of flow of 2 m<sup>3</sup>h<sup>-1</sup>m<sup>-1</sup> at 100 Pa pressure, when tested up to a pressure of 600 Pa (see Figure 3).

Figure 3 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, Veka Matrix 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 is determined by deducting from the overall width and height the appropriate profile dimensions. For each applicable feature, for example, a fixed light would require twice the outer frame dimension to be deducted from the overall width and overall height. Typical dimensions are given in Table 4.

Table 4 Typical dimensions for determining unobstructed glass area

Window feature	Dimensions (mm)
Outer frame (101.112)	50
Mullion or transom between fixed lights (102.142)	85
Mullion or transom between opening lights (102.142 and 103.171)	170
Mullion or transom between one opening and one fixed light (102.141 and 103.159)	157.5
Outer frame and opening light (101.112 and 103.171)	92.5

### 6 Ventilation




6.1 The opening area for natural ventilation may be calculated by multiplying together the overall width and height dimensions of opening lights reduced by the amounts given in Table 5. For 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 requirements of the various building regulations can be met by the incorporation in the window of a suitably sized trickle ventilator. The ventilator may be glazed in, fitted in a supplementary head member or fitted by another method approved by the BBA for use with the Veka Matrix system. Details of any such approved fitting methods can be obtained from the BBA. Ventilators covered by an Agrément Certificate are listed in the *Index of Current BBA Publications*.

Table 5 Natural ventilation dimension reductions

Frame member	Deduction from width or height (mm)
Outer frame (101.112)	50
Mullion or transom (102.142)	43

## 7 Thermal insulation

 7.1 The thermal transmittance value (U value) of a fully reinforced Veka Matrix outward opening window 1165 mm wide by 1161 mm high incorporating a 1000 mm by 1000 mm standard kitemarked 4/12/4 mm sealed double-glazed unit of known thermal performance, when measured by the Guarded Hot Box Method according to BS 874 : Part 3 : Section 3.1 : 1987, is  $2.75 \pm 0.27 \text{ Wm}^{-2}\text{K}^{-1}$ .

7.2 For design purposes, a representative value for the linear thermal transmittance of the PVC-U frame may be taken as  $0.26 \text{ Wm}^{-1}\text{K}^{-1}$ . The heat loss through the PVC-U frame is the product of the linear thermal transmittance value, the frame length and the difference in environmental temperatures either side of the frame, ie the heat loss (in watts) through the PVC-U frame =  $0.26 \times \text{total length of frame} \times \text{the difference in environmental temperature either side of the frame}$ .


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 unit is specified that carries the BSI kitemark to BS 5713 : 1979.

## 8 Condensation risk


8.1 For condensation to occur on any surface the temperature of that surface must fall below the dew-point of the air adjacent to it. Where a temperature differential exists between the interior and exterior surfaces of a Veka Matrix outward opening window the frame members do not constitute a 'cold bridge' and condensation will occur on the glass before it appears on the frame.

8.2 Measurements show that for a fully reinforced window, subject to internal conditions of 20°C and 65% RH, the external temperature must fall below 12°C before condensation occurs at any point on the glass, below -3°C before condensation occurs at any point on the visible interior surface of the PVC-U frame, or below -11°C before condensation occurs on the majority of the frame 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 8213 : Part 1 : 1991.

9.2 The windows can comply with the recommendations of BS 8213 : Part 1 : 1991 with regard to the positioning of hand operated controls.

 9.3 Account must be taken of the recommendations given in BS 6262 : Part 4 : 1994<sup>(1)</sup>, which include the use of safety glass, complying with BS 6206 : 1981, under certain circumstances.

(1) Dealing with the safety of people upon impact with the glazing.

## 10 Security against intrusion

10.1 Veka Matrix opening lights are fitted with a lock mechanism as described in section 1.12. When fastened in the closed position the opening light cannot be opened by manipulation from the outside, for example, by the insertion of a thin blade. Key operated locks are required for certain windows to meet the security requirements of NHBC Standards Chapter 6.7 *Doors, windows and glazing* and the *Zurich Municipal Technical Manual*, Sections 6.12 and 12.16. It is vital that glass packing is carried out to the manufacturer's recommendations to prevent forced entry by flexing of the frame members allowing disengagement of the lock mechanism.

10.2 Externally fitted glazing beads can be removed but subsequent removal of the glass without breakage and noise is virtually impossible due to the double-sided glazing tape or the use of security clips. Internally fitted glazing beads are virtually impossible to remove from the outside.

## 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 Certificate holder specified on the Front Sheet and approved by the BBA.

12.2 If damage occurs, the furniture and fittings can be replaced.

12.3 The PVC-U 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. Abrasive cleaners should not be used, particularly on woodgrain finishes as the loss of the acrylic lacquer will have a serious effect on durability.

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 PVC-U

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 PVC-U frame members and the application of dark colours to white profiles could lead to a risk of thermal distortion. Therefore painting is not recommended.

12.6 The friction hinges and locking mechanism should be cleaned and lubricated periodically to minimise wear and to ensure smooth operation. Care should be taken to avoid applying lubricant to the sliders as this will impair their braking action. The resistance of the sliders can be adjusted, if necessary, with the brass screw or die-cast, slot-headed cam provided in each slider.

## 13 Durability



13.1 Evidence is available on the performance in the UK and other Northern European countries of PVC-U similar to that used for the system over a period of 15 years for woodgrain windows and in excess of 20 years for white windows. Such evidence, when compared with the results of tests on the Veka Matrix PVC-U, indicates that the windows will have a life of at least 25 years. Any slight colour change or surface dulling that might occur will be uniform over the visible surfaces of the windows for both white and woodgrain finishes, assuming in the latter case that the acrylic lacquer is undamaged.

13.2 Fittings, including the hinges, locking mechanism and operating handles, as described in this Detail Sheet, will have similar durability except where windows are to be installed in areas subject to particularly aggressive conditions. These conditions can prevail in coastal locations or near sources of industrial pollutants and replacement of fittings may be necessary within the life of the window.

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

## Installation

### 14 General

14.1 The window must be fixed into the opening, in accordance with the recommendations in the *Veka Matrix Casement Technical Manual*, using proprietary expanding anchors through the frame or galvanized steel fixing lugs. Replacement windows should be fitted in accordance with BS 8213 : Part 4 : 1990 in particular with reference to clause 9.3.1.

14.2 Openings in new walls should be formed using a suitable template 10 mm wider and higher than the window to be installed. Alternatively, window former and acceptor products are available. Systems covered by an Agrément

Certificate are listed in the *Index of Current BBA Publications*. 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 between 150 mm and 250 mm from all corners (including mullions/transoms) 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 *Veka Matrix Casement Technical Manual*.

15.3 The installation is completed by application of a low-modulus PVC-compatible silicone sealant in conjunction with a foam-based backing rod 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 Veka Matrix Outward Opening PVC-U Window System.

### 16 Tests

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

air permeability  
 watertightness  
 effect of wind loads  
 effect of thermal differential  
 efficiency of window fittings  
 resistance to impact, racking and bending loads  
 ease of operation.

16.2 Tests in accordance with MOAT No 8 : 1973 and MOAT No 17 : 1990 gave the results for the PVC-U extrusions as detailed in Table 6.

Table 6 PVC-U extrusion test results

Test	Results	
	White	Brown
ash content (%)	4.8	2.6
Vicat softening temperature (°C)	80.5	90.4
tensile strength (MPa)	47.0	43.0
modulus of elasticity (MPa)	2300	2820
tensile impact (kJm <sup>-2</sup> ):		
at 23°C	921	727
at 0°C	881	669
induction time of dehydrochlorination (min):		
new material	61	83
UV aged material	49	51
impact test at -10°C	pass	pass
shrinkage on heating at 100°C for 1 hour	<2%	<2%
acetone resistance	pass	pass

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16.3 The thermal transmittance value of a Veka Matrix outward opening window was measured using the Guarded Hot Box Method.

16.4 Additional test work in accordance with MOAT No 57 : 1995 and BS 7722 : 1994 was carried out on woodgrain finish windows and profiles to determine:

## Windows

effect of solar heat gain

## Profiles

colourfastness of surface foil  
adhesion to substrate profile  
abrasion and scratch resistance  
retention of impact strength  
corner finishing.

## 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.

## Bibliography

BS 874 *Methods for determining thermal insulating properties*

Part 3 *Tests for thermal transmittance and conductance*  
Section 3.1 : 1987 *Guarded hot-box method*

BS 952 *Glass for glazing*

Part 1 : 1995 *Classification*

BS 1449 *Steel plate, sheet and strip*

Part 2 : 1983 *Specification for stainless and heat-resisting steel plate, sheet and strip*

BS 1474 : 1987 *Specification for wrought aluminium and aluminium alloys for general engineering purposes: bars, extruded round tubes and sections*

BS 5713 : 1979 *Specification for hermetically sealed flat double glazing units*

BS 6206 : 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*

BS 6262 : 1982 *Code of practice for glazing for buildings*

BS 6262 *Code of practice for glazing for buildings*  
Part 4 : 1994 *Safety related to human impact*

BS 6375 *Performance of windows*  
Part 1 : 1989 *Classification for weathertightness (including guidance on selection and specification)*

BS 7722 : 1994 *Specification for surface covered PVC-U extruded hollow profiles with heat welded corner joints for plastics windows*

BS 8213 *Windows, doors and rooflights*  
Part 1 : 1991 *Code of practice for safety in use and during cleaning of windows and doors (including guidance on cleaning materials and methods)*

Part 4 : 1990 *Code of practice for the installation of replacement windows and doorsets in dwellings*

BS EN 10142 : 1991 *Specification for continuously hot-dip zinc coated low carbon steel sheet and strip for cold forming: technical delivery conditions*

MOAT No 1 : 1974 *Directive for the Assessment of Windows*

MOAT No 8 : 1973 *Directive for Rigid PVC Products Used Externally in Building*

MOAT No 17 : 1990 *UEAtc Technical Guide for the Agrément of Windows in PVC-U*

MOAT No 57 : 1995 *UEAtc Technical Report for the Assessment of windows in coloured PVC-U*



On behalf of the British Board of Agrément

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

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