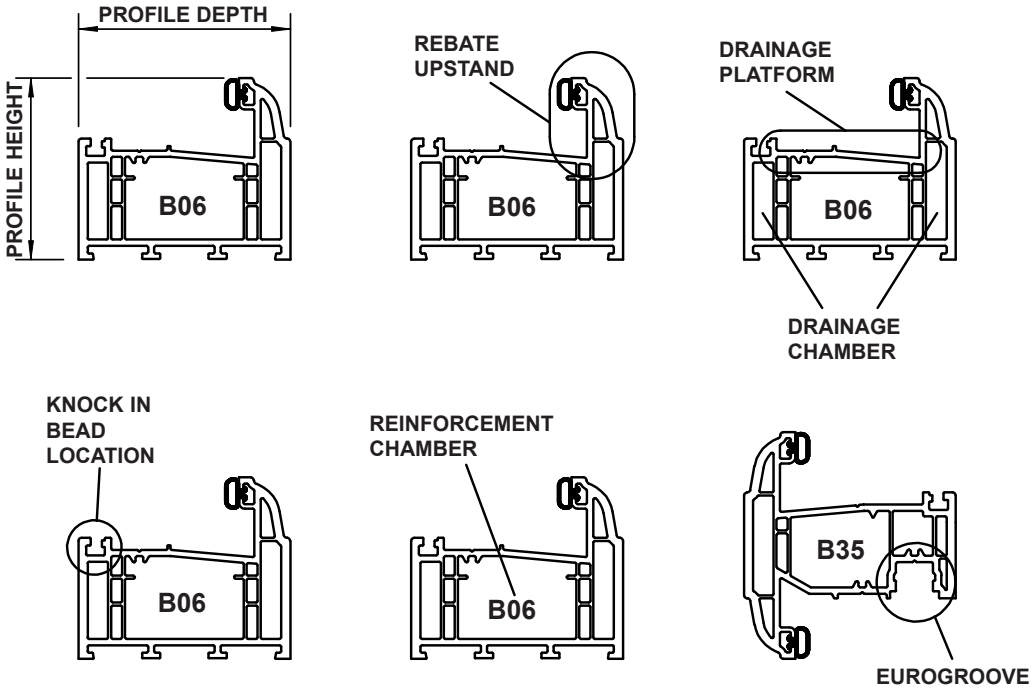
TERMINOLOGY

The following terminology is used throughout this manual:



BAY POLE
An independant structural member or assembly, used between individual bay segments, to carry applied loads.

BAY SEGMENT
The individual window which forms one facet of a bay window.

BAY WINDOW
A multi-faceted window, which forms an integral part of the facade of a building, and which projects no more than 1.5 metres from the building line.

BOW WINDOW
A type of bay window, usually carrying only light loads, which does not form an extension to the floor area of the room.

DEAD LOAD
The load due to the weight of all walls, permanent partitions, floors, roofs and finishes, including services and all other permanent construction Dead Loads are calculated from unit weights of the materials used.

DPC (Damp Proof Course) or DPM (Damp Proof Membrane)
A device, usually comprising of a layer or strip of material, placed within a wall to prevent the passage of moisture.

FRAME
Surround to a door leaf, window etc, enabling it to be fixed into postion.

LINTEL
A beam supporting loads over an opening.

MANUFACTURING SIZES
(also known as 'window size')
The overall window dimensions which result from making the appropriate deductions from the structural opening size, and allowing for any add-ons or extension pieces required.

ORIEL WINDOW
Multi-sided window projecting from an upper storey, and generally supported by brackets.

STRUCTURAL OPENING
An aperture in a wall into which the window or doorset is to be installed.

STRUCTURAL OPENING SIZE
The size of the maximum rectangular shape that can be fitted within the structural opening.

WINDOW SURVEYOR
A qualified or otherwise competent person who is capable of surveying for window and doorset installation, advising on suitable design, and assessing the quality of the finished installation.

ELITE 70 GENERAL MANUAL

INTRODUCTION

This manual contains information of a technical nature and consequently is only intended for use in the course of a business by persons who are skilled in the subject matter covered.

Although reasonable care has been taken in the preparation of this manual, H.W. Plastics Ltd. does not accept any liability for damage resulting (whether directly or indirectly) from the use of the information contained in this manual.

Accordingly this manual is supplied on the basis that the user accepts all risks associated with the use of the information contained within it.

SURVEY

GENERAL INFORMATION

The surveyor should be familiar with the BPF Code of practice for The Survey and Installation of Replacement Plastics Windows and Door Sets (Ref. 362/1), or any updates subsequent to this manual.

The surveyor should ensure that the chosen window design will function within the constraints imposed by the opening and its surroundings.

DEFECTS

A check should be made for defects around openings, both internally and externally. If any are found, the customer should be informed and agreement reached on the responsibility before work commences.

WIRING AND CABLES

The position of any existing wiring (e.g. for TV aerials, telephone or power) should be noted. Provision should be made to route these around the new windows. To avoid water ingress, they should not pass through any part of the PVC-U frame.

LINTELS

Special attention should be paid to the position of any lintel above the structural opening. If no lintel exists, and the area above would impose a load on the windows, one should be provided. Agreement should be reached with the customer to determine responsibility before work commences.

MEASUREMENT

If preliminary checks are satisfactory, the structural openings should be measured as follows:

The squareness should be assessed by checking the diagonals. If the two measurements differ by less than 10mm, the actual horizontal and vertical sizes are taken.
(See Fig.1.1)

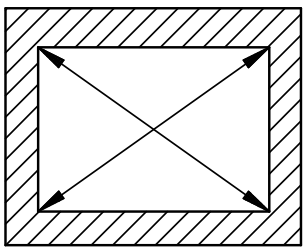


Fig 1.1

If the diagonals differ by more than 10mm use a spirit level or plumb bob to determine the usable area. (See Fig.1.2)

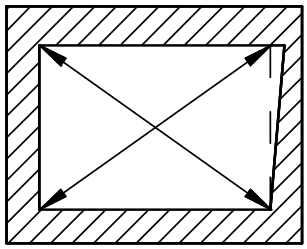


Fig 1.2

Measurements are then taken at a number of places and smallest sizes noted.
(See Fig.1.3)

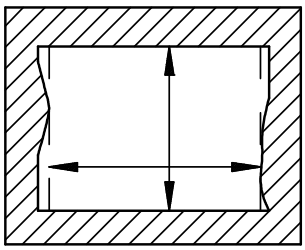


Fig 1.3

Under normal circumstances, every window should be measured.

When this is not possible, a suitable method of determining sizes should be agreed and confirmed e.g. for new build projects.

CILLS AND PACKERS

Survey dimensions should include cills and stacking packers . Allowance for cills & packers must be included when calculating frame manufacturing sizes.

EDGE CLEARANCE

Good silicone joint design requires a suitable gap all round of approximately 5mm between the frame and the structural opening. The deductions are affected by the position of the window in the structure.

A deduction of 10mm from structural opening to window size is generally acceptable, this will allow for a 5mm silicone joint all round.
(See Fig. 1.4)

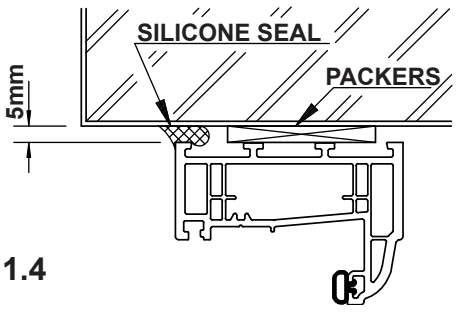


Fig 1.4

SURVEY

INTERNAL CHECK

In all cases internal sizes must be checked. A few of the points which need to be considered are:

	Effect
- Plaster thickness.	Hinge clearance. Sash overlap. Glazed in windows (profile height). Night ventilators.
- Tiled cills.	Hinge clearance. Sash overlap. Glazed in windows (profile thickness).
- Box sash replacement (see Fig. 1.5)	Hinge clearance. Sash overlap.

ON BOX SASH REPLACEMENTS THE INNER SKIN OF BRICKWORK IS SET BACK FROM THE OUTER SKIN

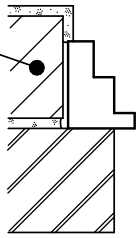


Fig 1.5

MULTI-LIGHT WINDOWS

For multi-light windows of equally spaced mullions/ transoms, surveyors must ensure that the overall size is exactly divisible by the required spacings.

If this is not done, the subdivision of frames will be adjusted by most computer systems to the nearest millimetre for manufacturing purposes and the overall frame size may well alter.

When noting transom and mullion positions, measure from the top left hand corner using the window edge as the datum (see Fig.1.6). Measurements are from frame edge to mullion/ transom centre line.

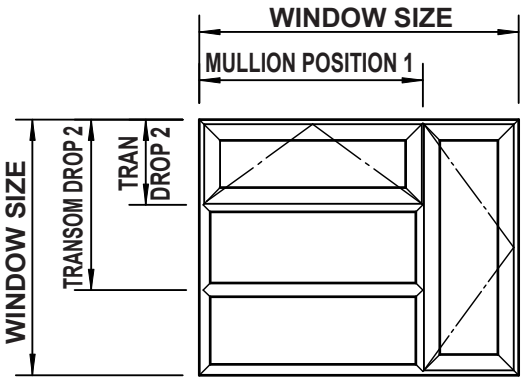


Fig 1.6

FIRE EXIT

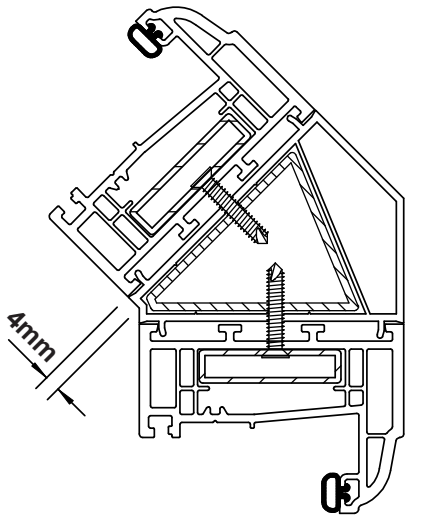
The BPF code of practice for The Survey and Installation of Replacement Plastics Windows and Door Sets (Ref. 362/1) states that the windows being installed should not make egress in case of fire more difficult.

The Building Regulations Document 'B' (Fire Safety) states: The window should have an unobstructed openable area that is at least 0.33 sq.m and at least 450mm high and 450mm wide (the route through the window may be at an angle rather than straight through). The bottom of the openable area should be not more than 1100mm above the floor.

BAYS , BOWS AND ORIELS

Non Load Bearing

In addition to the standard survey checks, special care needs to be taken with bay windows. For non load bearing applications, the Elite 70 system uses an adjustable baypole (see Fig.1.8), a 90 degree or 135 degree post (see Fig.1.7) or a variable bay assembly (see pages 1.3 to 1.5)



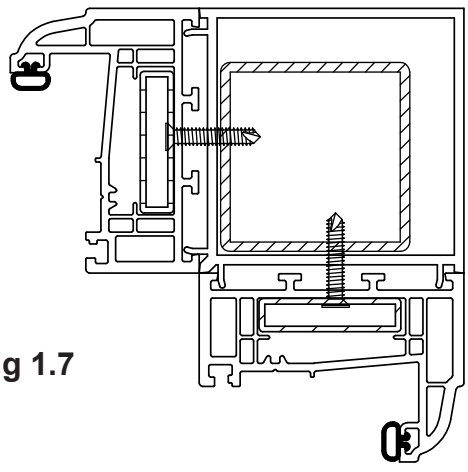


Fig 1.7

BAYS , BOWS AND ORIELS cont.
Non Load Bearing

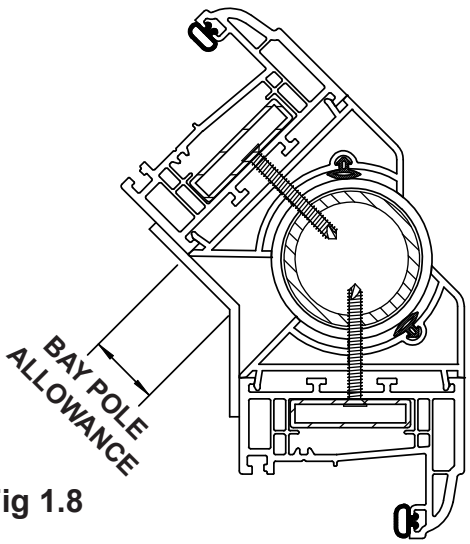


Fig 1.8

BAY POLE ALLOWANCE
The bay pole has a variable deduction (depending on the angle of the bay) which can be determined from the graph shown in Fig. 1.9.

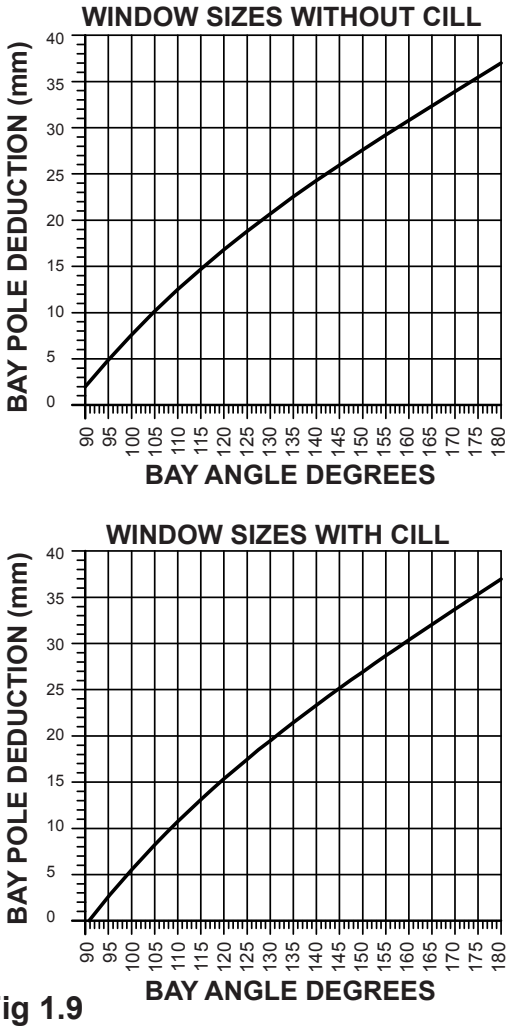
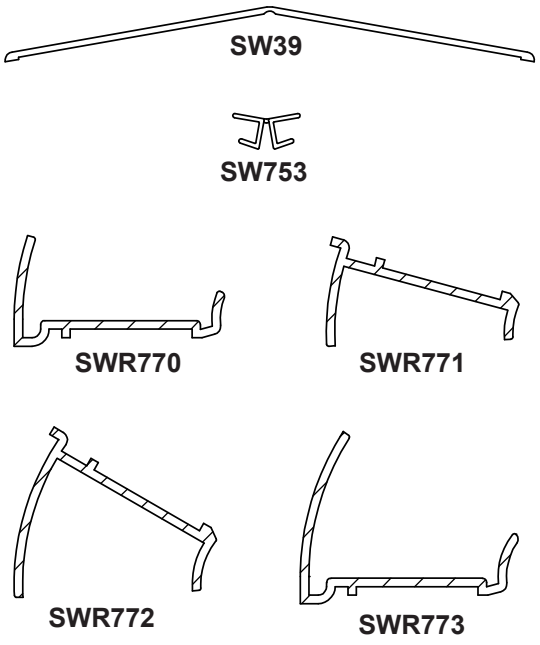
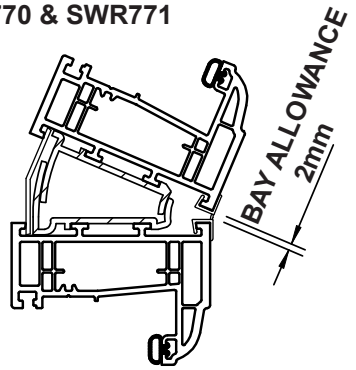


Fig 1.9

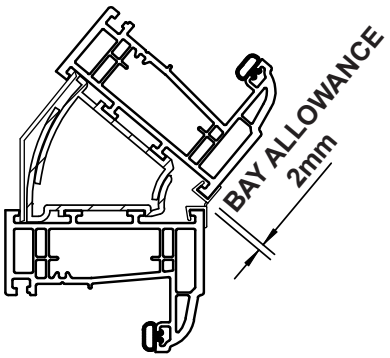
VARIABLE BAY ASSEMBLY



BAY ANGLES 13-30 DEGREES
SWR770 & SWR771



BAY ANGLES 30-60 DEGREES
SWR772 & SWR773

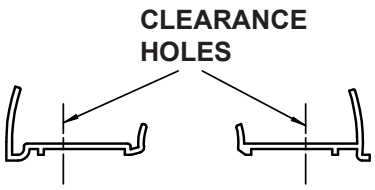


INSTALLATION
Fit the welded cill assembly into the aperture.

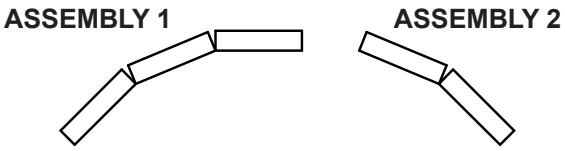
Cut the SW753 coupling to length, snip out the inner legs to clear welds where necessary.

VARIABLE BAY ASSEMBLY INSTALLATION cont.

Cut the aluminium angles to length and drill 5mm clearance holes for fixings, at no greater than 600mm intervals, leaving the final set of angles, to be assembled, undrilled.

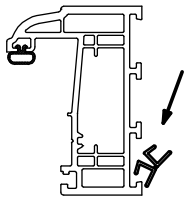


Working on the ground, assemble the frames together using SW753 (See SW753 assembly instructions). It is recommended that 4 sided bays and above are assembled in 2 or more parts for ease of lifting into aperture. e.g.

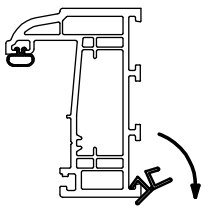


SW753 ASSEMBLY INSTRUCTIONS

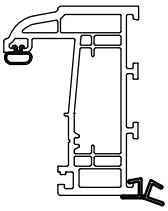
Hook the SW753 onto the inner leg of the frame.



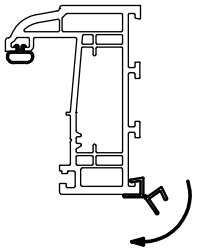
Twist the SW753 into the finished position.



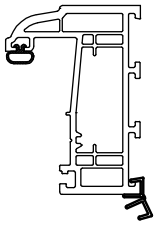
Finished position.



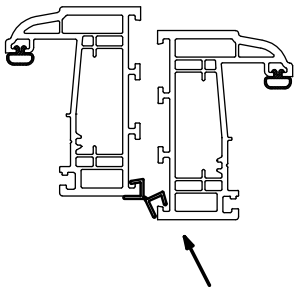
Flex the loose end of the SW753 around, along its full length.

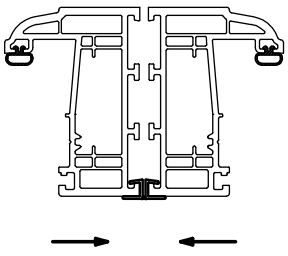


The looose end should be flexed back on itself along its full length.



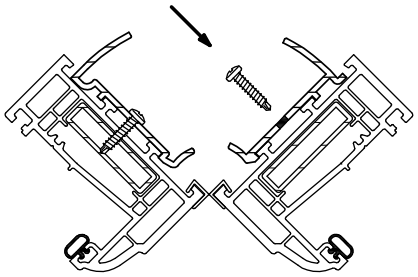
Carefully insert the next frame into the partially flexed loose end of the SW753 and squeeze the frames together, working from one end. Check the frames are fully inserted along their full length.





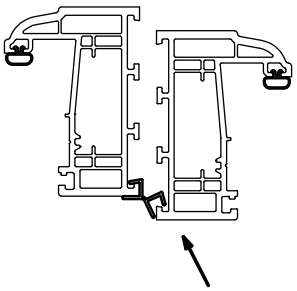
VARIABLE BAY ASSEMBLY INSTALLATION Cont.

Still working on the ground, open out the joints and fix the aluminium mullions onto the outer frames through the pre-drilled holes.

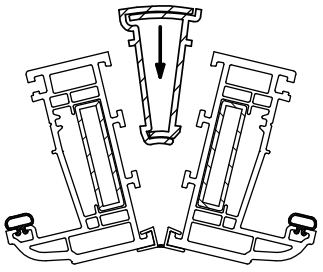


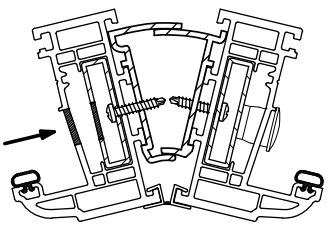
Repeat for the two pre-assembled frames, (Assembly 1 and 2). Lift the assembled bay section/s into the aperture and wedge in position if necessary.

Fit the SW753 into the final joint with the windows in the aperture.



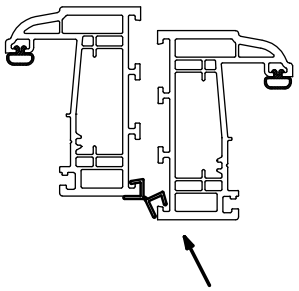
Interlock the aluminium angles together and insert them into the bay from the outside. Ensure the angles are located onto the outer frames correctly and screw them in position from the inside of the adjacent frames at no greater than 600mm centres





Push the bay assembly back against the cill & head and fix the frames in accordance with section 8 of this manual.

Secure the bay angles by driving a self countersinking reinforcement screw through the centre of the aluminium assemblies at no greater than 600mm centres.



Cut the SW39 cover strip to size and insert in the gaps by over bending the strip and then pushing the fold to straighten it out.

Finally seal the bay assembly into the aperture in accordance withe sections 8 and 11 of this manual.

BAYS , BOWS AND ORIELS

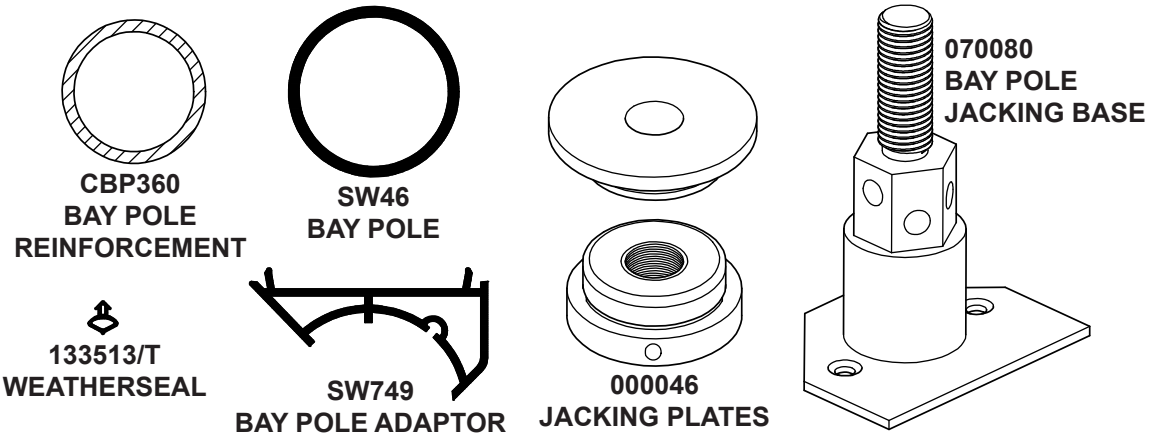
Load Bearing

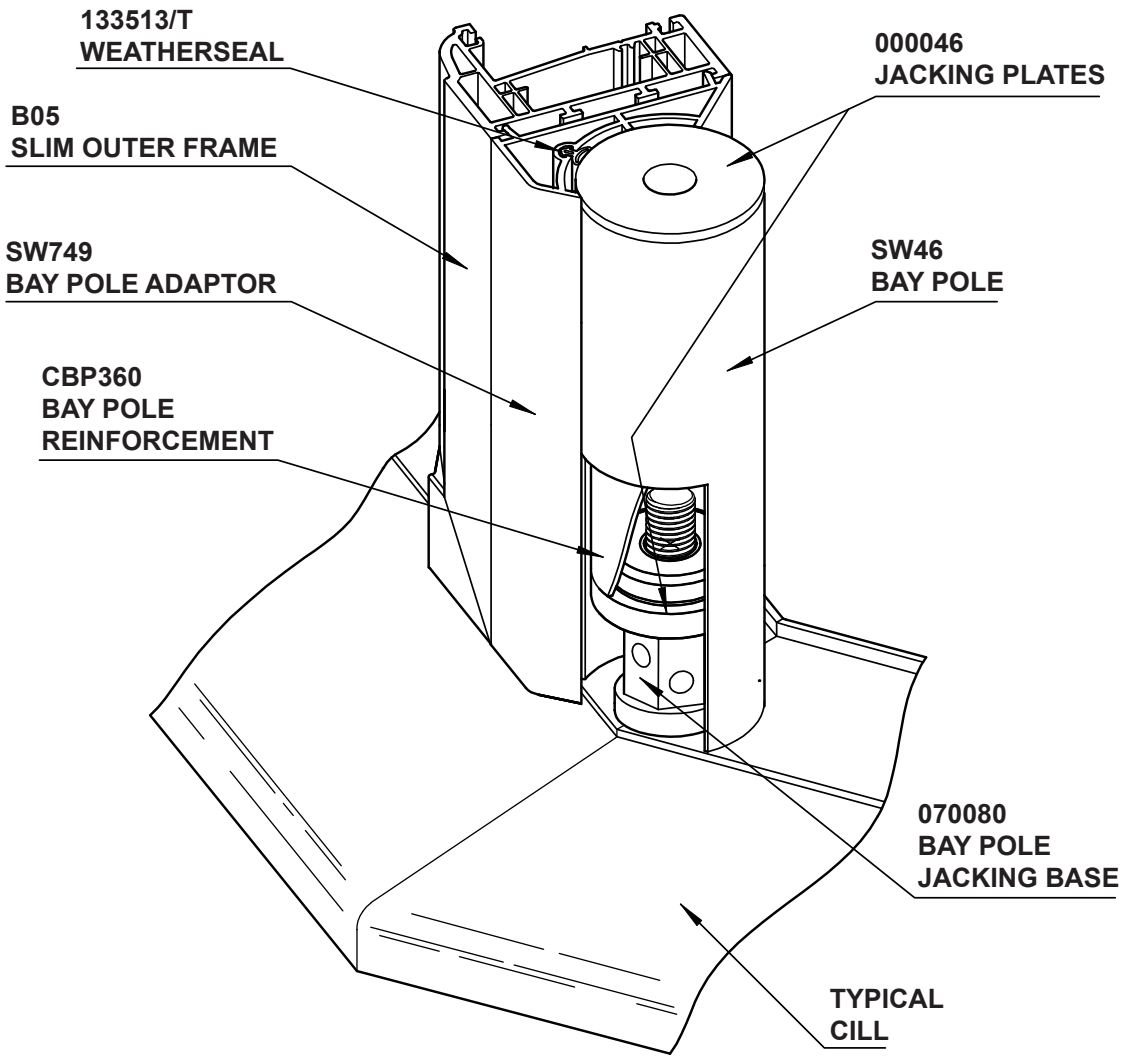
In addition to the standard survey checks, special care needs to be taken with bay windows. For loadbearing applications, H W Plastics has the following load bearing assembly.

COMPONENT IDENTIFICATION

Load Bearing Bays

For all load bearing applications, reference should be made to the BPF Code of Practice for the Survey and Installation of Replacement Plastics Windows and Doorsets (Ref W362/1) or any updates subsequent to this manual.

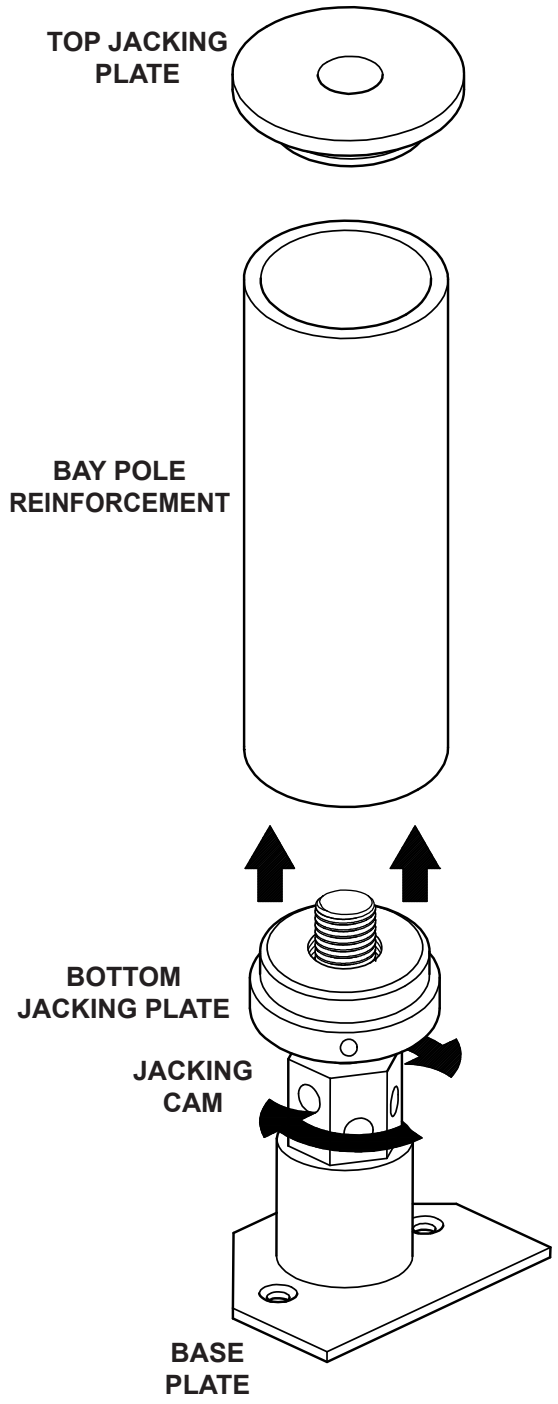




BAYS , BOWS AND ORIELS cont.

Load Bearing Bays

The bay pole jacking assembly is used for load bearing applications. The base plate fits at the bottom of the assembly underneath the cill to anchor the bay pole and spread any load acting on it. The top and bottom jacking plates fit to either end of the bay pole reinforcement. The jacking cam is then turned to push the bay pole upwards until it is in a secure loadbearing position.



Load Bearing Data

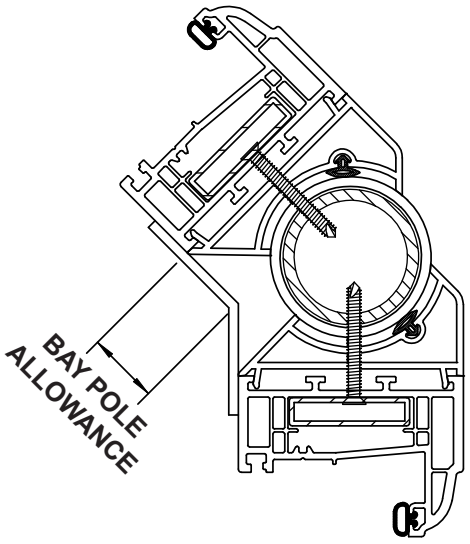
Use the table shown below as a guide to the maximum load each bay pole reinforcement **CBP360** will withstand.

Effective Bay Pole Length	Appliable Load
700mm	2.82 Tonnes
800mm	2.70 Tonnes
900mm	2.54 Tonnes
1000mm	2.38 Tonnes
1100mm	2.22 Tonnes
1200mm	2.00 Tonnes
1300mm	1.70 Tonnes
1400mm	1.40 Tonnes
1500mm	1.30 Tonnes
1600mm	1.13 Tonnes

Note: If the bay pole reinforcement is restrained at the centre, for example by means of the adjacent windows, then the Effective Length is only 70% of the actual length of the bay pole reinforcement.

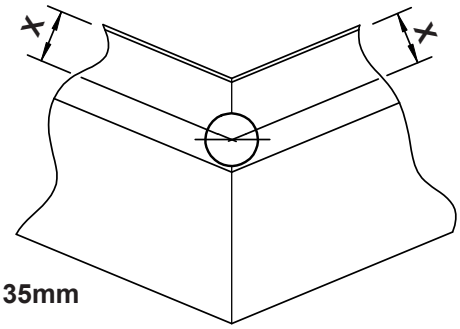
Bay Allowance

For the bay pole deductions, refer to Fig. 1.9 on page 1.3 of this manual.



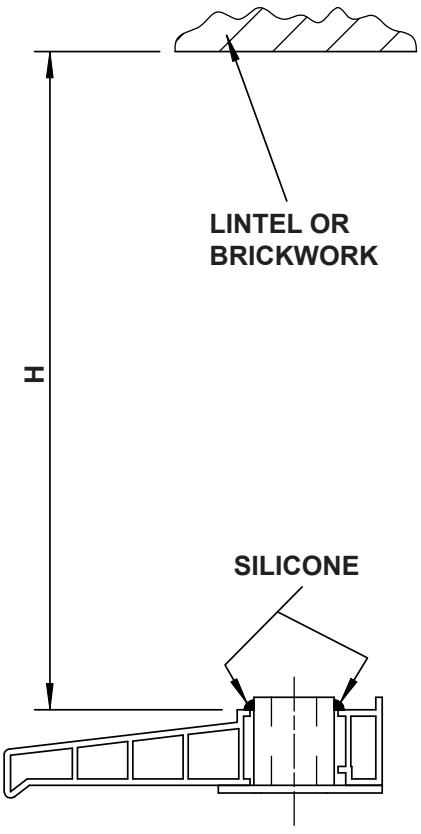
Load Bearing Bays
INSTALLATION INSTRUCTIONS

On cill assembly drill a 35mm diameter hole all the way through the cill at each weld seam as shown below. This hole is for the base plate bush/jacking cam clearance.



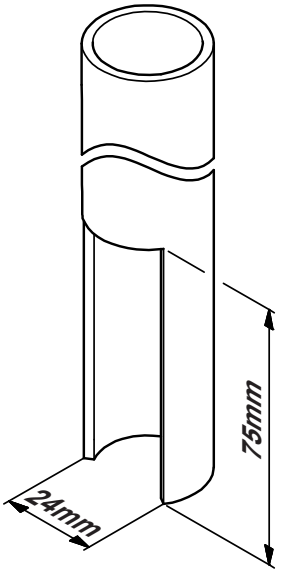
X = 35mm

Ensure each base plate sits in a stable position on a sound level surface. Place the cill over the base plates and silicone seal between the outer diameter of the base plate bush and the edge of the 35mm hole.

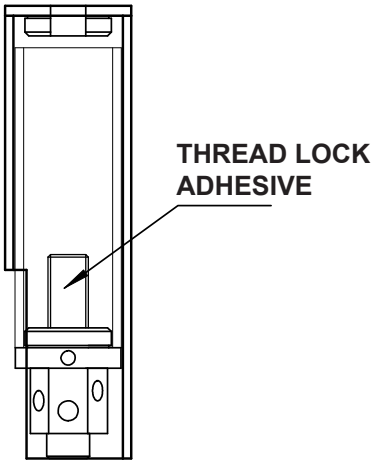


Measure the distance from the cill platform to the lintel or brickwork, call this 'H' as shown above. Cut the bay reinforcing CBP360 to length H-50. Cut the PVC-U bay pole SW46 to length H-5.

End prep the bottom of SW46 as shown below.



Wind down the bottom jacking plate to the bottom of the M16 thread and apply thread lock adhesive (e.g. locktite) to the threads above the bottom jacking plate. Assemble the poles, end caps and jacking cam, slide the PVC-U bay pole over the assembly as shown below.

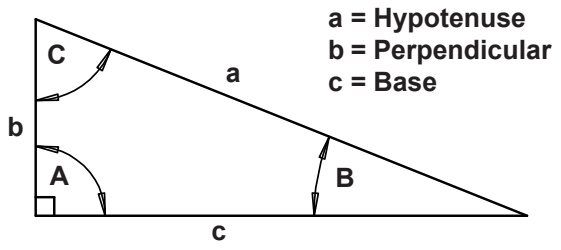


Slide the assembly into position until the jacking cam spigot drops into the base plate bush. Once the bay pole is true and vertical use a screw driver or similar to stop the bottom base plate from turning by means of the hole provided. Wind up the jacking cam by the use of a screwdriver or similar until the reinforcing is in a secure load bearing position. Now twist the PVC-U bay pole to conceal the cut out behind the bay adaptor. Adjacent frames can now be fitted. It is important that the frames are fixed to the pole and to the head of the building.

SURVEY

TRIGONOMETRIC CALCULATONS TO AID IN THE SURVEYING OF BAYS

SOLUTION OF THE RIGHT ANGLED TRIANGLE



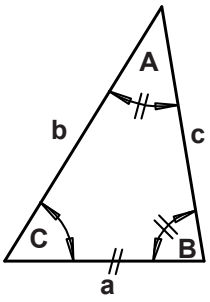
a = Hypotenuse
b = Perpendicular
c = Base

$\text{Tan B} = \frac{b}{c}$ $\text{Cos B} = \frac{c}{a}$ $\text{Cosec B} = \frac{a}{b}$

$\text{Sine B} = \frac{b}{a}$ $\text{Cotan B} = \frac{c}{b}$ $\text{Sec B} = \frac{a}{c}$

Known Data	Formulae for side and angle		
a & b	$c = \sqrt{a^2 - b^2}$	$\text{Sin B} = \frac{b}{a}$	$C = 90^o - B$
a & c	$c = \sqrt{a^2 - c^2}$	$\text{Sin C} = \frac{c}{a}$	$B = 90^o - C$
b & c	$c = \sqrt{b^2 - c^2}$	$\text{Tan B} = \frac{b}{c}$	$C = 90^o - B$
a & B	$b = a \text{ Sin B}$	$c = a \text{ Cos B}$	$C = 90^o - B$
a & C	$b = a \text{ Cos C}$	$c = a \text{ Sin B}$	$B = 90^o - C$
b & B	$a = \frac{b}{\text{Sin B}}$	$c = b \text{ Cot B}$	$C = 90^o - B$
b & C	$a = \frac{b}{\text{Cos C}}$	$c = b \text{ Tan C}$	$B = 90^o - C$
c & B	$a = \frac{c}{\text{Cos C}}$	$b = c \text{ Tan B}$	$C = 90^o - B$
c & C	$a = \frac{c}{\text{Sin C}}$	$b = c \text{ Cot C}$	$B = 90^o - C$
A, B&C	Infinite number of solutions		

SOLUTION OF THE OBLIQUE ANGLED TRIANGLE



NB // Signifies known data.

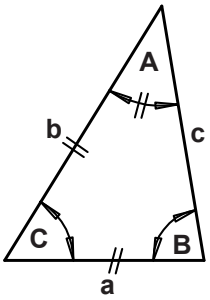
Any one side & any two angles known.

For example: Let the known side be a, and the angles A & B.

Then:

$C = 180^o - (A + B)$

$b = \frac{a \text{ Sin B}}{\text{Sin A}}$ $c = \frac{a \text{ Sin C}}{\text{Sin A}}$



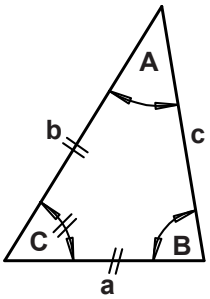
Two sides and the oposite angle.

For example: Let the known sides be a & b and the angle A.

Then:

$\text{Sin B} = \frac{b \text{ Sin A}}{a}$

$c = \frac{a \text{ Sin C}}{\text{Sin A}}$ $C = 180^o - (A + B)$



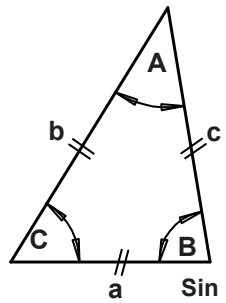
Two sides & the included angle.

For example: Let the known sides be a & b and the angle C.

Then:

$\text{Tan A} = \frac{a \text{ Sin C}}{b - a \text{ Cos C}}$

$B = 180^o - (A + C)$ $c = \frac{a \text{ Sin C}}{\text{Sin A}}$



All sides given.

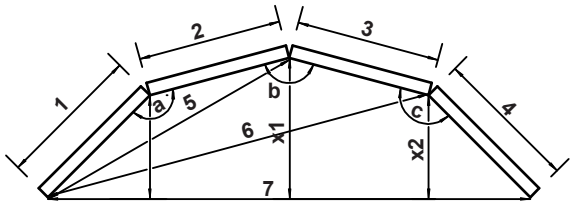
For example: Let the known sides be a, b & c.

Then:

$\text{Cos A} = \frac{b^2 + c^2 - a^2}{2bc}$

$\text{Sin B} = \frac{b \text{ Sin A}}{a}$ $C = 180^o - (A + B)$

EXAMPLE (Showing the above tables used to work out bay angles):



SIZES:

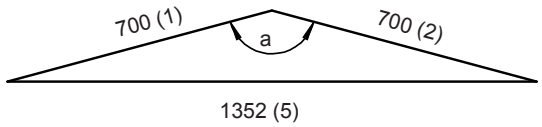
1 = 700	7 = 2342
2 = 700	x1 = 495
3 = 700	x2 = 676
4 = 700	a = Unknown
5 = 1352	b = Unknown
6 = 1912	c = Unknown

4 SIDED BAY, BAY ANGLES UNKNOWN

EXAMPLE CONTINUED ON PAGE 1.10

EXAMPLE CONTINUED FROM PAGE 1.9

Angle a:



From the solution of the oblique angle triangle.
Data known, all sides

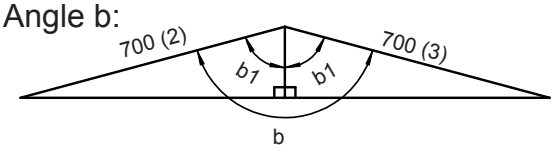
$$\text{Cos a} = \frac{700^2 + 700^2 - 1352^2}{2 \times 700 \times 700}$$

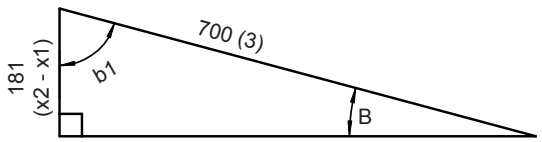
$$= \frac{-847904}{980000}$$

$$= -0.86521$$

$$\text{a} = \mathbf{150°}$$

Angle b:





From the solution of the right angled triangle.
Data known, all sides

$$\text{Sin B} = \frac{181}{700}$$

$$= \underline{0.2585714}$$

$$\text{B} = 15°$$

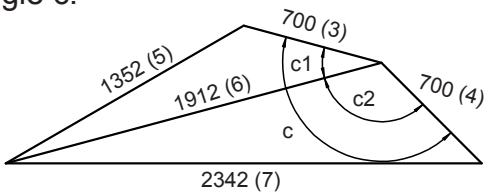
$$\text{b1} = 90° - 15°$$

$$\text{b1} = 75°$$

$$\text{b} = \text{b1} + \text{b1}$$

$$\text{b} = \mathbf{150°}$$

Angle c:



From the solution of the oblique angle triangle.
Data known, all sides

$$\text{Cos cl} = \frac{700^2 + 1912^2 - 1352^2}{2 \times 700 \times 1912}$$

$$= \frac{2317840}{2676800}$$

$$= 0.865899$$

$$\text{cl} = 30°$$

$$\text{Cos c2} = \frac{1912^2 + 700^2 - 2342^2}{2 \times 1912 \times 700}$$

$$= \frac{-1339220}{2676800}$$

$$= 0.500306$$

$$\text{c2} = 120°$$

$$\text{c} = \text{cl} + \text{c2}$$

$$= 120° + 120°$$

$$\text{c} = \mathbf{150°}$$

COUPLINGS

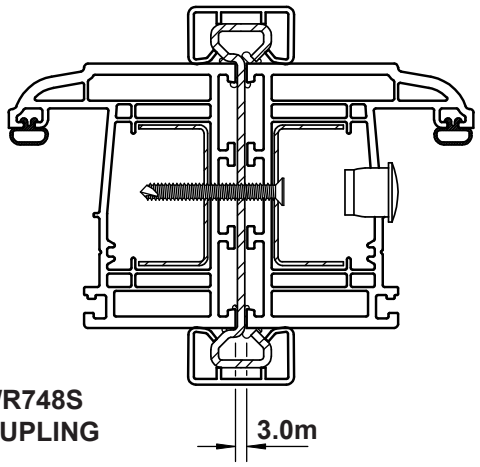
In certain circumstances it is necessary to couple windows. Coupling is needed for the following reasons.

1. The overall size of the frame exceeds 3 metres (The windows are coupled to allow thermal movement)

2. Two windows are coupled for strength.

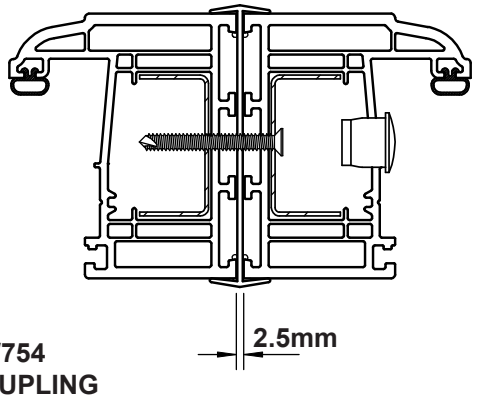
3. Two windows are coupled on site for ease of manufacture and transport.

Figures 1.10 to 1.13 show the available couplings and their deductions.



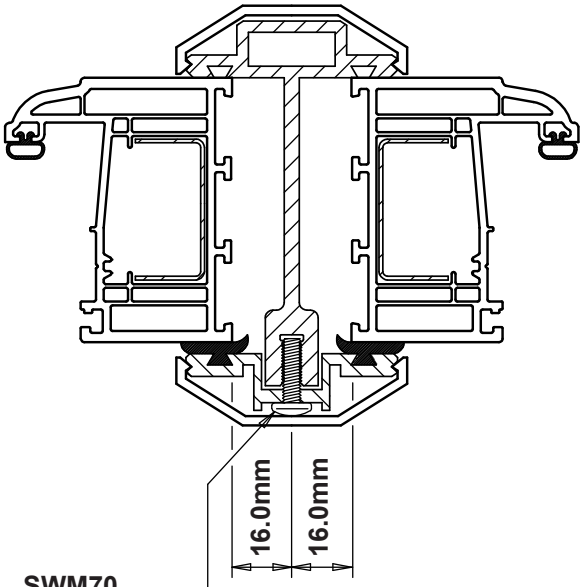
SWR748S COUPLING

Fig. 1.12



SW754 COUPLING

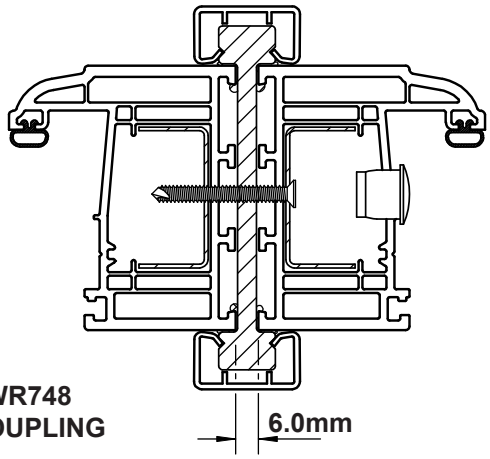
Fig. 1.10



SWM70 COUPLING

Fig. 1.13

FIX USING M5 X 20mm ROOFING BOLT SCREWS AT 150mm CENTRES



SWR748 COUPLING

Fig. 1.11

DESIGN

WIND LOADING

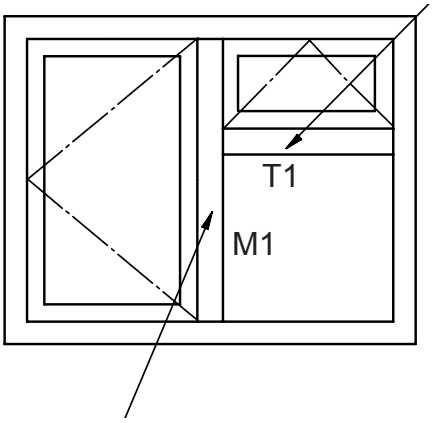
When selecting a suitable transom/mullion for the application, a design wind load is required. If a design wind load is not specified, it must be calculated using either CP3 Chapter V Part 2 or BS6399 Part 2, or any updates subsequent to this manual.

Note: BS7412 states a minimum wind load of 800 pascal's (pa) must be used.

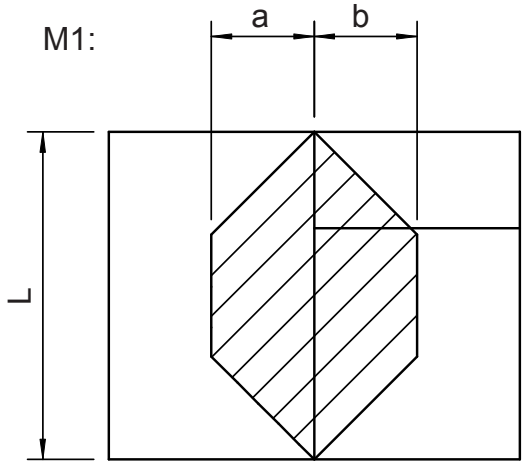
TRANSOM/MULLION SELECTION

Once the design wind load is known, the table on page 2.2 is used to establish the required strength in N.mm2. The required strength for every unsupported member of each window must be worked out, see Fig 2.1.

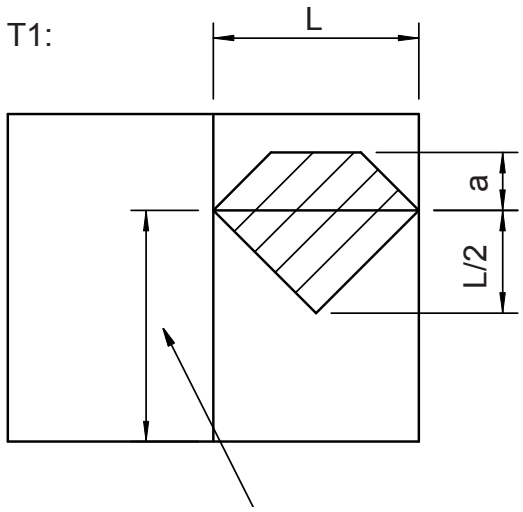
All the permutations of the Elyy value for profile and reinforcement combinations are shown on pages 2.3 - 2.8. Additional information for dead loads and data for corner weld calculations are included in the same tables.



To work out the required Elyy value for this member it would be:



To work out the required Elyy value for this member it would be:



Note: When this distance is greater than 'L' then the load width is L/2.

Fig. 2.1

REQUIRED RIGIDITY Elyy AT A DESIGN WIND LOAD OF 1200 Pa

(BS7412 STATES THAT A MINIMUM WIND LOAD OF 800Pa MUST BE USED)

To determine the total Elyy required, add the respective EI values for the widths 'a' and 'b'

Factors:-
(Elyy x 10^9 N.mm^2)

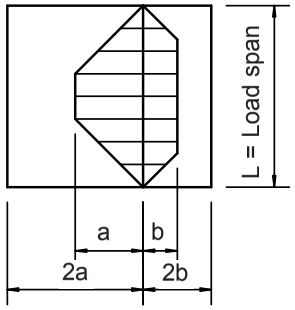
Example: For a span of L = 2000mm; a = 400mm and b = 600mm
Required Elyy = Elyy (a) + Elyy (b)
Elyy = 7.03 + 9.69 = 16.72

(Deflection L/150)

The table shown is for 1200 pa if a different pressure is required e.g. 800 pa then Elyy = $\frac{\text{Elyy}}{1200}$ x 800

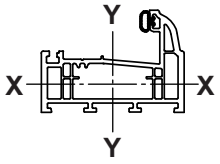
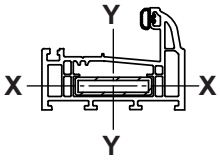
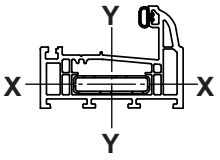
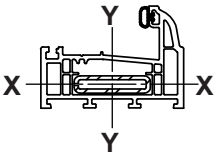
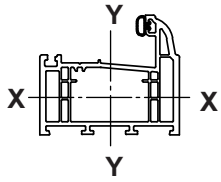
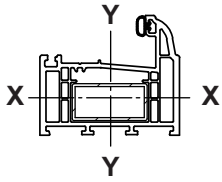
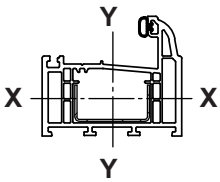
Load width 'a' or 'b' (mm)

Load span L (mm)	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350
600	0.07	0.08	0.09	0.10																					
700	0.11	0.14	0.16	0.18	0.18																				
800	0.17	0.22	0.25	0.28	0.30	0.31																			
900	0.25	0.32	0.38	0.43	0.46	0.48	0.49																		
1000	0.34	0.44	0.53	0.61	0.67	0.71	0.74	0.75																	
1100	0.45	0.59	0.72	0.83	1.92	1.00	1.05	1.09	1.10																
1200	0.59	0.77	0.94	1.10	1.23	1.34	1.44	1.50	1.54	1.56															
1300	0.76	0.99	1.21	1.42	1.60	1.76	1.89	2.00	2.08	2.13	2.14														
1400	0.95	1.24	1.53	1.79	2.03	2.25	2.44	2.59	2.75	2.81	2.86	2.88													
1500	1.17	1.54	1.89	2.22	2.53	2.81	3.07	3.28	3.47	3.61	3.71	3.78	3.80												
1600	1.42	1.87	2.31	2.72	3.11	3.47	3.79	4.08	4.33	4.54	4.70	4.82	4.89	4.92											
1700	1.71	2.25	2.78	3.28	3.76	4.21	4.62	4.99	5.32	5.60	5.84	6.02	6.16	6.24	6.26										
1800	2.03	2.68	3.31	3.92	4.50	5.04	5.55	6.02	6.44	6.81	7.13	7.39	7.60	7.75	7.84	7.87									
1900	2.39	3.16	3.91	4.63	5.33	5.98	6.60	7.17	7.70	8.17	8.58	8.94	9.24	9.47	9.64	9.74	9.77								
2000	2.79	3.69	4.57	5.42	6.24	7.03	7.77	8.46	9.10	9.69	10.21	10.68	11.08	11.41	11.66	11.85	11.96	12.00							
2100	3.23	4.28	5.30	6.30	7.26	8.19	9.06	9.89	10.66	11.38	12.03	12.61	13.13	13.57	13.93	14.22	14.42	14.54	14.59						
2200	3.72	4.93	6.11	7.27	8.38	9.46	10.49	11.47	12.39	13.24	14.04	14.75	15.40	15.96	16.45	16.85	17.16	17.39	17.52	17.57					
2300	4.25	5.63	6.99	8.32	9.61	10.86	12.06	13.20	14.28	15.30	16.24	17.11	17.90	18.61	19.23	19.76	20.20	20.54	20.79	20.94	20.99				
2400	4.83	6.41	7.96	9.48	10.96	12.39	13.77	15.09	16.35	17.54	18.66	19.70	20.65	21.52	22.29	22.97	23.55	24.03	24.40	24.67	24.83	24.88			
2500	5.46	7.25	9.01	10.73	12.42	14.05	15.64	17.16	18.61	19.99	21.30	22.52	23.65	24.69	25.64	26.48	27.22	27.85	28.37	28.77	29.06	29.24	29.30		
2600	6.15	8.16	10.15	12.10	14.00	15.86	17.66	19.40	21.06	22.66	24.17	25.59	26.92	28.15	29.28	30.31	31.22	32.02	32.70	33.27	33.70	34.02	34.21	34.27	
2700	6.89	9.15	11.38	13.57	15.72	17.81	19.85	21.82	23.72	25.54	27.27	28.91	30.46	31.90	33.24	34.47	35.57	36.56	37.43	38.16	38.77	39.24	39.59	39.79	39.86
2800	7.68	10.21	12.70	15.15	17.56	19.91	22.21	24.43	26.58	28.64	30.62	32.50	34.28	35.96	37.52	38.97	40.29	41.49	42.55	43.48	44.28	44.93	45.44	45.81	46.03
2900	8.54	11.35	14.12	16.68	19.54	22.17	24.74	27.24	29.66	31.99	34.23	36.37	38.41	40.33	42.14	43.82	45.38	46.80	48.09	49.24	50.24	51.09	51.79	52.34	52.73
3000	9.45	12.57	15.65	18.68	21.67	24.60	27.46	30.25	32.96	35.58	38.10	40.52	42.83	45.03	47.10	49.05	50.86	52.53	54.06	55.44	56.67	57.74	58.65	59.41	59.99

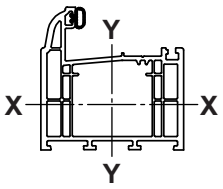
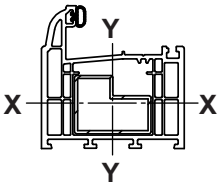
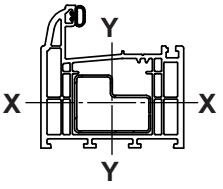
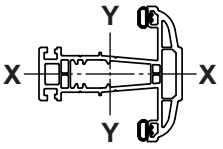
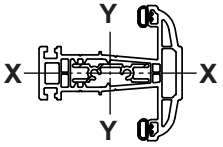
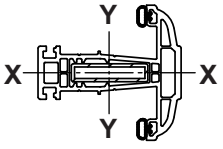
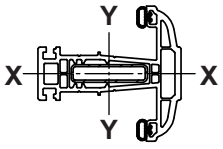


a = Load width (mm)
b = Load width (mm)
L = Load span (mm)

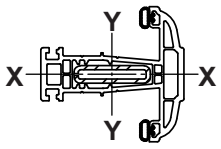
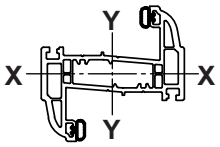
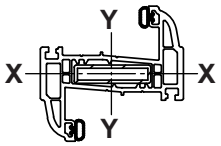
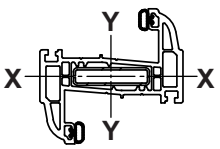
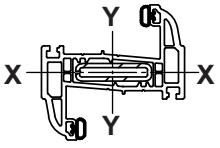
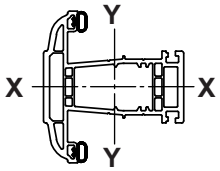
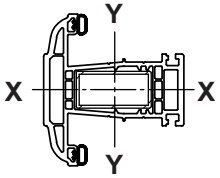
DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B05		116.83	31.17	0.29	1.06
B05 & BR21		———	———	0.39	2.27
B05 & BR20S		———	———	0.51	3.52
B05 & BR21S		———	———	0.62	5.26
B06		212.04	35.94	0.53	1.29
B06 & BR06		———	———	1.12	3.12
B06 & BR06S		———	———	1.02	4.47

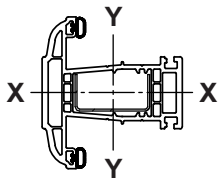
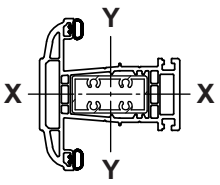
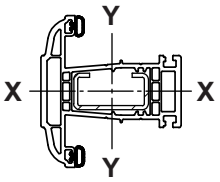
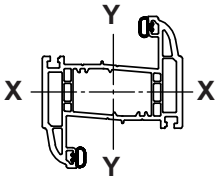
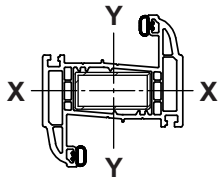
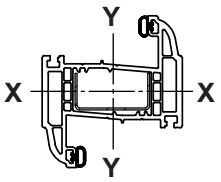
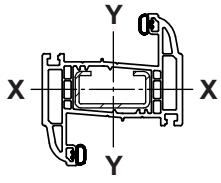
DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B07		348.24	40.86	0.87	1.55
B07 & BR07		———	———	2.13	3.67
B07 & BR07S		———	———	3.55	5.97
B20		161.74	33.00	0.40	1.10
B20 & BR20		———	———	0.46	2.04
B20 & BR21		———	———	0.50	2.31
B20 & BR20S		———	———	0.62	3.56

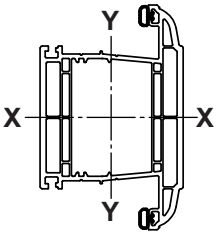
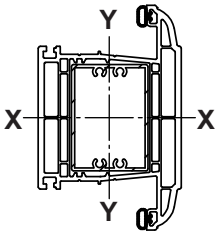
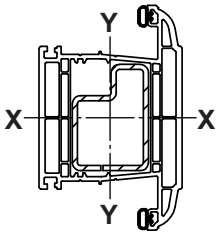
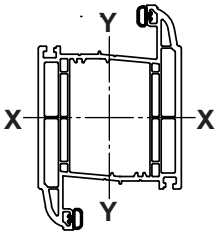
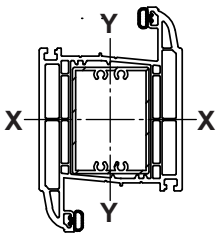
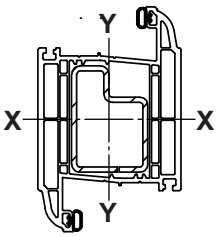
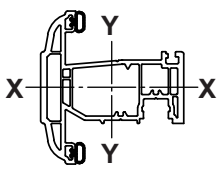
DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B20 & BR21S		———	———	0.73	5.30
B21		161.74	33.00	0.40	1.19
B21 & BR21		———	———	0.50	2.40
B21 & BR20S		———	———	0.62	3.65
B21 & BR21S		———	———	0.73	5.39
B22		272.60	38.00	0.68	1.34
B22 & BR06		———	———	1.27	3.17

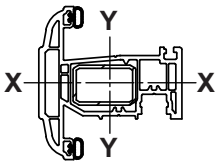
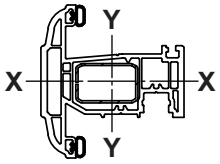
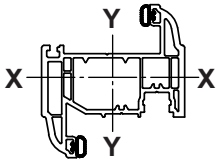
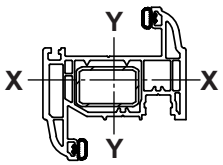
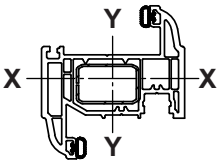
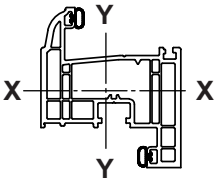
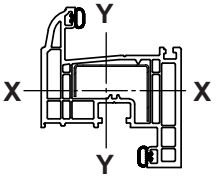
DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B22 & BR06S		———	———	1.16	4.52
B22 & BR22		———	———	1.39	3.41
B22 & BR22S		———	———	2.09	7.86
B23		272.60	38.00	0.68	1.42
B23 & BR06		———	———	1.27	3.25
B23 & BR06S		———	———	1.16	4.60
B23 & BR22S		———	———	2.09	7.94

DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B24		1008.80	55.00	2.52	2.15
B24 & BR24		———	———	10.92	6.22
B24 & BR24S		———	———	28.12	18.11
B25		1008.90	55.00	2.52	2.20
B25 & BR24		———	———	10.92	6.27
B25 & BR24S		———	———	28.12	18.16
B35		264.08	37.88	0.66	1.35

DESIGN

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B35 & BR35		———	———	1.18	2.42
B35 & BR35S		———	———	1.81	3.63
B36		265.60	37.77	0.66	1.42
B36 & BR35		———	———	1.18	2.49
B36 & BR35S		———	———	1.81	3.70
B38		386.36	42.05	0.96	1.61
B38 & BR38S		———	———	1.80	4.52

DESIGN

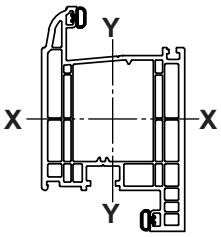
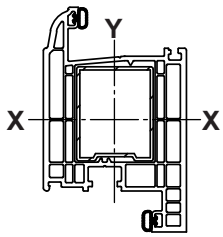
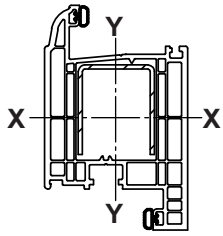
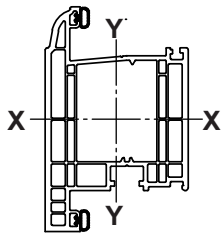
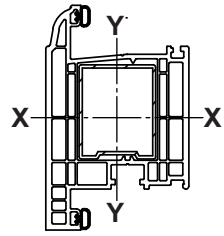
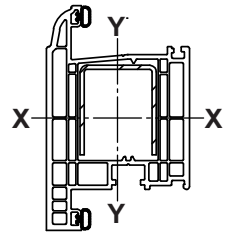
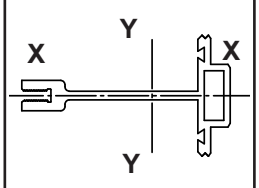
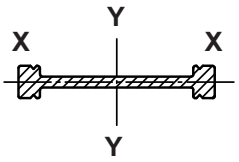
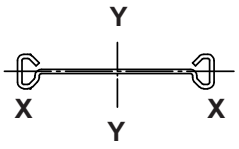
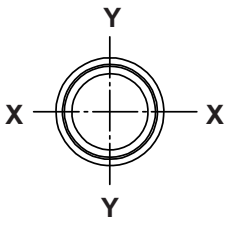
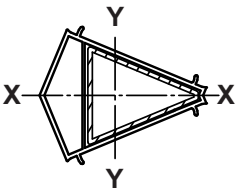
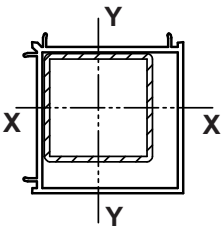
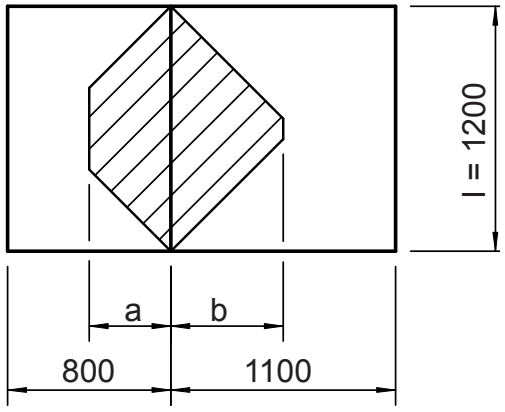
	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx ($x10^3$ mm^4)	e (mm)	Elxx ($x10^9$ $N.mm^2$)	Elyy ($x10^9$ $N.mm^2$)
B45		1158.30	58.20	2.89	2.35
B45 & BR45		———	———	7.75	5.95
B45 & BR45S		———	———	12.96	14.80
B46		1159.80	58.20	2.89	2.27
B46 & BR45		———	———	7.75	5.87
B46 & BR45S		———	———	12.96	14.72
SWM70		———	———	———	57.87

	ILLUSTRATION	CORNER WELD PROPERTIES		DEAD LOAD PROPERTIES	WIND LOAD PROPERTIES
		Ixx (x10^3 mm^4)	e (mm)	Elxx (x10^9 N.mm^2)	Elyy (x10^9 N.mm^2)
SWR748		———	———	———	41.17
SWR748S		———	———	———	62.81
SW46/ CBP360		———	———	———	5.49
SW735/ SWR735		———	———	———	5.84
SW790/ BMP90		———	———	———	12.84

DEFLECTION OF MULLIONS AND TRANSOMS DUE TO WINDLOAD

Applicable to transoms, mullions, coupled frames and structural mullions. The maximum permissible deflection (f) for free unsupported frame member = 1/150



Formula based on trapezoidal load:

$$Elyy = \frac{w \times a \times l^4}{1.92 \times 10^9 \times f} \times (25 - 40 \times (a/l)^2 + 16 \times (a/l)^4)$$

f = maximum deflection (mm)
w = design wind pressure (pascal's)
l = load span (mm)
a = load width (mm)
b = load width (mm)
Elyy = rigidity of PVC-U frame member (10^9 N/mm²)

Worked example

w = 2000 Pascal's
l = 1200mm
a = 400mm
b = 550mm
f = 1/150 = 8mm
a/l = 0.3333
b/l = 0.4583

For the left hand side of the mullion:

$$Elyy = \frac{2000 \times 400 \times 1200^4}{1.92 \times 10^9 \times 8} \times (25 - 40 \times 0.1111 + 16 \times 0.0123)$$

$$= \frac{1.6589 \times 10^{18} \times 20.7528}{1.536 \times 10^{10}} = 2.2413 \times 10 \text{ N/mm}^2$$

For the right hand side of the mullion:

$$Elyy = \frac{2000 \times 550 \times 1200^4}{1.92 \times 10^9 \times 8} \times (25 - 40 \times 0.21 + 16 \times 0.0441)$$

$$= \frac{2.281 \times 10^{18} \times 17.3056}{1.536 \times 10^{10}} = 2.5699 \times 10^9 \text{ N/mm}^2$$

Thus the total Elyy required is $2.2413 \times 10^9 + 2.5699 \times 10^9 = 4.81 \times 10^9$ N/mm²

HANDLING AND STORAGE

PVC-U PROFILES

To avoid deformation, profiles should be stored on racks on a firm base with supports at a **maximum of 1 metre centres.**

To prevent product damage, packaging should be opened along the full length. Profiles can then be lifted out.

Leave protective tape on until the window has been installed, once installed ensure the tape is peeled off.

Profiles can be stored outside - to ensure good welds they must be kept at a temperature of 18˚C for 24 hours prior to working.

To avoid the possibility of distortion, foiled profiles on dark substrates must not be stored outside.

REINFORCEMENT PROFILES

H W Plastics aluminium and or steel reinforcement must be used.

Reinforcement stored outside should be **protected from rain and moisture.**

GASKETS

To avoid contamination, gaskets should be stored in their containers untill ready for use.

PREPARATION

PROFILE CUTTING

The cutting area and blade should be kept free from dirt and grease to avoid contamination of the weld. More regular saw blade changes will be required with a PCE system.

Accurate cutting is essential for a good welded joint; it **must be at 45º and square to the profile face.**

For welded transoms, the profile needs to be reverse mitred - use either a removable stop or a scribed line on the saw beds.

Cutting of woodgrain profiles may need a slower travel speed to avoid chipping.

DIMENSIONS

The depth of V-cut depends on profile height and is equal to half height minus weld allowance.

The V-notch depths for welded transoms or mullions are as follows (Allowance for weld burn off is included):

Transom/Mullion profiles.	V-notch depth
B20 or B21	30.5mm
B24 or B25	52.5mm

When positioning the V-notch, the V corresponds with the required centre line of the member to be inserted.

In marking out for the centre of the V, due account must be taken for the 2.5mm burn off allowance at the end of the member to be notched. i.e. 600mm mullion position, mark 602.5mm from end of member.

CILLS AND PACKERS

Survey dimensions should include cills and stacking packers. Allowance for cills & packers must be included when calculating frame manufacturing sizes. Figs. 4.1 & 4.2 show typical allowances.

Fig. 4.1

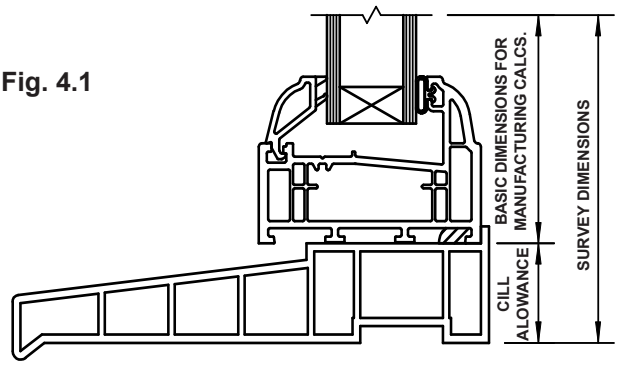
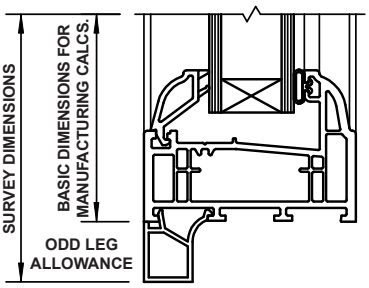


Fig. 4.2



MECHANICAL JOINTS

Cutting dimensions for mechanical joints are to suit the HW Plastics recommended cutters for end milling.

REINFORCEMENT CUTTING

All reinforcement is cut square. A separate saw is required to cut aluminium and steel reinforcement to avoid contamination. Steel should be cut with H.S.S blade. Aluminium should be cut with T.C.T. blade.

WELDED JOINTS

For welded joints the length of the reinforcement should be that of the PVC-U member to be reinforced less twice the height of the same member

e.g. reinforcement for a B05 member with a cutting length of 1000mm would be cut:1000 - (2x50) = 900mm (see Fig 4.3).

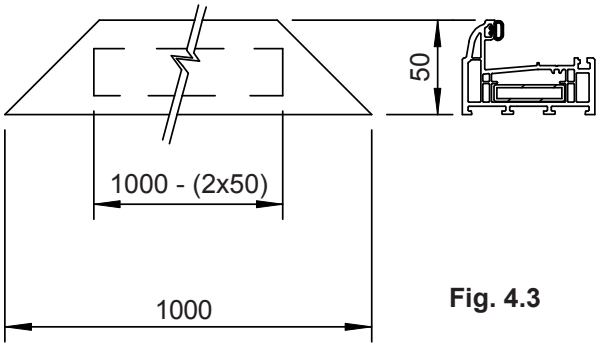


Fig. 4.3

REINFORCEMENT INSERTION

Reinforcement of members requiring 'T' or cruciform welded joints is carried out immediately after welding. This enables the reinforcement to be pushed through to clear a path through the internal weld sprue whilst soft. Where more than one joint is involved, the joints are welded and pushed through one at a time. Prior to each subsequent weld the reinforcement is removed until the final weld is complete.

MECHANICAL JOINTS

Mechanical joints are fabricated with a screw spline reinforcement see Fig.4.4. The reinforcement is cut 4mm shorter than the bar length and fixed centrally.

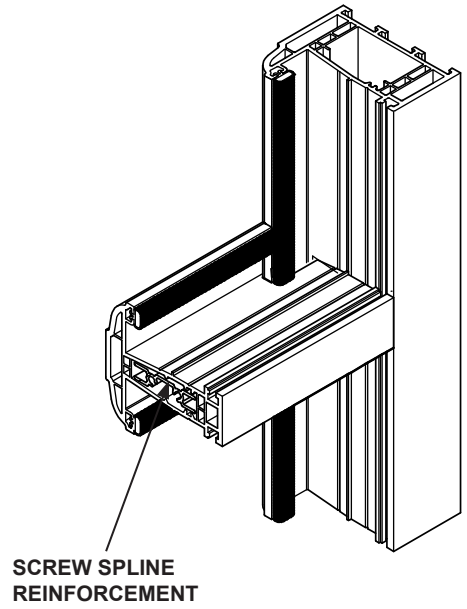


Fig. 4.4

MECHANICAL JOINT END PREP DETAIL

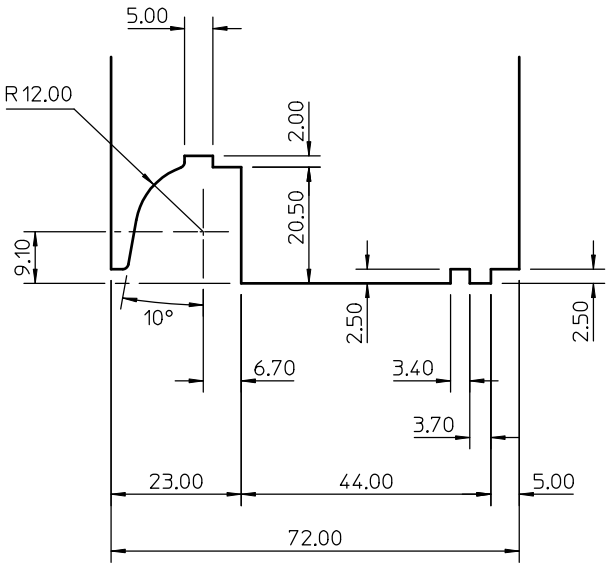


Fig. 4.5

DRAINAGE SLOTS

Drainage slots can be machined using a preset drainage machine or by hand router.

All horizontal members, except the heads of frames and vents, require water slots - which should be 5mm wide x 30mm long.

Drainage slots should be on the **outside chamber** of profiles, never in the reinforcement chamber.

Drainage slots should be **staggered** to avoid blow back.

Face drain slots should be positioned appropriately for appearance purposes. They can then be concealed using a face drain cover cap.

Each section of **multi-light** windows must be drained separately.

ESPAGNOLETTES

When espagnolette fittings are used, it will be necessary to position the upper drainage slots in the outer frame such that they are not covered by the keeps.

PRESSURE EQUALISATION

Drainage chambers on glazed-in windows are vented at the head with a 5mm hole to aid drainage.

V-NOTCH WELDED TRANSOMS

WELD BURN OFF

Calculation allows 2.5mm at each end of the profile for weld burn-off. Welders that have a different burn-off should be checked and adjustments made to the calculation if necessary.

SEQUENCE

The V-notch for welded transoms is cut before reinforcement utilising a special V-cut double bladed saw.

On cruciform welds, one weld is completed before the second V-notch.

PREPARATION

DATUM
The tables in the product manuals show the dimensions to be added to or subtracted from the basic dimensions, to give correct bar lengths for fabrication and the correct glass sizes after allowing clearance for spaces and packing blocks. Fig 4.7 shows how the tables relate to the profiles.

TRANSOM/MULLION
Sizes given for welded transom and mullion bars are for mitred bars which are then re-cut as a reverse mitre to leave a 90º point (see Fig.4.6).

WELD BURN-OFF
Figures for welded transoms, mullions and vent cutting sizes include the burn off allowance of 5mm (2.5mm each end of the bar)

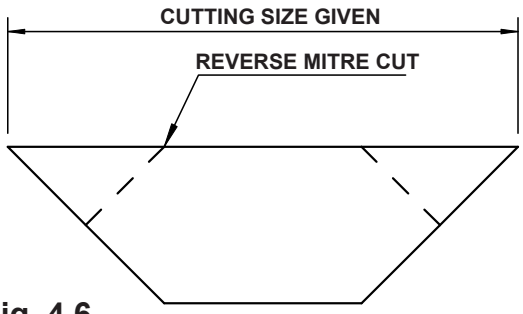
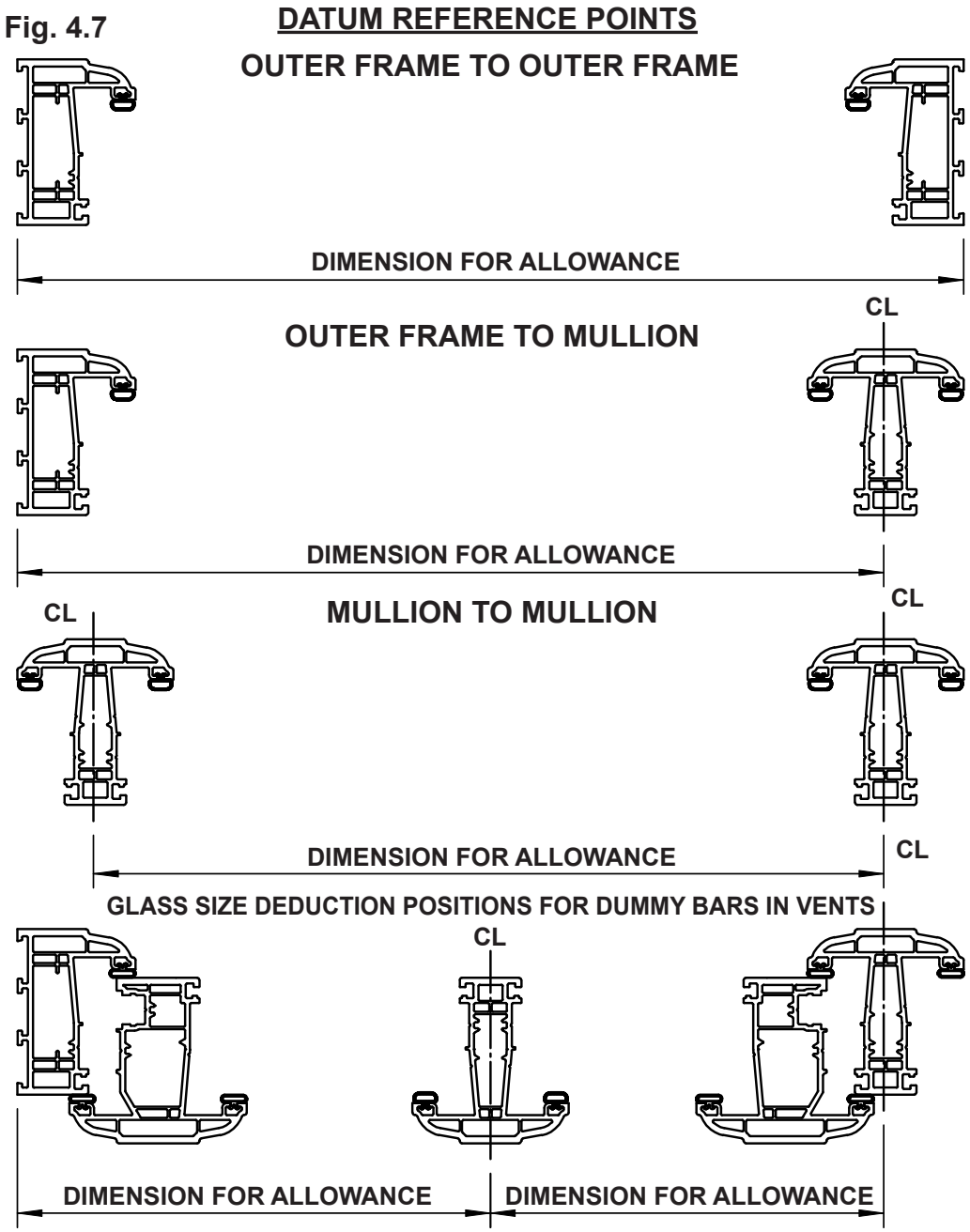


Fig. 4.6

Fig. 4.7



WELDING

THE WELDER

To maintain good welded joints, the teflon (PTFE) covers on heater plates must be cleaned regularly.

Worn or damaged PTFE should be replaced.

To ensure good welds, temperature and pressure settings should be in accordance with the manufacturer's instructions.

Typical temperature and pressure settings are:

Welding plate	240ºC
Table pressure	2 1/2 bar (37 psi)
Clamp pressure	4 1/2 bar (66 psi)
Pre-heat time	12 - 15 sec
Burn-off time	25 secs
Fusion time	30 secs

A visual check of the weld can show a good or bad weld:

-Yellowing indicates overheating.
-Rough and porous texture indicates too cold.
-Overall glossy appearance shows a good weld.

WELD PROCESS

To avoid profile distortion contour blocks should be used during welding.

Transoms welded into outer frames may also require support blocks when using differing profiles, especially profiles with Eurogrooves.

Welded frames should not be stored on cold surfaces immediately after welding.

WELDING SEQUENCE

Prior to welding, ensure that the protective tape has been pulled back.

Reverse butt welds are carried out first - prior to V-notch cutting. Transom/mullion joints must be made before assembly with the outer frame.

Care must be taken with the sequence to ensure reinforcement, (where required), can be inserted during welding.

Transom/mullion and corner joints should be carried out in the sequence to suit individual welder types.

With mechanical joints, - outer frames must be welded completely before fitting mullions and transoms.

Any frames under 700mm sq, when welded on a single head welder, must be allowed to cool for 10 - 15 min, before welding the fourth corner.

WELD CLEANING

Welders equipped with sprue limitation knives allow the excess sprue to be cleaned immediately after the welding process if a raised nib effect is required.

FAULTY WELDS

If, during corner weld strength tests or manufacture, faulty welds occur, the fault may be due to one of the following:

1.The heating plate **temperature** is not as indicated on the temperature gauge. The temperature of the plate can be checked by using a 239ºC Thermomelt marker which is applied to the part of the plate which is in contact with the profile when welding. If the temperature is low the marker will not melt.

2.Weld time and procedure not properly matched together.

3.Cooling/fusion time too short.

4.Cooling of the heating plate due to **draughts** from external doorways, etc.

5.Contamination of cut surfaces to be welded.

6.Clamping pressure too low causing the profile to slip.

7.The temperature of the profile **too cold** prior to welding.

If failure to overcome the problem occurs, the machinery supplier and/or HW Plastics should be contacted as soon as possible.

N.B. Cracked or damaged welds in any combination of profiles are not acceptable. Welded joints must not be repaired by the use of any type of filler. Any cracked or damaged welds must be rejected and the necessary profiles re-cut and welded accordingly.

CORNER CLEANING

CORNER CLEANING

The main surface sprue can be removed by using one of the following :

- Moon knife and guide.
- Grooving machine.
- Sanding and polishing.

MANUAL CLEANING

When removing excess weld other than the raised nibs allow the frames to cool sufficiently before hand.

Inner corners may be cleaned with a sharp chisel, taking care not to notch the profile.

AUTOMATIC CLEANING

Automatic corner cleaning machines are available which will :

- Clean the outside corners.
- Remove excess weld from the inside corners.
- Groove the main surfaces.

WOODGRAIN PROFILES

Woodgrain profiles should be cleaned by hand, if they are cleaned on automatic machinery check that the foil is not torn or damaged by the machinery.

With woodgrain on white profiles, any cleaned areas showing white will require touching up using the woodgrain marker pen.

QUALITY CONTROL

All windows should be subjected to inspection to establish conformance with the survey and manufacturing instructions, including:

-Type and handing.
-Dimensions.
-Operation and fit of vents.
-Furniture.
-Glazing.
-Drainage.
-Finish.

Inspections should be carried out at **intermediate stages** of manufacture to discover non-conformance at the earliest point in the process, in order to minimise remedial costs.

Every frame should be checked for **dimensions and squareness** before it leaves the welding area.

The overall height and width of an assembled frame should be within a permissible **deviation of 3mm** from the work size when measured at +/- 5ºC of the manufacturing room temperature. For assemblies with outer frames having **3 or more joints** per frame member the permissible **deviation shall be 4mm** when similary measured.

Frame assemblies should be such that they can be installed squarely within a maximum difference in the diagonal of 4mm.

In practice, adjustment to machinery (eg. welders) should be made when dimensional or squareness errors reach about half the maximum values.

Visual checks should be made on all components before they are assembled. Furniture should be checked to the maximum extent possible, for satisfactory operation before fitting.

INSTALLATION

The following section is designed to give guidance on the installation and maintenance of PVC-U windows.

The procedures in the BPF Code of practice for The Survey and Installation of Replacement Plastics Windows and Door Sets (Ref W362/1), or any subsequent updates following this manual, should be followed.

PRE-START CHECK

CHECK THE SURVEY AND GOODS

Prior to starting any work the installer should check the following:

The survey sheets are correct and clear.

The types of windows supplied are those the **customer ordered** and are **undamaged.**

Glass type and pattern are correct.

Window and glass sizes are compatible.

All cills and trims and gaskets are correct.

CARE OF PROPERTY

The **installer is responsible** for both internal and external protection.

Check for both internal and external defects in the structure. Any found should be checked with the surveyor.

Any furniture and fittings should be moved away from the working area.

Carpets and soft furnishings should be covered with clean dust sheets.

All access areas should be covered with dust sheets.

Check the windows are **not load-bearing**. Ensure there is a lintel or suitable load-transferring structure above the window.

REMOVAL OF EXISTING WINDOWS

FLAT WINDOWS

Damage will inevitably be caused to the adjacent reveals but care must be taken to keep this to a minimum.

Score around the internal perimeter to minimise damage to plaster and decorations.

Remove any trims and cover fillets.

Remove all opening lights.

Remove fixed light glass carefully to avoid injury.

Cut through and remove transoms and mullions. (See fig.8.1)

Saw through the jambs and remove them taking care not to damage internal cills. Remove heads and cills in the same way. (See fig. 8.2)

If a new internal cill is to be fitted, remove the existing cill at the same time.

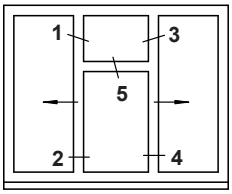


Fig. 8.1

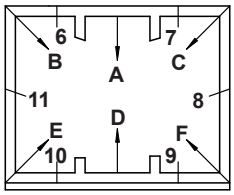


Fig. 8.2

LOAD-BEARING BAYS

If a replacement bay window is load-bearing, the advice of a structural engineer must be sought prior to the removal of the existing window assembly. The HW Plastics load bearing bay assembly may be used (see pages 1.6 - 1.8)

BAY WINDOWS

When removing bay windows **temporary supports will be required** e.g. Acrow Props or similar. Care must be taken on the position of the props which should support the superstructure without causing damage. Internal and external supports may be necessary. (Fig. 8.3 shows a typical internal support)

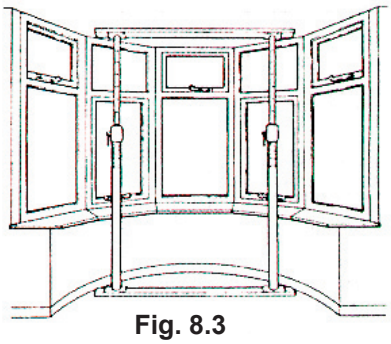


Fig. 8.3

When the superstructure is supported, the window should be removed so as to cause minimum disturbance.

It is recommended that the load-bearing poles are removed one at a time and temporary supports are monitored for any movement.

Any trims removed should be replaced using the appropriate finishing trims.

INSTALLATION

PREPARATION

EXISTING OPENING PREPARATION

Before installing the window, the opening should be cleaned of all loose material, fillers or mastic.

Check the existing DPC is not damaged. If non-existent then install one in accordance with the reccomendations in the BPF Code of Practice for The Survey and Installation of Replacement Plastic Windows and Door Sets (Ref:W362/1), or any updates subsequent to this manual.

Damage caused by removal of windows should be repaired at the installer's expense.

Defects noted during survey should be rectified as agreed at the time of the survey.

NEW BUILD OPENING PREPARATION

The aperture should be completed before fitting the windows. Windows should not be used as a template for building. The HW Plastics cavity closers may be used as a template.

FRAME PREPARATION

If stacking packers are required they should be fitted before the cills.

If cills are required, there are two methods of fixing:

CILL TO BUILDING FIRST

The cill is positioned in the aperture and levelled. It is bedded on either a sealant or mortar bed.

A run of sealant is applied to the cill and across the ends before the window is fitted (see Fig. 8.4).

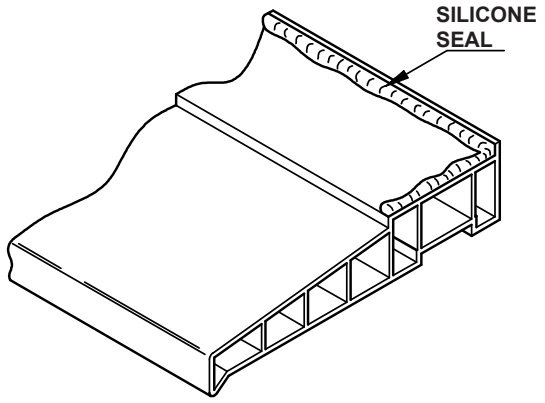


Fig. 8.4

CILL TO FRAME

The cill is cut to length (including the horns if required).

A run of sealant is applied on the frame (see Fig. 8.5).

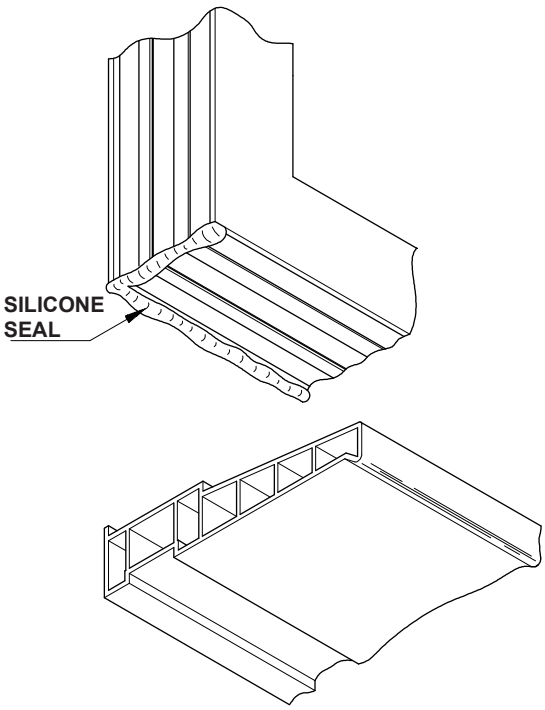


Fig. 8.5

The cill is fitted using self drilling screws (see Fig. 8.6).

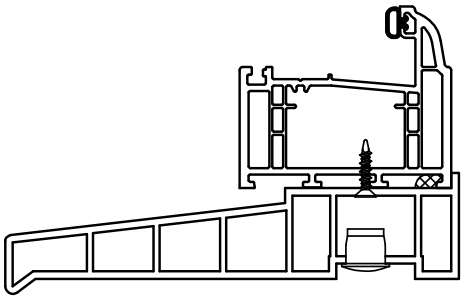


Fig. 8.6

Counterbore the underside of the cill to 13mm to accept a cover cap. Fit the screws 150mm from the corners and at 300mm centres. Avoid screwing at the mullions.

Fit the cill end caps.

FITTING - FLAT WINDOWS

POSITION OF WINDOW

On large contracts, agreement on window position should be reached before the start of any work.

The position should in general:

- bridge the cavity
- cover the DPC
- be set back a minimum of 10mm in the opening.

When replacing narrow windows (e.g. steel windows) with PVC-U, it is necessary either to cut back the plaster or to fit odd legs to the frame to ensure the outside face of the window is set back from the building line.

SEQUENCE

Make sure that the frame is square and true and not distorted.

Temporarily wedge the window in place.

Check the opening lights operate and do not foul the surrounds.

METHODS OF FIXING

There are various methods of fixing available which may be used separately or in combination:

THROUGH FRAME FIXING

There are many types of suitable screws and plugs. The frame should be drilled and the inner face opened up to 13mm to allow cover caps to be fitted. (Fig. 8.7 shows a typical wood screw and plug fixing)

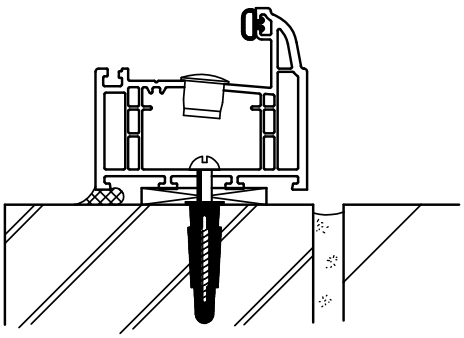


Fig. 8.7

LUG FIXING

Where lugs are to be bent to follow the building contours this should be carried out prior to clipping onto the frame to avoid distortion or damage. (Fig. 8.8 shows a typical lug fixing)

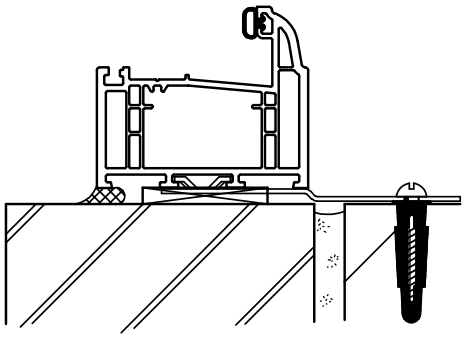


Fig. 8.8

With either method of fixing, all fixings should be of a material and finish to offer high performance corrosion resistance.

Avoid distortion of the frame by using packing shims at the screw positions. The frame should be packed to ensure correct operation of opening lights and so as to not alter overlaps or clearances.

All fixings should penetrate the surrounding substrate by a minimum of 30mm.

All temporary wedges should be removed before the fixings are secured.

FIXING DISTANCE

The following general guidelines apply to fixings on all four sides of the frame:

The corner fixing should be a minimum of 150mm and a maximum of 250mm from the corner.

Intermediate fixings should be at no greater than 600mm centres.

No fixing should be closer than 150mm, or further than 250mm to the centre line of mullions or transoms.

There must be a minimum of 2 fixings on each jamb.

FIXING AT CILLS

In general, fixings at the cill should be in accordance with the rules given in this section. However, when a sub cill is screwed to the cill section of the outer frame, the rules given for head fixings can be followed, providing an adequate silicone or mortar bed is provided.

SPECIAL CASES
HEAD OF WINDOWS

Due to the presence of precast or steel lintels it may be impractical or pose difficulty to achieve the required fixings.

Under these circumstances the BPF recommendations are:

Condition at Head	Maximum Head Length between Mechanical Fixings*
Head unreinforced	600mm
No foam-fix - Head reinforced with Aluminium	900mm
No foam-fix - Head reinforced with Steel	1100mm
Head unreinforced - foam fixed only	1700mm
Head foam-fixed reinforced with Aluminium	1800mm
Head foam-fixed reinforced with Steel	1900mm

*If the jambs are fixed in accordance with page 8.3 of this manual, then the head ends may be regarded as mechanical fixings.

For foam fixing specification and application refer to section 7.6 of the BPF Code of Practice for The Survey and Installation of Replacement Plastics Windows and Door Sets (Ref:W362/1), or any updates subsequent to this manual.

FITTING - BOW / BAY WINDOWS
GENERAL GUIDELINES

The rules for fixing and installation of flat windows also apply to bays with the following additions:

Site conditions and the size of the bay will determine if the bay is pre-assembled or assembled in situ.

Whichever method is used, checks must be made to ensure no loads are carried by individual segments.

For loadbearing bays reference should be made to the BPF Code of practice for The survey and Installation of Replacement Plastic Windows and Door Sets (Ref:W362/1), or any updates subsequent to this manual.

Spacing of fixings to the bay pole or post should be as the general guidelines on Page 8.3. See Fig. 8.9 for a typical bay assembly.

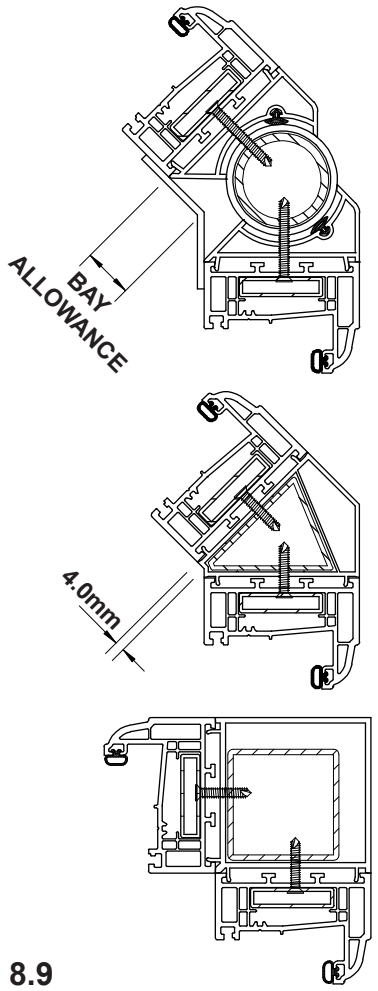


Fig. 8.9

PRE-ASSEMBLY

If the bay is pre-assembled in the factory or on site prior to fitting, the following points should be followed:

Welded **cills should be left over size** to allow for final cutting on site.

All fixing centres should be as for flat windows.

All joints between frames and cills should be siliconed.

Joints between stacking packers/bay pole adaptors and frames are siliconed.

SITE ASSEMBLY

Before final fixing of cills, windows should be positioned temporarily to check on the line of the cill and the window in relation to the structure of the building.

All remaining stages should be as for flat windows.

GLAZING

GENERAL INFORMATION

All glazing should be in accordance with BS6262 and all current codes of practice.

The method of glazing depends upon the type of window.

GLASS PACKING

In all cases packers must be of a material that will not rot or change shape (see BS6262) and wider than the glass. To prevent movement, the packers must be fixed in position using an approved silicone sealant.

The position of glass packers is very important for a number of reasons:

-To centralise the glass in the opening.
-To prevent movement of the glass during operation.
-To prevent the weight of the glass distorting the frame

When packing windows with cavity locking blocks fitted, packers are required at this position to eliminate deflection of the frame.

Packers should also be placed at the locking points to give extra security.

When openers are adjacent to fixed lights, packers are also required in the fixed light next to the locking points to prevent deflection of the transom or mullion.

N.B. Ensure that the glazing blocks do not block drainage paths.

A glazing platform BM03 is available to allow for drainage (see fig. 9.1 and 9.2).

All profiles except B36, the BM03 glazing platform must be used. The sealed unit should be placed on packers on the glazing platform (see Fig. 9.2 and Fig. 9.3).

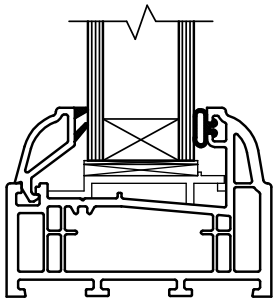


Fig. 9.2

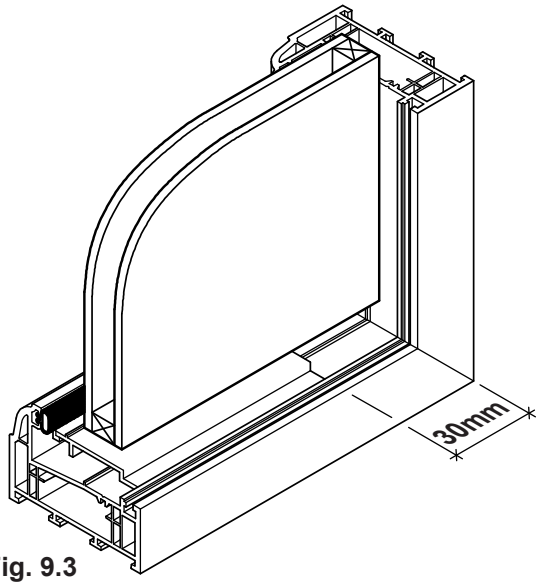


Fig. 9.3

MITRED BEADS

Fit the shorter of the glazing beads first. These can be fitted into position with a soft faced mallet.

When fitting the longer glazing beads, it will be necessary to insert one corner then deflect the bead sufficiently to fit the other corner. The bead can then be clipped into position.

LEADED GLASS

When glazing leaded glass it may be nescessary to reduce the size of the gasket to compensate for the lead.

VENT ADJUSTMENT

VENT FRAME ADJUSTMENT

If during manufacture, the windows are correctly positioned, and the glazing and doors procedure is correctly followed, little or no adjustment should be needed.

However, should adjustment be required refer to the section on manufacturing in the specific product manual.

POST-INSTALLATION CLEANING

Before final finishing, all the frames and glass should be cleaned, refer to the table in section 12.

All drainage channels should be cleared of swarf and dust which may have been produced during fitting.

Glass and panels should be cleaned with water and detergent. PVC-U cleaner should not be used on panels.

When cleaning woodgrain profiles care must be taken not to damage the surface.

With woodgrain on white profiles, the weld sprue will need touching up with a woodgrain marker pen.

FINISHING

INTERNAL

When damage to plaster is minimal, small joints can be filled with internal acrylic sealant.

EXTERNAL

After cleaning external trims can be applied, if required. This should be carried out using an approved silicone.

All external joints can then be siliconed.

Manufacturer's recommendations should be followed fully with regard to silicone application.

Joints of varying widths can be catered for see Figs 11.1, 11.2 and 11.3.

JOINT WIDTH UP TO 6mm

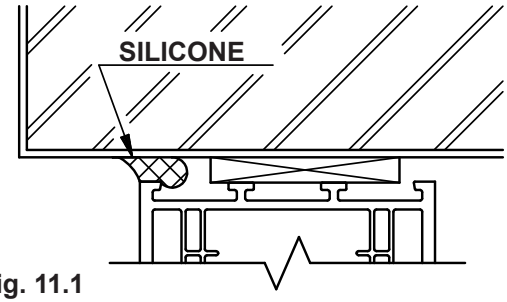


Fig. 11.1

JOINT WIDTH 6mm TO 10mm

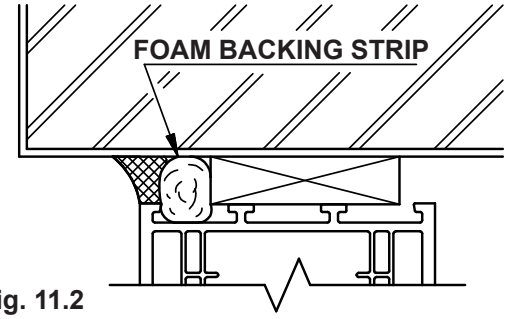


Fig. 11.2

JOINT WIDTH 10mm TO 15mm

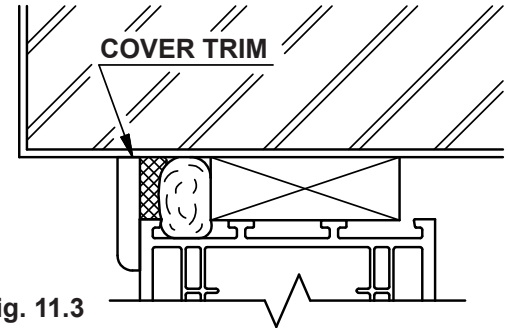


Fig. 11.3

MAINTENANCE

CLEANING

Dirty marks on PVC-U frames can easily be removed by using the cleaning materials shown in the table below.

Cleaning cloths should be unbleached cellulose/ cotton material. Do not use cloths containing synthetic fibres.

Any unacceptable scratches on **white profiles only**, can be removed by sanding and polishing. Sanding should be carried out using a 320/400 grit sanding disc and polishing by using a sisal rotary brush to bring back the surface finish. It is important to achieve as smooth a sanded finish as possible before polishing. If this is not done, there will be a visual difference between the surface finishes. Woodgrain surfaces cannot be sanded.

On woodgrain surfaces, care must be taken when cleaning. Any white areas showing, either through damage or cleaning, can be retouched using a woodgrain marker pen.

CONTAMINATION	CLEANING METHOD		
	Scrape off and polish with a dry cloth.	Clean with water and mild detergent	Clean with non-abrasive household detergent and water.
Pencil.			✓
Emulsion paint.	✓		
Felt pen.			✓
Organic grease.			✓
Inorganic grease			✓
Plaster.	✓	✓	
Woodstain.		✓	
Ball pen.			✓
Cellulose paint.	✓		
Rust.			✓
Soot.			✓
Cement mortar.		✓	
Wax pen.		✓	

CONDENSATION

CONDENSATION
HOW IT OCCURS:

The air around us contains moisture as vapour even though it is not clearly felt. The warmer air is, the more vapour it can contain. The vapour when cooled in proximity to colder surfaces such as window glass, mirrors and poorly insulated external walls, forms into droplets as condensation.

In the confined space of heated rooms the warm air can become humid more easily, due to domestic activity especially cooking and bathing and laundry. To cut down heating bills, extra insulation is applied to areas where heat losses occur, namely the roof space and cavity walls. To reduce heat loss further, windows and doors are draught proofed. Draft proofing allows more thermal comfort but will reduce the amount of fresh air entering and circulating the rooms, which normally helps to keep the air moisture content low. If restricting heat loss restricts natural ventilation, humidity is more likely to build-up and there is a higher risk of condensation problems. This is especially so in winter, when the air is colder than usual.

SOURCES OF MOISTURE:

Cooking produces steam which disapears. The water still exists as vapour and although the air is clear, the moisture content has risen.

Bathing and laundry are major sources of moisture. When a hot bath is run, a lot of steam saturates the air until the moisture condenses into droplets forming a mist.

Flueless gas or paraffin heaters produce large amounts of water vapour.

Breathing and perspiration, for example two adults sleeping for eight hours produce about one and a half-pints of water.

Indoor aquariums especially heated ones, large house plants.

Structural damp through leaking roofs, poor weather resistance of wall or window features, or rising damp due to a substandard D.P.C.

EFFECTS OF CONDENSATION:

The most obvious effect is of the condensate pooling at the base of the window.

Condensation will occur on any surface cool enough and can create conditions where mould-will grow. Mould spores are ever present in the atmosphere and a very common mould, which can form, is black mildew.

The condensate can permeate into porous material and cause damage to furniture, textiles such as carpets, curtains and wallpaper.

PREVENTION BY ADEQUATE VENTILATION:

1. EXTRACTING MOISTURE:

Areas that produce moisture in significant quantities are kitchens, bathrooms and showers. These areas benefit from properly positioned extractor fans, which can be operated intermittently as the need arises. Capacities should vary from not less than 15 litres per second in bathrooms to between 30 and 60 litres per second in kitchens.

2. RAPID VENTILATION:

In the absence of any means of forced air ventilation, then opening windows, will assist to disperse steam and moisture during or after cooking, bathing, laundry and indoor clothes drying etc.

3. BACKGROUND VENTILATION:

Any room will benifit from having a small ventilator allowing a small circulation of fresh air. Suitable ventilators are available and specifically designed to fit the frame of the window. Known as ‘Trickle’ or ‘Night’ ventilators, they are available in varying sizes.

The size recommended for average rooms is dependent on room size and location however as a minimum 4000mm² direct flow is commonly used, and most ‘Trickle’ or ‘Night’ ventilators can be adjusted to reduce draughts.

Trickle or night vents are available from a number of suppliers including ‘Titon’, ‘Greenwood Airvac’ and ‘Glazpart’.

If trickle or night vents aren’t fitted, then Elite 70 windows can be fitted with a suitable ‘Night Vent Locking’ espagnolette lock and keep, to allow the window vent to be locked in a slightly open position (Known as Night vent locking) thus allowing trickle ventilation to take place.

Caution ‘Night Vent locking’ is always a compromise between ventilation and security and as such it is recommended that ventilation should always be acheived in the first instance by means of ‘Trickle’ or ‘Night’ ventilators fitted to the windows.

CONDENSATION

OTHER MEANS OF PREVENTION:

Keeping the room warmer may not necessarily reduce condensation, it may even encourage it. If the heat source e.g. a central heating radiator, is positioned underneath the window, it will keep the glass temperature slightly higher, but more significantly creates a 'heat curtain' by air convection, helping to reduce the formation of condensation. Extra heating will not eliminate the underlying cause excessive humidity.

Electric de-humidifiers are very effective, especially after events such as major building work, flooding etc, which leave large amounts of moisture in the fabric of the building. For regular use however, the running costs may be relatively high in comparison to installing effective ventilators.

EFFECT OF INSULATED GLAZING:

By installing double glazing of any kind, whether as sealed units or secondary sashes, or as a coupled window, the room face of the inside glass will not be as cold as that of a single pane. Under identical temperature, humidity and ventilation conditions, double glazing will show less condensation on the room-side surface than with a single pane. Where double insulating glass units are installed, condensation should not ocurr within the sealed unit cavity. Evidence of this indicates the sealed unit is faulty and therefore requires replacement.