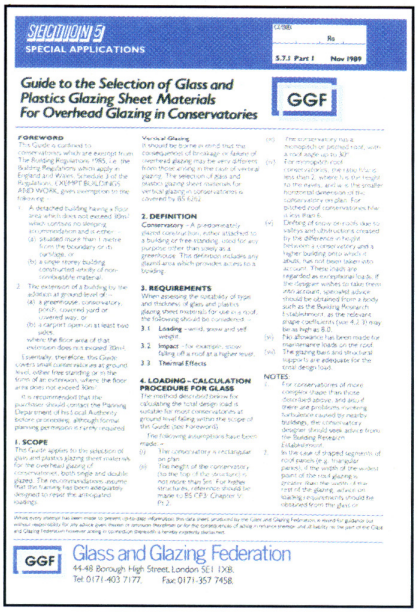
TO

In this Head 2 Head article, Ultraframe's technical support engineers, Bill Kenyon and Mick Rowley discuss the correct specification of glass sealed units in conservatory roofs.

One of the questions we are most frequently asked is "What type of glass should be used in conservatory roofs and are there any guidelines that we can refer to?" Currently, around 20% of the pre-fabricated roofs dispatched from Ultraframe feature glass roofs. This is part of an ongoing trends as more and more homeowners



SECTION 5
SPECIAL APPLICATIONS

5.7.1 Part 1 Nov 1989

Guide to the Selection of Glass and Plastics Glazing Sheet Materials For Overhead Glazing in Conservatories

GGF

FOREWORD

1. SCOPE

2. DEFINITION

3. REQUIREMENTS

4. LOADING - CALCULATION PROCEDURE FOR GLASS

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request complex conservatory shapes and specifications and the selection of glazed units is just one aspect of this trend. Installation companies now have the confidence to build these more complex conservatories.

Regular contact by Ultraframe's Technical Support Engineers with Building Control Officers leads us to believe that the use of 4mm annealed glass would be "frowned upon".

So you can imagine a scenario where 4mm float glass double glazed units have been used in the roof. Following an accident, perhaps where a window cleaner, or the weight of snow breaks the unit and the shards of glass fall onto the occupants below. This is where a legal battle will begin.

When glazing conservatory roofs there are no mandatory regulations or British Standards that exist. In cases of this nature the courts will refer to the standards and papers produced by the industry's lead body or Trade Association. In our sector this is the Glass and Glazing Federation and its specialist division, the Conservatory Association.

The Conservatory Association's rules make it a requirement of membership that all glazing in a conservatory shall meet class C of BS 6206 as a minimum requirement. The GGF publish in its Glazing manual a number of data sheets covering the technical requirements that a conservatory needs to meet. One of these data sheets, No 5.7.1 part 1 gives a considerable amount of guidance about the glass that should be used in a conservatory roof.

Data sheet 5.7.1, titled "A Guide to the Selection of Glass and Plastics Glazing sheet material for Overhead Glazing in Conservatories" clearly states that glass in conservatory roofs should meet at least Class C of BS 6206. Therefore the glass used will need to be toughened, laminated or "Georgian wired safety glass." All these materials will meet this minimum requirement of BS 6206 and will either "not break" or "break safely".

- Toughened glass will break after the application of 4 times the load of standard float glass. But should it break it will break into small, relatively harmless crystals.
- Laminated glass will break under the same load as float glass of an equivalent thickness but the shards or splinters formed will be contained by the adhesive faced interlayer.
- Georgian wired safety glass will also react in a similar way, with the wire retaining shards of glass.

In the light of this information, the court would find in favour of the homeowner and against the installer.

The GGF's data sheet also goes into detail about the loads that various specifications of glass will support. It gives calculation procedures and worked examples which enable the user anywhere in the country to decide if wind or snow loads are what they most need to consider. Then they can decide what thickness and span unsuitable for single or double glazed units will support these loads.

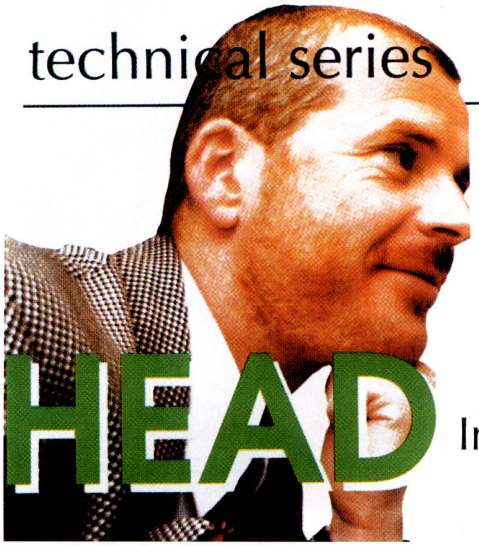
The GGF also has members involved in the manufacture of specialist solar control and safety films which can be retro-fit applied, giving compliance with the British Standard.

The importance of the design of the roof and the exact specification that will enable it to support whatever glazing is decided upon, is covered in further GGF Data sheets and, of course, in the many Ultraframe technical design manuals.

Many conservatory installation companies are unaware of the technical standards that should be met - the Glass and Glazing Federation provides excellent technical support to its member companies.

This is a good reason to be a GGF member. Membership starts from as little as £300 per annum and the GGF can be contacted on 0270 403 7177.

technical series



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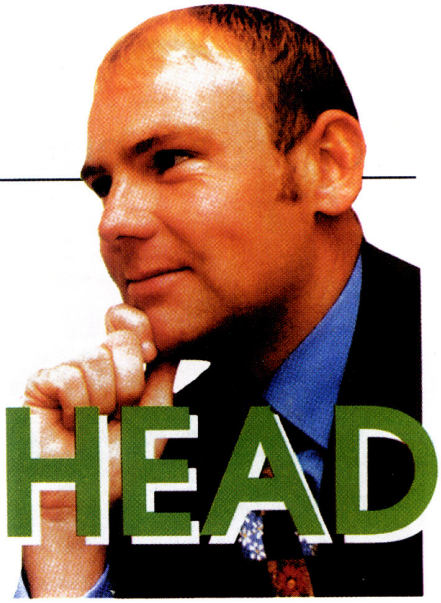


In this Head2Head, Bill Kenyon and Neil Sarsfield, technical support engineers at Ultraframe, discuss the specification and installation of a cavity tray.

One of the questions frequently asked is "Is a cavity tray necessary?" Unfortunately the answer is not straight forward.

What is a cavity tray?

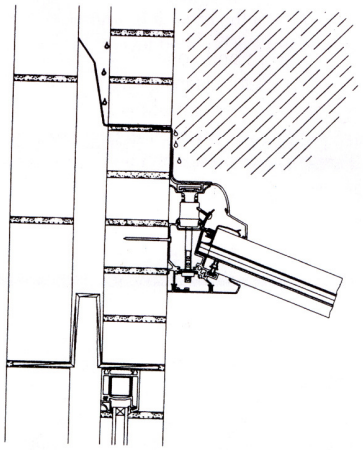
It is a high level barrier to moisture that is formed from a series of interlinked trays that are built into the outer leaf of masonry.

Why are cavity trays necessary?

Masonry material is generally porous and, during wet weather, it absorbs moisture. The cavity tray prevents the moisture appearing inside the conservatory as the status of the back wall changes from being external to inside the conservatory.

When should it be fitted?

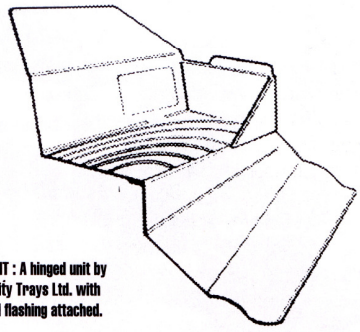
This, as they say, is the $64.000 question! On new houses, those covered by the NHBC 10 year warranty, cavity trays are a mandatory. Following the guidance of the NHBC is good guide to help decide if they should be 'retro-fitted'. On the training courses at Ultraframe, particularly those aimed at surveyors, we recommend that the issue of a cavity tray is broached early with a retail customer - it saves any conflicts later. The maxim should be 'if in doubt, fit it.' Factors such as the depth and style of mortar joint, the conditions of any window cills above, which way the conservatory faces are all important.



BELOW : A typical installation sequence.

How should it be fitted?

Some installation companies hesitate at the mention of a cavity tray - probably because of the 'fear factor'. Undoubtedly, when fitting a cavity tray the installation company needs to be organised. The back wall needs to be set out for the base crew using a chalk line to facilitate accurate cutting of out of the brickwork. The chalk line is normally 75mm above the top of the glazing bar capping. Cavity trays are usually supplied in varying lengths dependent upon pitch. For example, at 25° the tray is 270mm long. It is recommended that perhaps enough cutting out is done for 2 trays so that there is minimal disturbance to the surrounding masonry (an electric cutting wheel or similar is ideal for this purpose). Each tray is then positioned and mortared home. A longer than normal cavity tray is utilised at the ridge to enable the lead flashing to be correctly dressed over the PVC-U flashing trim that is supplied with the roof. When planning a cavity tray installation, it is important to calculate the correct number and style of trays. As each of the main trays are handed (i.e. left to right) they cannot be interchanged. Further, a stop end should be used along with a weep hole at the corner end of each tray run.



RIGHT : A hinged unit by Cavity Trays Ltd. with lead flashing attached.

How much does it cost?

At 25° pitch there are eleven 270mm long cavity trays per metre of vertical rise per side. A 3m wide conservatory is around 1m high at the ridge -so, 22 trays at £6 each plus a special ridge tray at £10.00 gives approximately £150 material cost. Including the labour, around £300 of cost is involved.

A professional installation is one that is right first time. Offering guidance to your retail customer and then installing a cavity tray effectively is a further guidance demonstration of professionalism. The guidance offered here should help you achieve that objective.

technical series

HEAD TO HEAD

In this Head2Head, Bill Kenyon and Neil Sarsfield, technical support engineers at Ultraframe, discuss the purpose of tie bars and how to specify them.

What is a Tie Bar

Over the last year, the most frequently asked question is, "Do I need a tie bar?" A tie bar is a piece of threaded bar that is usually joined to two opposed roof slopes - a further attachment is usually made at the ridge. The principle is to restrain any horizontal spread at the eaves eg. under heavy snow conditions.

A completed conservatory utilising the tie bar to grow ivy

The Theory of Tie Bars

- The requirements for tie bars within a conservatory are primarily dependant on the length of the ridge (measured from house wall to finial point).
- Loading on the roof (snow or dead) will cause minimal vertical deflection along the ridge length which in turn imparts a horizontal reaction (thrust) at the eaves beam through the glazing bars.
- The tie bar system restrains the horizontal reaction, stability is thereby offered to the sideframes minimising horizontal spread of the eaves beam.

- Tie bars should always be positioned in line and directly under glazing bars (forming a vertical triangle) and supporting the ridge.
- Standard fixing details is to the glazing bar utilising special brackets which are supplied with each tie bar kit.

Factors that influence the necessity for a tie bar include ridge length, pitch, glazing material, conservatory width, glazing bar span and location (wind speed, snow loads and altitude). A typical tie bar chart from Ultraframe's revised UK Structural Design Guide is illustrated.

Typical Installation

When a tie bar is specified by the manufacturer or fabricator, it is a structural requirement of the roof and MUST ALWAYS BE FITTED.

Failure to comply with this may result in your reputation collapsing along with the roof. Furthermore, submitting to the occasional request by homeowners to leave out a tie bar is not permissible, even if they sign a waiver, because in law you are seen as an expert and the client signed waiver is no defence.

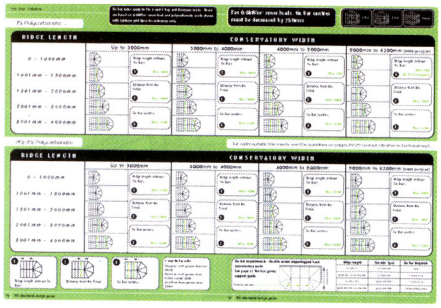
A basic installation sequence is illustrated - always note that the tie bars must be fitted and adjusted prior to the roof being glazed (even polycarbonate). Tie bar brackets are normally attached to the glazing bars on pre-fabricated roofs and accompanying roof confirmation plans and installation guide indicate their positions.

A tie bar prevents spread under load

Summary

Tie Bars, when fitted are a structural requirement of the roof. However, some customers ask for tie bars when they are not structurally necessary - they have an aesthetic role, giving the conservatory a classic Victorian feel. Customers have been known to grow trailing ivy along their entire lengths, but a line should be drawn at hanging flowering baskets from them, as to do so may compromise its structural performance.

One final point - some installers have it in mind that the tie bars should slope up slightly (see photo with ivy). However, particularly on large roofs this imposes additional load on the on the ridge and possibly will effect the structural dynamics of the roof. It is advisable that tie bars should always be fitted level.

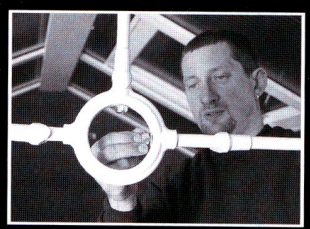


A typical tie bar specification chart lifted from Ultraframe's revised structural design guide

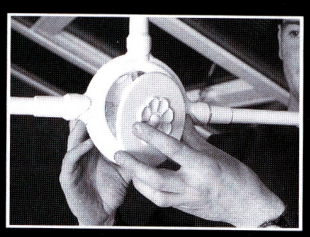
Typical installation sequence

Fit the centre drop rod to the ridge body. The drop rod should be in-line with the brackets on the bars

Screw the horizontal threaded bars into the brackets

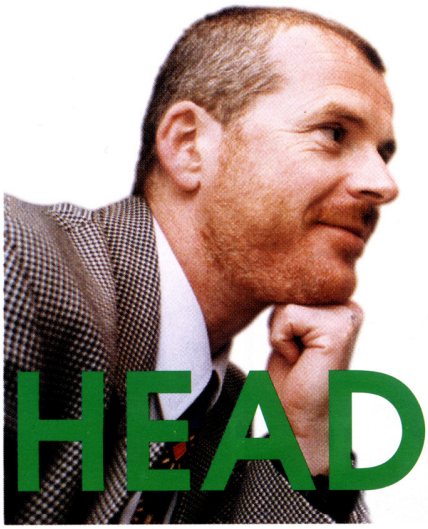


Assemble the centre boss and adjust the tie bar so that the window frames are plumb



Fit the coverplate

HEAD TO HEAD



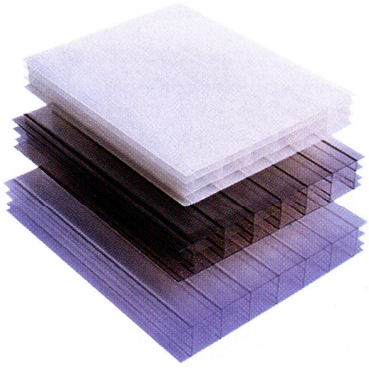
In this Head To Head article, Ultraframe's technical support engineers, Bill Kenyon and Mick Rowley discuss the theory of heat build up in conservatories and how the correct specification of polycarbonate glazing can remedy it.

Light is composed of a number of spectra, the light wavelengths in each having different properties. Most well known of these is ultra violet, which is short wavelength light, responsible for producing sunburn, and causing material to fade or yellow.

At the opposite end of the wavelength range is infra red, long wavelength heat-bearing radiation, which is responsible for solar heat gain in buildings such as greenhouses and conservatories. Between the ultra violet and the infra red lies the visible light spectrum.

The process of solar gain is not always clearly understood, but can be explained in fairly simple terms. Sunlight entering a building is absorbed by its surfaces and contents, and reflected back again. In the course of this absorption and reflection, there is a partial shift to longer wavelengths, i.e. more infra red light is produced. However conservatory roof glazing materials, such as polycarbonate reflect a large proportion of this back into the conservatory. Heat is therefore being effectively trapped, and it builds up inside – the process of solar gain.

The choice of colours for furnishing and floor coverings within a conservatory play an



important part in minimising the ability of their materials or surfaces to absorb light and reflect it with increased infra red content.

Dark coloured surfaces, black in particular, will absorb more and proportionally re-radiate more heat than white surfaces, which absorb less, therefore re-radiate less, therefore cause less heat build up. To grasp this principle one only has to think of the traditional houses in the Middle East or Mediterranean Coast which are heavily white washed and highly reflective outside, relatively cool inside.

Polycarbonate manufacturers have adopted several strategies to inhibit excessive heat build up within conservatories, using standard products:

First strategy is to fit bronze tinted sheets. Bronze, being dark, absorbs light and reflects more back outwards as infra red instead of allowing it to enter. (Indeed bronze polycarbonate can be warm to touch)

Second strategy is to fit opal tinted sheet. Opal reduces the total amount of light entering, and also diffuses or scatters that light, including its infra red component over the interior surfaces. There is less possibility of there being a "hot spot" in a south facing conservatory, and there is created a very pleasant soft internal environment.

The third strategy is to use dual colour bronze-opal polycarbonate. When initially launched, the inner opal layer was intended primarily for aesthetic effect, softening the darker tone of the outer bronze layer. The important practical effect of combining the reflective function of the bronze and the diffusing function of the opal was, however, soon realised.

The most recent development has been a product with more selective reflection properties. This has been achieved by introducing a metallic based pigmenting agent into the polycarbonate. This Heatguard

material reflects a very large proportion of the incoming solar energy, reducing the solar gain effect by up to 50%, produces a well diffused light internally, and the perception of a pleasantly cool environment. Research and development effort will continue to be focused on this type of product as it offers many favourable properties.

Whilst we have concentrated in this article on polycarbonate glazing, in a future issue of Head to Head we will review the various specifications of solar control glass sealed units.

Thermal efficiency and light transmittance data

Glazing Options		'U' value* W/m²K	Light Transmittance %
16mm triple wall	Clear	2.4	82
	Opal	2.4	51
	Bronze	2.4	31
	Bronze/Opal	2.4	30
	Heatgaurd	2.4	22
25mm five wall	Clear	1.6	68
	Opal	1.6	30
	Bronze	1.6	15

* 'U' value is a measure of thermal efficiency; the lower the rating, the more efficient. For comparison, double glazed units have a typical 'U' value of 3.0 W/m²K

HEAD TO HEAD

For this Head2Head,Ultraframe technical support engineers Bill Kenyon and Mick Rowley look at the requirement for and specification of Gallows Brackets.

Gallows brackets transfer the load from the conservatory roof onto a supporting structure thereby eliminating potential box gutter deflection and movement. Gallows brackets that are designed to carry structural loads should have a cross brace and , as a good rule of thumb ,the vertical leg should be at least 1.5 times greater than the horizontal.

Some Box gutters require extra support other than fixing through it`s side (i.e. into a wall or fascia) where it:-

1.Exceeds the limitations of the manufacturers structural design guidance for an unsupported area.
Depending on the load being imposed onto the box gutter (determined by the width, projection and glazing material used), the box gutter will require extra support beyond certain centres to resist deflection. (Typically either every third glazing bar to a maximum of 2.4 metres).
This must not be confused with the maximum span for a 'unsupported' box gutter which is less, 2.25mtrs. The definition of an unsupported box gutter being a box gutter which is neither supported underneath or fixed to a wall/fascia.

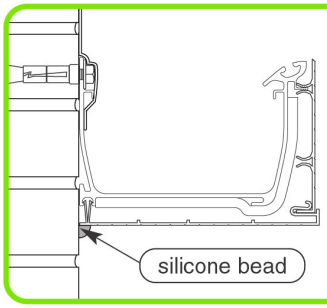
2.Where there is extra load being concentrated or transferred down from the ridge.
Areas of concentrated load usually occur under tie bars. Tie bars, due to their inherent design, have many functions- they prevent lateral spread and support the ridge, transferring the roof load (in-between tie bars) down and onto the boxgutter eaves. As you can see it is essential that these areas are fully supported.

3.Eliminate any undue stress in a particular area.
Areas where the load needs to be spread away from a potentially weaker area would be on internal and external box gutter corners. On larger conservatories the loads coming from the hips\ valleys could put undue stress on any welds at the corners of box gutter runs, and so supporting these areas on either side will reduce localised stress in this area.

Alternatives to gallows brackets:
Essentially there are three options.
1.Boxgutter supported on bricks
2.On wider soffits a suitable post (powder coated) with a welded plate top and bottom suitably fixed into the base can look very effective.
3.Wide patio doors should be overcome using the third option which is to use a support beam to support the box gutter along its length with gallows brackets /brick piers at each end.
Some installers consider attaching long "L"& "T" shape brackets to sit the box gutter on, usually above a patio door/window and then attaching this to a fascia. This method should be viewed with caution. Remember the support required is only as good as its weakest fixing, Fixing into fascias /endgrain of rafters needs to be considered very carefully with regard to their condition, grade and species.
Fixing into walls requires the same amount of consideration. The correct specification of fixing should be used to complement the inherent material properties of the wall and avoiding any fixing being pulled through and failing.
Surveyors should always take care to correctly specify box gutters and structural supports. By definition, these items are only fitted on bigger and more complex roofs. Follow the guide lines to get it right first time.

In summary gallows brackets should be fitted:

A. On all roofs utilising (165mm or 265mm) box gutters when fitted with a tie bar irrespective of width or projection,and the gallows bracket to be situated immediately underneath the tie bar.
B. On all poly roofs over 4500mm and glass roofs over 3000mm in width or projection when utilising 165mm or 265mm box gutters.
C. When gallows brackets are used they should be spaced every third glazing bar or between 2.0 to 2.4metre centre`s.
D. Gallows brackets should be fitted on both sides of internal and external corners of box gutters



Fitters Tip

During the cold winter months we occasionally receive calls alleging that there is a leak form the boxgutters. This usually manifests itself as damp blushes on the plaster. This is usually as a direct result of either warm moist air getting behind the back of the insulated boxgutter and condensing, which is easily remedied by applying a bead of silicone at the junction where the claddings meet the house wall (shown left) or from inadequate pointed flashings on the back wall, again easily remedied.

HEAD TO HEAD

In this Head2Head article, Ultraframe's technical support engineers, Bill Kenyon and Mick Rowley discuss problems that arise when the incorrect sealants are used by installers.

Through product innovation, Ultraframe has attempted to reduce the number of areas where sealant is required to the absolute minimum. However, in the one or two places on a conservatory that silicone sealant is required, it is vital that the correct material specification is made.

Occasionally we receive a direct call from a frustrated installer who is attempting to rectify water penetration. After quizzing him on how he had put the components together, we ask him if can he get a tube of silicone out of his van that he will have used on his roof and read back the properties on the label. Invariably, he states that it is high modulous and that's all.

This article is intended to explain why it is very important to use the correct type of sealant, what properties to look for and what will happen when the incorrect sealant is used

The properties of silicone/modified silicone sealants can be divided into two camps - firstly their adhesion \ curing \ setting properties and secondly their 'elasticity'

1. Adhesion \ Curing \ Setting Properties
It is essential to ensure that the silicone utilised will adhere to the material it is being applied to. There are two types, each with their own curing (setting) characteristics \ chemistry: -

a) Acetoxy cure- when curing this gives off an acid as a by product (acetic acid hence the vinegar smell) and is not suitable for use on such materials as plastic, PVC, glass and polycarbonate, because the acid that it releases can cause stress cracking of the adjacent components, undermining the bond. These are more suitable as a general purpose sealant i.e. sealing around sanitary ware.

b) Neutral cure - when curing this does not give off any acid as a by product to undermine the bond and so this is the most suitable for plastic, PVC, polycarbonate, aluminium and glass.

2. High and Low Modulous
This refers to the elasticity or conversely the rigidity of the silicone when bonded to a material.
a) High Modulous silicones require a high force to stretch them and will have a very poor elasticity, being a lot more rigid, and are ideal for sealing around bathrooms and basins.

b) Low Modulous silicones require a low force to stretch them and will generally be ideal to accommodate expansion and contraction of plastic, PVC, polycarbonate, aluminium and glass.

When acetoxy high modulous silicones are applied to plastic, PVC, polycarbonate, aluminium and glass they will initially adhere, but in practice this seal quickly breaks down initiating a further site visit

Preparation
Preparation is the key to good adhesion. One of the main reasons why silicone does not appear to adhere is due to the lack of surface preparation. All pvcu, glass and aluminium products must be cleaned with an alcohol-based solvent; this should be applied with a cloth and then removed with another dry cloth to remove grease and dirt. When sealing to polycarbonate or glass ensure that the silicone bonds directly on to the polycarbonate or glass and not to either the breather tape/protective tape respectively.

If silicone fails to bond and can be peeled off when it has not adhered, the exposed silicone should then be examined for the presence of dirt and pitting - the likely cause of failure.

Good Practice
Installers should be checking that their low modulous neutral cure silicone conforms to BS5889 Type A (type B refers to high modular silicones) and that it carries a 10 year guarantee (this preferably in writing from the manufacturer). Silicone with the above criteria have a life expectancy of between 20 - 25 years. The colour of silicone does not affect its adhesion or elasticity properties

Conclusion
As with most things in life "you get what you pay for". Ensure that your installers and sub contractors use low modulous neutral cure silicone.
Cutting corners for the sake "of saving a penny for a hapeth of tar" will almost certainly increase your overall long term running costs with repeat returns to perform remedials and loss of future sales via recommends.

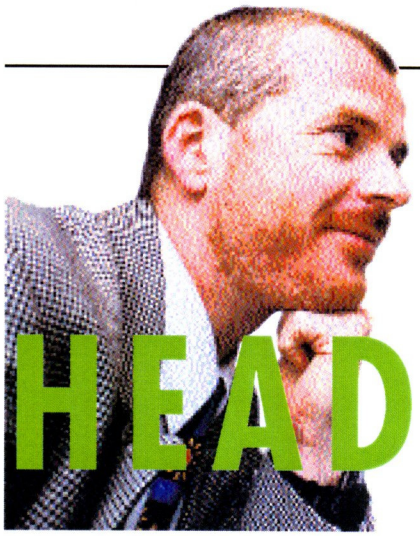
Ultraframe is launching a revised range of box gutter adaptors, one of the biggest changes to which is the incorporation of a "free" tube of modified sealant with each adaptor. Previously, installers had to use their own low modulous / neutral cure product but Ultraframe now supply Gutterbond, a proprietary product that can actually be used under water!

By supplying the correct sealant, Ultraframe is removing the potential for incorrect specification and eliminating call-backs.

Step 1 Apply a generous bead of Gutterbond

Step 2 Slide the boxgutter in place

Step 3 Once in position turn the toggle to fix the adaptor firmly in place.



TO

For this Head2Head, Ultraframe technical support engineers Bill Kenyon and Mick Rowley discuss the various factors which can affect the planned alignment of roof glazing bars with their supporting vertical side frames

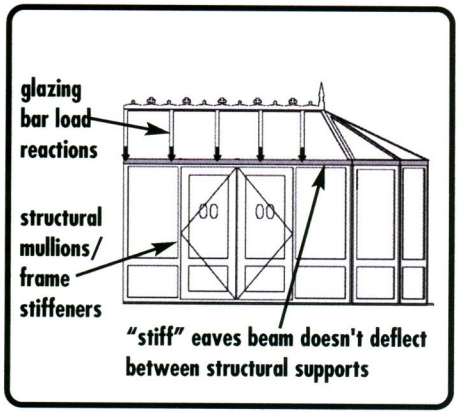
Most people would accept that in an ideal world, glazing bars should align with the frames beneath, giving an integrated design that is easy on the eye. However, it is not a sin to design a conservatory where they don't line up, and in fact, many factors will contrive to work against this ideal. Lets check out the factors that may make bar/ frame alignment impractical.

SITE CONDITIONS

They will invariably dictate the design of the conservatory and therefore the glazing bar set outs. These would include chimney breasts, soil vent stacks, the inclusion of raised or elevated boxgutters, height restrictions, boundary walls - even worse, the base could already be built, leaving you to "fudge it".

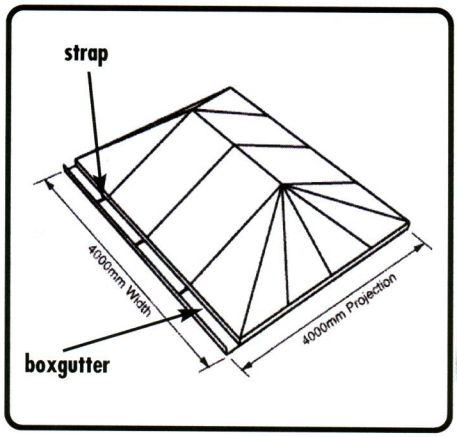
LAYOUT

Combinations of widths / pitches / projections that interact with the style of conservatory selected by the homeowner will restrict to a lesser or greater degree the permitted glazing bar centres. Take as an example a conservatory where extra wide french doors are required. Ultraframe's eaves beam, in this situation, plays a vital role as it allows even distribution of the load's reactions from glazing bars by spanning between structural supports within the side frames and walls.



Ultraframe's UK Structural Design Guide gives full details on the performance of individual roofing components in different regions with different glazing materials, and takes into account factors such as exposure categories. If the style and size of conservatory dictates wide glazing bar spacings, the addition of extra ones purely for aesthetic purposes will add cost to the overall roof structure. Whether this is an unnecessary cost is a matter of individual judgement.

STRUCTURAL SUPPORTS

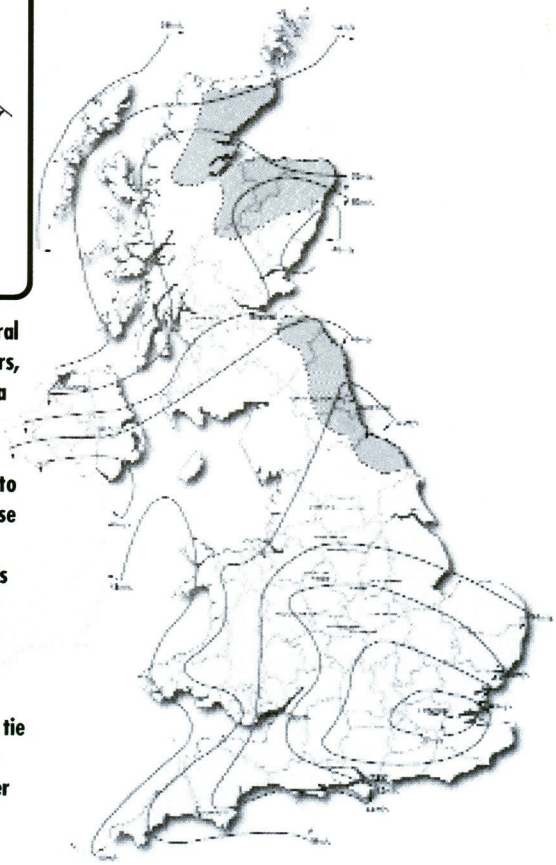


The inclusion of wind posts, brick piers, structural gallows brackets supporting strapped boxgutters, corner posts and frame stiffeners will all have a direct affect on the spacing, frequency and location of glazing bars. Any one of these or occasionally combinations of them are required to support particularly large conservatories or those that are built in exposed locations. When specified, tie bars must be fitted to ensure loads are adequately and evenly transmitted to the eaves beam. For those ordering a prefabricated roof from Ultraframe or one of it's 29 BBA Registered Fabricators, a roof confirmation is always faxed to the installer. This confirms the tie bar and glazing bar positions, as a tie bar must always be located in-line with and directly under glazing bars (to form a vertical triangle) and support the ridge.

INTERNAL ANCILLARIES

With regards to ancillary products, accommodating a reasonable size and number of roof vents, Ridgeflows and the omnipresent fan, can necessitate that the ridge is made longer. This increases the pitch between the sides and the front, resulting in hips which do not then come off at 45°, and as a consequence, jack rafter bars will have to be staggered.

Whilst it may be idyllic to align glazing bars and frames, it is clear that it is not essential to do this and quite often there are compelling reasons why this can't be achieved. Whatever glazing bar centres are finally decided upon, it is better if the homeowner is aware of their final position, thereby avoiding any potential conflict and possibilities of cash retention.



STATS, LIES AND CLEVER QUESTIONING

Bill Kenyon and Neil Sarsfield, part of a team of technical support engineers at Ultraframe, share their experiences of the conservatory industry.

No doubt most people have heard of the famous quotation by Benjamin Disraeli, a former prime minister , "There are lies, damn lies and statistics" . Essentially, it is concerned with the accurate collection and presentation of facts. In dealings with queries and questions from installation companies, we have to obtain the facts before we can offer advice and instruction. However, whilst this sounds easy in principle, in practice it is more difficult.

On the occasion that we are approached the installation problem has often escalated - the homeowner may be holding back a cheque following previously unsuccessful attempts to remedy the perceived problem. It is in these highly charged and emotional circumstances that establishing the facts becomes vital in ensuring a speedy and effective response.

Clearly call backs are something that all in the industry wish to avoid as they eat into the installers profit margins. Moreover, self employed fitters may be tempted by a "quick fix" when a more long term, permanent solution is called for.

When an installation problem occurs, it is usually the homeowner/client who will call the installation manager and attempt to describe the potential problem. Probing questions at this stage will enable the scene to be set, clearly and accurately. The next stage is for the installation manager to question the fitters on what has occurred - in many respects this is the most critical stage. Careful prompting and probing is necessary to tease out the exact story of what has occurred. It may be more accurate to ask the fitter what hasn't happened. Try to ask open ended questions, ones that can't easily be brushed off with a Yes or No answer. Questions starting "How, why what, when, where" elicit more detailed answers. Spending time at this stage collecting the facts will reap dividends in that a more detailed brief passed onto Ultraframe will enable a more accurate first time technical solution to be proposed.

Unfortunately. all too often when a solution has been proposed it proves embarrassing to the installation manager that the fitters have been economical with the facts i.e. left something out which usually means further wasted visits to site.

Our team of 4 dedicated technical support engineers are there purely to offer advice and guidance and maximising the effectiveness of this team depends upon the accuracy of the information supplied - the old adage "rubbish in - rubbish out" quite clearly applies.

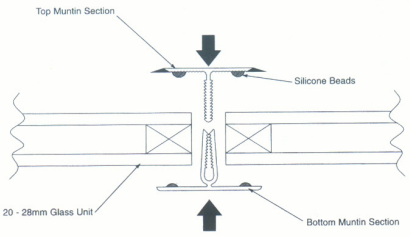
Problem solving on site - Case Study

•A site meeting was called on a commercial project that was to include 12 people - main contractors, architects, QS, client - to resolve a problem that had proven difficult to resolve. Needless to say, the situation was highly charged and solicitors were in the wings.

•The call to Ultraframe was taken from the Installation Manager who assured us his fitter was beyond reproach, had done everything by the book but couldn't give details of what remedial work had been carried out. In all the fitter had visited site 4 times!

•Ultraframe's technical support team then spoke to the fitter direct. After careful probing it was found that a critical component in this large roof, namely a muntin bar joining two large double glazed units, had not been properly installed using silicone beads in the unit which needed to be applied before the double glazed units were pushed home. It was found that the fitter had, on subsequent remedial visits, simply siliconed the surface of the joint, which continually broke down in the weeks that followed.

•In conclusion, the cost of undertaking corrective action was never going to be cheap because of the size of the roof the requirements for scaffolding. However, by failing to investigate properly at the initial stages, additional costs were incurred and, more importantly, goodwill between the installer and his client was damaged beyond repair.



Typical Questioning Sequence

Prefab or bar length?
Date installed?
Order No?
Size and shape of roof?
Who has installed it?
Have you seen the installation?
Who has seen the installation?
Were you there when it was fitted?
Confirm the line of communication

Type of ridge - MK 2,3,4?
Length of ridge?
How many sections did the ridge cap come in?

What exactly is the problem?
When was it first reported to you?

What is the ridge connected to at the back?
What material have they used to flash with - lead / flashband / silicone?
Have you used the pre-supplied flashing trim?

What solution have you proposed to date?
What have you done to test your solution?

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Don't get boxed in

Bill Kenyon and Neil Sarsfield, part of a team of technical support engineers at Ultraframe, share their experiences with particular reference to box gutters.

Without doubt, conservatory designers have increasingly pushed the boundaries in the last few years. Whether this is due to companies developing more adoptable systems or because consumers are asking for more complex designs, it is difficult to tell - perhaps it is a combination of both forces in equal measure.

So, whilst company's continue to innovate, have installers skills kept pace? Horror stories, thankfully few and far between, are anecdotal - box gutters screwed to rotten fascia boards or fastened simply with expanding foam. More likely legend than fact, our intention is to focus on the correct installation of box gutters as around 15% of all roofs now feature this component.

•What does it do?

But what is the purpose of a box gutter? Its primary purpose is to take copious amounts of rainfall, usually from one or possibly two adjoining roofs, and dispose of it quickly and effectively. Box gutters also fulfil secondary objectives such as providing access routes for cleaning and also providing structural stability. It is important, therefore, that all known uses of the box gutter are known at the outset, so that proper provision is made for structural performance.

•The survey

An accurate survey is always the best starting point. 'A stitch in time saves nine' can equally br applied to conservatory construction. Always check if wall are plumb and square, vitally important when 90° internal box gutters are concerned. Overlooking or worse, ignoring problems at this stage, will only lead to more serious problems down the line - sloping ridges, glazing bars that are not parallel, polycarbonate or more serious, glass units that do not fit.

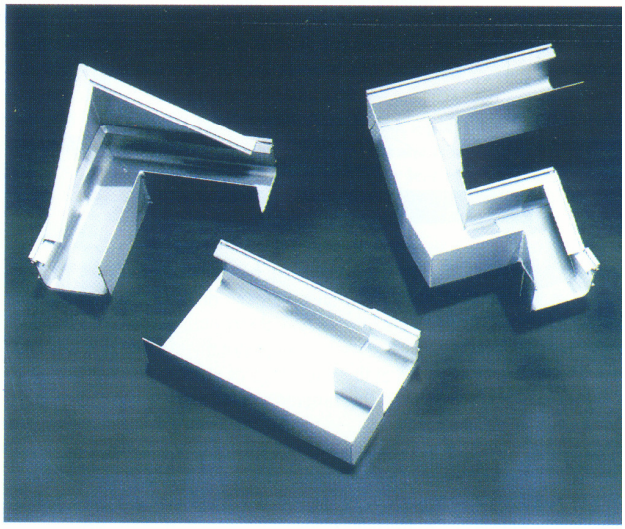
When it comes to installation, the box gutter is normally fitted first. If the box gutter is to be fitted to an existing timber fascia, it is imperative that the condition of the timber is checked. At best this may means the use of a screwdriver to probe into the timber or it may mean removal of the bottom course of tiles. rafter ends will also need inspections. Timber noggins may need to be inserted behind the fascia board to adequately support the box gutter at the correct fixing centres. Simple wood screws may not be enough and coach bolts may be required.

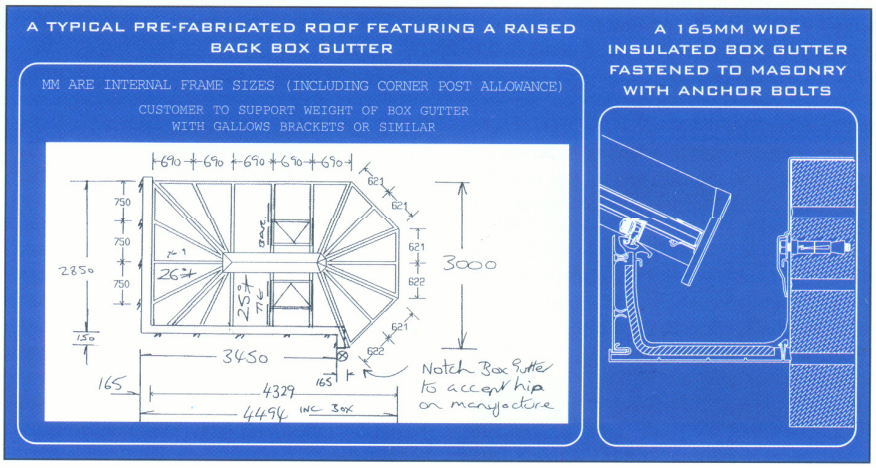
If the structure is of a masonry construction, the preferred method is the deployment of anchor bolts which are more suitable than hammer activated anchors. Anchor bolts with their hexagonal head and washers not only expand and grip the masonry substrate but also draw the box gutter into the wall.

However, depending upon the width of box gutter, more support may be needed than simply bolting to the structure. 'L' shaped structural support brackets sometimes known as gallow brackets, may be deployed but they must be more than simply a decorative item. Another option is to weld straps across the width of the box gutter at suitable intervals, thereby preventing it from folding in on itself under extreme loads. For box gutters that are manufactured up to 600mm wide we suggest that masonry piers are the only suitable option. These must be tied to the existing building to form a structural pier to support these substantial gutters.

Historically, box gutters were made from steel or lead lined timber. But today, structural grade aluminium is used which is usually insulated and then capped internally with PVC-U - all with the simple objective of minimising condensation.

Installers need not fear installations that incorporate box gutters - just show a healthy respects. Roofing system manufacturers or fabricators can offer advice - just ensure that it is sought prior to design and installation and not when a problem occurs post installation.





TO

For this head2head, Ultraframe technical support engineers Bill Kenyon and Mick Rowley discuss how teabreaks spent reading installation manuals instead of the Sun newspaper can be time well spent.

The production, publication and dissemination of accurate and up to date technical information is something that we at Ultraframe are rightly proud of. Literally thousands of pounds are spent each year updating databases and checking contact names with the simple intention of getting the correct technical guides into the right hands.

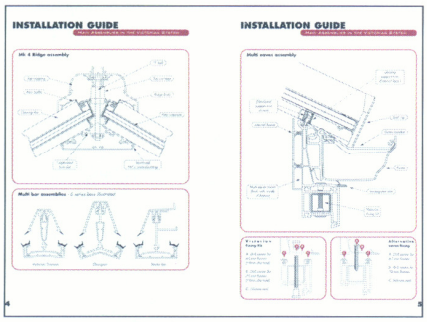
Unfortunately, these guides are often ignored by fitters, keen to "get on with the job". However, it is not until some time later, perhaps when the wind and rain are coming from a certain direction, that a problem is found and a call-back visit is necessary.

Vital information

Correct specification and use of materials, including sealants, is vital. Listed below are some of the problem areas identified in recent call back situations:-

- **Using high modulus sealant in place of low modulus, neutral cure clear.**

- **Using "flashband" type products in place of lead flashing.**



● **Typical installation guide**

● **Training school prospectus**

- **Storing polycarbonate sheets in stacks exposed to direct sunlight.**

- **Throwing away components if an immediate use cannot be found for them - foam bungs, ridge flashing trims, etc.**

- **Failing to seal the glazing material in roof vents.**

All of these points are covered in the guides that are produced by the Marketing Team. We are heavily involved in the presentation and content of these guides, many of which are constantly being amended as a direct result of situations experienced by our customers, to whom we are grateful for feedback. In other words, as a result of other peoples problems experienced at survey, fabrication or installation stages, you benefit from this experience - if you read the guides.

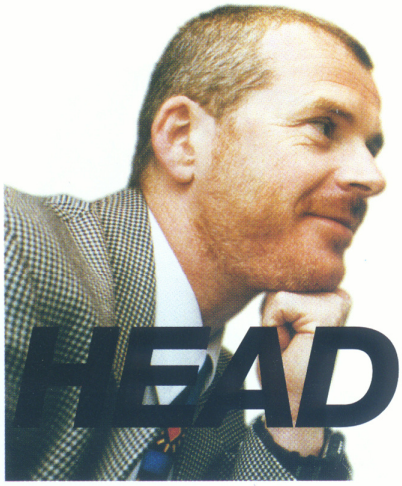
Essential feedback

The feeding back of essentially negative experience gained at someone else's expense, is not the only way everyone can benefit. If you can see a way to improve written or visual content by the addition / removal of certain drawings / photos / text then we are pleased to receive these comments.

Most professional companies make items like fabrication and installation guides controlled documents. As part of Quality Control procedures e.g. ISO 9001 / 9002, they must be able to demonstrate how they update employees with new material. They may even organise training courses. Ultraframe provides "off the shelf" training on installation, fabrication and surveying, all with the objective of updating those either on the job or in office positions.

In conclusion

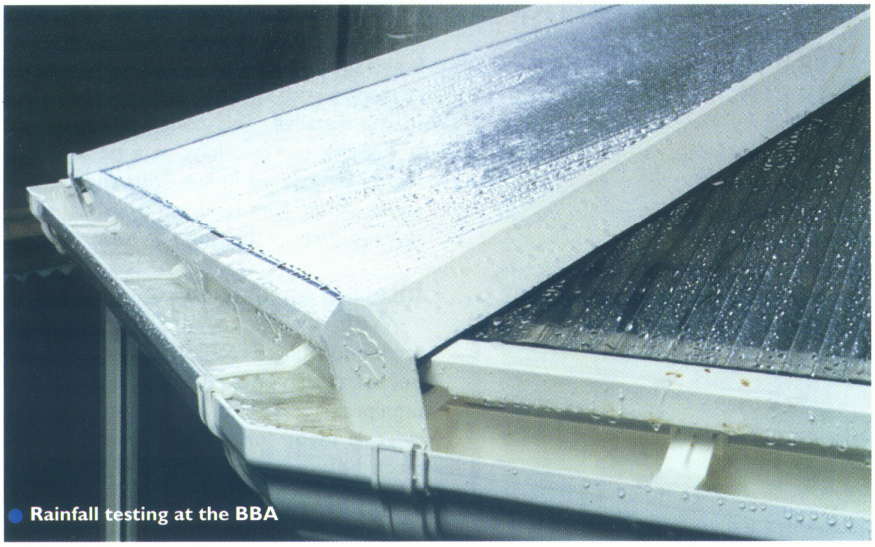
These courses represent excellent value for money as they are free! Think of the potential costs of a problem conservatory with call back costs, retained cheques and legal action pending - it makes training, which can prevent all of that, even better value. In conclusion, always read the manuals / guides, if in doubt ask the technical support team and finally enroll on courses that can bring your skills up to date. Otherwise the costs incurred can be much more than financial.



TO

In this Head2Head, Ultraframe technical support engineers Bill Kenyon and Mick Rowley examine why gutters on conservatories are always laid level.

When the proud owner of a new conservatory looks out from the upstairs window of the property, it can be a little disconcerting to see rainwater apparently ponding in either the pvc-u integral gutter system or 165/265mm box gutter. However it is perfectly acceptable but occasionally we are called in to mediate between an installer and a homeowner who is holding back a sizeable financial penalty.



● Rainfall testing at the BBA

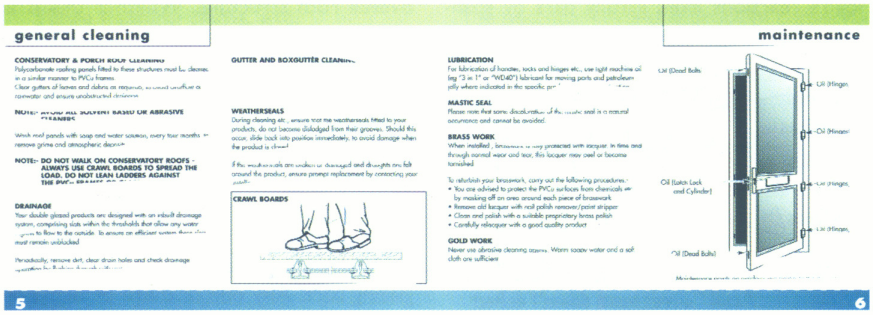
According to BS 6367:1983 Code of Practice for Drainage of Roofs and Paved Areas and the Building Regulations 1985 "Rainwater Drainage" approved document HP part 3 it is perfectly acceptable to lay gutters level. Basically, provided the depth of the gutter is deeper than the depth needed to prevent an overspill and, most importantly, the outlet is large enough for the gutter to discharge freely, then there will be no problem at all.

Ultraframe's Victorian and Ultralite low pitch roofing systems both utilise Marley classic guttering. Ultraframe subjected its complete roof systems to independent testing by the BBA. 75mm of rain must fall in one hour and, with one outlet positioned centrally or at one corner, the roof coped admirably.

The guttering supplied as standard by Ultraframe can drain an area of 100m² with one outlet, and it does not matter if that outlet is at one end or in the middle of a run of gutter. The only real cause for concern is when a box gutter is employed to catch rainfall from an adjoining existing tiled roof. Installers need to calculate the total area to be drained and specify the appropriate number of outlets - contact either of us and we will be glad to help you in this task.

One final thought - more problems could occur with gutters 2-3 years down the line as homeowners often forget their maintenance responsibilities. Regular cleaning of the gutter is essential. Ensuring that the homeowner undertakes these duties is a difficult task for the homeowner - but now Ultraframe has come up with the solution. An A5 landscape sized maintenance and service handbook can be purchased from Ultraframe for only 20p per copy and handed to the homeowner upon completion, thereby serving two critical functions -they understand that gutters are always laid level (and therefore do not hold back on your cash) and it makes them aware of their maintenance responsibility.

● A typical situation with tiled roof draining onto the box gutter.

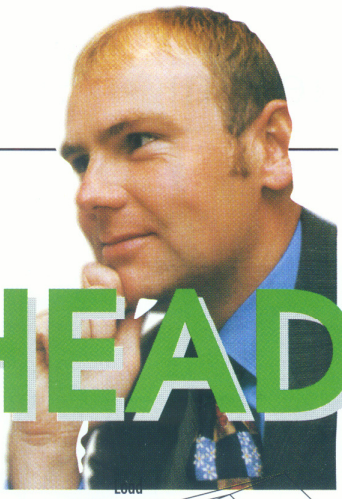


● A section from the new 12 page maintenance and service booklet for victorian conservatories.

REPRINTED FROM CONSERVATORY INDUSTRIES, *AUGUST 1998*

technical series

HEAD TO HEAD



In this Head2Head, Bill Kenyon and Neil Sarsfield, technical support engineers at Ultraframe, discuss the purpose of tie bars and how to specify them.

What is a Tie Bar

Over the last year, the most frequently asked question is, "Do I need a tie bar?" A tie bar is a piece of threaded bar that is usually joined to two opposed roof slopes - a further attachment is usually made at the ridge. The principle is to restrain any horizontal spread at the eaves eg. under heavy snow conditions.

A completed conservatory utilising the tie bar to grow ivy

The Theory of Tie Bars

- The requirements for tie bars within a conservatory are primarily dependant on the length of the ridge (measured from house wall to finial point).
- Loading on the roof (snow or dead) will cause minimal vertical deflection along the ridge length which in turn imparts a horizontal reaction (thrust) at the eaves beam through the glazing bars.
- The tie bar system restrains the horizontal reaction, stability is thereby offered to the sideframes minimising horizontal spread of the eaves beam.

- Tie bars should always be positioned in line and directly under glazing bars (forming a vertical triangle) and supporting the ridge.
- Standard fixing details is to the glazing bar utilising special brackets which are supplied with each tie bar kit.

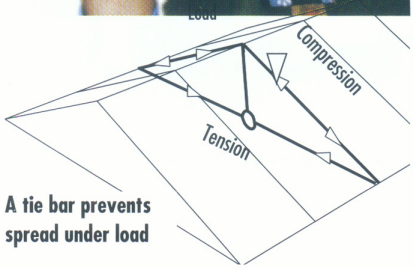
Factors that influence the necessity for a tie bar include ridge length, pitch, glazing material, conservatory width, glazing bar span and location (wind speed, snow loads and altitude). A typical tie bar chart from Ultraframe's revised UK Structural Design Guide is illustrated.

Typical Installation

When a tie bar is specified by the manufacturer or fabricator, it is a structural requirement of the roof and MUST ALWAYS BE FITTED.

Failure to comply with this may result in your reputation collapsing along with the roof. Furthermore, submitting to the occasional request by homeowners to leave out a tie bar is not permissible, even if they sign a waiver, because in law you are seen as an expert and the client signed waiver is no defence.

A basic installation sequence is illustrated - always note that the tie bars must be fitted and adjusted prior to the roof being glazed (even polycarbonate). Tie bar brackets are normally attached to the glazing bars on pre-fabricated roofs and accompanying roof confirmation plans and installation guide indicate their positions.



A tie bar prevents spread under load

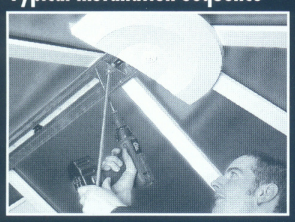
Summary

Tie Bars, when fitted are a structural requirement of the roof. However, some customers ask for tie bars when they are not structurally necessary - they have an aesthetic role, giving the conservatory a classic Victorian feel. Customers have been known to grow trailing ivy along their entire lengths, but a line should be drawn at hanging flowering baskets from them, as to do so may compromise its structural performance.

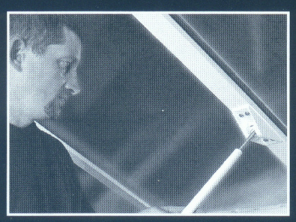
One final point - some installers have it in mind that the tie bars should slope up slightly (see photo with ivy). However, particularly on large roofs this imposes additional load on the on the ridge and possibly will effect the structural dynamics of the roof. It is advisable that tie bars should always be fitted level.

A typical tie bar specification chart lifted from Ultraframe's revised structural design guide

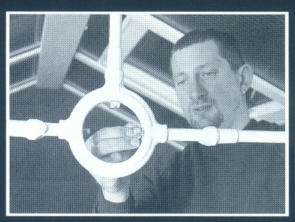
Typical installation sequence



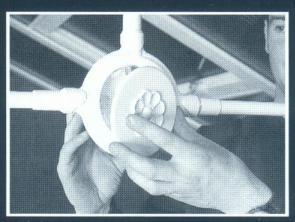
Fit the centre drop rod to the ridge body. The drop rod should be in-line with the brackets on the bars



Screw the horizontal threaded bars into the brackets



Assemble the centre boss and adjust the tie bar so that the window frames are plumb

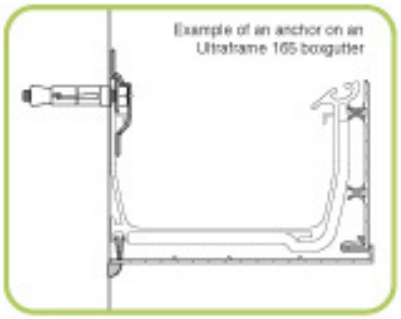


Fit the coverplate

HEAD TO HEAD

Ultraframe technical support engineers Bill Kenyon and Mick Rowley look at the correct specification and installation of masonry anchors

When fixing box gutters and gallows brackets to various concrete, masonry, brick or block substrates, great care needs to be taken to select the correct anchors.



Brick, block and masonry substrates vary widely in quality, in particular their compressive strengths may vary from 2.8 to 70N/mm. To aid the kiln firing of clay bricks clay is removed by the use of a "frog" or a multitude of holes being let into the bed of the brick. This latter method provides particular problems for fixings.

Loadings on fixings

There are two kinds of loads to consider. The first is tensile load, also described as "pull-out" where a force would be required to pull a fixing out of its hole i.e. along its axis, the second is shear. This is where the force is usually at right angles to the bolt and is the amount of force which would be required to sever or shear the bolt. They both have what is called a "zone of influence" into the surrounding substrate. This can be imagined as a conical shape (see drawing) this being the area that is taking the load which is emanating at 45° from the base of the fixing to the surface of the substrate.

Clearly, increasing the embedment depth increases the anchors performance.

A reduction in the projected area (conical shape) for example by planning anchors too close together or too near to the edge of the brick, will result in reduced performance and should be avoided if possible. If it is unavoidable, appropriate reduction factors should be applied to the safe working load issued by the anchor manufacturer.

Anchor Types

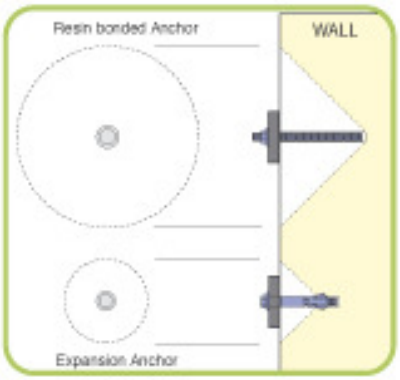
There are two main types:-

1. Torque controlled expansion anchors

A clamping force is extended through the fixture to the base material. The clamping force is proportional to the tightening torque. Tightening to the manufacturers recommended torque ensures that the clamping force is greater than the published safe working loads. Adjustable torque wrenches of the "break back" type should be used so as not to over stress the bolt material.

This type of bolt works by locally compressing the substrate with the forces deployed at the point of expansion, not over the whole length of the anchor. Clearly, if the point of expansion falls within a cavity of a brick or block, the full expansion effect may not be deployed.

2. Resin bonded anchors



These gain their operational strength through increasing the amount of surface area that the anchor touches when inserted into the pre-drilled hole. They are particularly suitable for suspect masonry substrates.

Once the hole is drilled, it is vital that dust and debris are removed with either a small wire brush or air pump. If the brick is suspected to contain holes, a small mesh sleeve is inserted prior to the injection of the two part resin. Before the resin sets a threaded rod is inserted leaving sufficient protruding to attach washers and nuts to.

Because resin bonded anchors exert no expansion forces, they are particularly suited to "weaker" substrates such as aircrete blocks.

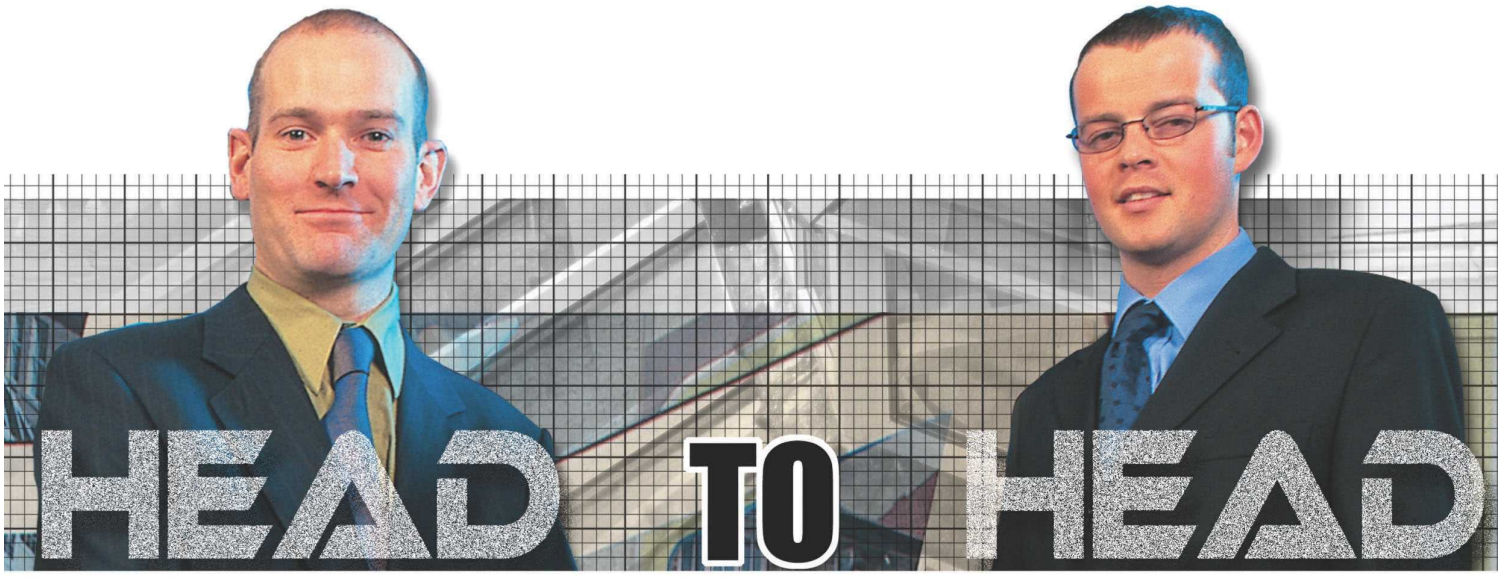
Always consider every factor including the relevant loads. Further information can be sought from the technical support department at two of the leading anchor manufacturers.

- Rawl :0141 638 7961
- Hilti :0161 886 1144

Key Points

Remember to:-

- Drill correct diameter hole, to the exact depth.
- Clean the hole thoroughly. This is important for all anchors, but critical for bonded anchors.
- Use the correct setting equipment and procedure.
- Tighten to the recommended torque.
- Wherever possible, avoid the margins of masonry and mortar joints.



In this Head to Head, Ultraframe technical support engineers Simon Tennant and Miles Fallon discuss the importance of correct fixings in conservatories.

Ridges dropping, fixings being pulled from the host wall & frames bowing out are all results of insufficient or non-existent fixings. All of these problems are more often than not blamed on the lack of a tie bar, the inclusion of which is looked upon as the only solution. However with further investigation other factors are usually revealed as the source of the problem.

Eaves-beam connections

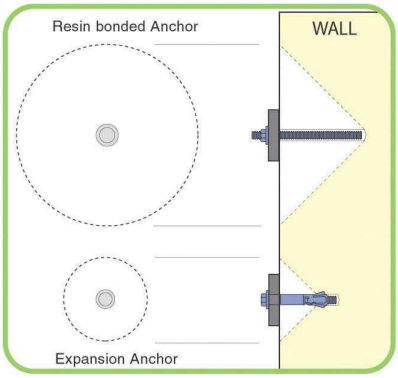
A common error is the failure to fix the eaves or ring-beam adequately at joint positions. The eaves-beam, when connected together creates a continuous 'ring' which supports the glazing bars & ridge which allows the roof to stand up.

It is of paramount importance that any cleats designed to connect the eaves together are fixed correctly during installation using the fixings provided, if no cleats are provided with the system, suitable measures should be adopted with advice from the manufacturer. Failure to do this will seriously compromise the structural integrity of the roof. Any force applied to the eaves-beam joints, for instance through glazing bars could result in the joints 'opening up' & allowing the 'hipped' glazing bars to move forward & therefore allowing the ridge to drop.

Fixings into the host wall.

The type of fixings required when installing a conservatory is entirely the responsibility of the installer. Brick, block and masonry substrates vary widely in quality, the performance of an anchor primarily depends upon the integrity and strength of the substrate material into which it is fixed. In general, the stronger the substrate the greater the load before failure.

There are two typical kinds of load to consider. The first is tensile load, also described as 'pull-out' where a force would be required to pull a fixing out of its hole i.e. along it's axis. The second is shear, where the force is at right angles to the fixing.



Torque controlled expansion anchors are far superior in performance than 'hammer- in' screw fixings, being typically in excess of 10x stronger for the same diameter.

The starter or wallplate bars require a positive fix at several points i.e. in close proximity to the eaves beam & ridge & at regular centres in between, the spacing being dependent on the type & condition of the wall.

The load transferred down the glazing bars from the ridge results in a force effectively trying to 'push' the conservatory away from the host wall. Weak, badly situated or insufficient fixings could fail & be pulled from the wall causing the frames/eaves-beam to be pushed forward & therefore causing the ridge to drop.

Frames

Careful consideration should also be given to the type of fixing used to connect the eaves-beam to the frames. As discussed previously, it is generally considered a pre-requisite that window frames used in conservatory construction should be reinforced. Although screw fixing down into steel would be perfectly adequate for the majority of conservatories, larger structures, particularly those with glass roofs should employ a dedicated fixing.