

bere:architects
Mildmay Centre
Woodville Road
London N16 8NA
T +44(0)20 7241 1064
www.bere.co.uk

Airtightness Report

**Practical guidance to achieve excellent levels
of airtightness in Passivhaus building fabric**

October 2012



■ Contents

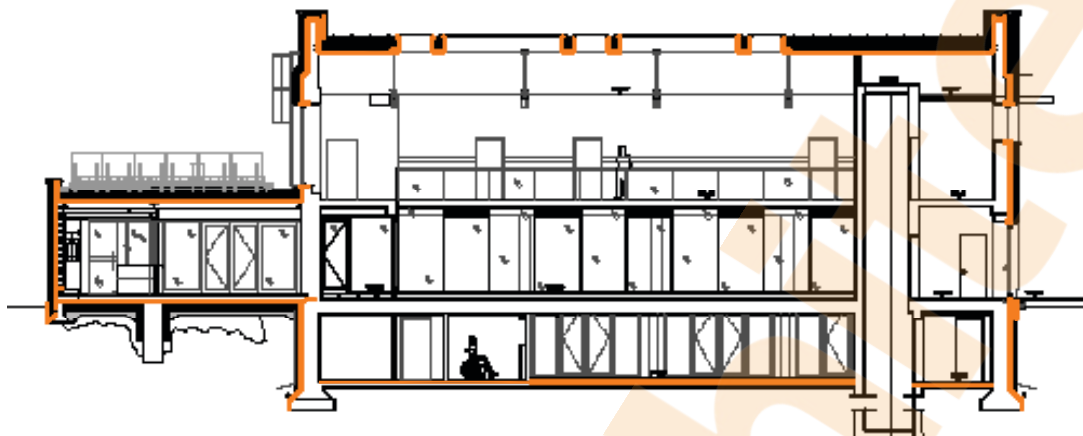
	Page
1: Detailing Airtightness	3
2: Air Tests	4
3: Responsibility	5
4: Critical junction	6-7
5: Window Installation	8-10
6: Reputable suppliers and manufacturers	11

1: Detailing Airtightness

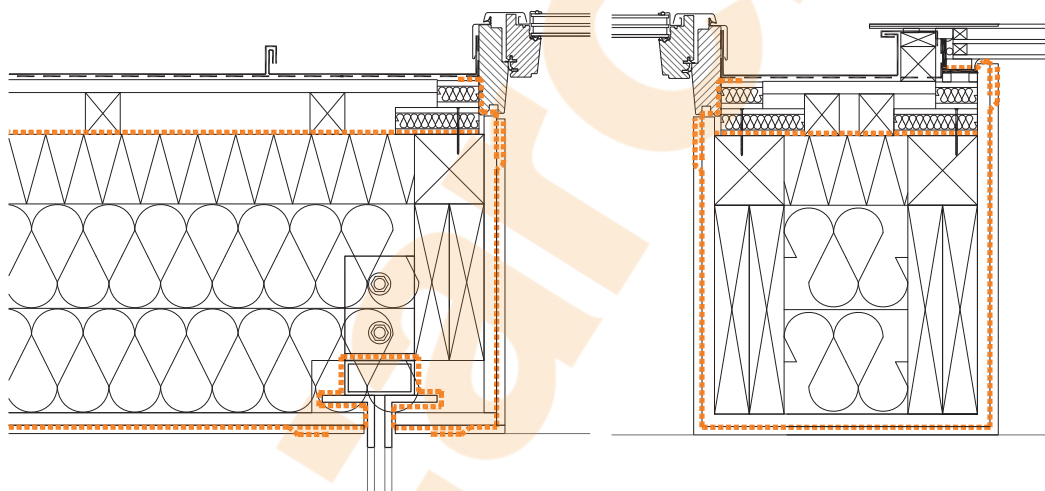
Architects & designers need to take responsibility for airtightness early in the design stages of a project. An overall strategy should be developed, and details designed for buildability.

Ways to achieve this:

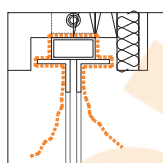
1.1: Complete a package of airtightness strategy drawings highlighting the line of airtightness in the construction, in both plan and section.



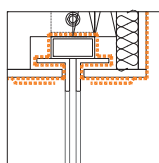
1.2: Large scale details which highlight membranes in a distinct colour.



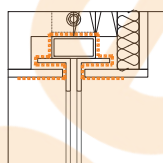
1.3: Construction sequence drawings for difficult construction junctions and written explanations e.g:



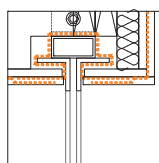
Stage 1
Lay airtightness barrier over roof truss and RHS. Fix in place using double sided tape*. Leave hanging down.



Stage 3
Lay a continuous sheet of membrane* across whole face of OSB. Tape* over membrane* encasing roof trusses.



Stage 2
Fix 18mm OSB to SW purlin. Fold back membrane* and tape* to inside face of OSB. Fill voids with insulation from above.



Stage 4
Fit 12mm plasterboard soffit.

Dotted lines indicate position of membranes.

* product advice at rear of this manual

2: Air Tests

Three air tests should be included in the tender specification:

2.1: The 1st test is to be completed as soon as the building has been made air tight.

2.2: The 2nd is to be completed after all the service penetrations have been made.

2.3: The 3rd on completion.

This allows any defects in the airtightness to be found before work is covered up and prevents trades 'passing the buck'. It also helps the contractor by preventing abortive work on site and difficult, expensive repairs. **Contractors should be asked to highlight the three air tests in their tender programme.**



Clockwise, starting from top left: 1st airtest at Mayville Community Centre;

3rd airtest on completed retrofit;

Airtight service penetration seal;

1st airtest at Passfield Drive retrofit project.



3: Responsibility

It is the architects / designers responsibility to produce designs that allow the contractor to organise the first air test as soon as the line of airtightness is complete **yet fully accessible to the air tester**. This includes the line of airtightness at all junctions (window-wall etc) which must not be covered over. The architect should also explain and demonstrate the importance of airtightness and explain the architect's strategy to achieve this.

3.1: Involve contractors as early in the design process as possible – buildability is key.

3.2: Hold a pre-start airtightness meeting to discuss details and air test programme.

3.3: On site airtightness training or 'toolbox talk' with all key trades during construction.

3.4: Contractor to appoint an 'airtightness champion' before the project starts on site and identify them to the rest of the design team. They will be responsible for inspecting the completed work and training any new site operatives.

3.5: Arrange for key site operatives to attend an air test on another project as soon as possible. This will help them understand what they need to achieve.



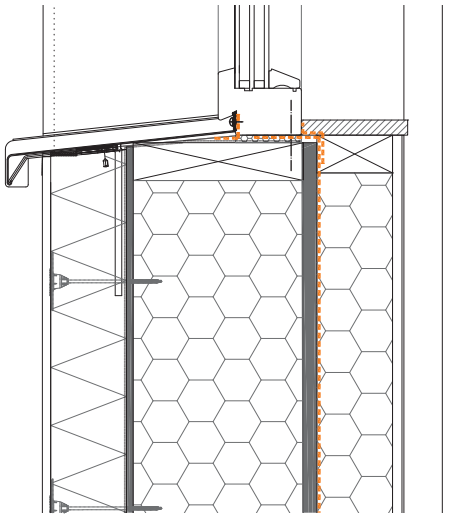
4: Critical junctions

The contractor is responsible for ensuring all details are completed correctly. Any problem areas should be identified early and concerns discussed with the architect / designer.

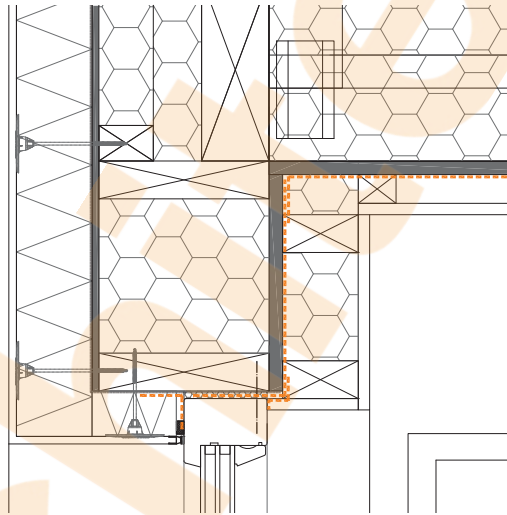
Critical junctions in new build include:

Example detail from our Welsh Passivhaus, Ebbw Vale

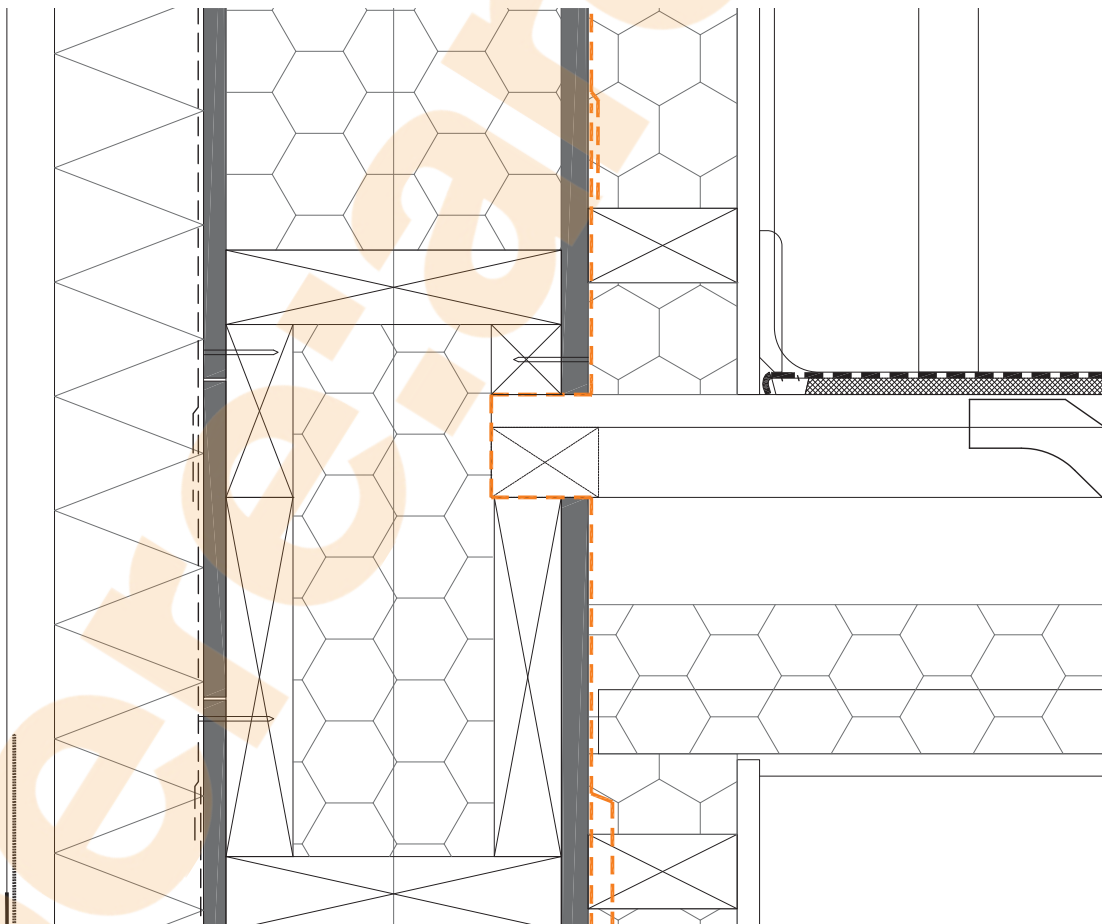
4.1: Window / wall junction



4.2: Eaves detail

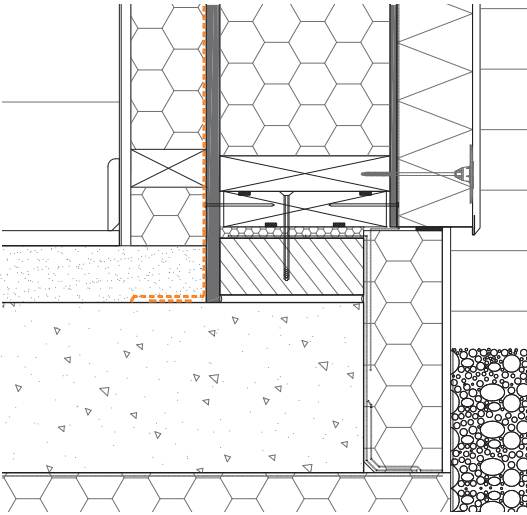


4.3: Intermediate floor detail

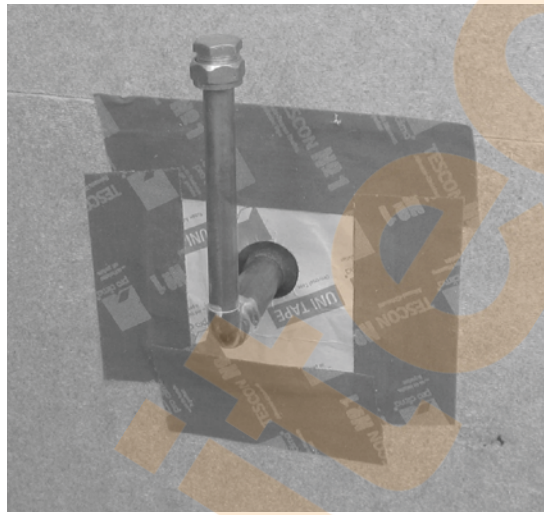


4: Critical junctions (cont.) example drawings

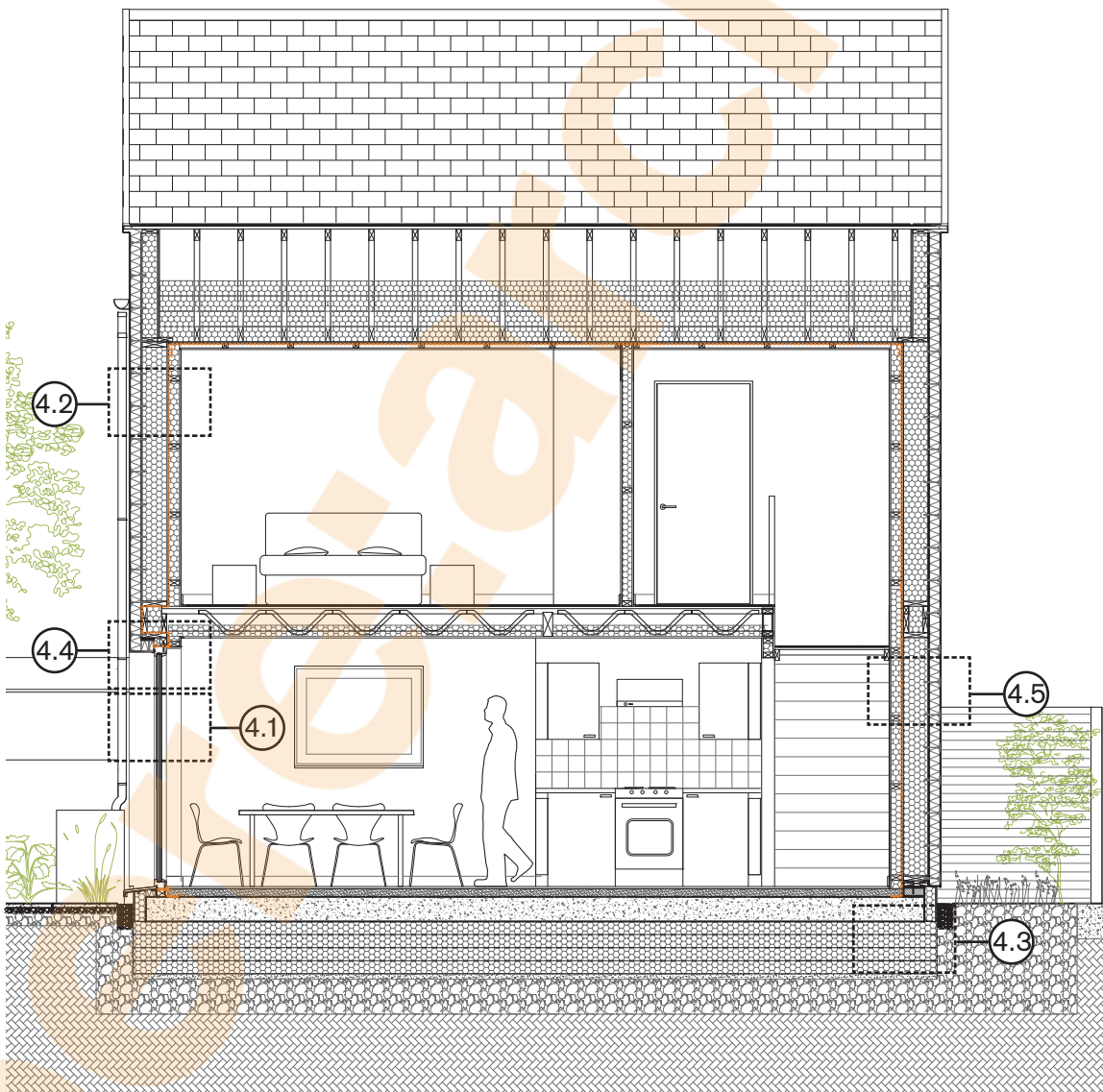
4.4: Wall / floor slab detail



4.5: Services penetrations



General arrangement airtightness strategy drawings



5: Window Installation

5.1: Before fitting the window, the contractor must apply airtightness tapes to the sides and top of the window. The tape needs to be continuous to all three of these sides.

5.2: 'Rabbit Ears' need to be formed at the top corner junctions to allow the tapes to be neatly folded back to the building fabric and to allow the window to expand and contract safely.

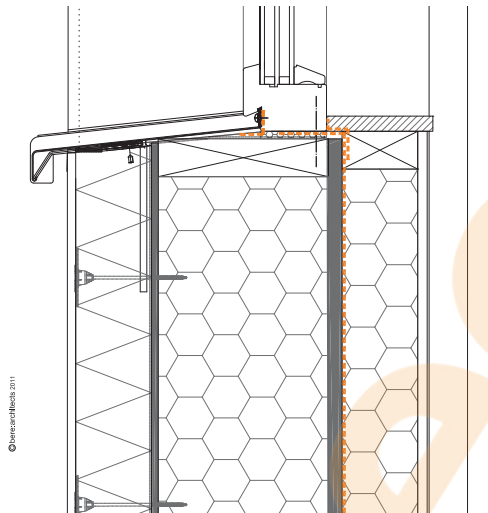


5.3: Usually two layers of tape are applied to each window; the external is for weatherproofing and the internal for airtightness.

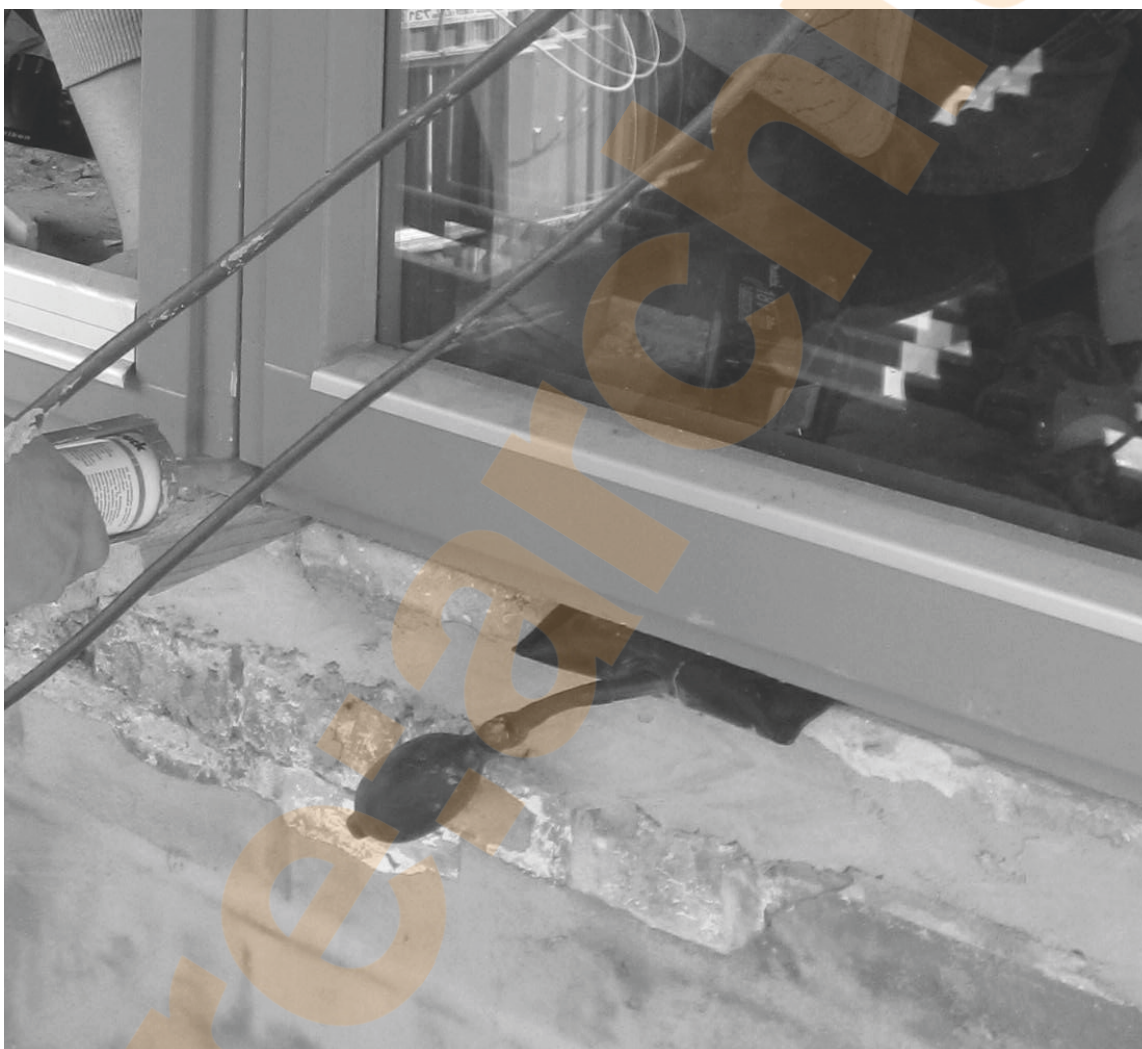
5.4: Tape is not applied to the bottom of the window before installation in order to make the installation of the window easier. The tape to the bottom of the window is face-fixed after installation and then hidden by the window cill (inside and outside).

5.5: 10mm tolerance should be provided on all sides of the window to allow for expansion of the window and movement of the opening (so opening = window dim +20mm).

5.6: Windows are installed and fixed with special continuously threaded screws. These are designed to prevent the window from being pulled and warped, they simply locate the window in the opening.



5.7: Air bags are often useful to temporarily hold the window in the opening, allowing it to be precisely levelled before fitting, without sufficient force to distort the window.



5.8: Screw fixings, using special headless screws that suspend the window without pulling at the frame, must be a maximum of 700mm centres and 150mm away from corners.

5.9: Spray expanding foam around the window to help spread the load and insulate around the window. Any excess should be cut away, but care needs to be taken to avoid cutting the membranes or tapes. It is advised to use a controllable spray gun, eg by Hilti.



5.10: All window tapes to be fixed back with either tape or flexible sealant, the outside tape to be fixed to the weather proofing layer and the inside completes the airtightness layer.



6: Reputable suppliers and manufacturers

Tapes

Pro Clima tapes /adhesives supplied by Ecological Building Systems - contact 01228 406 375

Siga tapes /adhesives supplied by NBT - contact 01844 338 338 or Green Building Store Tel: 01484 461705

Tremco Illbrook window tapes supplied with Doublegood windows - contact 0844 800 3016

Membranes

Pro Clima membranes supplied by Ecological Building Systems - contact 01228 406 375 or Green Building Store Tel: 01484 461705

Siga membranes supplied by NBT - contact 01844 338 338

Air test technicians

BSRIA - contact 01344 465 583

BRE - contact Felix Ahatty 01923 664 000

ALDAS - contact Paul Jennings 07866 948 200

Surface penetration grommets

Pro Clima grommets supplied by Ecological Building Systems - contact 01228 406 375

Siga grommets supplied by NBT - contact 01844 338 338

Expanding foam

Fischer expanding foam stocked by many good builders merchants including Jewsons and Build Base

Expanding foam dispenser

Fischer professional metal foam gun stocked by many good builders merchants including Jewsons and Build Base

Window headless screws

Supplied with Doublegood windows

Inflatable window levelling air bags

Winbags supplied by Axminster Tool Centre, Trade Counter Direct, Transtools among others

Wurth Amo bag supplied direct from Wurth - 08705 98 7841 and also stocked in Wurth trade stores.

Recommended CPD's (continual professional development)

SIGA, NBT, Ecological Building Systems