

MATILDA'S BLANKET INTERNAL WALL INSULATION

Technical
document

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When a bright 5 year old called Matilda was having the meaning of climate change explained to her by her father, in a moment of brilliance, and using the kind of pure logic only a child has, she replied:

"We don't want the planet to be yukky, do we Daddy? Isn't that for the grown-ups to fix?"

And in that simple moment, Matilda's Planet was born.

At Matilda's Planet we integrate, adapt and commercialise new technologies that either reduce energy consumption, harvest energy inexpensively or conserve the energy that we use. With Matilda's Blanket, we're creating new, cosier homes that people can afford to live in – the same homes they were living in before, only much warmer and much more cost effective to heat.

Matilda's Blanket is changing perceived thinking on home insulation. It provides distinct advantages over older technologies such as external cladding and traditional internal wall insulation (IWI); and it's keeping homes warm on the inside, making them cost less to heat, and protecting the environment.

Better performance – u-values of 0.30 – 0.24 is insulation way beyond target standards; as are acoustic and fire performance.

Better for landlords – with fast, low cost installation, no change to the external character of the property, and Energy Obligation Company (ECO) compliance, landlords will regularly find it's the best solution, socially and commercially.

Better for residents – there's no plastering involved and rooms can be completed in a day - so there's no need for residents to move out during installation; and, most importantly, homes are significantly warmer and fuel bills are reduced significantly.

Better for the environment – the energy savings delivered make a massive contribution to carbon emissions reduction.

KEEPING HOMES WARM, SAVING MONEY, SAVING ENERGY

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TECHNICAL INFORMATION

TECHNICAL OVERVIEW

Matilda's Blanket is a patented system, which uses an exceptionally smart damper system which allows the new wall to 'float' within the structure, letting it move with the building, preventing any potential cracks. The blanket is thermally decoupled from the inherited structure. This gives it significantly better technical performance in thermal and acoustic insulation and, along with other features, addresses the most common concern in IWI systems; that of moisture transfer. It ensures that both standard and interstitial condensation is prevented by avoiding any dramatic temperature changes.

Internal Wall Insulation, is (in corporate speak) disruptive. However. Matilda's Blanket is the least disruptive solution, employing a revolutionary new approach. In practice one of its key advantages is the simplicity that it brings to programmes for thermal improvement; whether the target property has been derelict for years or still has the householder in occupation. As a result, it is creating a stir in the retrofit marketplace and has been successfully deployed on a range of large projects. It is also currently in trial with over a dozen new customers who are planning programs of several thousand units each. It's a winner for the developer, the installer, the landlord and the householder.

The system has minimal impact on the living space in the room – it's no thicker than a standard radiator. This also makes for easy transportation and installation, reducing the need for large teams and multi-trades on-site which is a significant factor for any project manager.

The Blanket System is the most sophisticated internal wall insulation solution in the world which incorporates the initial site survey, off-site fabrication, delivery of bespoke materials in a complete box set and installation.



TECHNICAL SPECIFICATION

Matilda's Planet Internal Walling Insulation consists of glasroc board as the back panel, PIR insulation (foil-faced) sandwiched between the front and back panels and Rigidur H (gypsum board) as the front panel (facing the warm side). Each panel is bonded using a reactive hot-melt polyurethane adhesive.

The board is available with the nominal characteristics shown in the Table below

NOMINAL CHARACTERISTICS	
Length	2400 - 3000 mm
Width	1200 mm
Insulation thickness (PIR)	50 mm
Plasterboard (Rigidur H)	10 mm
External thickness of plasterboard (glasroc)	6 mm



Ancillary items supplied as part of the Complete Blanket System, include:

- Header track
- Foil coating
- Skirting
- Base damper system
- Joint adhesive
- Joint filler
- Intumescent sealant
- Fixings and plugs.

MANUFACTURE

Panel lamination involves materials being glue coated and laminated through a dedicated process to create a "blanket". The blanket is then cut to size and the relevant tongue-and-grooves are cut in using dedicated machines. Finally, the tracking system is installed and the panels foil coated to complete the panel.

As part of the assessment and ongoing surveillance of product quality, The British Board of Agrément (BBA), has:

- Agreed with the manufacturer the quality control procedures and product testing to be undertaken
- Assessed and agreed the quality control operated over batches of incoming materials
- Monitored the production process and verified that it is in accordance with the documented process
- Evaluated the process for management of non-conformities
- Checked that equipment has been properly tested and calibrated
- Undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

DELIVERY AND SITE HANDLING

Matilda's Blanket System is delivered to site on 3m wrapped pallets. In some cases and upon request 3m crated pallets can be provided. Since the design and production of the system are site-specific, the boards are pre-cut and packed by wall or room set depending on the required quantity. Each board has the manufacturing code printed on the surface and each pack carries a label with the product description and characteristics, installation instructions, manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

It is essential that the boards are raised off the ground and stored inside or under cover on a dry, level surface in a well-ventilated area. The boards must be protected from rain, snow and prolonged exposure to sunlight and any that have been allowed to get wet should not be used.

The boards must not be exposed to a naked flame or other ignition sources. Materials should be distributed to site in an appropriate manner as to avoid damage and lost components.

ASSESSMENT AND TECHNICAL INVESTIGATIONS

The following is a summary of the assessment and technical investigations carried out on Matilda's Planet Internal Walling Insulation.

DESIGN CONSIDERATIONS

Matilda's Planet Internal Walling Insulation is an internal, prefabricated, modular insulation system comprising rigid PIR boards bonded to plasterboard, for use as an insulating dry lining to masonry and hard to treat walls, in existing and new dwellings and buildings of similar occupancy.

The boards are designed for use as an insulating dry lining system for new and existing dwellings or buildings with similar occupancy. They should be installed in accordance with the Certificate holder's instructions.

Since insulating dry linings are not intended to offer resistance to rain penetration, walls to be insulated with dry lining must be already rain resistant and show no signs of water ingress.

When insulating solid walls, particularly older exposed walls, designers should consider the extent to which the wall and components in the wall can tolerate the lower temperatures and prolonged drying time resulting from the application of the Internal Wall Insulation. Care should also be taken to assess the risks of interstitial condensation forming and as such, additional measures such as sealing the external render from water penetration should be considered.

It is recommended that services which penetrate the dry lining, eg, light switches and power outlets are kept to a minimum and sealed with intumescent in order to limit damage to vapour checks. If present, mould or fungal growth should be treated prior to the application of the system.

It is essential that proper care and attention is given to maintaining the integrity/continuity of Vapour Control Layers (VCL).

De-rating of any electrical cables in areas where the product restricts the flow of air should be considered.

The system may be installed on a masonry construction including clay and calcium silicate bricks, concrete blocks, and natural and reconstituted stone blocks. Masonry walls of new buildings should be designed and constructed in accordance with BS 5628-3 : 2005 and BS 8000-3 : 2001. It is essential that such walls are constructed having regard to the local wind-driven rain index. Where reinforced masonry is involved, the design should be in accordance with BS 5628-2 : 2005.

The installation of an insulating dry lining system requires careful detailing around doors and windows to achieve a satisfactory surface for finishing. In addition, every attempt should be made to minimise the risk of thermal bridging at reveals and where heavy separating walls are attached to the external wall. New work must be designed to accommodate the thickness of the dry lining, particularly at reveals, heads, sills and in relation to ceiling height.

Where the dimensions of fixtures are critical (eg bathrooms), these should be checked before installation.

PRACTICABILITY OF INSTALLATION

The system is designed to be installed by a competent general builder, or a contractor experienced with this type of system. Full training is provided.

THERMAL PERFORMANCE

Calculations of thermal transmittance (U value) of a specific construction using insulated dry lining should be carried out in accordance with BS EN ISO 6946 : 2007, BRE Report (BR 443 : 2006) and BRE Digest 465, using the declared thermal conductivity (90/90 value) $0.021 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for the insulation component and a design value of $0.21 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for the plasterboard.

The U value of a typical wall construction will depend on the thermal value of the substrate wall and its finish. An example U value of the system installed on a typical brick substrate wall (thickness 215 mm and $\lambda 0.77 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) including a 30 mm cavity with low emissivity on both side ($e = 0.20$), internal board (Rigidur H) of thickness 10 mm, external board (Glassrock) of thickness 6 mm and PIR insulation of thickness 50 mm will be, $U = 0.29 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$.

JUNCTIONS

The system can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between elements and openings. For Accredited Construction Details, the corresponding psi values in BRE Information Paper IP 1/06, Table 3, may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in:

England and Wales — Approved Documents to Part L and for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). See also SAP 2009 Appendix K and the iSBEM User Manual for new build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

CONDENSATION

SURFACE CONDENSATION

Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the junctions with other elements are designed in accordance with technical guidance.

For buildings in Scotland, constructions will be acceptable where the thermal transmittance (U value) of the wall does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and openings and junctions with other elements comply with the guidance given in BS 5250 : 2011, and Annex G, BRE Report (BR 262 : 2002).

INTERSTITIAL CONDENSATION

The thermal insulation delivered by Matilda's Blanket removes the most common cause of condensation; a cold surface meeting warm moist air. In addition to the thermal insulation the laminate delivers two layers of vapour control in the form of vapour control membranes with a third membrane applied to the external wall. This coupled with the air tight void behind the laminate removes the risk of moisture transmission either from the warm living area or from the external environment.

TESTS

Results of test data carried out on Matilda's Planet Internal Insulated Dry Lining were assessed to determine:

- **Soft body impact testing on laminated board**
- **Impact resistance**
- **Adhesion and cohesion**
- **Flexural strength**
- **Resistance to perforation**
- **Determination of partition stiffness.**



INVESTIGATIONS

The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and compositions of materials used. A condensation risk analysis was carried out. A series of U value calculations were carried out.

An evaluation was made of the component compliance with Standards as listed below:

- **PIR to BS EN 13165 : 2012**
- **Evaluation of compliance of Glasrock to BS EN 15283 : 2008**
- **Evaluation of compliance of gypsum to BS EN 520 : 2004**
- **Evaluation of compliance of the insulated gypsum board to BS EN 13950 : 2005**
- **Evaluation of compliance of the filling PIR (at the bottom of the system) to BS EN 13165 : 2012.**

BLANKET BENEFITS

KEY BENEFITS

KEY BENEFITS	SUPPORTING DATA
High levels of insulation which significantly lower energy bills for the owner/occupier	We have modelled our system using buildDesk & WUFI and the performance figures from our National Physics Laboratory test results.
Significant reduction of risk and Health & Safety issues on-site	As the system is manufactured off-site in our factory, a large part of the risk is moved there. There are no 'Working at Height' issues either
Quick to install requiring semi-skilled labour	It's a modular system that installs very easily. Training is required, but the level of skill needed is low
Internal solution - no planning issues	There is no need to go through lengthy Planning Permissions
Manufactured to engineering tolerances off-site	All quirks, anomalies, problems are identified at survey stage and manufactured INTO the solution, leaving little requirement for on-site adjustments
Highly cost-effective	Many of the costs associated with EWI or other IWI systems simply don't exist. And the speed of installation is under half that of external insulation, significantly reducing labour costs and risk
Can be installed all year round, in any weather conditions	Can do more installations per year
High acoustic and fire performance	Thanks to the materials used, confused jointing and the sealed air gap
U VALUE OF 0.29 - 0.24W.M2K	Using SAP calculations

DURABILITY

The system complies with all building regulations. The panels are made up of British Gypsum boards and PIR, all of which hold the necessary EU Standards.

IMPACT TESTING

Rigidur H 7lb sledge hammer tests by British Gypsum showed it to be upto 22 times stronger than plasterboard (plasterboard broke on 3 to 4 swings. Rigidur on 65-67 swings

60 YEAR LIFE

Our system will not be affected by weathering or any external forces, it will be in ambient internal conditions. The only way that the system could degrade would be through misuse or abuse. The boards themselves have the backing of British Gypsum's SpecSure Lifetime Warranty.

BBA

Certified

REMOVABLE AT END OF LIFE

The system can be deemed to be demountable if required as it is not direct fixed to the structure and therefore can be easily replaced if required.

REPAIRABILITY (DIY/INSTALLER/MAINTENANCE)

Damaged or broken elements (although unlikely) can easily be replaced by simply cutting away damaged section and reinserting a new patress section bonded to the existing structure.

PERFORMANCE OVER TIME/DEGRADATION

Once again, consideration has to be given with regards to the potential risk – while we could quite understand the risks for external insulation – our internal solution has limited or no risk of degradation.

APPEARANCE/COLOUR FASTNESS

As an internal solution it would be highly unlikely that the system over its life time would not be redecorated to suit occupier's taste. However we are very conscious that the smoothness of the finished internal wall is critical. To that end we have developed a specially engineered product to achieve this high level of finish.

THERMAL PERFORMANCE STANDARDS

Conforms to UK Standards - (Applicable Standards depend on type of product, e.g. BS 4841-2 applies to rigid PIR products. We need to know the full range of product types to determine which). Please also note that the structure will not be thermally bridged by using our system as it is independent of the building.

R VALUE, U VALUE, EU STANDARDS

Additionally, if required, we undertake to do a thermal model for each installation/design using desk top studies and standard modelling techniques.

AGEING TESTS

Covered by British Gypsum tests.

ACOUSTIC VALUE

The Acoustic Value of the total structure will be significantly enhanced by using our system.

Acoustic performance is an often overlooked benefit of a Matilda's Blanket installation, but in addition to the thermal performance Matilda's Blanket also gives great sound insulation in the region of 46db. The decoupled wall provides an approved detail under Building Regulations, section E.

BUILDABILITY

SECONDARY ADAPTATIONS

Window reveals and door abutments are standard details.

HEALTH AND SAFETY

The risk during installation is very low – with no working at heights, minimal cutting and no machinery required during the installation phase. A low level of risk should be considered regarding manual handling, however, this has been mitigated as we have reduced the weight of each individual panel to below 25Kg

INSTALLATION TEAM AND PROCESS

The system is reliant on the level of accuracy of the survey. A competent person can easily install the system, but they must be trained by ourselves. Once trained, a semi-skilled work force can be used to undertake these works and full training is provided by Matildas Planet.

SPECIALIST TOOLS/EQUIPMENT

Hand tools only required for the installation. Each metal section required for the head and base tracks has been cut to length in the factory. Adhesives and joint filler supplied with the panels.

EASE OF TRANSPORT

The panels are delivered and off-loaded to the site using a truck of the required size. Alternatively, delivery can be to a central 'Distribution Centre' (warehouse) and rooms called off as and when needed – requiring a small van for delivery.

EASE OF STORAGE

No on-site storage is necessarily required – each room will be prepared into a series of rooms sets to be called off from local distribution centres required for that day's work/operation.

PLANNING PERMISSION

Not required – Note: Listed buildings will require a working interface with the local conservation officer- however as the system can be argued to be demountable and that the system does not affect or is fixed to the walls, the system sits within the requirements for conservation.

WEIGHT PER M2

The system in the design phase takes consideration of the any loadings. Each panel is easily carried by the two-man team on-site.

Total overall thickness including the air gap is from 81mm.

81mm

CONFIDENCE

CONFIDENCE	MATILDA'S PLANET COMMENTS
Certification	Full BBA approval.
Cost per M2 (complete)	The cost of the total system installed is below industry standard and completed in less than half the time of external, which has a major effect on overall cost.
Production Capacity	Matilda's Blanket is currently fabricated in four facilities to meet the demand in all regions (England, Scotland, Wales & Ireland). As an additional measure, a full set of machinery for an additional facility is maintained to meet the rising demand.
Factory Production Control	Operating to ISO standards
Installation Costs	As above, installation is rapid and requires a 2 man, semi-skilled workforce, meaning a major saving on all other systems.
Service Life	Backed by British Gypsum's product guarantees.
Maintenance Requirements	No maintenance is expected to be required.
Product Warranty	Product warranty is provided. 25 Yr. Insurance backed guarantee.
Life Cycle Analysis Issues	Sustainable use of natural resources. British Gypsum products backed by BES 6001 – Responsible Sourcing Accreditation.

HEALTH AND WELLBEING

HEALTH AND WELLBEING	SUPPORTING DATA
During Installation	The product is safe during installation. It poses minimal risk as all fabrication is completed off site and delivered in ready to install panels.
In Use	The product is safe during use. It is installed by fully trained company endorsed installers.
VOC's CFC's HCFC's, Formaldehyde (Building Regulation C4 'resistance to weather and ground moisture', 'the walls....shall resist the passage of ground moisture to the inside of the building'.)	None used in the production of the system. As an internal solution "Resistance to weather" is not applicable
COSHH Data Sheet	Available for all constituent parts
In Production/Manufacture	All production protocols are in place. As the system arrives on-site as a manufactured, finished product, all elements of the process can be monitored – from the way the system is manufactured through our Quality Management System.
Dust propagation	During production we have a full extraction system in place. There are minimal dust issues on-site and none in use.
Mould/Mildew promotion	The total system is manufactured on mould-resistant boarding and will not propagate.

FIRE PERFORMANCE STANDARDS

Test method & test number	Parameter	No. tests	Results	
			Continuous parameter - mean (m)	Compliance parameters
EN ISO 11925-2 (30s exposure - surface)	F _s	6	-	Compliant (Nil mm)
	Flaming droplets/ particles		-	Compliant
EN ISO 11925-2 (30s exposure - edge)	F _s	6	-	Compliant (Nil mm)
	Flaming droplets/ particles		-	Compliant
EN ISO 11925-2 (30s exposure - Specimen Turned at 90°, insulation core exposed)	F _s	6	-	Compliant (≤ 130 mm)
	Flaming droplets/ particles		-	Compliant
EN 13823	FIGRA _{0.2MJ}	3	12 W/s	-
	FIGRA _{0.4MJ}		12 W/s	-
	THR _{600s}		1.1 MJ	-
	LFS		-	Compliant
	SMOGRA		3 m ² /s ²	-
	TSP _{600s}		32 m ²	-
	Fall of Flaming Droplet/Particle?		-	Compliant
	Flaming of Fallen Particle Exceeding 10s?		-	Compliant

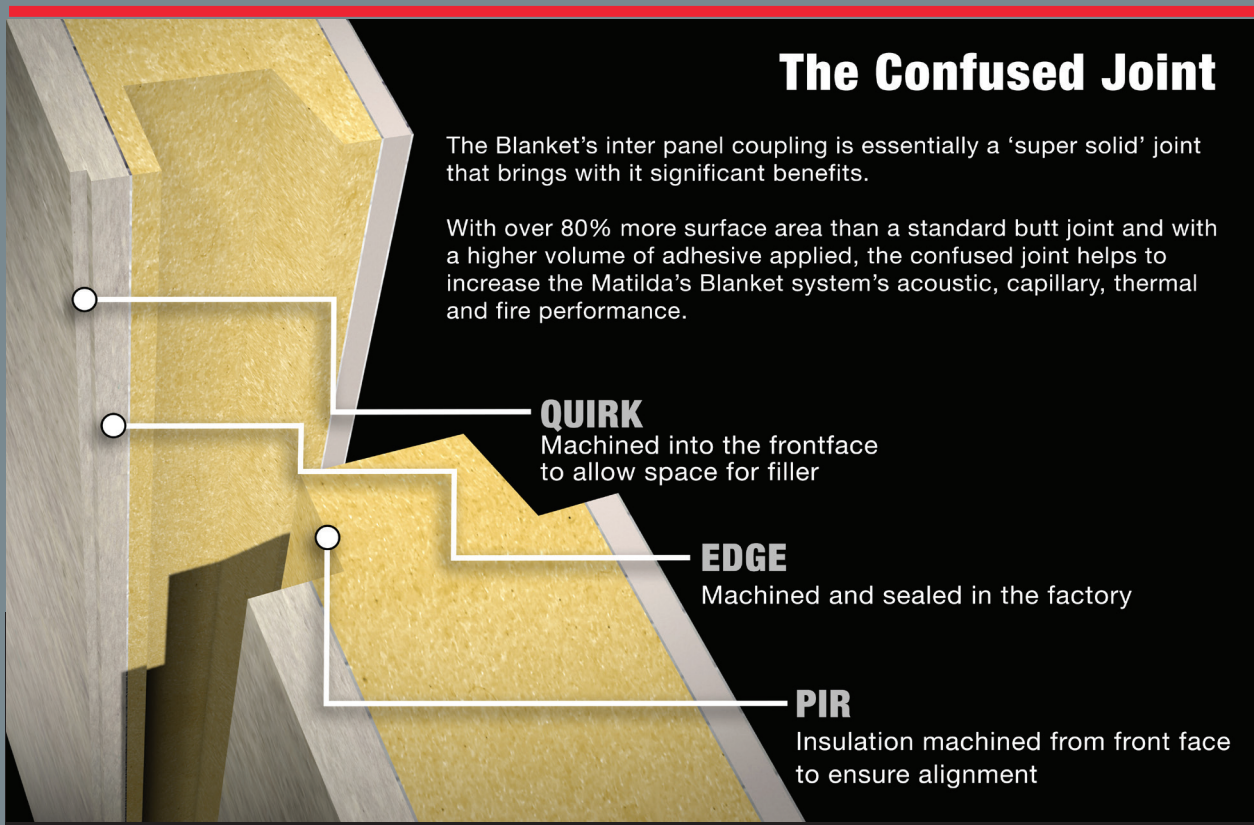
Fire Behaviour		Smoke Production				Flaming Droplets	
B	-	s	1	,	d	0	

i.e. B – s1 , d0

Reaction to fire classification: B– s1, d0

ADDITIONAL INFORMATION

Predictable performance with an audit trail through to the end product. We have a team of technical experts who will help you design your solution to a predicted technical performance. The fact that the system is factory made in a monitored production environment means you have an audit trail that demonstrates that what you designed is what is installed."



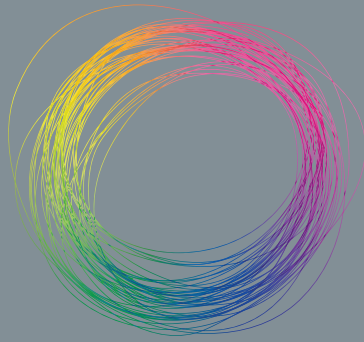
INSTALLATION

GENERAL

- Matilda's Planet Internal Walling Insulation is for use on internal walls.
- Installation should be in accordance with guidelines, good dry lining practice and the Certificate holder's instructions.
- The system is prefabricated to fit around windows, doors, air bricks. It is essential that all parts of the system completely fill the spaces for which they are intended and are adequately secured.
- All insulated dry lining installations require careful planning and setting out.
- Before fixing the system, sufficient time must be allowed for damp-proofing treatments, where applied to dry out.
- A minimum ambient temperature of 10°C is required during installation to ensure best results.

PROCEDURE

- Existing power sockets and radiators should be removed and extended allowing them to be re-fixed after the system has been installed.
- To begin the process of creating a sealed air gap behind the panel, the entire wall has to be covered in the foil supplied. The foil has a scrim in it to prevent any sharp edges on the existing wall from tearing it. It is important that the entire wall is covered with no gaps. The edge of the foil should be overlapped by approximately 100mm. The foil should be extended around the ceiling, the end walls and the floor so that it will go under all the rails.
- To ensure a smooth front face the rails have to be exactly aligned using a laser level and secured in place using standard fixings.
- The panels are designed to be inserted into the rails in a specific order according to the installation drawing. Once located, care should be taken to ensure that the dampers at the foot of the panel are inserted and sit within the base rail.
- A line of joint adhesive is applied down the entire length of the joint once the panels are slid in place and the accuracy of fitting checked. The panels are then put in vertical compression by tightening the damper nut up at the bottom. The final panel with the compression joint on the side is inserted in position leaving the compression joints exposed. Once inserted into place and bonded using the adhesive vertical compression is applied as before. Then, horizontal compression is also applied by tightening the dampers on the vertical edge in exactly the same way as the bottom dampers.
- The bottom dampers and panel joints are back filled using a strips of PIR insulant and a special joint filler respectively.
- The skirting is applied using a skirting adhesive. A bead of intumescent sealant is run around the entire wall — around the skirting, up both sides of the wall, around the ceiling joint and around all the window reveals.



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