



timber frame system manual

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BDA Agrément Certificate BAW 18-070/02/A
energystore superbead cavity wall insulation 0.033λ



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Introduction

energystore company background

energystore has been a manufacturer and supplier of insulation to the building trade for nearly 50 years and holds many accreditations for its products.

energystore is the 'system designer', and in being so, is the sole supplier of insulation materials to you – as a licensed installer – under our signed agreement.

The installer's relationship with KIWA BDA

KIWA BDA Certificate: 18-070/02/A

Relationship includes:

- The process of BDA approval from assessment to certification.
- The 'adequacy of fill' & 'fire resistance' tests.
- Ongoing BDA inspections following certification.
- The BDA installer surveillance scheme.

Installer pre-requisites to being approved to use energystore superbead on timber frame projects:

Given the increased potential risk of fire on a timber frame construction site, all installers interested in using **energystore superbead** on timber frame projects must:

- Be members of the Structural Timber Frame Association, adhering to their high standards.
- Be able to demonstrate a clear understanding of Site Safe standards.
- Have been trained by energystore in the differences between timber frame & traditional install processes.

If the installer cannot satisfy the above requirements, they cannot become approved to use **energystore superbead** in timber frame buildings.

energystore's responsibilities

It is energystore's responsibility as the system designer and supplier to advise, support and develop a working relationship with all installers in order to help them provide the safest and best-quality service to all customers at all times.

energystore will provide the approved and certified BDA system methodology, support and updates on an ongoing basis to all timber frame approved installer companies from the beginning to completion of contract.

energystore undertakes to:

- Provide training, approval and ongoing monitoring of technicians.
- Issue timber frame identity cards to approved installers (valid for two years).
- Ensure that all approved installation companies and their technicians comply with BDA and all other industry requirements.
- Undertake agreed inspections either with or without notice. (This will usually be on a frequency of between 10 to 15 week cycles, usually four per annum, or as necessary.)

Bonded bead product range

energystore superbead cavity wall insulation 0.033λ

IMPORTANT HEALTH NOTICE:

Pentane is heavier than air and will settle at lower levels e.g. at head height in a silo area. It is therefore essential to ensure the silo area is well ventilated at all times.

As a precaution, we would suggest that if you have a delivery of **energystore superbead** on a Friday and your premises is then shut for the weekend, be sure to open all doors and windows and turn on any fans to circulate fresh air through the building as quickly as possible on your return. Should anyone feel unwell, vacate the area immediately.

And always remember to inform others.

Adhesive product range

The range of energystore adhesives are individually designed to work with each of the bonded bead types available. Installers are required to use only the adhesive supplied by energystore.

To get an effective bond it is essential you use the correct adhesive designed specifically for the bead product you order.

Storage of adhesives and directions for use:

- Do not allow the adhesive to freeze.
- Keep out of direct sunlight.
- Store all adhesives between 5-25°C.
- Only use approved adhesive.
- Adhesives come in two types: one to be diluted and one that should not be diluted.
Follow the instructions on the drum carefully, and if in doubt contact energystore prior to commencement of work.
- Filter all adhesive before use.
- Specialised adhesives are available for use in winter and extremely cold conditions.
- Adhesive must not be allowed to freeze or sit in sunlight; precautions must be taken to store materials in a frost-free environment.
- Batch numbers must be taken and noted to allow for accurate traceability and the expiry date must not be exceeded.

Building regulations

Ref. CIGA manual: *Installing Cavity Wall Insulation* (page 3).

Building notices for Northern Ireland, England and Wales:

All installers are now legally obliged to submit a building notice to the Building Control office of the appropriate local authority at least 48 hours before installation (or as specified). Failure to submit is a criminal offence that carries the risk of fine and/or imprisonment.

UK regional building regulations:

- **The Building Regulations (England and Wales)**
- **The Building Standards Regulations (Scotland)**
- **The Building Regulations (Northern Ireland)**

Buildings under construction

NEW BUILD SURVEY FORM

- A New Build Survey Form is to be completed before any installation works and must detail: services, construction of wall, position of noggins and grounds, boilers, fires and flues.
- It is suggested that at the pre-install survey, photographs are taken – per house type – of the exterior walls to be insulated.

- A site-specific risk assessment is carried out on all properties prior to commencement of work. This risk assessment is taken to site with the installer and is attached to the back of all work sheets.
- The drill pattern will depend on each individual building. All timber frame walls will need to be borescoped on the day of installation to ensure cavities are clean and all services are identified and installed in line with previously supplied architect site drawings.

INSPECT OTHER BUILDINGS

New build property warranties are usually supplied by the NHBC, Premier Guarantee, Global and or from the architect responsible for the build and its planning.



Agrément certificates

Certificate number BAW 18-070/02/A

This Agrément Certificate Product Sheet relates to **energystore superbead**, expanded polystyrene material injected in bead form with a bonding agent, for use in timber frame walls, masonry walls up to and including 12 metres in height, with nominal cavity widths not less than 40mm.

The product can be used in buildings above 12m in height provided the building has been assessed by energystore prior to install and the height waiver process has been followed.

Timber frame properties

Construction

There are several key differences that distinguish timber frame construction from other traditional construction methods.

In recent years, many approaches to timber frame construction have been developed, but all projects will have similar key features to consider the fire risk and moisture durability of a timber frame building.

Timber frame construction is developing and changing rapidly, but the diagram below outlines the typical components of a timber frame wall.

Typical timber frame cavities

Timber frame houses will have an empty cavity of typically 50mm between the external masonry and the timber frame. It is essential that this cavity remains empty to allow for adequate air circulation and to ensure that there isn't a bridge, allowing water to cross the cavity and come into contact with the timber.

Under no circumstances should this cavity be filled with **energystore superbead**. To further prevent risk of water exposure of the timber, a protective waterproof membrane is placed across the timber facing the external masonry.

The timber stud cavity will typically be in either 400mm or 600mm panel sections with a typical stud or panel width of 140mm.

Many timber frame structures will have a separate service cavity for electrical wiring as per the diagram below, but some builders may run the service cables in the same cavity as the insulation.

Where this is the case, careful consideration should be given to ensure that the wiring is kept in conduit to allow easier wiring changes in future. This means that the insulation used doesn't need to come into contact with loose wiring as per NHBC Standards clause 8.1.7. This stipulates that electricity cables should not be placed under, against or within thermal insulation unless they have been appropriately rated, and that PVC covered cables are not in contact with polystyrene. All installers and subsequent trades must be made aware of this.

Vapour control layer

The timber frame panels will also have a vapour control layer (VCL) on the internal facing of the timber stud. This vapour control layer or VCL is

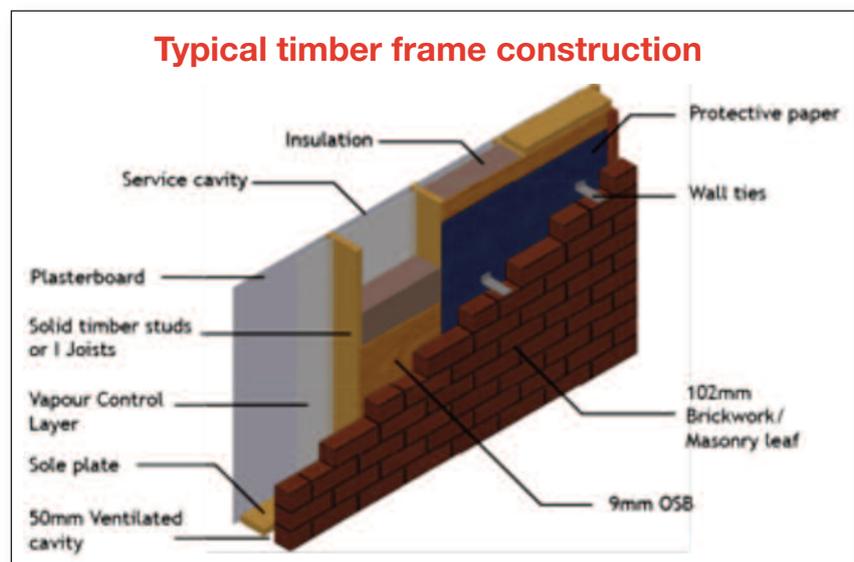
designed to ensure that the moisture content of the timber is kept at or below 20% and to ensure air tightness to boost the energy efficiency performance of the building.

Where a property has no VCL the install must not go ahead! Alert the site foreman and return when this has been rectified. It is essential that continuity of the layers be maintained at laps and joints at wall, ceiling and wall/floor level.

Particular care should be taken when re-sealing the membrane after installing energystore superbead.

The vapour control layer is regularly cut and resealed as part of the construction process but faulty workmanship when making good can lead to reduced air tightness, affecting the overall performance of the building.

High performance VCL tape should be used such as Siga Sicral or Tyvek AVCL. The use of these products will ensure that the integrity of the VCL is maintained and that any air tightness is not affected by the membrane being cut.



Timber frame properties

Installation equipment

The following is a comprehensive list of equipment and accessories required by all installers of cavity wall insulation.

System manual

This installer manual should be carried on-site by all installers and be available at all times. It sets down measurable standards and routines to ensure quality and professionalism.

Cavity wall insulation injection machinery

The cavity wall insulation injection machinery has to be regulated in order to achieve BDA approval.

Any changes to the installation system used by a registered installer must be approved before being put into use on-site.

All approved installation machinery should bear a registration plate that is specific to the installation system and the cavity wall insulation product being used. All cavity wall insulation systems and injection machines must operate in strict accordance with the system specification and BDA certification.

BDA

The preferred system of installation described in this manual, together with all material recommended for cavity wall insulation, has been tested and approved by BDA. The materials and system of installation described should NOT be altered.

BDA approved operations, policies and their cautionary procedures exist for the safety of the property occupier, the customer, installers and members of the public.

Compressors

Compressors should be of a suitable capacity to deliver the required psi/bar as stated by the system designer.

This will vary depending on:

- The number of delivery hoses attached to the compressor.
- Operating lengths.
- The height of the building and or its distance from the truck.

The compressor should operate at a working pressure of 5 bar maximum when installing **energystore superbead** in a timber frame property.

Adhesive

energystore approved adhesive MUST be used when installing **energystore superbead** in a timber frame property.

Adhesive must be fed through a flexible hose to the rear

Table of flow rates bead/adhesive

It may be necessary to alter the jet size to achieve the correct adhesive flow rate.	Bead (Kg/min)	Adhesive (ml/min)
	0.8	190
	0.9	205
	1	220
	1.1	245
	1.2	265
	1.3	285
	1.4	310
	1.5	330

of the injection gun, then through a jet sprayer which will apply a fine coating of adhesive to the beads before they're pumped directly into the cavity of the wall under the recommended operating pressures illustrated in the above chart.

To find the adhesive flow rate per minute, open the valve to the jet and establish a fine, steady spray of adhesive. Collect spray in an accurately marked measuring cylinder for a period of one minute. Compare the flow rate with the chart and adjust accordingly.

Quality control

Records must be kept of delivery of adhesive and bead from the suppliers and must include the following:

1. **Date of receipt.**
2. **Batch/product number.**
3. **Quantity delivered and container size.**
4. **Quality checks that were made on each product and any action required.**

Bead delivery hose

This usually has an (internal) diameter of 38mms with a coiled helix anti-static reinforcement to earth any electrical charges. The hose has a smooth inner facing.

Airline hose

Airline hoses are 12mm reinforced piping and convey high-pressure air from the compressor to the regulators, the control valves and the head of the gun (also known as the venturi chamber).

Adhesive line

The adhesive line conveys the adhesive from the glue chamber to the delivery gun. The line is usually between 6mm and 10mm in diameter.

Delivery gun

The preferred internal construction of the delivery gun is always of steel or aluminium. The delivery gun has a diameter of 22mm.

Timber frame properties

The pre-delivery area is also known as the venturi. Essentially it is the area where the bead is mixed with the adhesive to form a bonding blend that will then cure and set in the cavity wall.

Nozzles

To avoid any damage to the bead and to ensure a consistent spread of the adhesive, only directional nozzles should be used when installing in a timber frame property.

Adhesive flow/regulation

The adhesive flow is controlled by adhesive injection jets. These are available in a variety of sizes and can be interchanged to regulate the adhesive flow without compromising the air pressure flow.

Operating pressure

The system is designed to operate at a safe maximum pressure. Preset safety valves must also always be fitted during operation.

The maximum pressure for delivering the two main products is:

- **Bead delivery: 5 bar maximum.**
- **Adhesive delivery: 5 bar.**
These may be regulated to adjust flow rate.

Quality checks

Factory quality control

Factory quality control is in place to ensure that the size and density of all bead products matches the required specification and that installers' equipment is operational in accordance with energystore's system manual.

This involves:

- Checking the diameter of bead by passing samples through a graded series of sieves.
- Checking the density of bead by filling a vessel with dry bead and then weighing the contents hourly during production process.

Installation equipment tests:

Installer equipment is inspected daily prior to the commencement of work, and the flow rate and bead weight/density recorded.

Flow rates are calculated by filling a hessian bag with dry bead for 60 seconds. The bead is then weighed and recorded.

Select the appropriate adhesive flow rate (AFR) in accordance with the flow rate of the bead and density (DBD) of the bead being used.

The ratio of adhesive to bead must be correct. To ensure

this, a bead flow rate check should be carried out and the flow rate of adhesive adjusted to suit (see the bead adhesive flow rate chart on previous page).

The pump is charged with adhesive and all interconnecting lines and pipes are fitted. Compressor is started and adhesive pump is pressurised to 5 bar.

Health & safety

It is the responsibility of all installers and their employees to ensure that they are working in accordance with the Health and Safety at Work Act at all times.

It is the duty of every employer – as far as is reasonable – to ensure the health and safety of every employee.

It is also the responsibility of every employee to take reasonable care of his or her own safety. All employees must make themselves aware of their company's health and safety policies and procedures at all times.

Working on a timber frame construction site

Timber frame can be a high-risk fire hazard when appropriate care is not taken on-site. Every construction site has combustible materials, waste piles and processes that create heat. Heat can cause combustion of materials on-site.

Prior to working on a timber frame construction site, all installers should have received and reviewed the site's fire-safety plan and be fully aware of Site Safe policy.

Installers must be aware of the location of temporary fire doors, ensuring they are always closed, designated smoking areas and the importance of a tidy site with no waste being left in risky areas.

If the practices being observed on the construction site give you cause for concern, notify the site fire office and do not return to site until the concerns have been properly addressed.

Protective clothing & equipment

Installers are required to have the following available to them at all times on-site:

- **Gloves (anti-white finger gloves for drillers)**
- **Hard hat**
- **Reflective tabard/jacket/coat/leggings**
- **Appropriate dust mask**
- **Ear defenders**
- **Disposable gloves**
- **Hand wash/barrier cream**
- **Protective footwear**
- **Harness**
- **Ladder lanyard assembly**
- **Securing brace/hook**

Timber frame properties

Installation equipment

- Ensure all those operating any equipment on-site have had the appropriate training.
- Take special care when moving equipment and materials in order not to put yourself or others at risk.
- Disconnect the supply when not working with electrical equipment.

Access equipment

- Make sure all access equipment is securely connected, joints are secure and in good order, bolts and couplings are not damaged and correct spanners are used in order to prevent ringing bolt heads.
- Make sure access equipment is securely attached to the building with the correct harness straps and bolts in place.
- Check that all walkways on scaffolding and towers are secure and with the correct planked walkways and side kick boards fitted.

Employers responsibility

It is the employer's responsibility to ensure all staff are trained and have a good working knowledge of any equipment they are required to operate. Also that all staff have had adequate health and safety training to protect their well-being and that of other team members, other tradespersons and customers.

Body harnesses & personnel body protection equipment

All staff – without exception – are required to wear protective harnesses at all times while working. Failure can result in dismissal and the employer being fined or receiving a custodial sentence.

Handling materials

- Wear protective clothing at all times when handling materials.
- Never strain or expect others to risk injury.
- Whenever possible spread the load with colleagues when moving heavy materials or equipment.

Compressed air

- Ensure the compressed air is controlled and conveyed through the recommended equipment.
- Make sure all hoses are in good order and free of cracks, splits and fractures.
- Replace any damaged hoses and or connections immediately.
- Check safety valves at least once a week.
- Check the compressor's operation every week.
- Use only correctly sized couplings.
- Only qualified employees should operate the equipment.
- Only operate the equipment in line with the safe or recommended maximum pressure.

Ladders

- Before commencing works, check that ladders are the correct grade for heavy trade use and are in good order.
- If there are any signs of wear or damage, the ladders should be replaced immediately.
- Use ladders at the recommended angle.
- When using restraints make sure not to over tighten the ladder to the angle of the wall as this will cause metal fatigue and weaken the ladder.

Hoses & cables

Where hoses and cables cross the public footpath, display warning notices and make a simple footbridge to avoid leaving a trip hazard.

Drilling operation

Types of drill

Electric or cordless drills only.

Core holes must be 75mms in diameter.

- Check that no cables are present to prevent drilling through the power supply.
- Each panel should be drilled centrally and 100mm–150mm from the top of the panel.
- Always use quality, sharp core bits.
- It is imperative that a drill stop set to the depth of the plasterboard is accurately used at all times to prevent unnecessary cuts into the VCL.
- Drill with light pressure to minimise undue damage to the plaster board.
- Core holes horizontally – not at angles.
- Any electrical cables should already be marked on drawings and enclosed in conduit.



Drill points

- Drill holes should be made centrally in each panel, 100mm – 150mm from top of the panel.
- Any noggins will be shown on site plans. Locate noggins and ensure one drill hole must be drilled under noggins in each panel.
- One hole per panel should be drilled centrally under each window.

- Where there is a 25mm cavity between timber studs (usually found either side of windows), two drill holes should be made to ensure a good quality of fill. The first should be half way up and then 100mm – 150mm from the top of the cavity.
- One drill hole should be drilled under flues and waste pipes.
- Ensure the wall is filled completely, especially around the filling point. To do this rotate the nozzle through 180°.
- Consider the building features when drilling; be sympathetic to the cosmetic appearance of all properties at all times.
- Take care around building features without causing damage to panels.
- As every property is different, always explain the drilling pattern to customers.
- Keep customers well informed at all times.
- Remember: good communication is key to customer satisfaction.

Prior to filling, the installer should perform a 360° borescope check of the panel to ensure it has been built in line with provided specification drawings.

A slice no larger than 22mm should be cut in the VCL to allow the nozzle through the VCL. It is imperative that the cut in the membrane is no larger than 22mm to enable a satisfactory overlap of the VCL repair tape, ensuring that the VCL is in tack and the air tightness is not affected.

Filling can commence once the installer is satisfied that the panel has been built to specification, wiring is encased in conduit and location of the drill hole is suitable for the panel type. Usually there will only be one hole per panel. When drilling ensure no debris is introduced to the cavity.

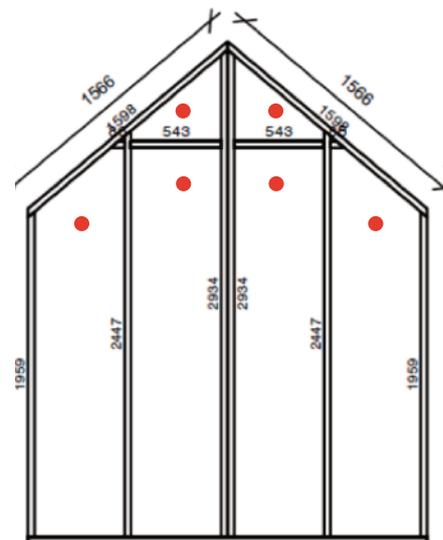
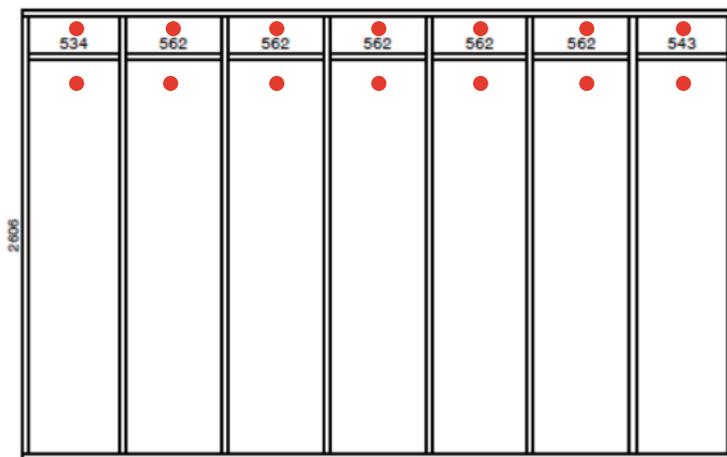
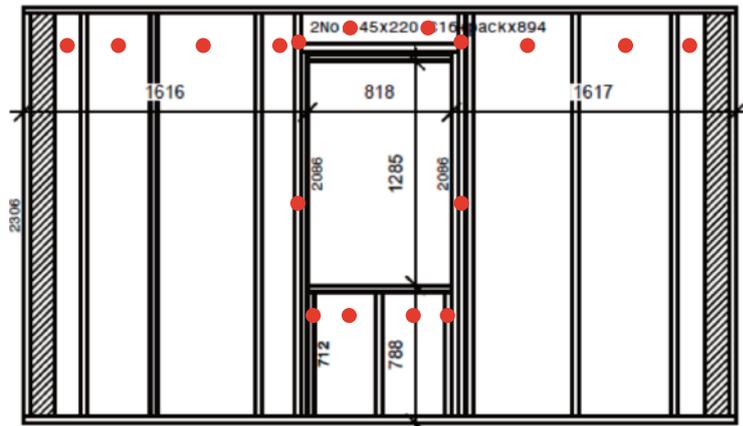
Drill pattern

Timber frame construction is a highly flexible method of construction and there will be many different combinations of panelling from site to site. It is important that site plans are carefully assessed before each installation to ensure that a drilling pattern is appropriate for the combination of panelling used on that site, with careful consideration of noggins, service lines, flues, vents and windows.

All cores should be drilled centrally and 100mm – 150mm from the top of each panel section. Any panel section that is more than 1.5m in height and less than 50mm in width should be drilled in two places, 100mm from top of cavity and then halfway down the cavity.

Drilling operation

Drill patterns for timber frame properties



Where there are panels with diagonal cut features, the drill holes should be located in the centre of the panel's width and in line with where the panel meets the diagonal.

Borescope

Borescope inspections must be carried out to verify the existence of clear cavities and to identify any services within the cavity.

A borescope check should be carried out on every panel being installed to assess and ensure that the panel has

been built in line with the specification provided in the architect's drawings.

The borescope check should be completed using the proposed drill hole in line with the drilling pattern (see diagram above) to minimise the number of holes drilled in the internal plasterboard.

Drilling operation

Making good

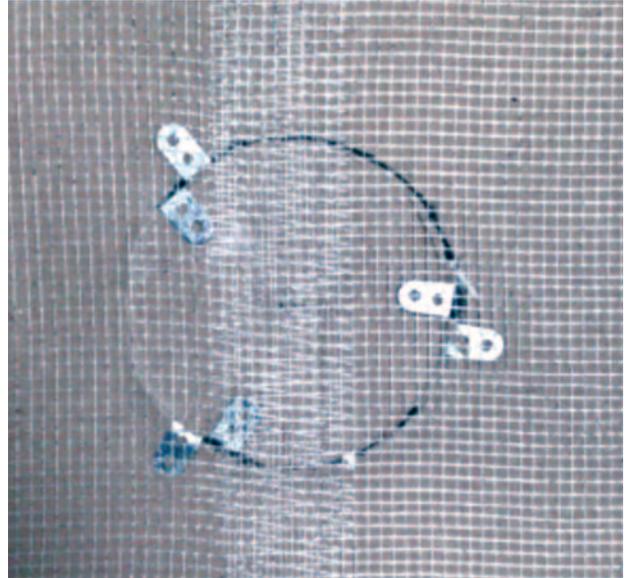
Once the panel has been filled with bead, the core must be replaced and VCL repaired as follows:

You must ...

- Repair the VCL: This is repaired using SIGA Sicral single sided tape, Tyvek, AVCL or a similar high performance repair tape specifically designed to repair the VCL and have a permanent airtight sealing. A 60mm patch is cut to ensure a minimum 15mm overlap of the tape.



- The original core is replaced using a bear drywall repair clip. It is imperative that the core is recessed and not raised and the dry wall clip sit as flush as possible to the surface of the wall so that they do not kink outwards.



- Once the core is replaced in this manner the repair must be covered with two lengths of 4" sticky scrim side-by-side as above. This application method will remove the risk of cracking, giving an approximate overlap of 60mm prior to plaster.

For wet trade: plaster finish

- A minimum of 2mm plaster/skim will be required to cover the repair.

For drylining

- The same process as above must be adhered to
- A minimum of 2mm drylining filler will be required to cover the repair.

Cavity wall insulation

Pre-installation building assessment & survey

The following checks must be made prior to the commencement of all insulation works:

- Building must be surveyed to ascertain its suitability for the installation of the bonded bead system.
- Photographs should be taken where possible of each house type to show studs, particularly around windows and bays where the 25mm sections appear.
- Every panel should have a borescope check to ensure suitability for fill.
- Always check that the details on the survey form are accurate and have described the cavity walls accurately.

Check the following are within normal expectations:

- The nature of the site.
- The form of construction.

Pre-installation property checks: external

Why are external checks necessary?

- To ensure the installation is carried out to an acceptable and approved specification without damage to the property or exposing any individuals to health and safety risks.

Prior to the commencement of the installation works, on-site installers must:

- Double-check the initial assessment. Is there anything unusual or different from the initial assessor's report?
- Borescope each panel to ensure specification and survey were accurate.

Final checks



Installed bead density check

How to calculate density:

- Measure the volume of materials used M^3 .
(Net area of walling x width of cavity.)
- Target installation density is $12 \pm 2 \text{ kg/m}^3$.

Final checks

- Check that all cores are satisfactorily replaced, no tools remaining.
- If any remedial treatment is required, ensure it is recorded and reported for action at the earliest opportunity.
- The site must be left clean and tidy as found.

Customer sign-off

Check that your customer is totally happy and satisfied with the installation work and then ensure that they sign off the job as being complete.

Customer care

CUSTOMERS ARE INDIVIDUALS

- Each customer has specific needs, desires, concerns and expectations that must be respected

and handled with understanding and good manners.

- Be sure you understand your customer's expectations in order to avoid issues later.
- Be polite at all times. Do not be overfamiliar or too friendly as this may cause offence.
- Be professional at all times.
- Explain what you are doing and why to keep the customer informed and happy.
- Give them the opportunity to air their concerns before commencing any works. It will save you time and trouble later.
- If you think you are going to have a procedural problem, bring it to the attention of the customer as soon as possible, discuss options and agree a way forward, noting on the job card the deviation and agreement reached.
- Note all reasons for, and changes to, standard procedure. Take photographs and record details of the agreement reached with the customer and the final outcome. Also include the testimony of any colleagues present.
- Ensure that your actions are always in the customer's best interest.
- Always encourage the customer to inspect and sign-off completed installation work, noting any changes, agreements and comments plus further works agreed.
- Always get a customer signature of satisfaction.



Head office: 21-23 Shore Road Holywood Co. Down BT18 9HX
Telephone enquiries: 028 90 301500 or 01772 429530 email: info@energystoreltd.com
www.energystoreltd.com