

TECHNICAL INFORMATION SHEET

Adhesive vs. Mechanical attachment of insulation boards used on Externally Insulated Facade Systems.

There is often confusion why some EWI system holders offer mechanical only fixings options for External Wall Insulation (EWI) systems but Parex does not. This is an understandable question and in simple terms some system holders conducted their third-party certifications many years ago, under an older testing regulation or they may not have an adhesive product that is suitable. There has been no requirement for them to have their systems tested under the newer regulations but at certificate renewal time, the system do not get re-tested but just re-assessed as to the suitability of their current system. This can offer a price advantage but can and does provide some alarming potentials for possible failures of the systems over long term periods. This may not concern an applicator whose primary objective may be price and speed but as a quality manufacturer of EWI systems we need to ensure our solutions are robust and last for many decades and thus offer an insurance against our products. As a customer you have a choice but as a system manufacturer (most system holders do not manufacture's any of their products!) we do not wish to offer anything but the best solution both for us as a company and for you as a customer. As an international manufacturer of over 30 years this has provided us with robust and trouble free solutions and many structures around the world that have caused no issues.

Why do Parex only require adhesive to bond the EPS insulation to the substrate?

Adhesive application of EPS* insulation is by far the most suitable way of fixing the insulation boards to either masonry, concrete or suitable render board substrates. The adhesive performs significantly better than mechanical only applications and has been proven to be a far superior fixing application on numerous occasions under test conditions and when real world severe wind loading weather events have occurred.

Because of this reason Parex does not use or recommend mechanical only fixing applications and this is also not the recommended guidance under ETAG004. The application process is heavily reliant on good application techniques. If the applicator uses a slightly bigger drill bit (for faster fixing application) the fixing may have limited holding capacity and in worst case scenarios could have virtually no holding capability. This may not get picked up during the installation stage and is thus covered over when the base coat is applied. Apart from the above, the potential for longer term failure is significantly higher with mechanical only fixing techniques as the fixings can relax and the insulation can contract slightly away from the fixing thus causing a loosening of the insulation. Parex adhesive significantly minimises these potential issues as it is a highly modified and high performance product which has high bond capability onto multiple substrates, which has also undergone rigorous testing and has achieved full European Technical Approvals, British and Irish Board of Agrément certifications and American Standard certification too.

The adhesive provides comprehensive bonding over the back face of the insulation board. In addition to superior bond strength, the adhesive also helps to reduce the stresses in the system which occurs at the insulation board joints as a result of thermal changes. The adhesive is an effective restraint against thermal changes which occur daily and seasonally due to the prevailing weather. With mechanical only applications the resultant effects can be;

- Fixing not working due to poor installation
- Curling of the insulation – particularly at the edges

Specialist materials for civil engineering, infrastructure and construction

- Fixing only generally provides minimal resistance to insulation shrinkage particularly at board joints
- Micro cracking or visible cracking of the adhesive – allowing in moisture – consequence of above
- Staining of the façade – usually shown up as joint lines – consequence of above

Apart from the potential for failure, when mechanical only application is used, the prospective for thermal breaks to occur between the insulation panels is increased and this may, over time, show through the surface finish leaving un-slightly sight lines. This can be particularly apparent when an acrylic finish is used and can be a significant issue if a poor-quality base coat is applied and the substrates begins to micro crack – This may not begin to occur until many years have passed but once it does, allows moisture to penetrate the system which could cause many issues to the property if not detected in time.

The adhesive techniques distribute rather than concentrate the load that is created using a mechanical fixing. The tensile bond strength of the Parex adhesive exceeds the 115 kN/m² tensile strength of the insulation board.

For bonded only applications, the adhesive can be applied over the entire back face of the insulation board by applications with a notched trowel or for uneven substrates or when a dot and dab method is used, Parex recommends a minimum of 50% coverage of the board, based upon a full perimeter band and with a minimum of 5 large dabs in the fixing location points.

At all corners, always ensure a full adhesive bed to the edge of the insulation is achieved.

Even assuming a worst-case coverage of 25% of the insulation, the tensile bond strength (pull off strength) of the adhesive, far exceeds the wind loading requirements for the UK. At all corners.

Does the adhesive thickness affect the bond strength?

With adhesive applications, the thickness of the adhesive does not affect the bond strength. When applied to the Siniat Weather Defence board, which Parex has a BBA system approval on to, and to other Parex recommended render boards, the failing factor under wind loading will be the connection between the render board and the framed substrate, not at the adhesive interface. Increased pull-off performance of the render board is achieved by increasing the number of board fixings subject to a structural engineers design approval.

When do Parex require the addition of mechanical fixings?

Mechanical anchoring is always required in addition to an adhesive layer for surfaces unsuitable for bonding only applications, such as rendered substrates, painted surfaces or water resistive barriers. Always consult Parex for technical advice and a project specific specification.

Due to the make-up of some types of insulation, mechanical anchoring is always required as an addition to the adhesive. This generally applies when using suitable external façade insulations such as Phenolic, Mineral Wool and some PIR boards.

Can I just use mechanical fasteners and no adhesive?

No. In addition to not providing effective thermal restraint, when mechanical fasteners are the only form of connection to fasten the insulation board, the attachment failure under full scale negative wind load (wind suction pulling off the boards) laboratory testing (to replicate the conditions that can occur to the most

Specialist materials for civil engineering, infrastructure and construction

vulnerable parts of the building e.g. external corners, high exposure locations) is caused by the fixings creating a punching shear (the fixing is left in place and the insulation is pulled away) around the fastener head through the insulation panel. A typical 65mm diameter fastener, fixing a 50mm insulation panel at 8 fixings m^2 will provide a negative wind load failure of approximately $43kN/m^2$. This is significantly less than is achieved using the insulation board and adhesively fixed application. Insulation thickness beyond 50mm does not significantly increase the pull off resistance of the insulation.

Conclusion

If the insulation board was mechanically only fixed, under severe wind loading conditions, the insulation could shear at the fixings and the whole insulation panel would come away and the surface finish can show staining marks around all the board joints. Should this occur the issues are who is to blame the system holder or the installer? Why take the risk? If it was your home you would want a fit and forget system and not be concerned will it fail in the future?

Bonding and mechanically fixing the insulation board provides consistency of fixing, resists thermal movement and provides a quality installation. There is no assurance that all mechanical fixings hold correctly and this would generate weak zones within the installation.

**For additional information on fixing requirements for other types of insulation please refer to our other Technical Information Sheet;*

Adhesive & mechanical attachment of mineral and phenolic insulation boards used on Externally Insulated Facade Systems.

For additional information or other Technical Information Sheets, please visit our Web site link http://www.parex.co.uk/Render_Systems/Technical_Information_Sheets_and_FAQs

Or for product datasheets contact;

Parex Ltd

Holly Lane Industrial Estate

Atherstone

CV9 2QZ

Tel: 01827 711755

www.parex.co.uk