

Adhesive vs. Mechanical Attachment of EIFS Technical Bulletin

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This Technical Bulletin is to describe how mechanically fastening EPS insulation board compares to adhesively attaching EPS insulation board to a substrate.

When mechanical fasteners only are used to fasten the insulation board, the EIFS attachment failure under full-scale negative wind load laboratory testing is the breaking of the insulation board by punching shear around the fastener head. A typical commercial fastener such as a 2" diameter Wind-Lock Wind-Devil anchor fastening 1" thick EPS fails around the head at approximately 45 pounds of force. Assuming that the anchors are placed 1 per square foot, as Wind-Lock recommends, the negative load at failure is approximately 45 pounds per square foot. 2 inch thick EPS has roughly double this resistance. Thickness beyond 2" doesn't significantly increase the pull-off resistance.

Comparatively, when adhesively attaching insulation board, the adhesive provides complete anchorage over the entire back face of the insulation board by application with a notched trowel. This distributes the load, whereas mechanical fasteners have to resist the concentrated load of the tributary area they support. The tensile bond strength of Parex adhesive exceeds the tensile strength of the insulation board of approximately 2400 pounds per square foot. Even assuming a worst case coverage of only 25% of the insulation surface from trowel notches covering 25% of the trowel edge, adhesively attaching EPS insulation board the tensile bond strength of 600 PSF clearly exceeds the negative load resistance of the mechanically attached insulation board. With adhesive, thinner EPS attachment is just as strong as thicker.

Adhesive attachment also helps to reduce the stresses in the system that occurs at the insulation board joints as a result of thermal changes. Bearing of EPS against attachment screw shafts is not as effective as adhesive bonding in restraining insulation board dimension change from thermal changes.

For bonding to gypsum sheathing, its facer cohesive strength in tension of approximately 15 psi, or over 2160 PSF, is the limiting bond strength. Sheathing attachment to framing is the overall limiting negative load strength and must be designed and constructed to project requirements. For bonding to concrete, adhesive bond strength is approximately 50 psi. This exceeds the 2400 PSF cohesive strength of the EPS.

Mechanical anchoring is typically required for surfaces unsuited to bonding such as painted surfaces

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