TECHNOTES

Dissimilar materials and the application of exterior perimeter sealant around windows, doors, and other material transitions

What are the principals associated with the application of sealant between a Pella window and door frame and other building materials? Allowing for expansion and contraction between a window or door frame and surrounding building materials is essential to the performance of any installation, the prevention of damage, and even meeting the building code. Rough opening clearances are required to create adequate space not only for construction and manufacturing tolerances; but, for thermal movement and the placement of interior and exterior lines of perimeter sealant (see Diagram 1).

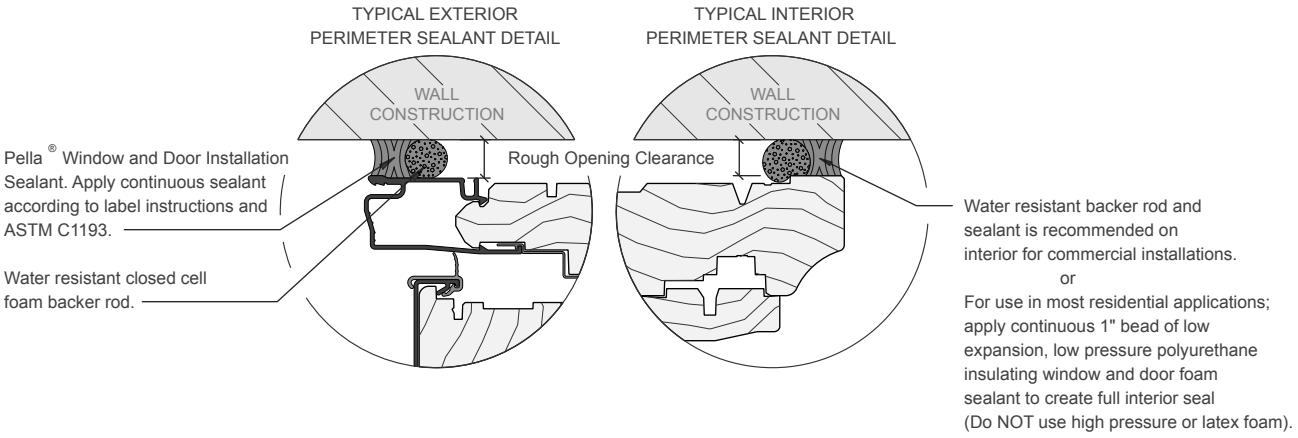


Diagram 1: Typical Pella window sealant application section details

While some materials expand and contract more than others (see Diagram 2), dissimilar materials adjacent to one another have a compounding affect. An example of a worst-case scenario might be a vinyl window in combination with exterior aluminum trim. Regardless of the materials, it is required that adequate clearances and the proper placement of sealants be provided to allow movement between the various building materials to occur to prevent damaging product or compromising performance.

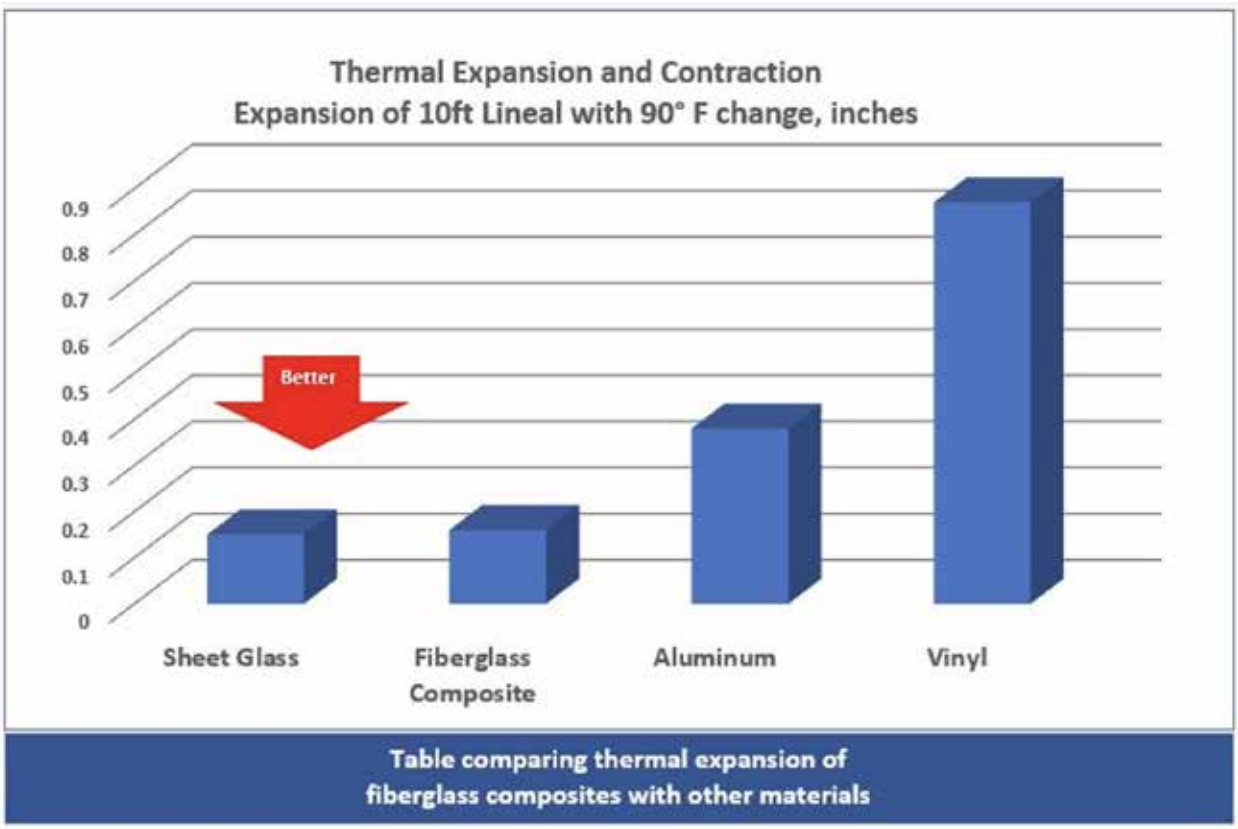


Diagram 2: Table comparing thermal expansion fiberglass composites with other materials

While not related to the issue of dissimilar materials and allowance for movement, it is also important to recognize that the exterior line of perimeter backer rod and sealant protects the window to wall interface and imperfections in the building's weather barrier from exposure to bulk water that occurs during incidents of weather. For this reason, the proper application and maintenance of sealant is also of importance to ensure its performance over time (see Diagram 3).

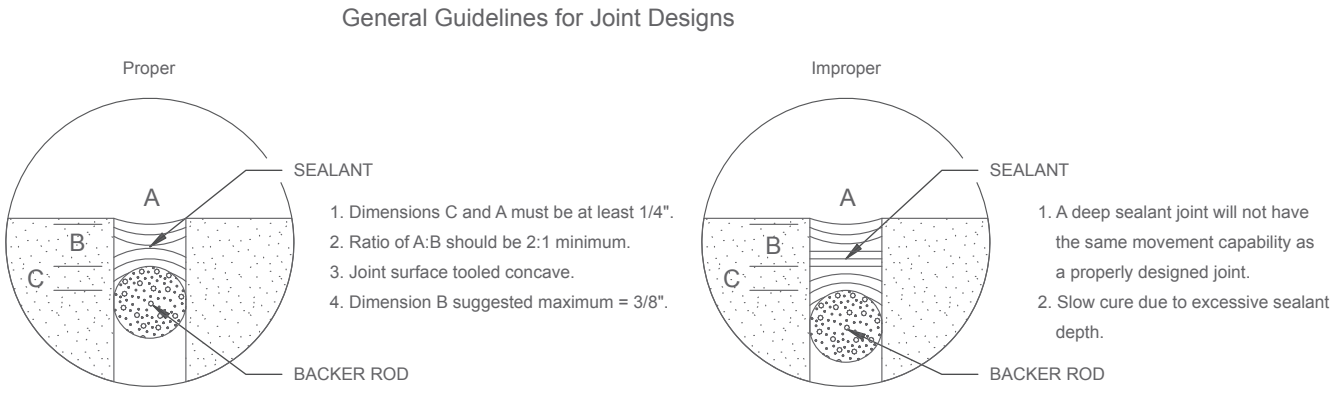


Diagram 3: General guidelines for joint designs diagram above is in alignment with AAMA 851-20 Fenestration Sealants Guide for Windows, Window Walls and Curtain Walls and ASTM C1193 Standard Guide for Use of Joint Sealants.

What about the building code?

As an example, consider building applications involving stucco. When stucco dries it shrinks, and when temperature changes occur window frames expand and contract. These issues have a compounding affect that can result in cracks around the window frame that may allow for the unintended penetration of moisture in the wall. Applying this principle, a 1/16 inch crack that opens around a 4 foot x 4 foot window would be equivalent to a 3.5 inch square hole in the wall cladding. A combination of twelve of these openings could be equated with a 1 foot x 1 foot square hole.

Further, when a window frame expands it pushes up against adjacent materials that are preventing its thermal expansion causing additional stresses to be placed on frames, frame corners, and the stucco. It is these potential failures that the building code and recommendations from Pella address and are applicable to all building materials or substrates, including stucco.

The International Building Code (IBC) as it relates to window and door openings in stucco

- Section 2510 of the 2015 IBC covers “Lathing and Furring for Cement Plaster (Stucco)”. Subsection “2510.3 Installation” states that “Installation of these materials shall be in compliance with ASTM C926 and ASTMC1063”.
- ASTM C1063 covers the installation of lathing, casing beads and furring for stucco. It states in paragraph “7.11.3 Casing Beads-Non load bearing members shall be isolated form load bearing members, and all penetrating elements, with casing beads or other suitable means, to avoid transfer of structural loads and to separate from dissimilar materials.”
- ASTM C926 covers the installation of Portland cement base plaster (stucco). It states in paragraph “A2.1.3 Sealing or caulking of V-grooves, exposed ends and edges of plaster panels or exterior work to prevent entry of water shall be provided.”

Other locations of the International Residential Code (IRC) and IBC also address the separation of dissimilar materials and the application of sealant between transitions.

Are there exceptions?

There is almost always some kind of exception; however, it is not the practice of Pella Architectural Solutions to knowingly show code violations or deviations from Pella product installation recommendations in shop drawings. An exception could potentially be made if a local code were to exist that would amend the IBC or IRC, or perhaps a local building official or design professional would be willing to approve and sign a disclaimer. Regardless, problems associated with non-compliance with the building code or taking exception to Pella's recommendations are not covered by Pella product warranty and a disclaimer to that effect should be expected in the event of such an occurrence.