

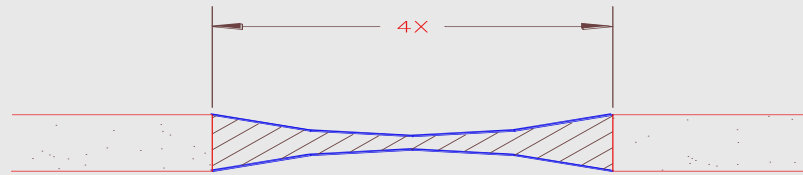
SEALANT FAILURE & DESIGN CRITERIA



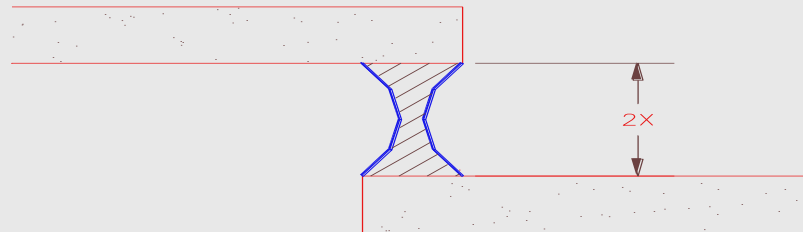
I. Type & Function

- Movement occurs in structures regardless of characteristics.
- Elastic joints at strategic locations can accommodate or cushion the various movements.
- Construction joints are designed and located by the Architect, Engineer, and in some cases the Contractor.
- There is a difference between Expansion/Contraction and Isolation Joints versus Control Joints.

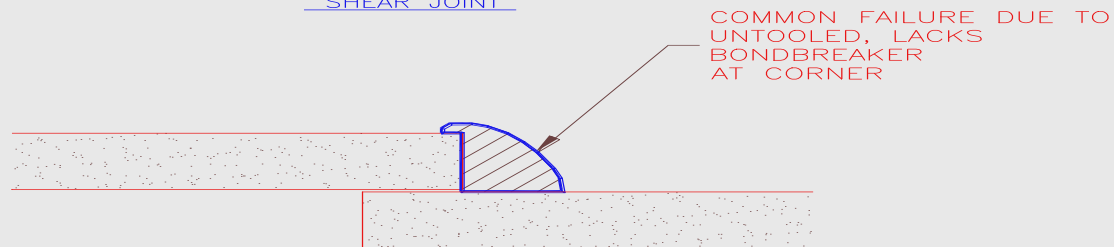




BUTT JOINT



SHEAR JOINT



IMPROPER LAP JOINT

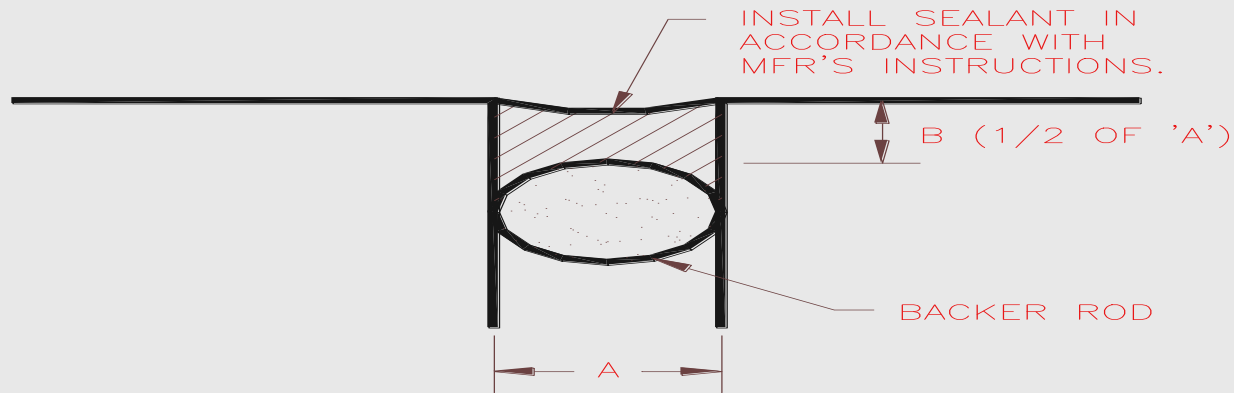
VARIOUS JOINTS

II. Design Considerations

- Location
- Dimension
- Anticipated Movement
- Changes in Structure
- Actual Joint Design



Standard Joint Detail



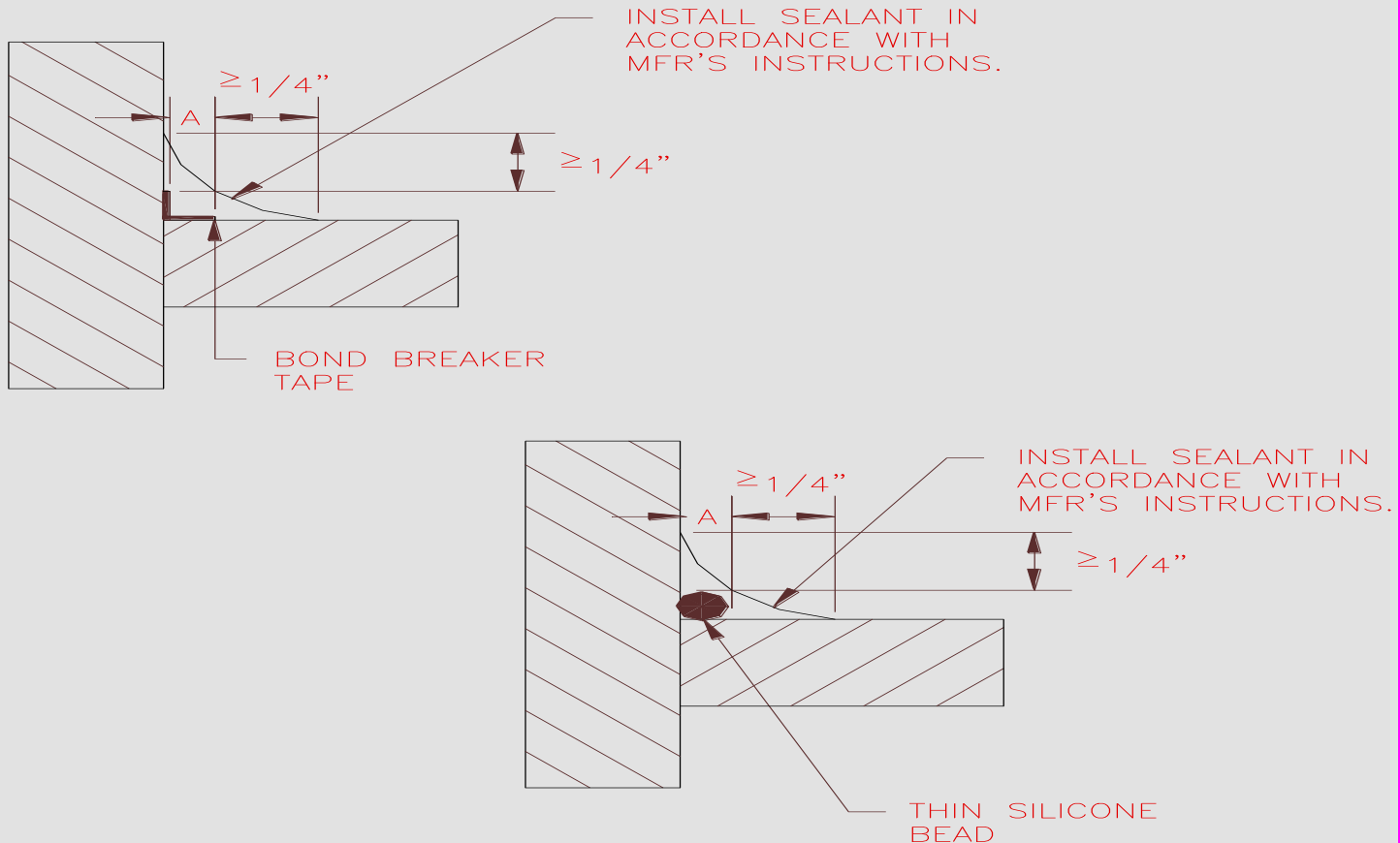
NOTE: WHENEVER CONDITION EXISTS BASED ON CRITERIA FOR DETAIL "A", IT SHALL BE USED. WHEN EXISTING CONDITIONS DO NOT PROVIDE ROOM FOR A BACKER ROD AND PROPER JOINT, DETAIL "B" SHALL BE USED.

INSTALLATION NOTES:

1. SAW CUT OR RAKED OUT JOINT.
2. THE SEALANT BEAD DEPTH SHOULD BE LESS THAN THE JOINT WIDTH.
3. THE SEALANT SHOULD BE NO THICKER THAN 1/2" & NO THINNER THAN 1/4".
4. THE RATIO OF JOINT WIDTH TO SEALANT DEPTH SHOULD BE ABOUT 2:1. SEE A & B ABOVE.
5. A SEALANT IS NO BETTER THAN THE SURFACE TO WHICH IT IS ATTACHED. PROPER PREPARATION IS CRITICAL.
6. THE MANUFACTURERS INSTRUCTIONS MUST BE CAREFULLY FOLLOWED TO OBTAIN PROPER SEALANT ADHESION.

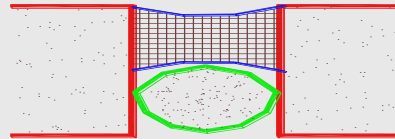
JOINT DETAIL 'A'

Fillet Joint Detail

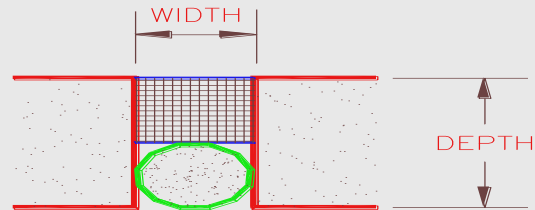


$$A = (\text{JOINT MOVEMENT})(\text{JOINT MOVEMENT CAPABILITY IN } \%)$$

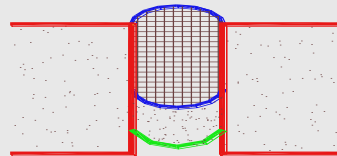
JOINT DETAIL 'B'



EXTENDED



NORMAL

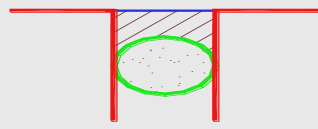


COMPRESSED

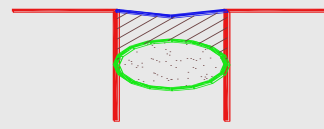
*SEALANT GENERALLY REQUIRES A MINIMUM JOINT WIDTH OF 1/4" AND SHOULD NOT EXCEED 1-1/2"

JOINT WIDTH & DEPTH

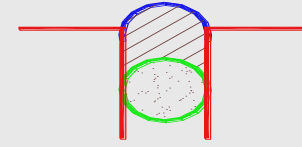
NOT TO SCALE



1/2" JOINT

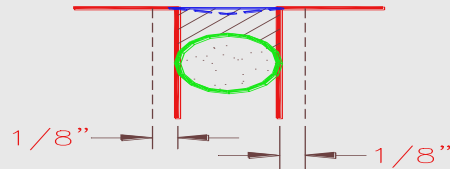


WITHSTANDS EXTENSION

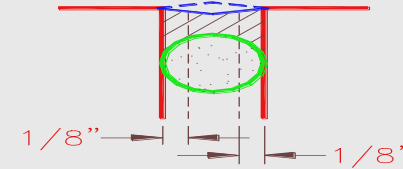


WITHSTANDS COMPRESSION

* MOVEMENT SHOULD NOT EXCEED 25% IN EITHER EXTENSION OR COMPRESSION FROM ITS INSTALLED SHAPE.

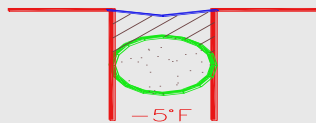


EXTENSION MOVEMENT

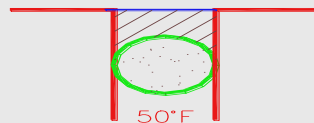


COMPRESSION MOVEMENT

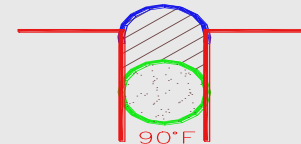
* THE PERCENTAGE OF MOVEMENT IS DIRECTLY RELATED TO JOINT SIZE. EXAMPLE: IF EXPECTED MOVEMENT IS 1/4" IN ONE DIRECTION, MINIMUM JOINT SIZE SHOULD BE 1".



-5°F

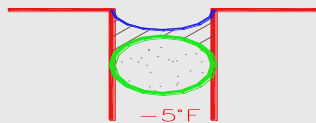


50°F

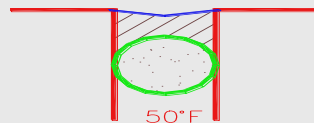


90°F

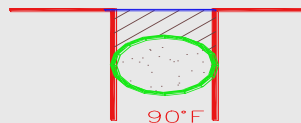
JOINT SEALED AT 50° F (SEALANT EXTENSION AND COMPRESSION EQUALIZED)



-5°F

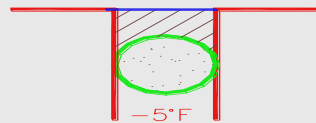


50°F

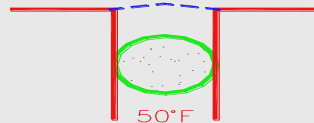


90°F

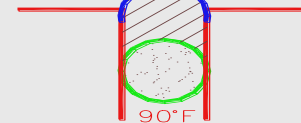
JOINT SEALED AT 90° F (SEALANT ALWAYS UNDER TENSION)



-5°F



50°F



90°F

JOINT SEALED AT -5° F (SEALANT ALWAYS UNDER COMPRESSION)

* TEMPERATURE AT TIME OF APPLICATION IS RELATIVE TO SEALANT PERFORMANCE

JOINT DESIGN & APPLICATION

NOT TO SCALE

III. Preparation For Sealants

- **Good adhesion equals proper preparation**
- **Begins with inspection of conditions at site**
- **Joint criteria**
- **Priming**
- **Accessories**
 - **Filler boards**
 - **Bond breakers**
 - **Back-up materials**



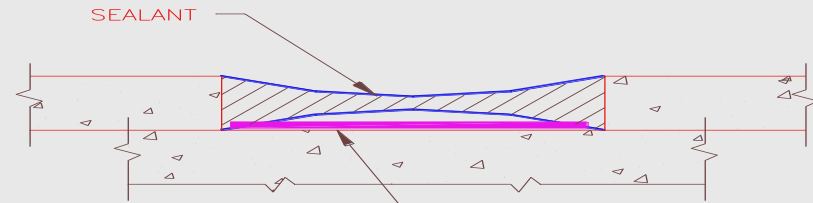
Bond Breakers

POTENTIAL LOCATIONS
OF FAILURE

SEALANT ASSUMES
A DISTORTED SHAPE
ON EXPANSION

BOND AREA IMPOSES
ADDITIONAL STRESS ON
SEALANT, RESTRICTING
ELONGATION

EXPANDED JOINT
(UNDESIRABLE AFFECT W/ SEALANT BONDED TO BOTTOM OF JOINT)



POLYETHYLENE STRIP OR
OTHER SPECIFIED RELEASE MATERIAL

EXPANDED JOINT
(USE OF BOND BREAKER MATERIAL)

BOND BREAKERS

IV. Function of Sealants

Properties & features of a sealant:

- 1. Long term adhesion to the faces of the joint**
- 2. Resistance to creep, slump or cold flow**
- 3. Resistance to undue shrinkage**
- 4. Non-bleeding or non-staining properties**
- 5. Properties to accommodate movement.**
- 6. Resistance to specific chemicals**
- 7. Compatibility with paint/coatings**
- 8. Resistance to weathering and aging**
- 9. Adequate hardness or abrasion resistance**
- 10. Retention of physical properties**
- 11. Stability in storage**
- 12. Ease of mixing**
- 13. Ease of application**

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IV. Function of Sealants (con't)

- The life of a sealant may be extended by the nature of the joint, specifically a joint configuration where the sealant is protected by the structure (e.g. recessing the seal within the joint so that its outer surface is shielded from the sun and weathering).
- The life of a sealant can be limited, however, with variations in the size of the structural components unless realistic tolerances are taken into account, both in design and assembly.



IV. Function of Sealants (con't)

Nine Basic Sealant Classifications

- 1. Hot-pour**
- 2. Cold-pour, two-part or three-part, chemically-cured**
- 3. Non-sag, non-cured**
- 4. Non-sag, one-part, chemically-cured**
- 5. Non-sag, two-part or three-part, chemically-cured**
- 6. Heat-softened, non-sag sealants**
- 7. Strip sealants – cold – applied mastic strips**
- 8. Strip sealants – hot-ironed, preformed strips**
- 9. Compression seals**



V. Maintenance & Inspection

Must review symptoms before problems can be determined. Close inspection of joints will allow you to determine the type of failure.

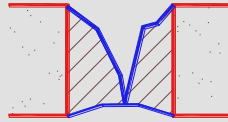
1. Improper joint design
2. Improper preparation
3. Untooled joints
4. Lack of proper backer rod/bond breaker
5. Spalling of adjacent material
6. Sealant failure (alligatoring, crazing splitting)
7. Excessive building movement/settlement including wall components and materials
8. Water penetration



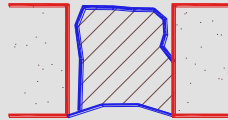
V. Maintenance & Inspection (con't)

- Solution may require modification to existing joints or the wall assemblies.
 - If this is not cost effective, the best alternative can be provided for the existing condition.
 - However, this is not a permanent solution – it requires a maintenance code.
- Joint preparation and joint design is critical to all applications.
 - Most critical in a renovation/repair project

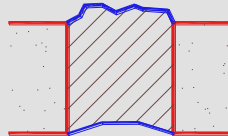




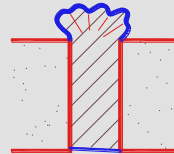
COHESIVE FAILURE



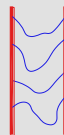
ADHESIVE FAILURE



UNTOOLED JOINT



COMPRESSION FAILURE



REVERSION

SEALANT JOINT FAILURES

VI. Dispelling Myths

- As is true of all construction material warranties, the warranty does not indicate the quality of the product or its life expectancy. Mother nature and the courts have proven that point. A warranty does not protect the Owner, it limits the liability of the Manufacturer. Select a product based on your specific conditions and its “track record” or performance.
- Successfully resolving moisture problems in the Building Envelope is based on careful review of the symptoms to find the PROBLEM. You must solve the problem.
- Seldom is one component of the Building Envelope the total or only problem. When reviewing a Building Envelope, you must first document all of the interior problems. Then review the exterior Building Envelope as a whole with no predetermined position. The problem most likely will be several components, contributing to varying degrees.
- Avoiding lawsuits in renovation projects requires that you properly assess a life expectancy and a cost of a particular fix, and outline it to the Owner in writing.
- If you are relying on a sealant as your only line of moisture protection, it is not a question of if it will fail, but when.













