

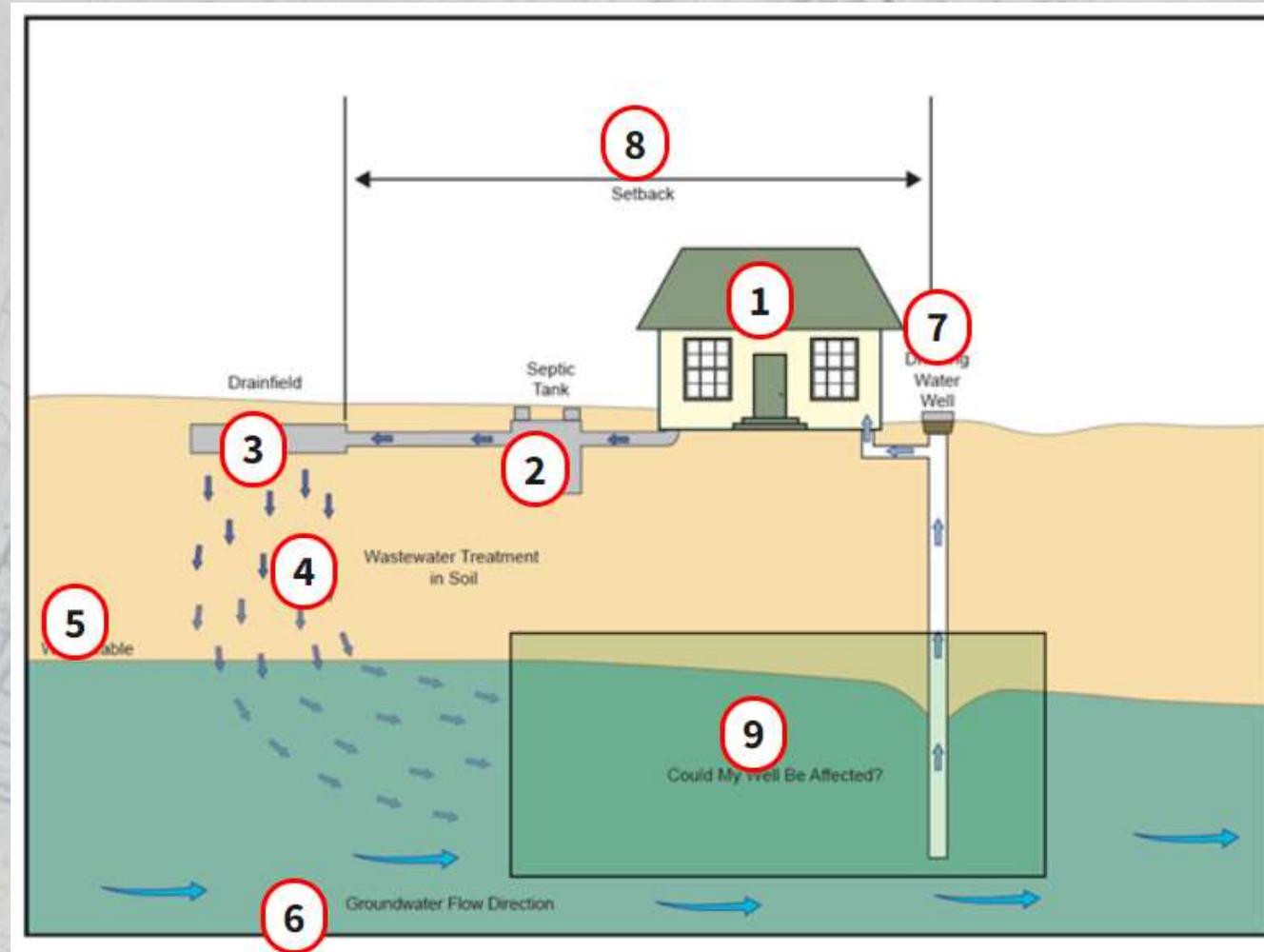
Watertight Precast Concrete Tanks

From Walls to Joints to Risers

Learning objectives

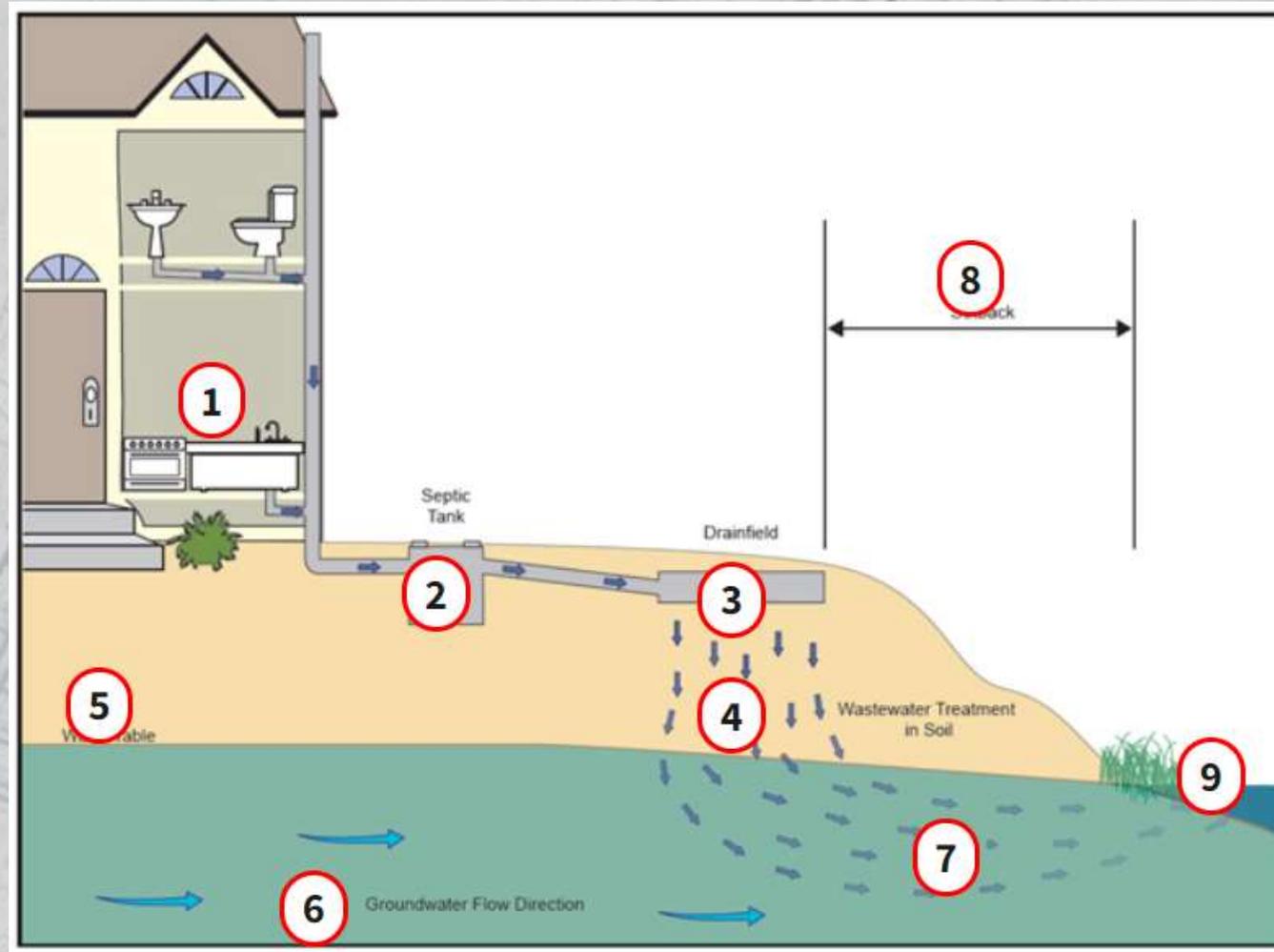
- Learn why we care about watertightness in septic systems
- Learn about the role of quality materials for watertightness
- Learn how concrete coatings and sealers can help
- Learn the importance of a good joint seal
- Learn how to seal risers to prevent infiltration

Why does it matter?



<https://www.epa.gov/septic/septic-systems-and-drinking-water>

Why does it matter?



<https://www.epa.gov/septic/septic-systems-and-surface-water>



Infiltration and Exfiltration

- **Infiltration** is water entering the onsite waste treatment system by a means not considered in the design calculations.
 - Ground water
 - Rain
 - Poor grading
 - Gutters
 - Overloading
 - Leaking toilet
 - Running water longer than needed
 - Adding a bedroom/bathroom that was not planned for
- **Problem:** Additional water affects the system performance and may overload the soils leading to premature failure.

Infiltration and Exfiltration

- **Exfiltration** is water leaving the onsite waste treatment system that was not planned for in the design calculations.
 - Leaking components
 - Tanks
 - Joints
 - Plumbing
 - Overfilled tank
 - Flood
 - Plugged components
 - Poor maintenance
- **Problem:** Insufficient water volume to maintain a good septic balance in the tank. Also, sewage entering soil where it is not designed to do so. Leach beds that are never active.

A Concrete Tank Needs to Be Strong

- Structural Design
 - Loading conditions
 - Concrete thickness
 - Concrete mix design
 - Reinforcement
- Materials
 - Cement / SCMs
 - Aggregates
 - Water
 - Admixtures



A Concrete Tank Needs to Be Watertight

- Well proportioned concrete
- Good production practices
- Proper concrete curing
- Handling and storage
- Well sealed joints
- Coatings / sealers
- Pipe-to-tank connections
- Proper Installation



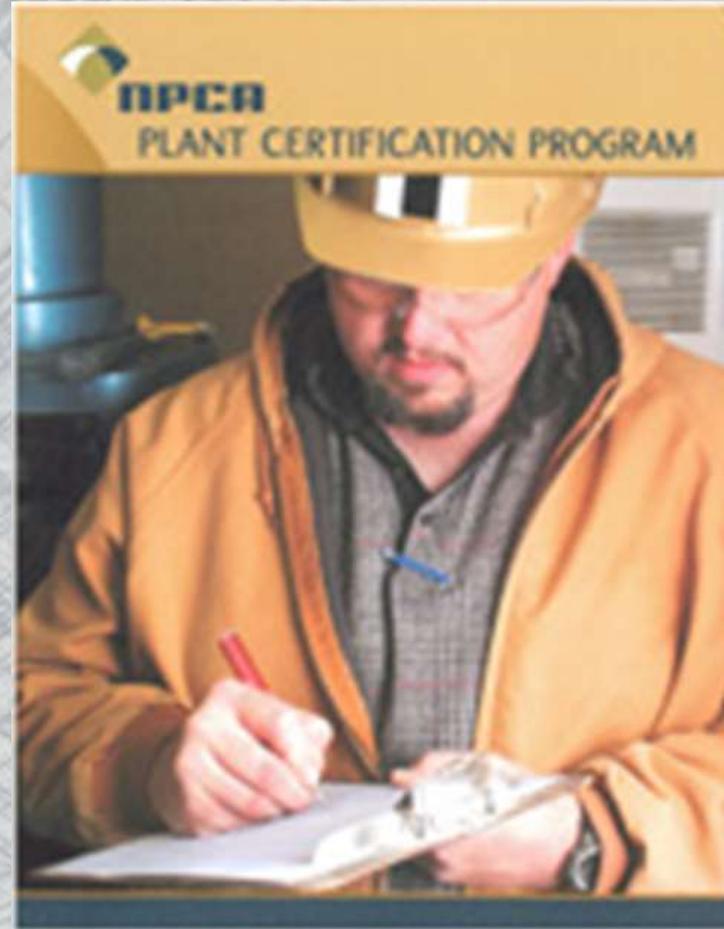


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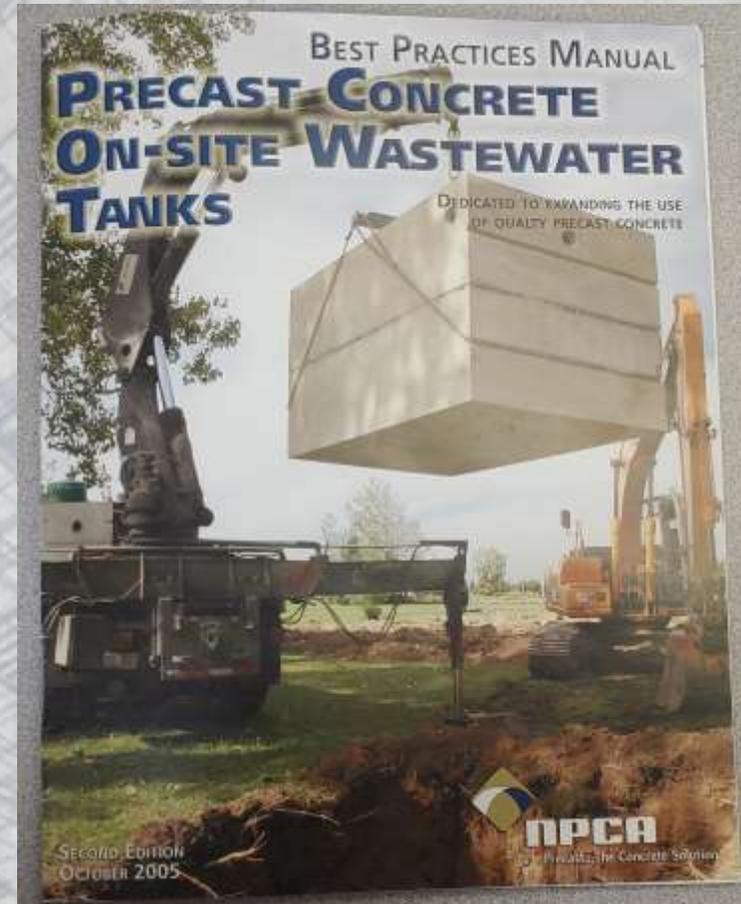
Quality Control / Quality Assurance



Specifications and Guidelines



www.astm.org

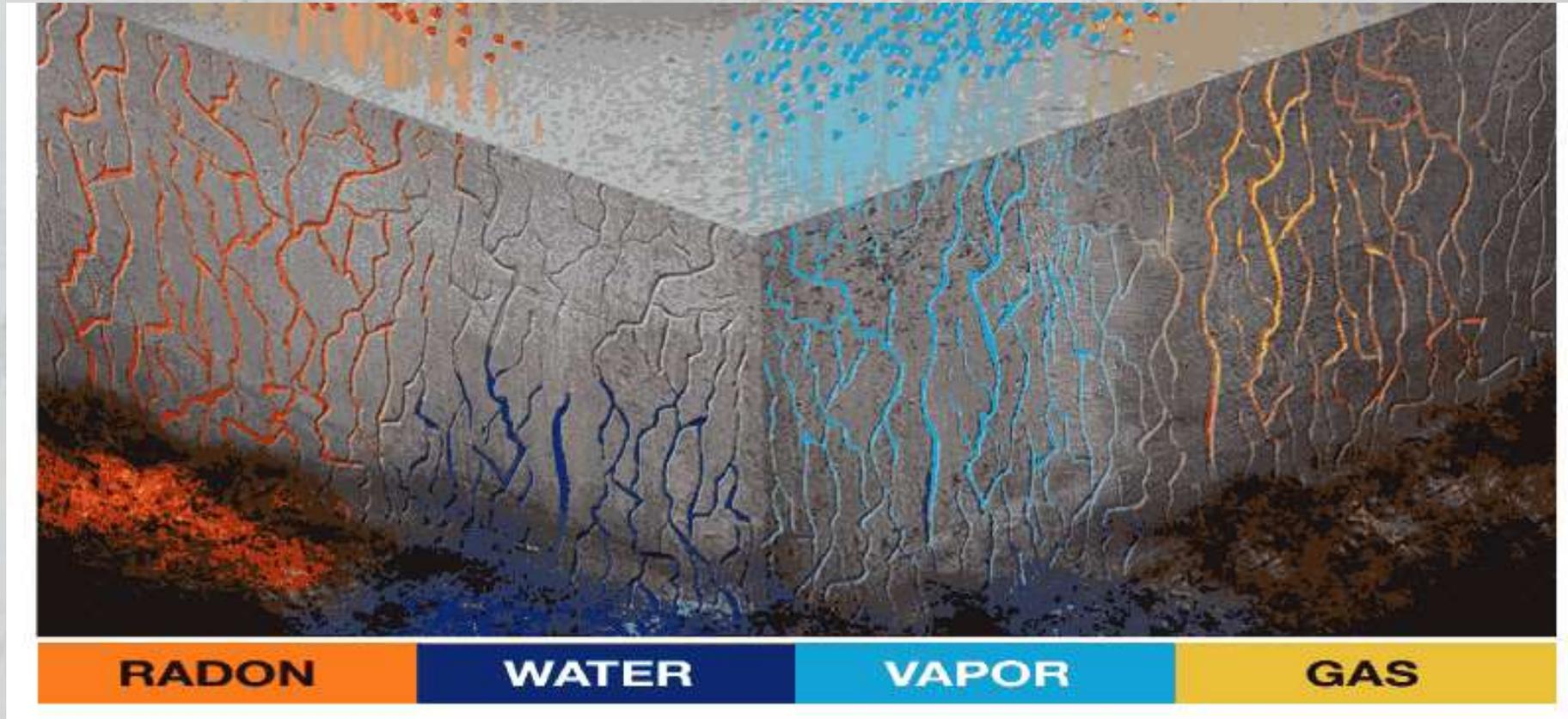


www.precast.org

ConSeal™

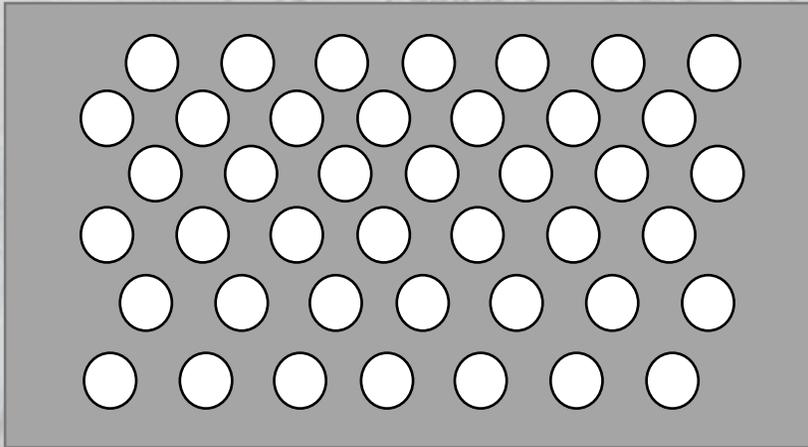
Coatings and Sealers

Concrete is a Porous Material

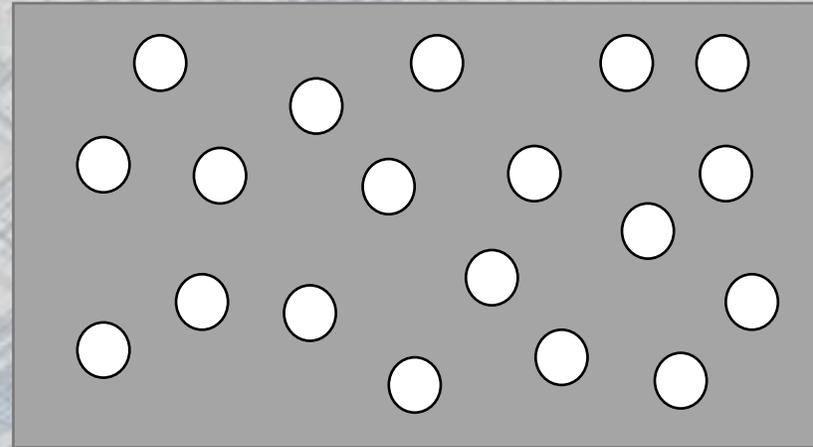


Porosity

MORE

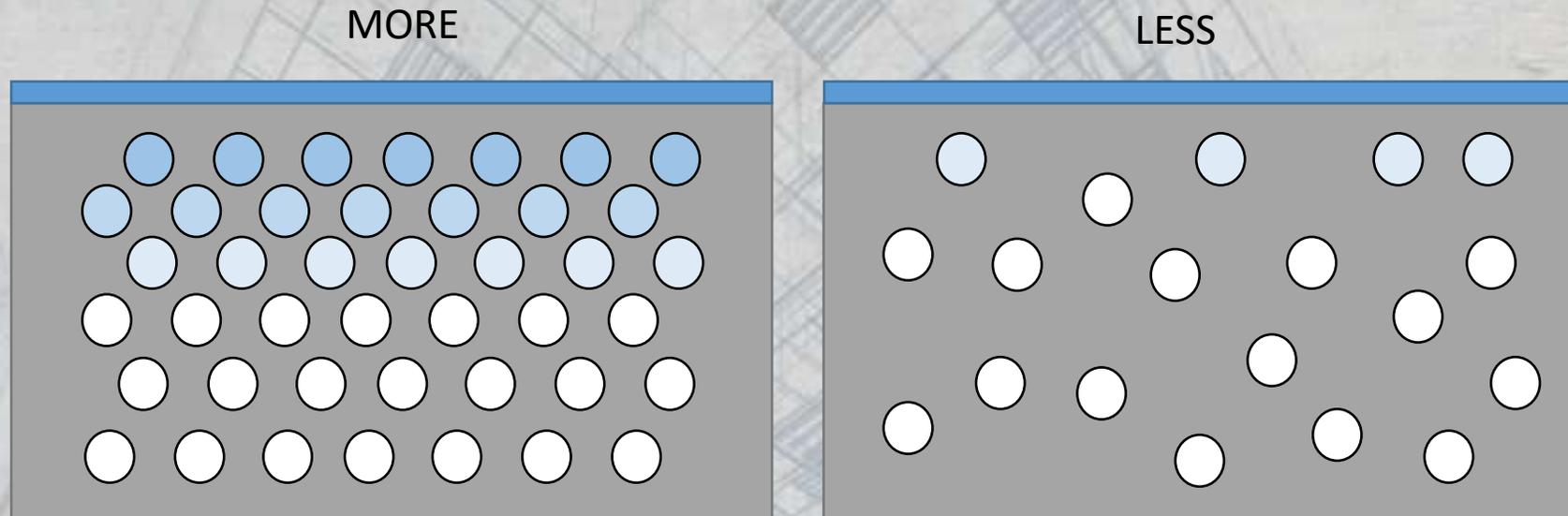


LESS



Porosity is the ratio of the volume of openings (or voids) to the total volume of the material. It basically represents the storage capacity of the material.

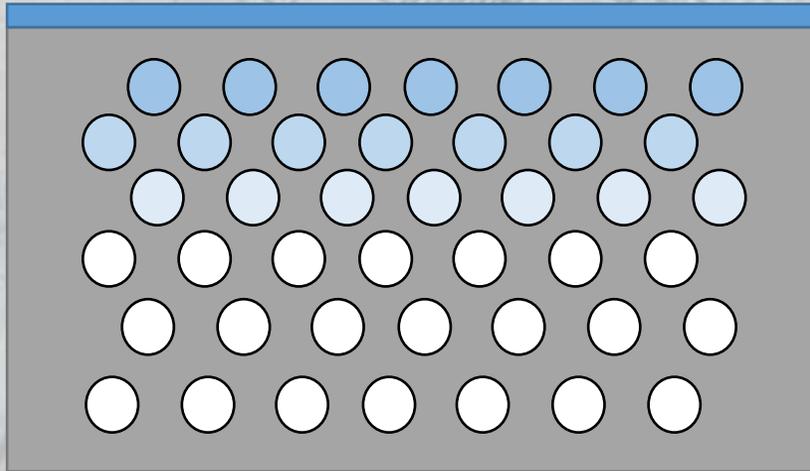
Permeability



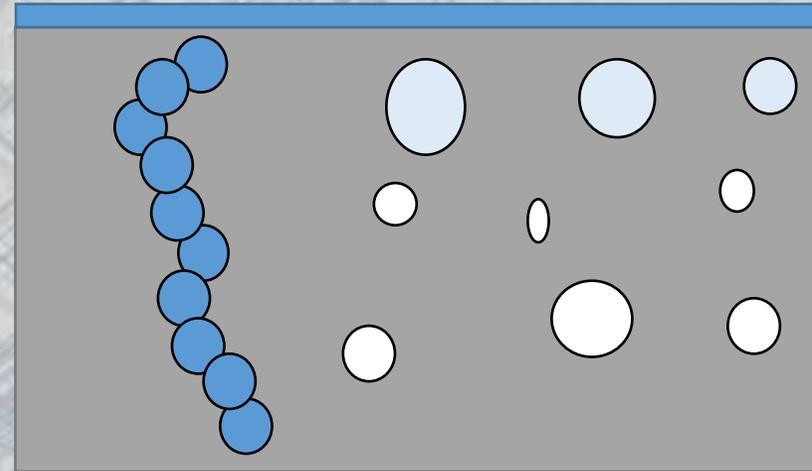
Permeability is the measure of the ease with which fluids can flow through a porous material. Permeability is expressed in terms of speed (in./s or mm/s) as opposed to porosity, which is expressed in volume per volume (cu in./cu in. or mm³/mm³).

Permeability

LESS



MORE





Waterproof or Dampproof

- Hydrostatic condition
- Below/Above grade
- Coating thickness

Waterproof Definition

“Building codes typically require that basement walls be dampproofed for conditions where hydrostatic pressure will not occur, and waterproofed where hydrostatic pressures may exist.”

- National Concrete Masonry Association

Waterproof Definition

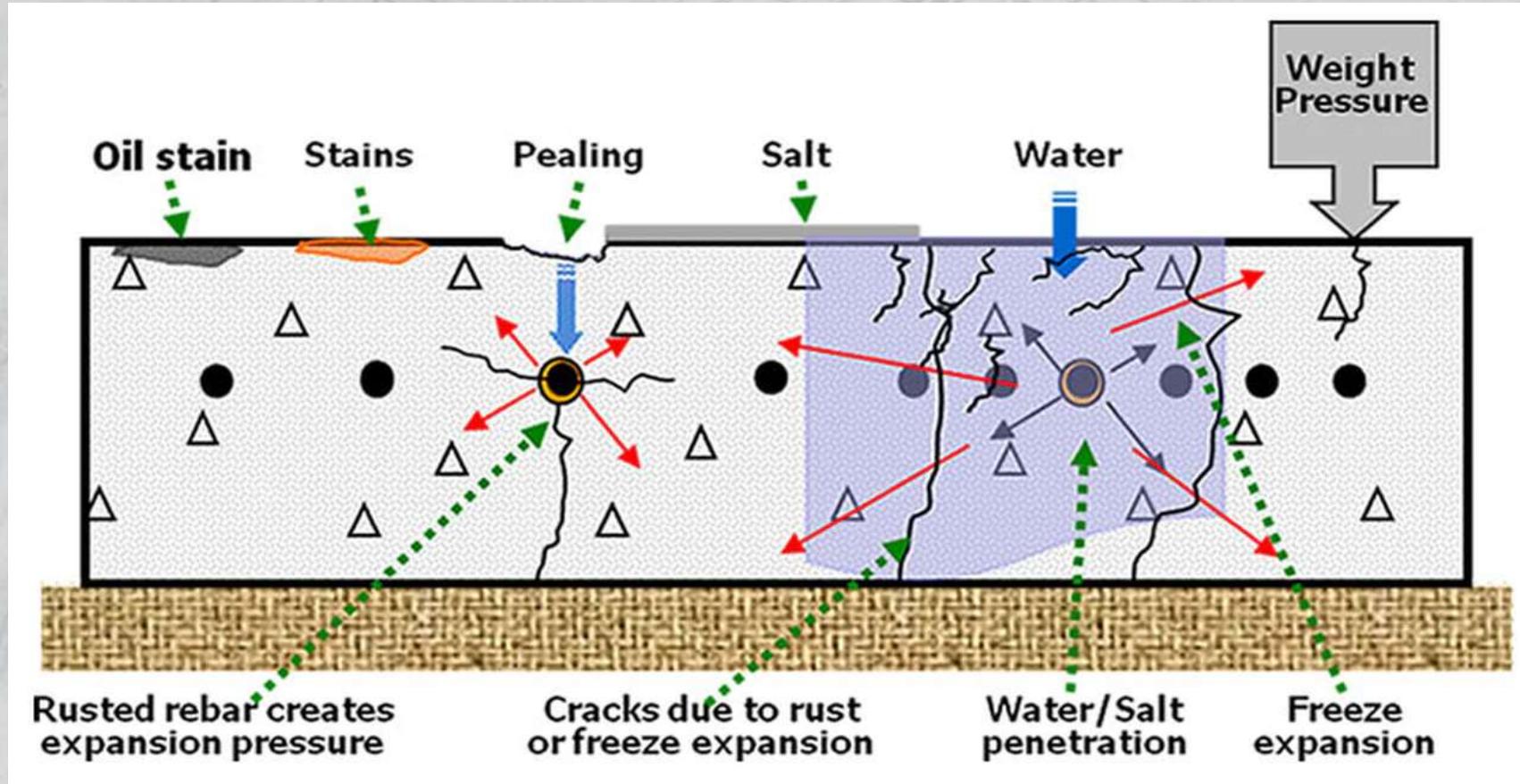
- Waterproofing coatings are typically 40 mils or greater in thickness.
- Dampproofing coatings are generally thin: around 12 mils or less.
- Resistant to hydrostatic pressure.



This Photo by Unknown Author is licensed under [CC BY-NC](#)

ConSeal™

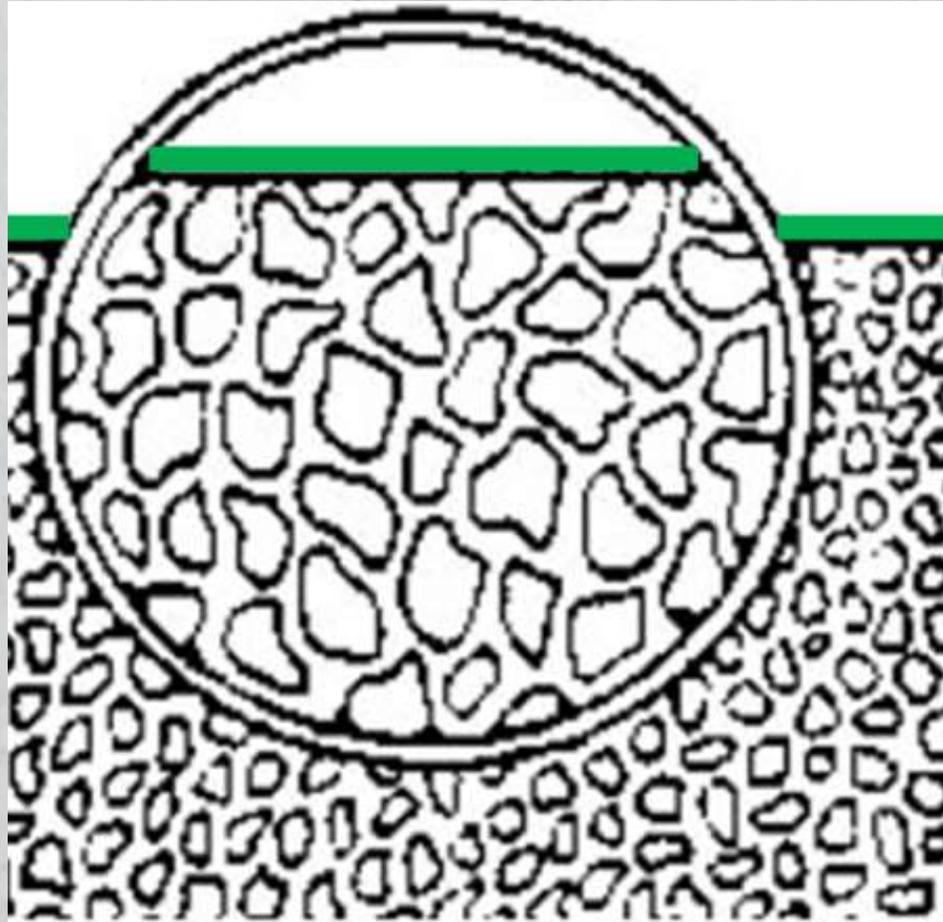
Why Seal Concrete?



Various Coating and Sealing Technologies

- Coatings/paints
 - Acrylics
 - Epoxies
 - Urethanes
 - Asphalt
- Cementitious coatings
 - Portland based
 - Special materials
- Sealers
 - Silane
 - Siloxane
 - Silicas
 - Combinations
- Admixtures
 - Waterproofing
 - Antimicrobial
 - Strength enhancing

Coating vs. Sealer



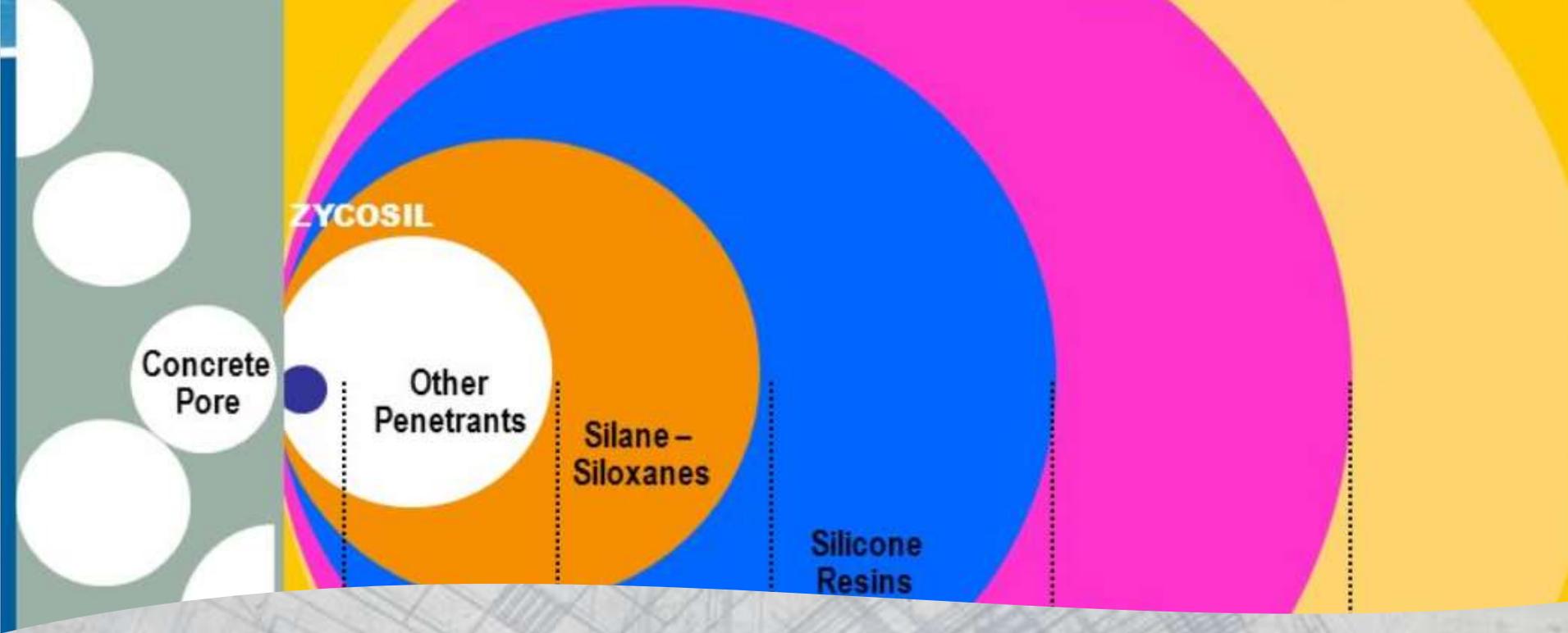
The “X” Adhesion Test



Bad Adhesion

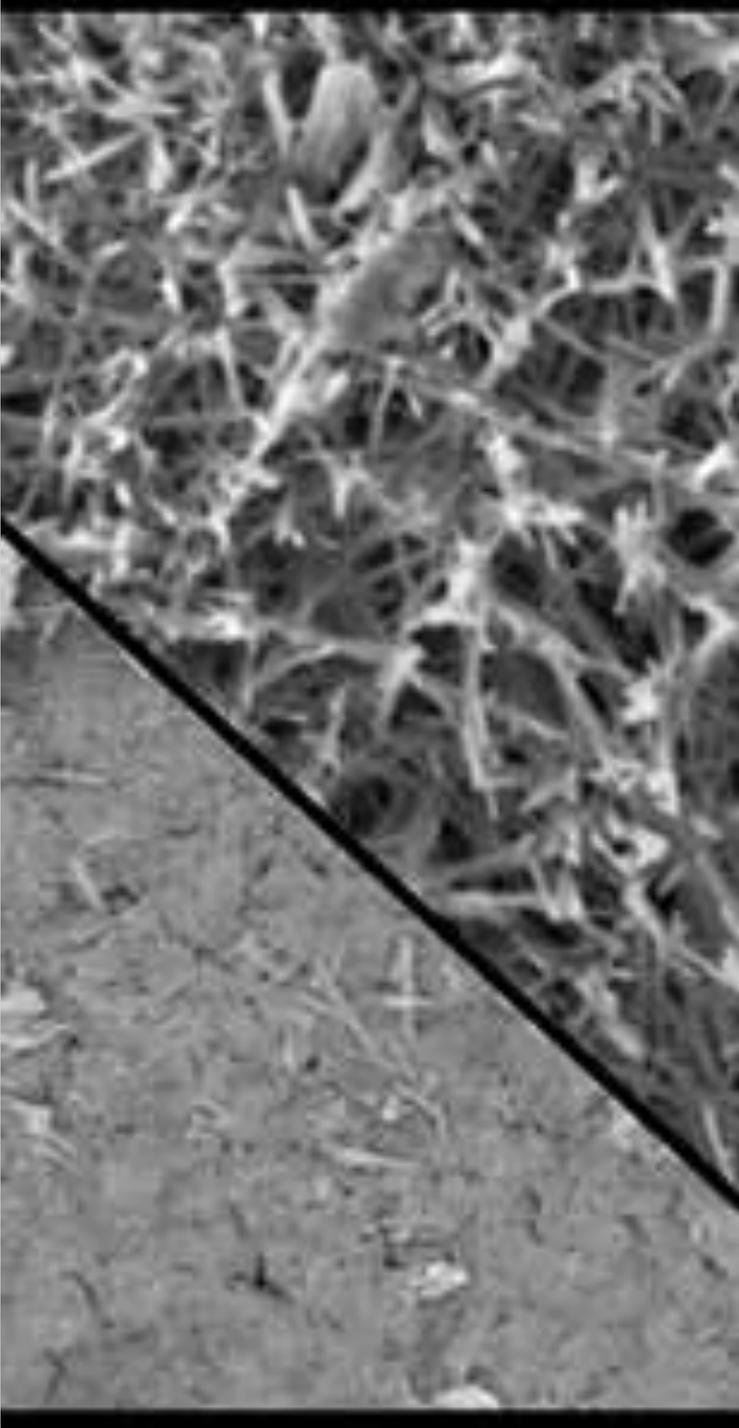


Good Adhesion



Sealers for Concrete

Penetrating sealers come in different sizes. Smaller molecules penetrate deeper, some are reactive, and some create hydrophobicity.



- Concrete admixture (powder/liquid)
- Works internally, reacts chemically
- Crystals created to block the pores
- Waterproof [CRD C48]
- Low Permeability [ASTM C1585]



Waterproofing from the inside

The background of the image is a light-colored, textured surface, possibly concrete or stone, with a faint, large-scale architectural drawing overlaid. The drawing consists of a complex grid of lines, representing a floor plan or a structural layout, with various rectangular and polygonal shapes. The lines are thin and light blue or grey, creating a subtle watermark effect.

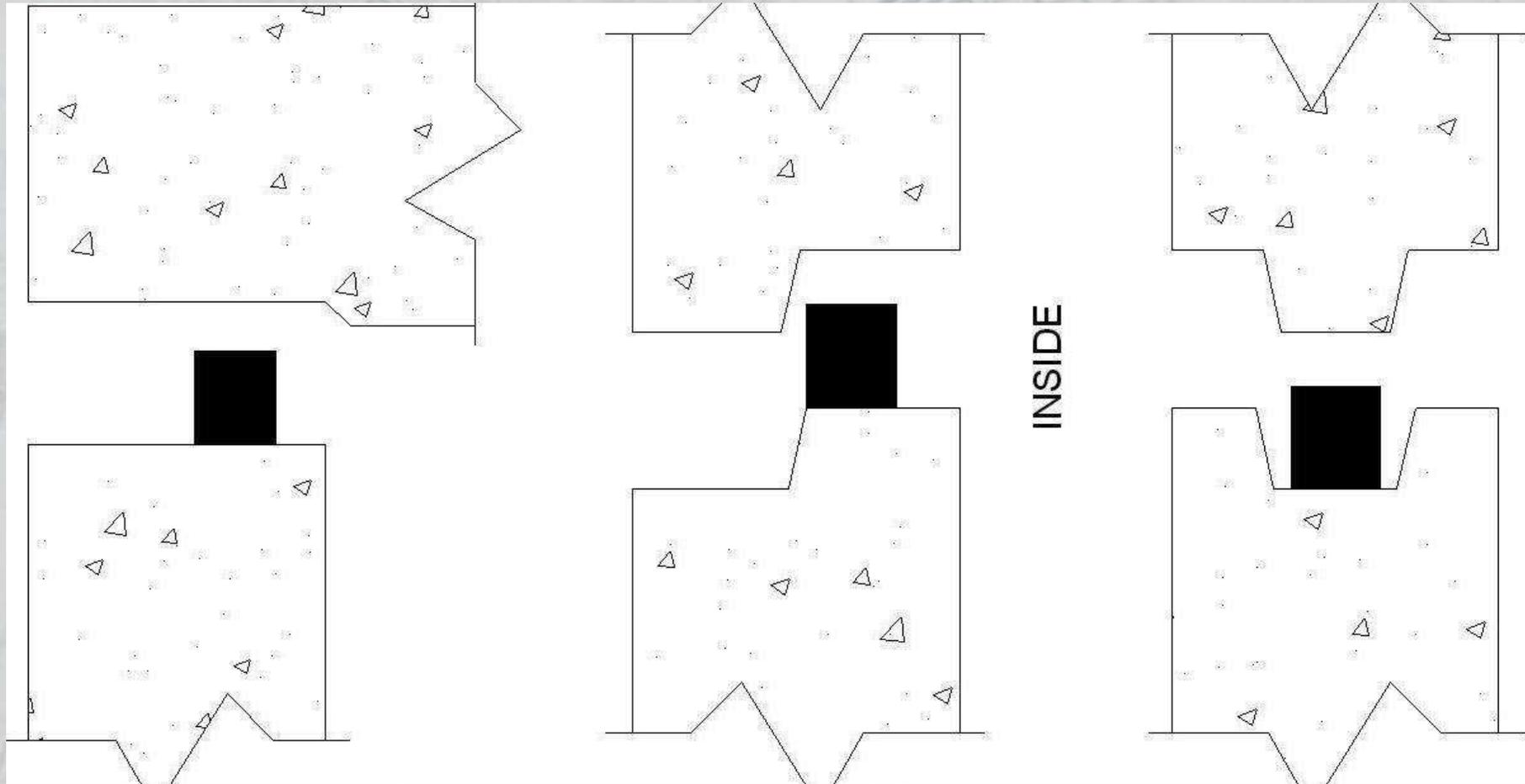
Creating The Seal

Preformed Butyl Sealant Installation

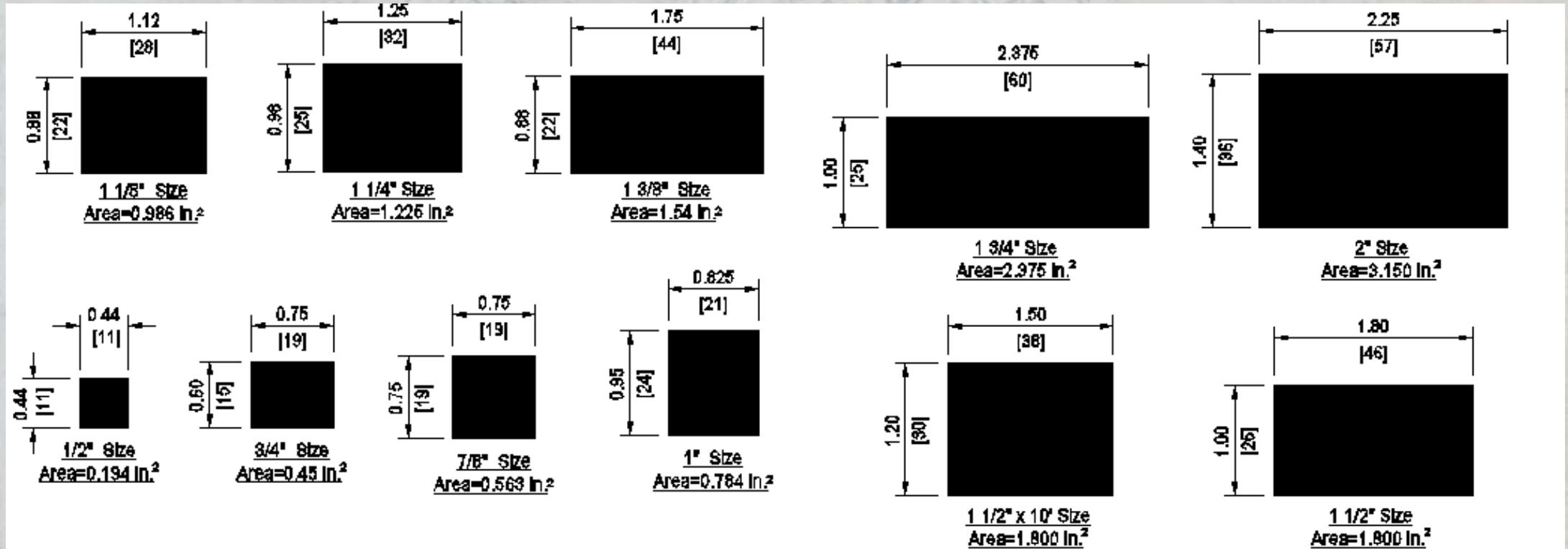
- Sealant Characteristics
 - size
 - placement
 - compression
- Joint quality
- Honeycomb/
Spalls in joint
- Dirt and debris



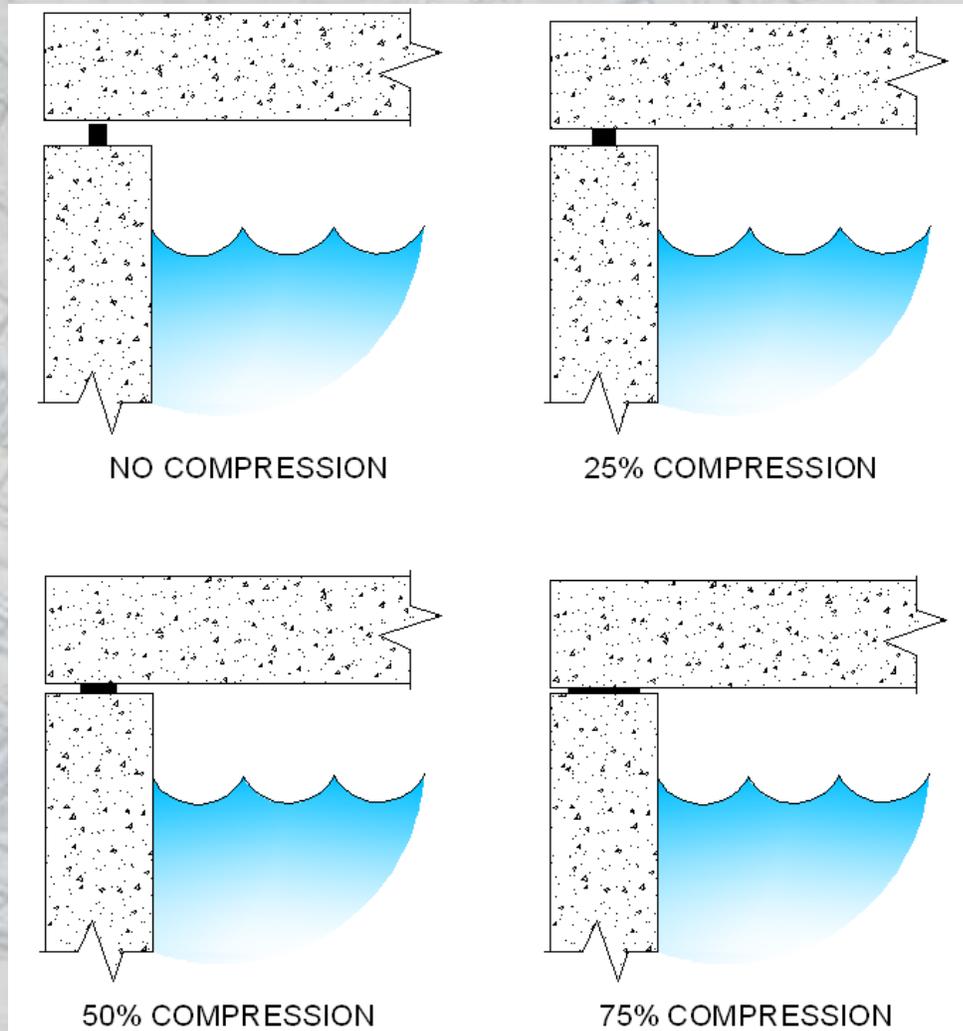
Sealant Placement



How Much Sealant?

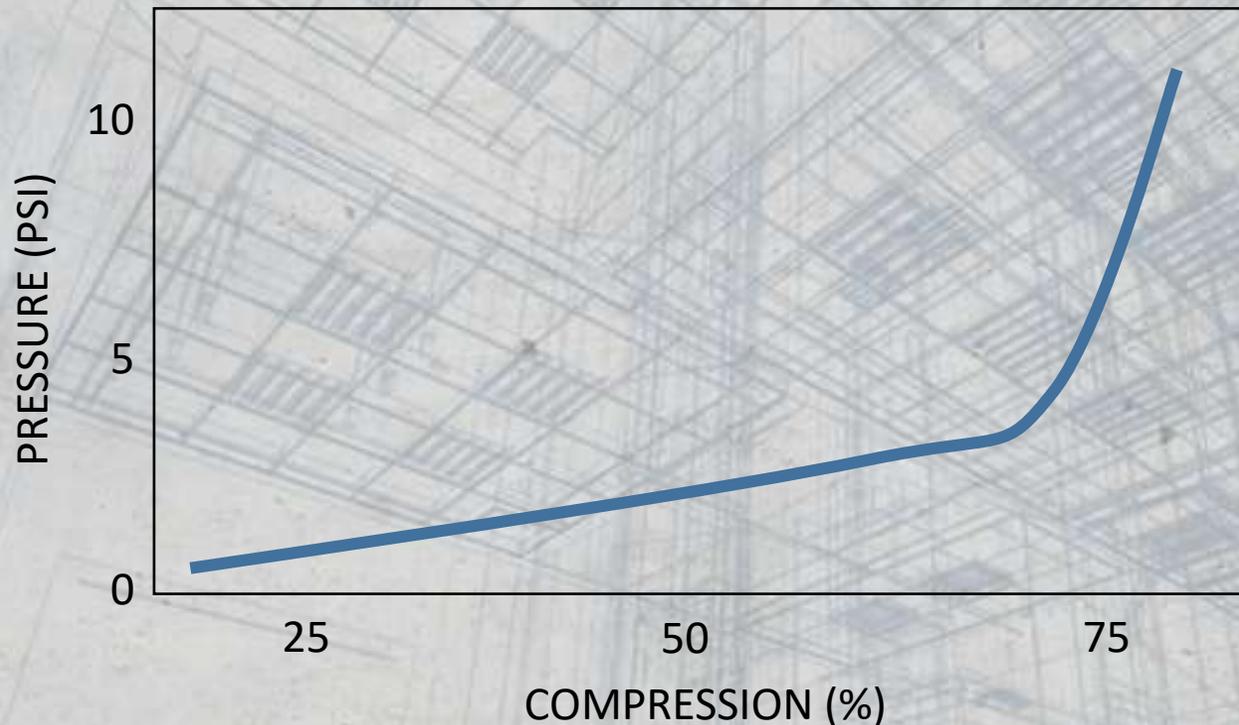


Compression

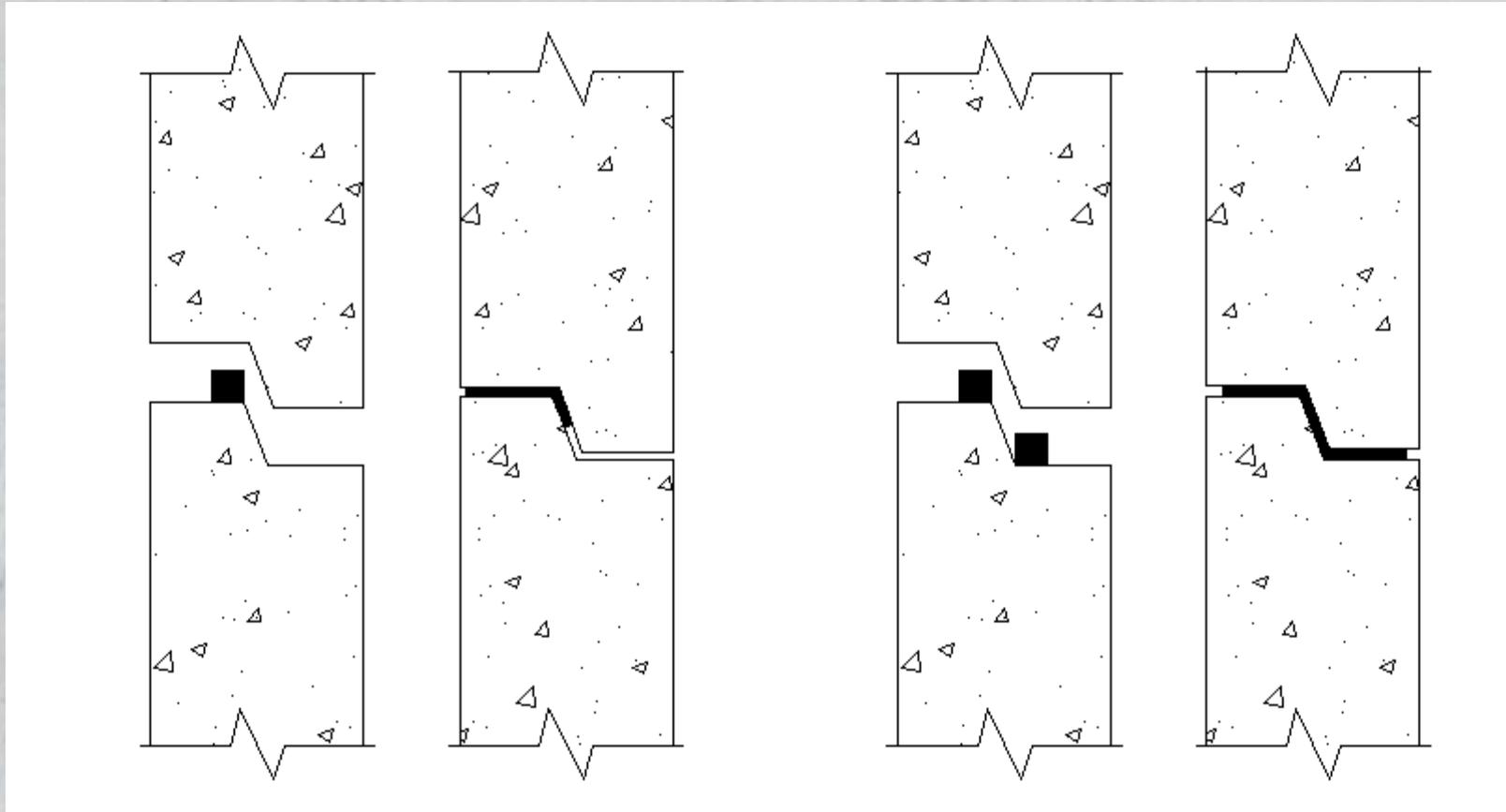


Sealant Compression Rate

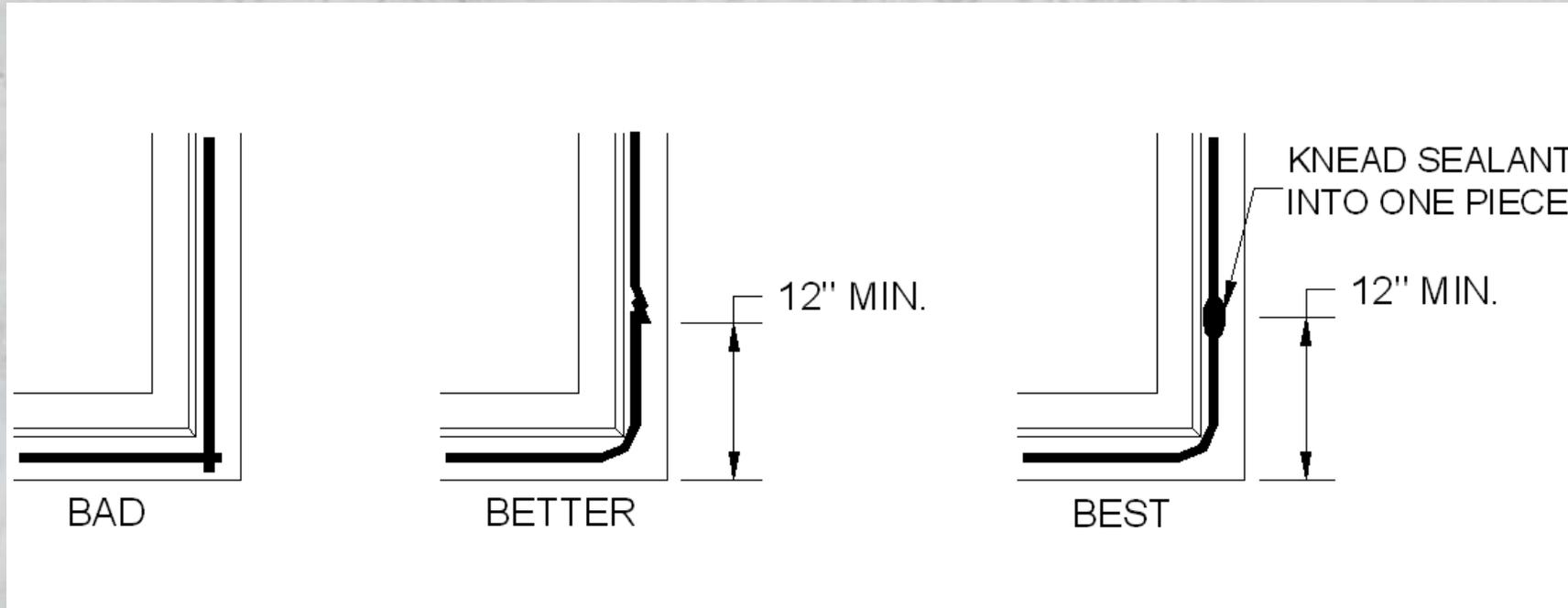
- Pressure = FORCE / AREA
 - F/A
- As the butyl sealant gets thinner, the width gets wider, the area gets larger, and the pressure decreases.



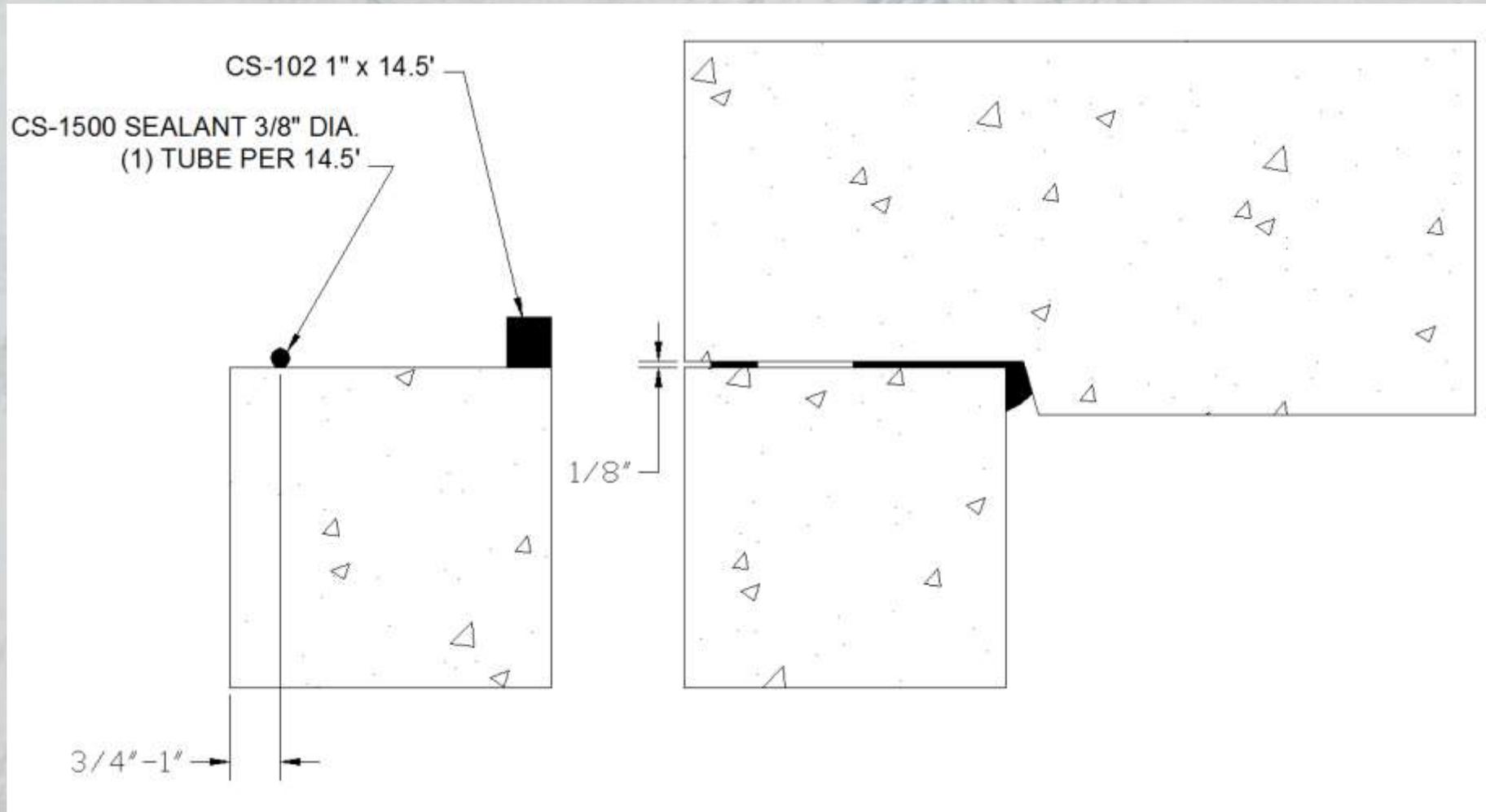
Placement



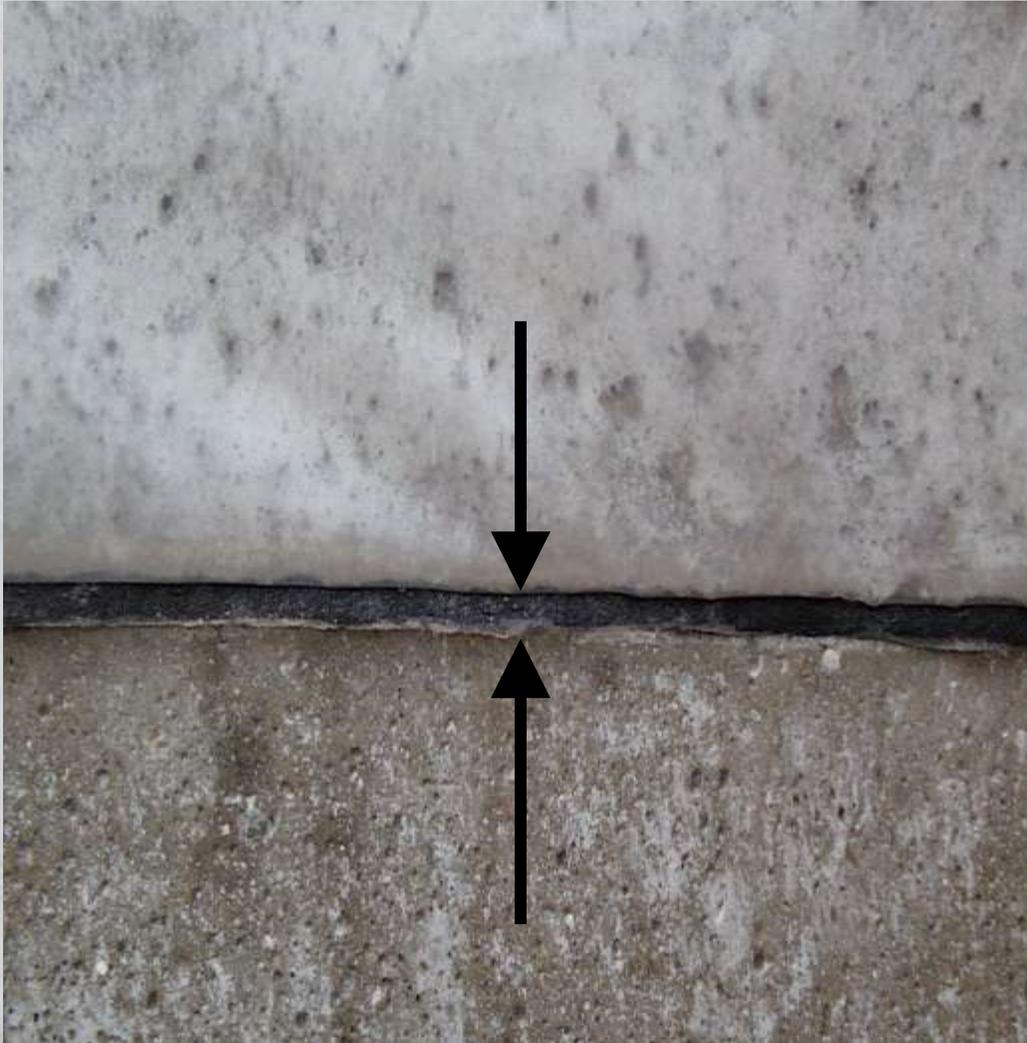
Making a Continuous Seal



Butyl and Gun-grade Sealant



Maximum Joint Gap



3/8" maximum gap between two mating joint surfaces BEFORE sealant is applied.

ASTM C 1227-05 Section 10.3

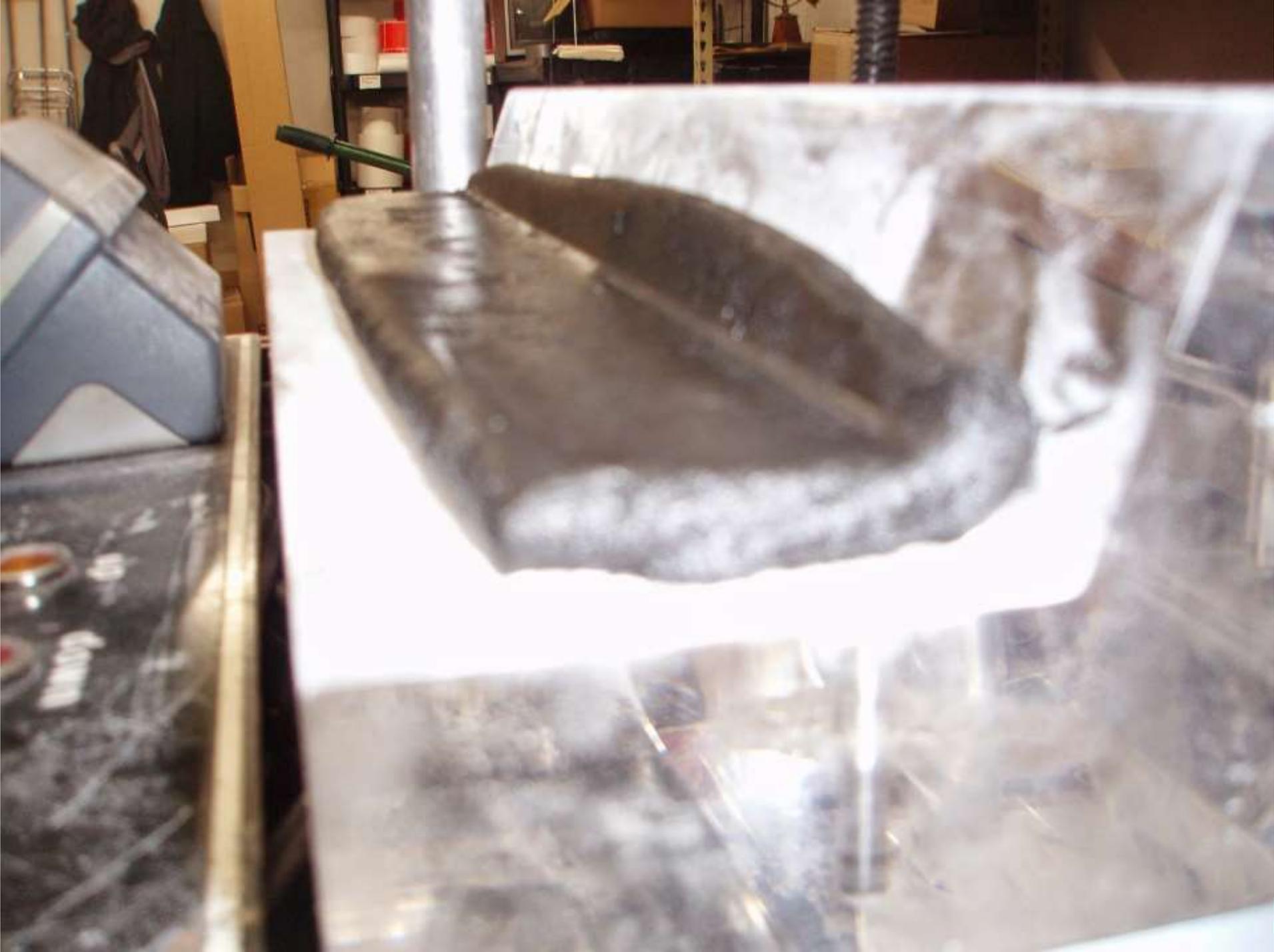
Minimum 50% compression of sealant

Sound / clean concrete at the joint surface







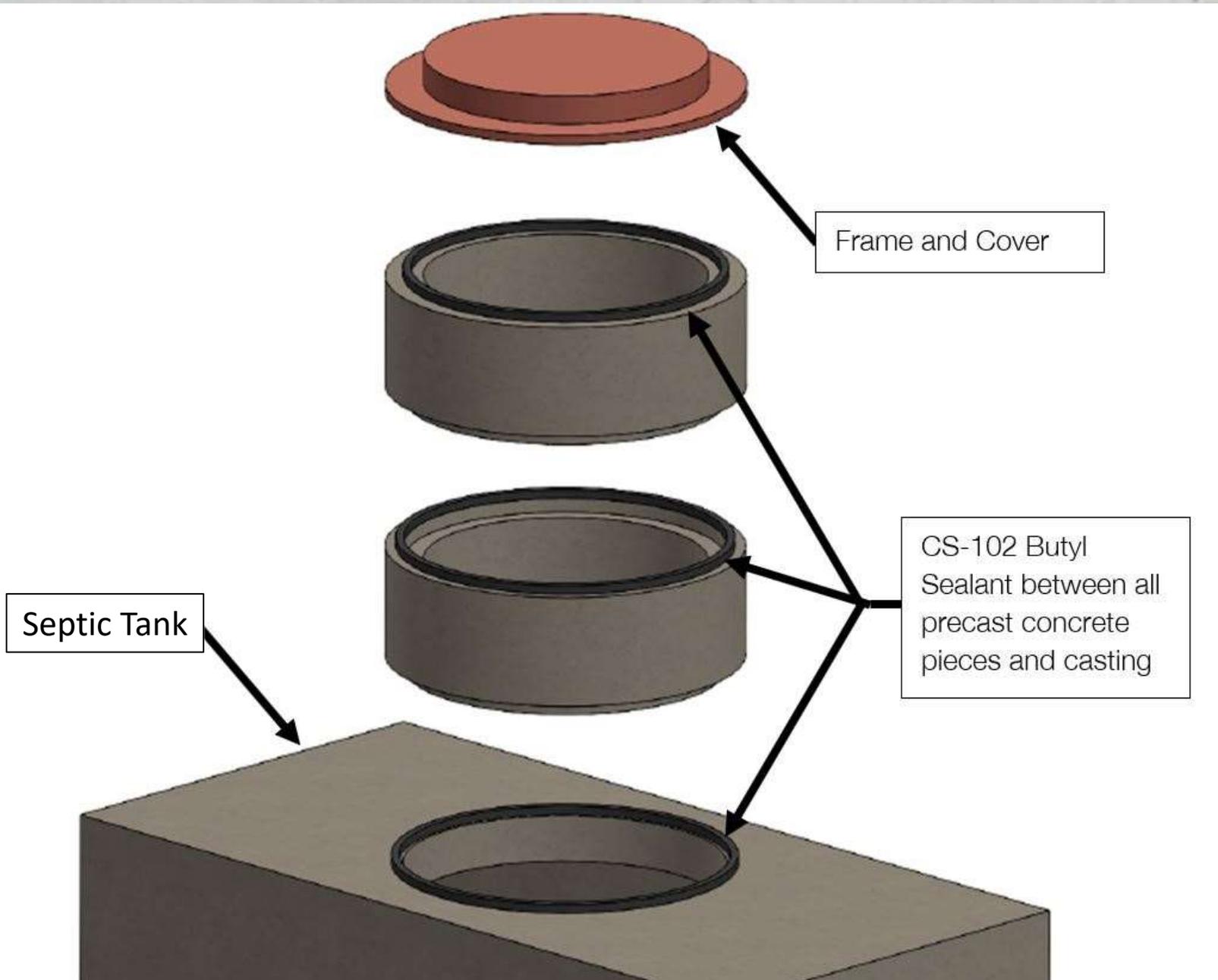




The background of the image is a light-colored, textured surface, possibly concrete or stone. Overlaid on this is a faint, blue-tinted architectural drawing of a building's structural frame. The drawing shows a complex grid of lines representing walls, columns, and beams, with some areas filled with hatching to indicate depth or specific materials. The drawing is centered and slightly tilted.

Sealing the Riser





Sealing a Plastic Riser System



https://www.youtube.com/watch?v=Yfgr_CPKq_Q
Enduring Charm LLC, Jan 16, 2021

Special Conditions for Risers

1. The riser is not heavy enough to compress the butyl
Answer: Use a gun grade sealant

Special Conditions for Risers

2. How do I seal a cold joint in a cast in riser?

Answer: Use a preformed waterstop sealant or use caulk sealant around the chamfer of the riser to lid interface.



Special Conditions for Risers

3. Is there anything I can apply to the outside of the riser ring?
Answer: You can apply a 6" wide joint wrap.



Special Conditions for Risers

4. What type of seal can I use to allow for easy re-entry?
Answer: CS-367 EntrySeal from ConSeal provides a watertight seal with a non-adhesive sealant.

[Back To Products](#)

CS-367 Entry Seal

CS-367 Entry Seal is a general purpose butyl rubber sealant for multiple applications that require a watertight seal, but can be readily accessed. Not intended as a replacement for ConSeal CS-102 or other ConSeal performance rated sealants. **Not intended for use in expansion joints or joints that move.**





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