



Watertight INTEGRITY  
Dampproof vs. Waterproof

Sam Lines  
Concrete Sealants, Inc.

# Course Outline

- Precast Concrete Joints
  - Rubber gaskets
  - Butyl sealants
  - Joint wrap
- Concrete Porosity
  - Sealers
  - Coatings



# **WATERTIGHT MANHOLE JOINTS**

## Precast Concrete Joints

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Making watertight connections

# About ASTM International

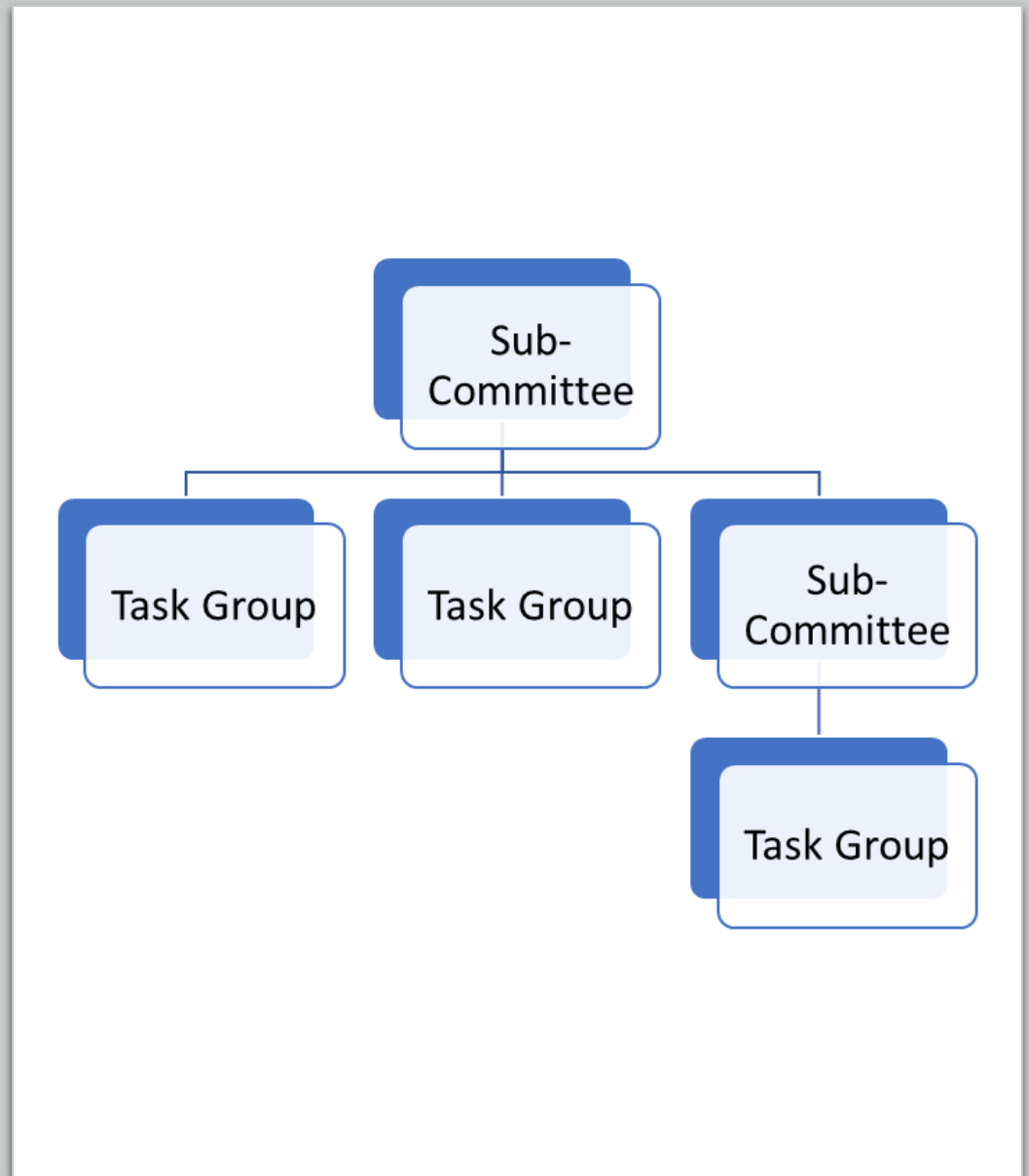
- One of the world's largest international standards developing organization.
- 30,000 Global Members
- >12,500 Int. Standards
- >140 Countries
- 145 Tech Committees



# Committee Structure

The Technical Committees are divided into seven families

- **(A) Ferrous Metals**
- (B) Non-Ferrous Metals
- **(C) Cementitious, Ceramic, Concrete and Masonry Materials**
- (D) Miscellaneous Materials
- (E) Miscellaneous Subjects
- (F) Materials for Specific Applications
- (G) Corrosion, Deterioration and Degradation of Materials



## ASTM C443 Joints for Pipe and Manholes

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- Rubber Gasket Specification
- 13 psi / 10 minutes in straight alignment
- 10 psi / 10 minutes deflected
- Specific joint designs



# ASTM C990 Preformed Butyl Tape

- 10 psi / 10 minutes
- Self-Adhesive
- Fills irregular joints
- Testing to meet the ASTM C443 requirements

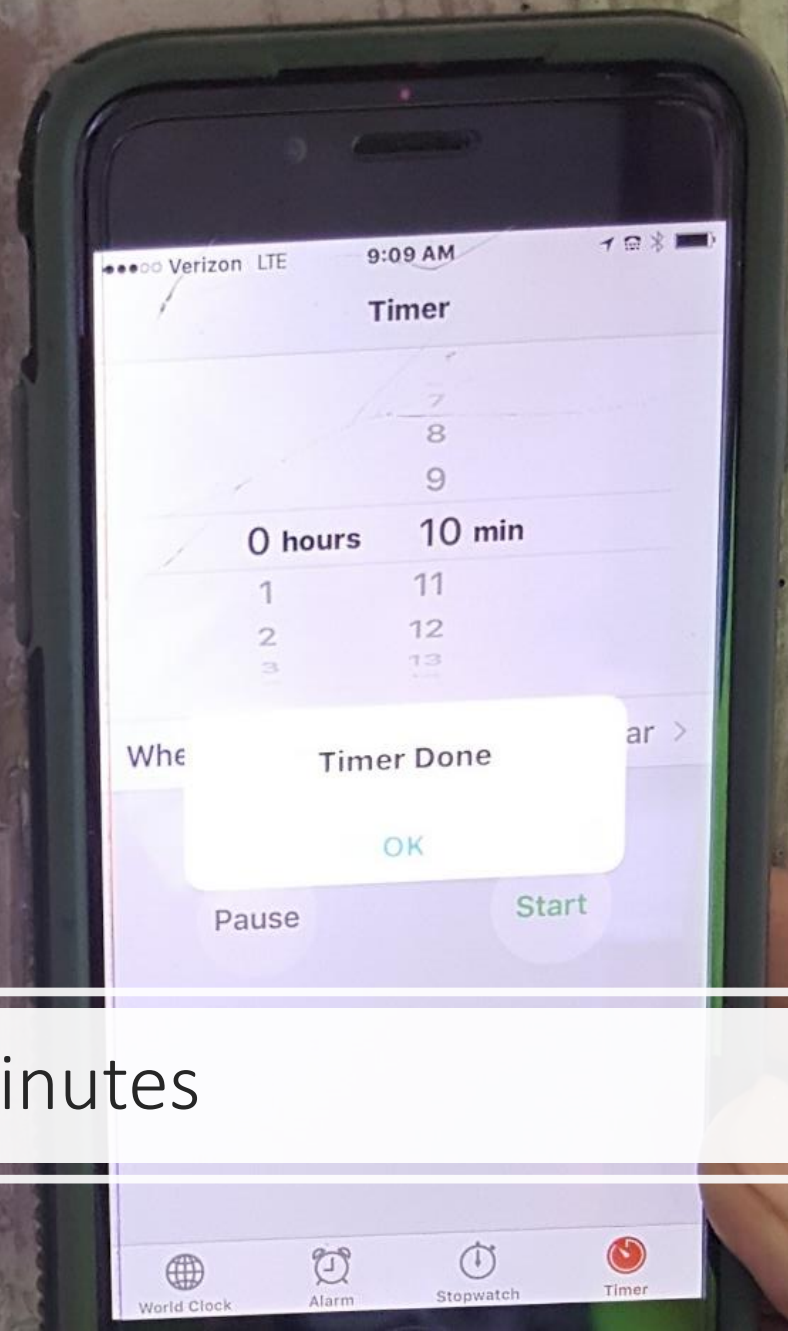




# Hydrostatic Testing







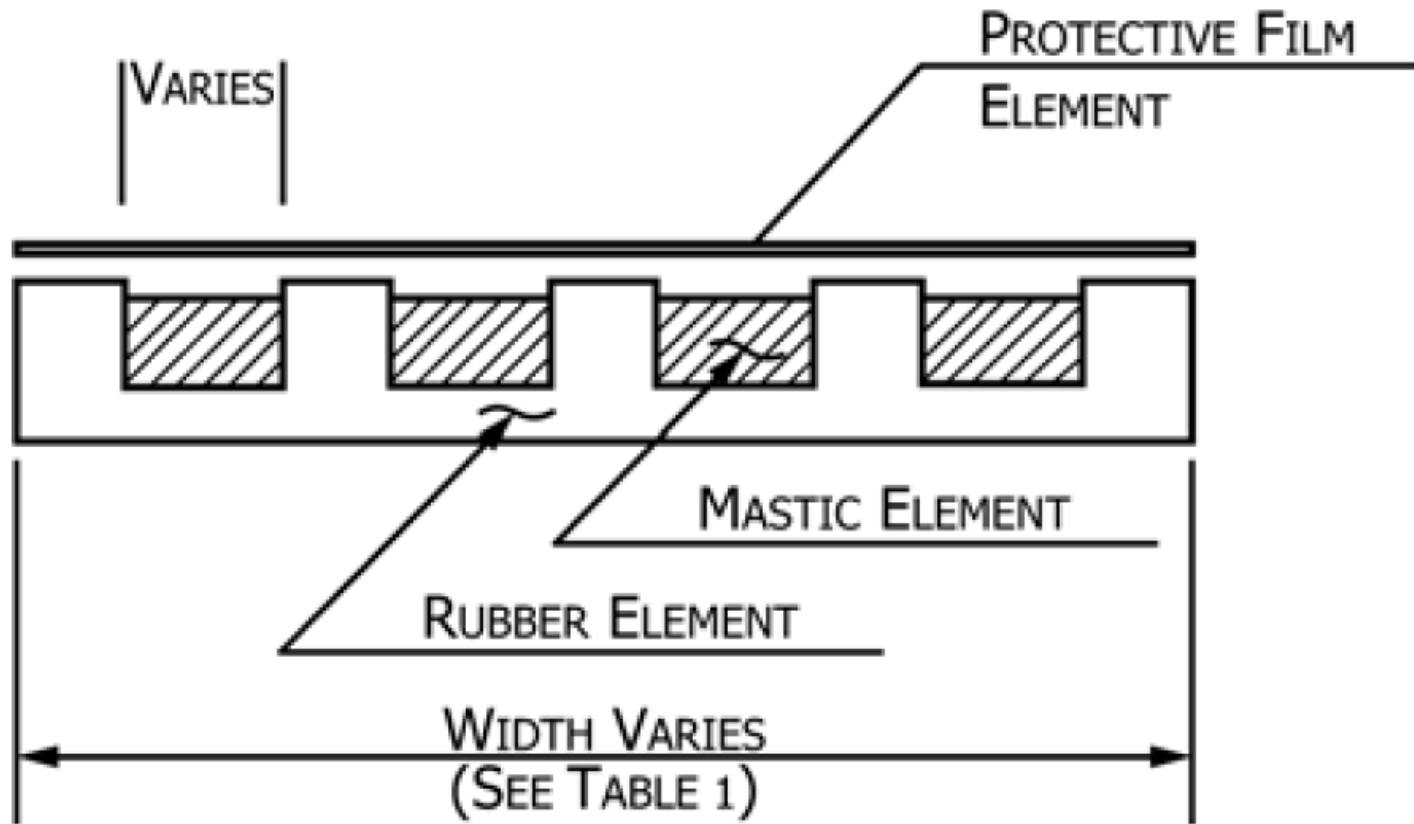
13 psi for 10 minutes

NOTE 1—This specification covers only the design and material of the sealing bands. Sealing bands covered by this specification are adequate, when properly installed, for external hydrostatic pressures up to 13 psi, (30 ft) without leakage. The amount of infiltration or exfiltration flow in an installed pipeline is dependent upon many factors other than the sealing bands; allowable quantities and suitable testing of the installed pipeline and system must be covered by other specifications.

## ASTM C877 External Sealing Band

- Positive side water resistance to 13 psi
- Prevents “silting” of fines in the soil
- Available in Type I, Type II, and Type III

# Type I



**FIG. 1 Sealing Band Type I Schematic (Not to Scale)**



Type II





Type III

# Placement of Preformed Butyl Sealant in a Precast Joint

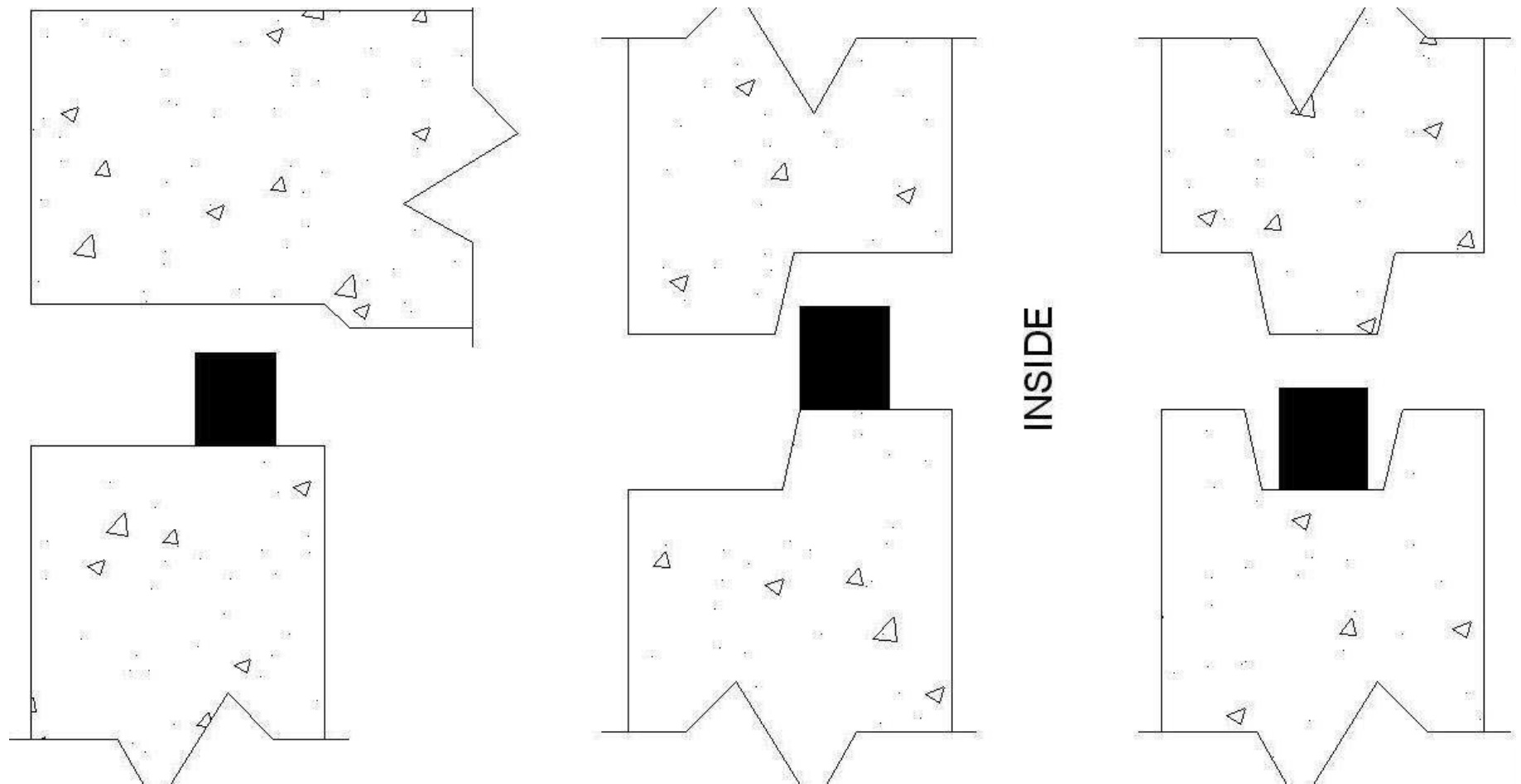




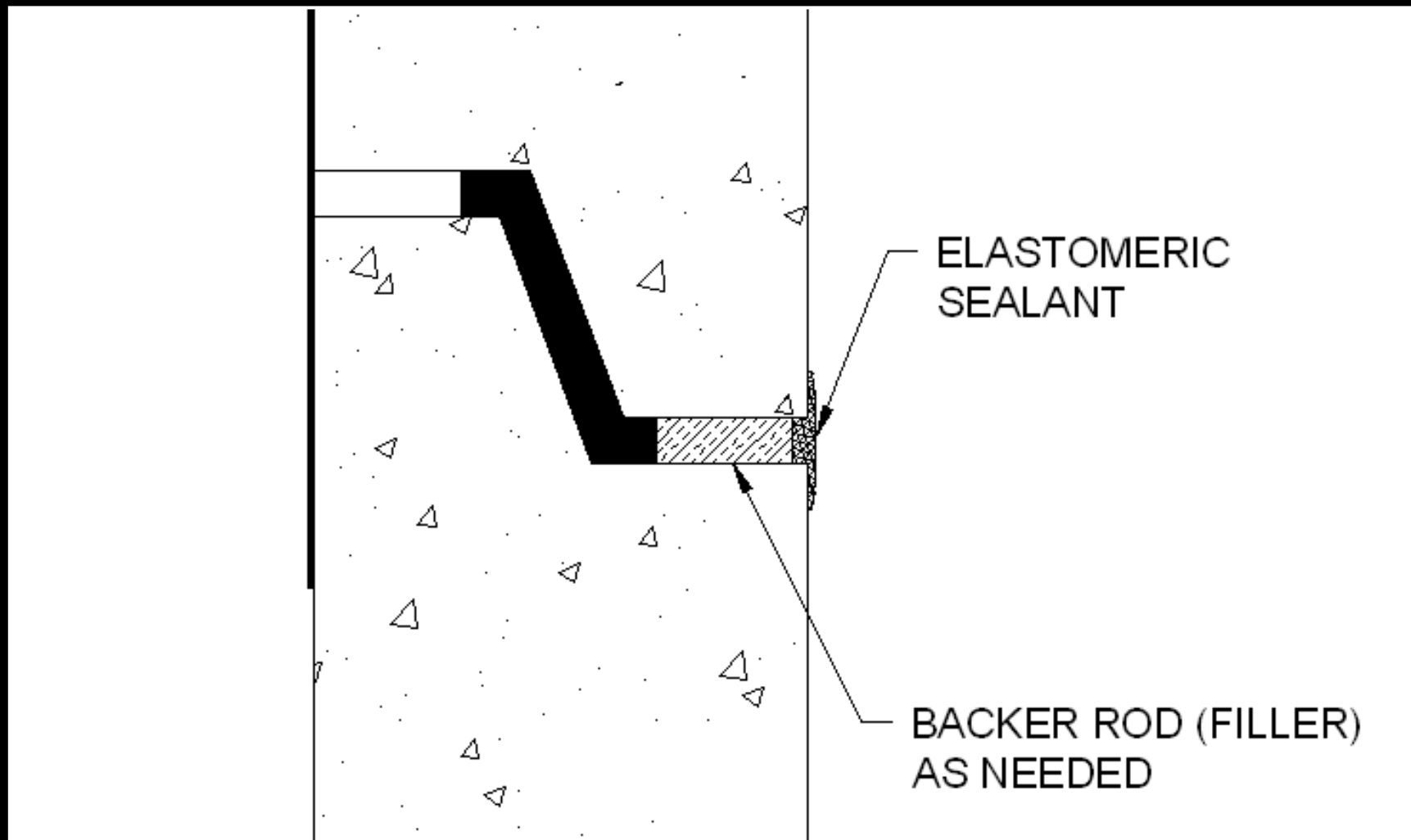


## Preformed Butyl Sealant Installation

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



Sealant Placement



Watertight System









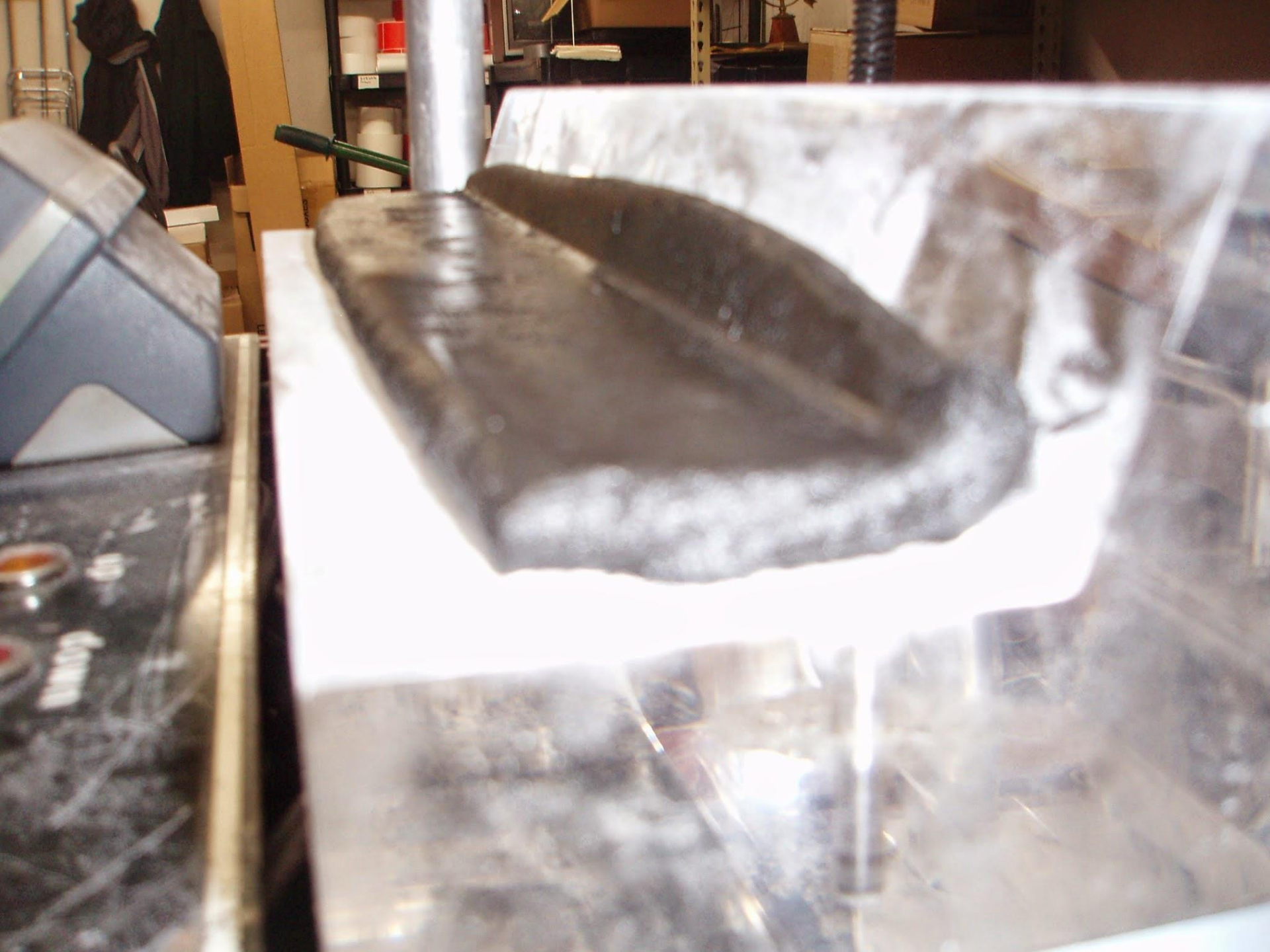
























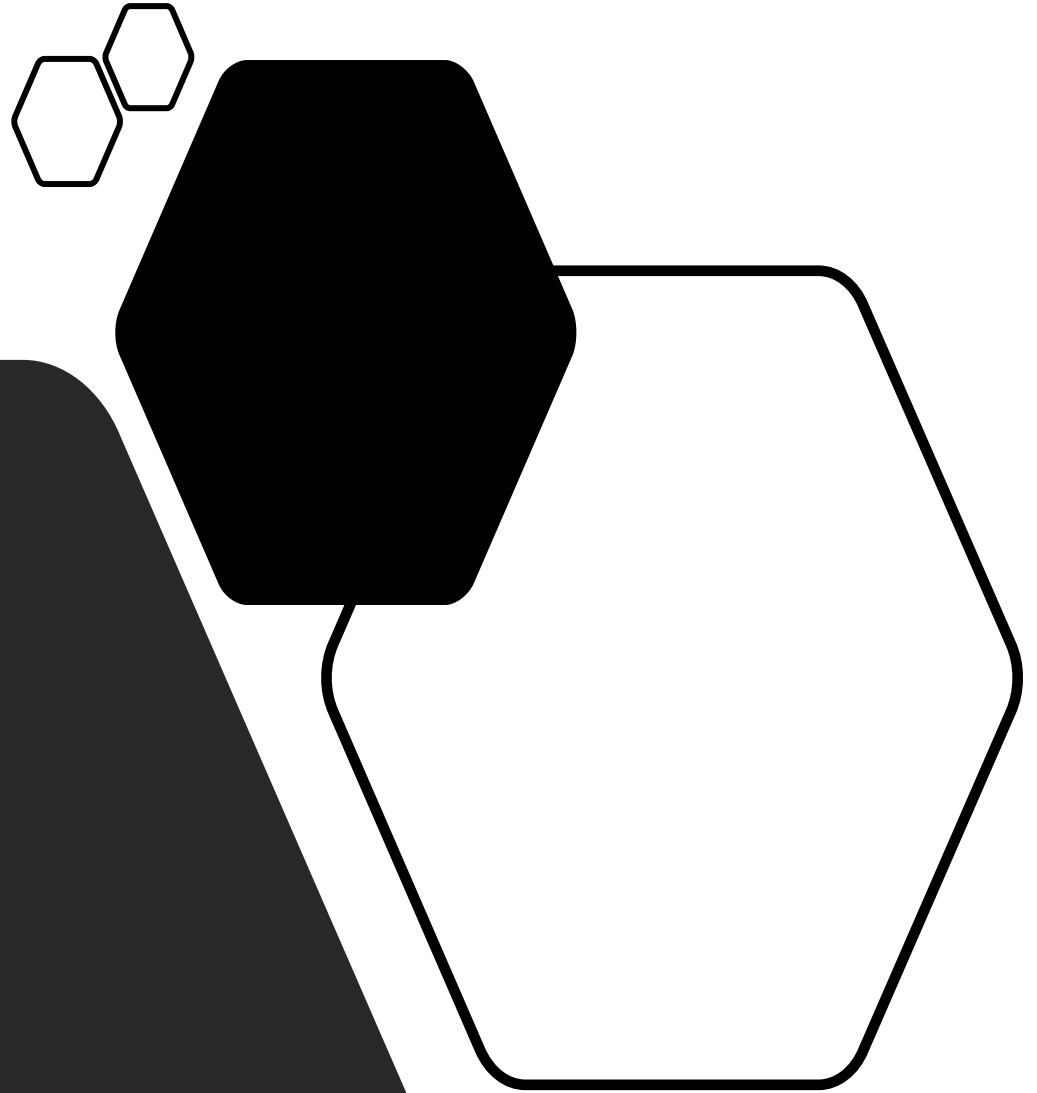




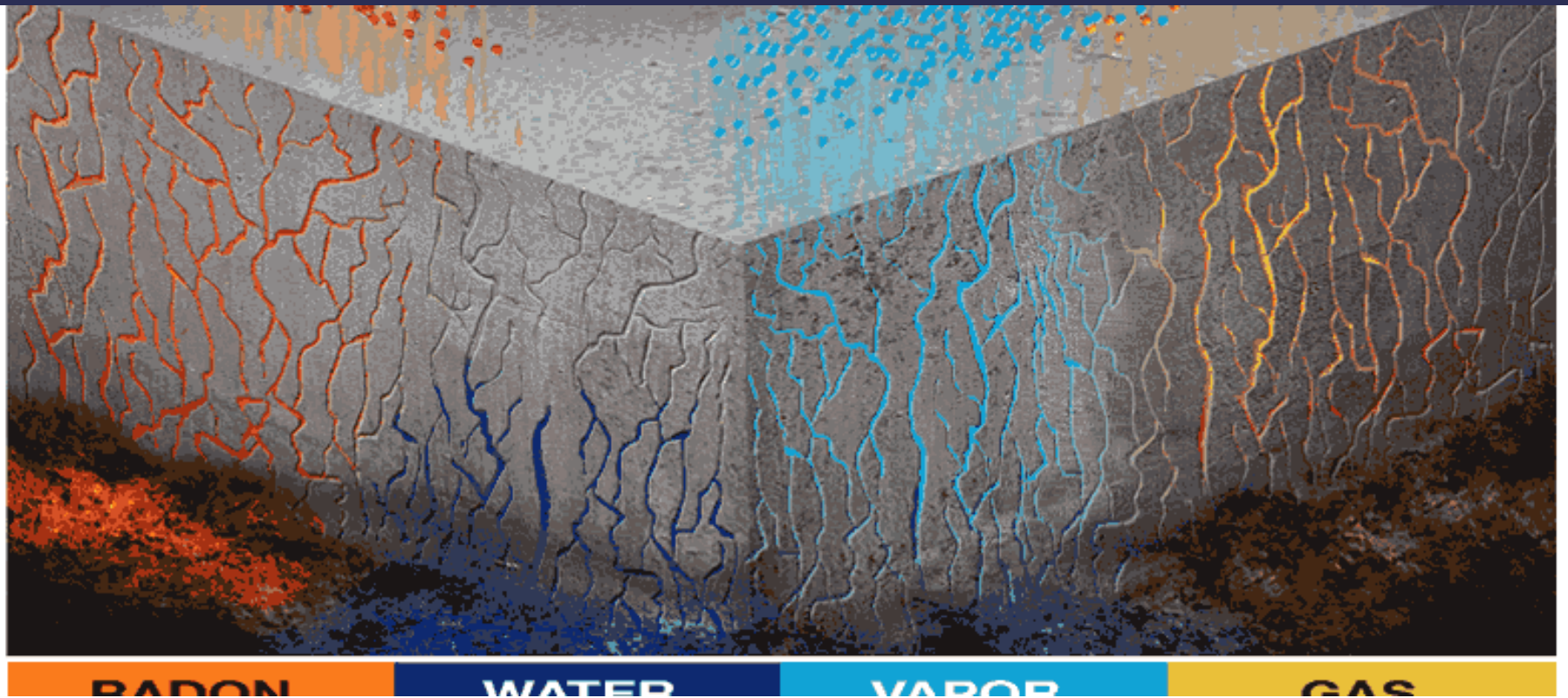




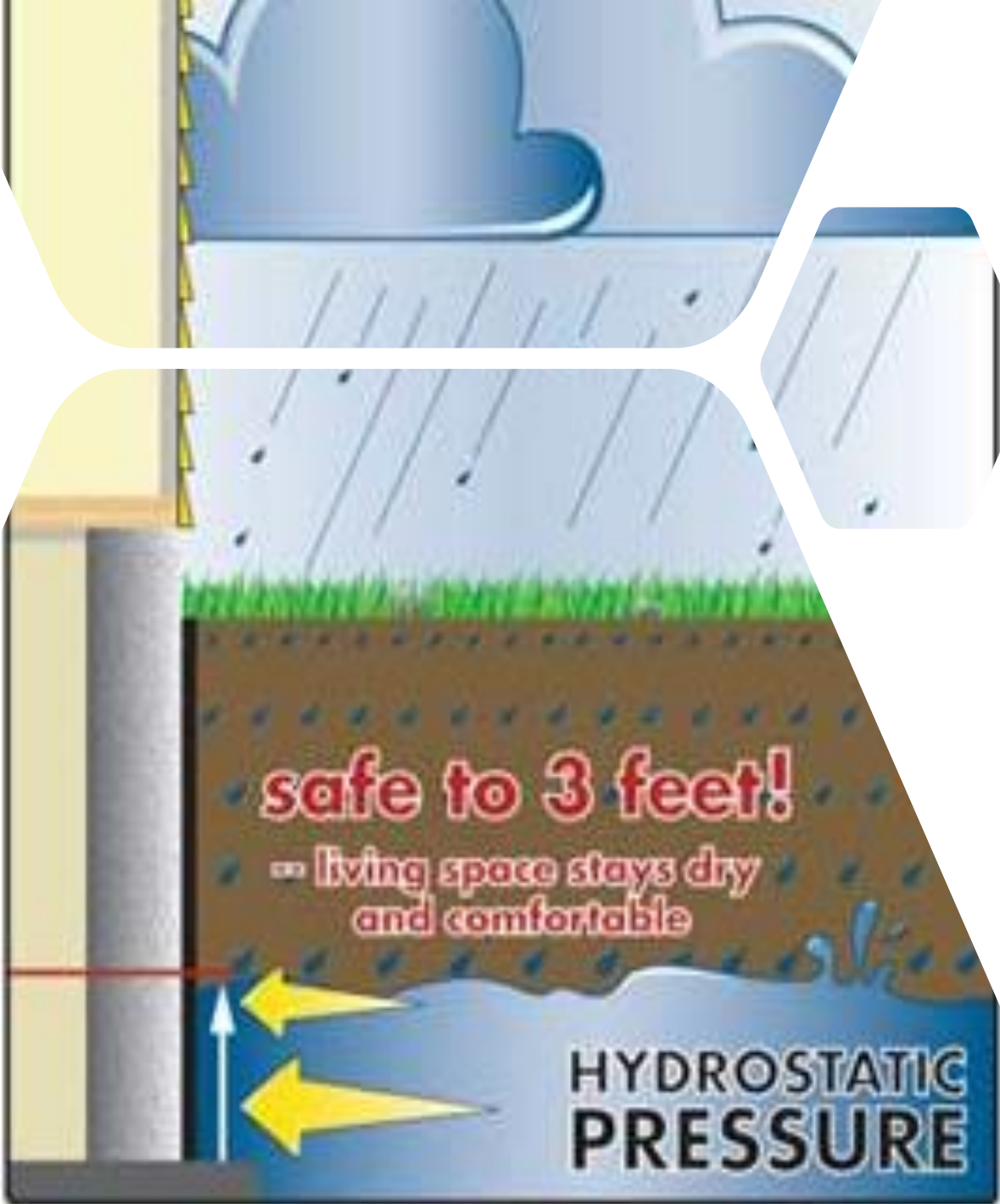
# Concrete Porosity







Concrete is Porous



## Waterproof or Dampproof

- Hydrostatic condition
- Below/Above grade
- Coating thickness

# Waterproof Definitions

- “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 Definitions

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

**Can anything truly be  
waterproof?**

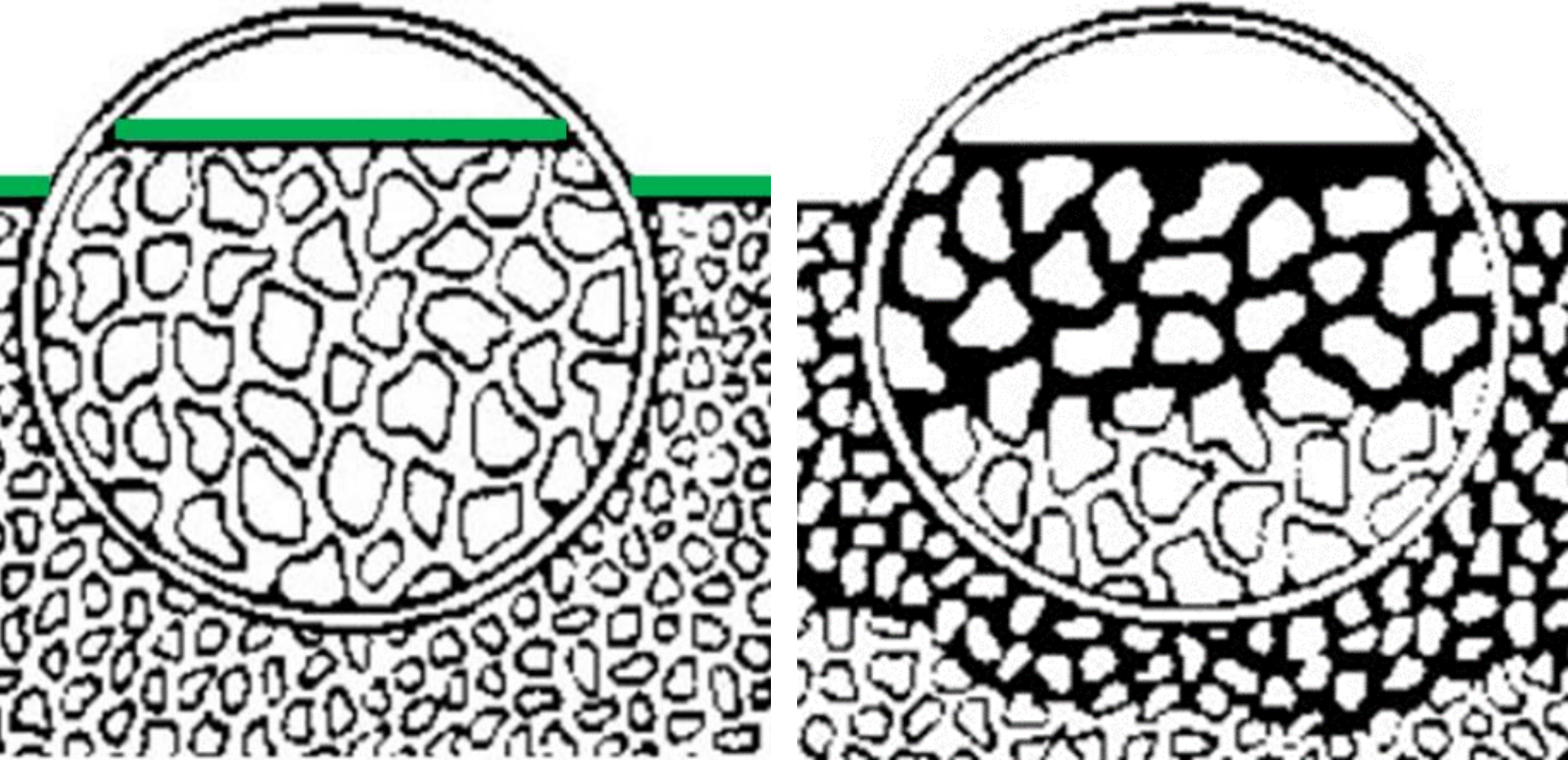


# Assessment Question

- Can anything truly be watertight?  
What about steel? Glass?  
Plastic?

# A Variety of Technologies

- Coatings/paints
    - Acrylics
    - Epoxies
    - Urethanes
    - Asphalt
  - Cementitious coatings
    - Portland based
    - Special materials
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- Sealers
    - Silane
    - Siloxane
    - Siliconates
    - Silicas
    - Combinations
  - Admixtures
    - Crystalline



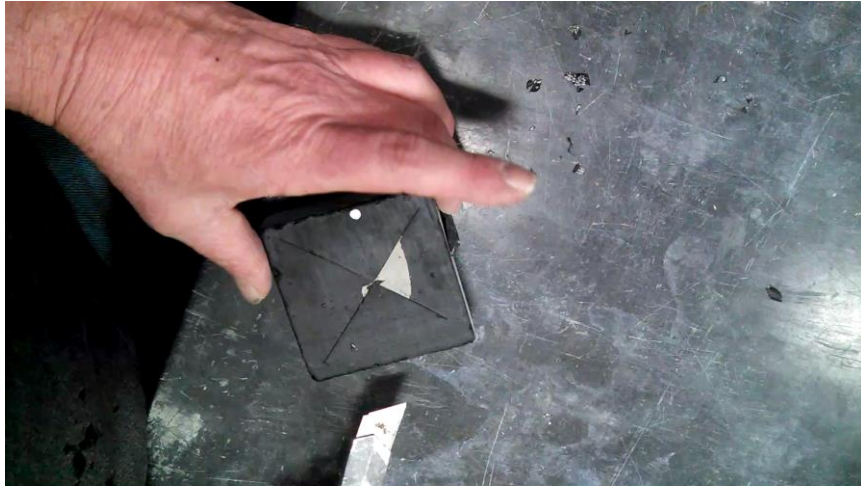
Coatings vs. Sealers



## Coatings Challenges

- Delamination
- Excessive Concrete moisture
- Concrete dirty or dusty
- Form release agent on the concrete
- Forming surface





Bad Adhesion



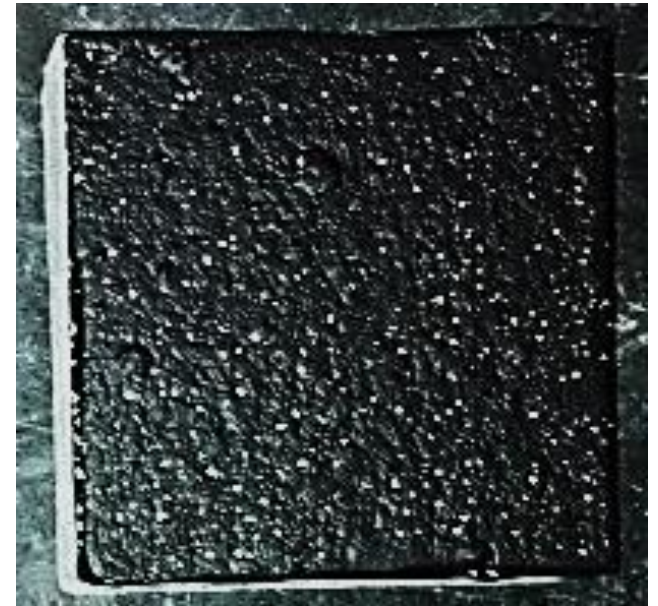
Good Adhesion

# The “X” Adhesion Test

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# Coating Problems

- Outgassing
  - Air escapes from concrete
  - Leaves pinholes, typically in thin coatings





## Cementitious Coatings

Cement based coatings bond well to concrete. They often fill the small voids in the concrete. They offer a thicker coating than some paints.

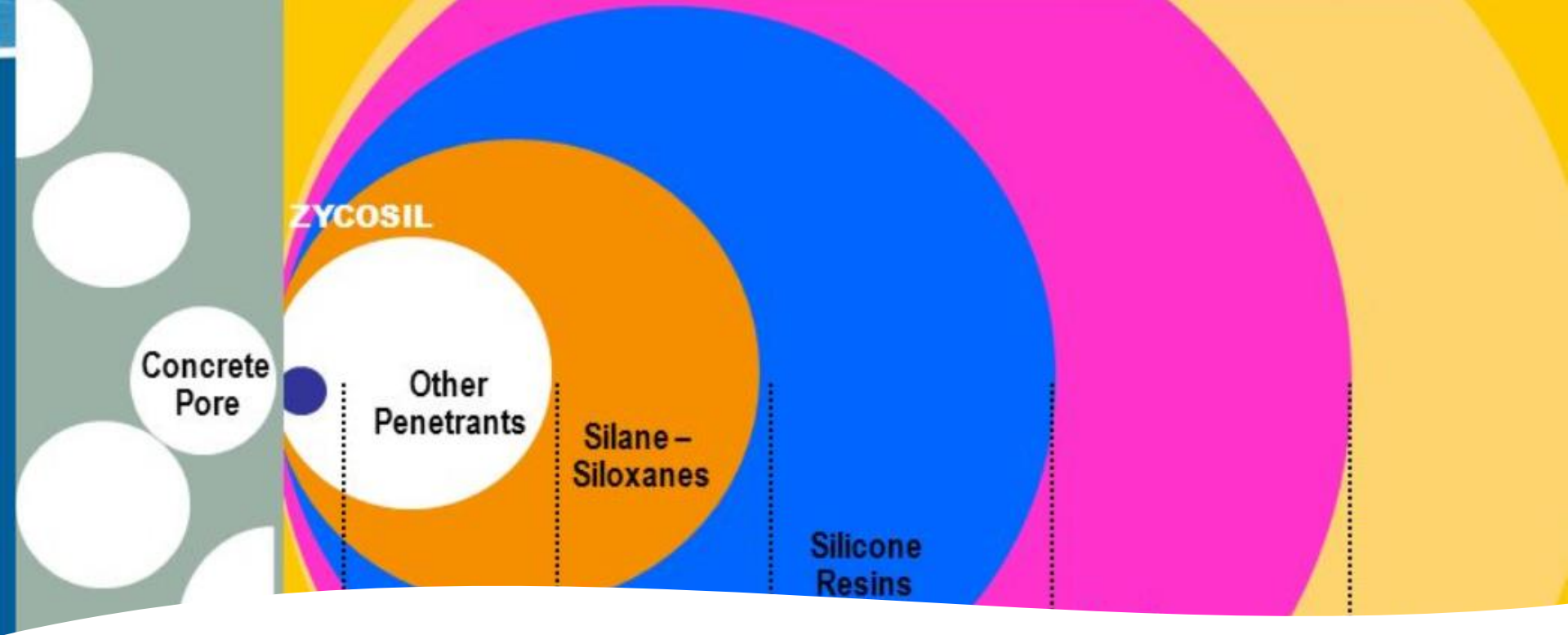
# Cold Applied Waterproofing Membrane

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- ASTM C836
- Elastomeric (flexible)
- Resists Hydrostatic Pressure
- 40 – 60 Mils Typical
- Single and Two Component Systems

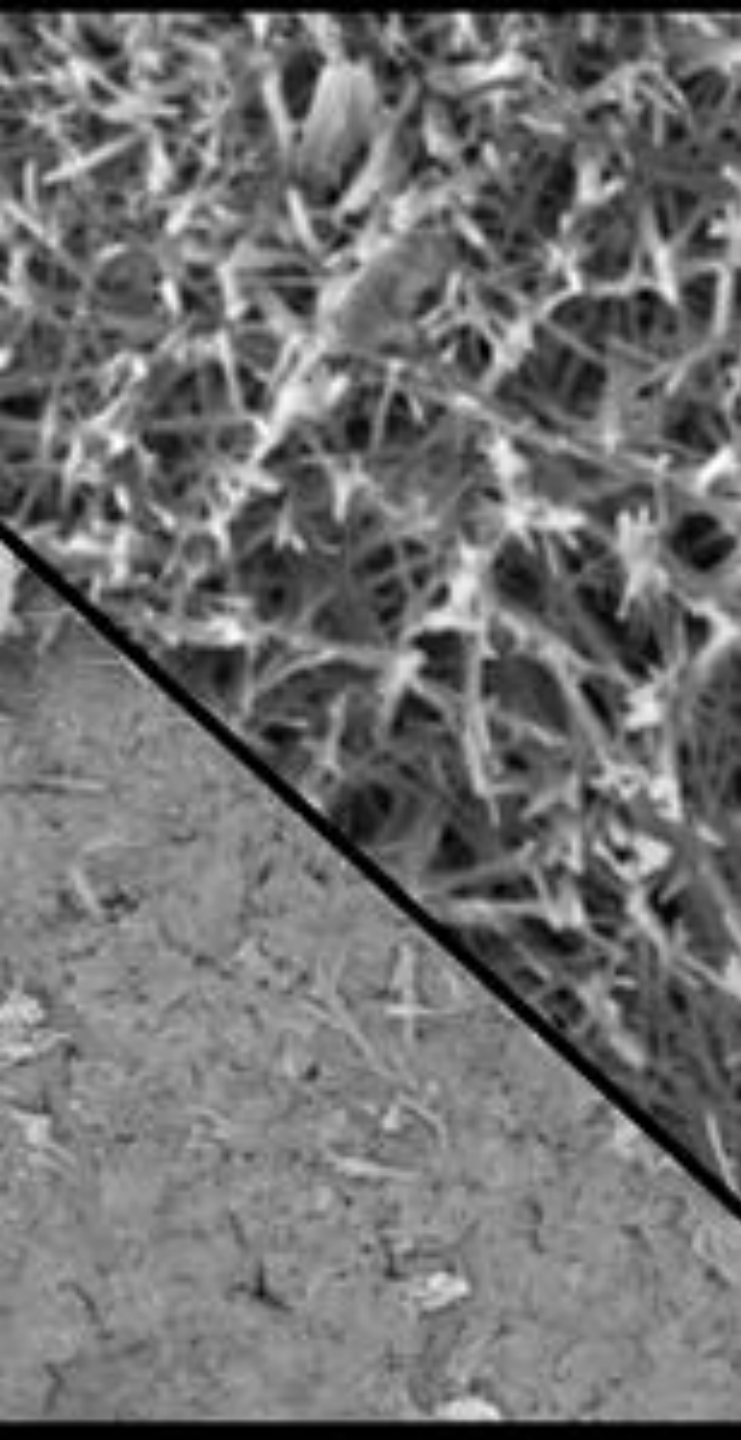






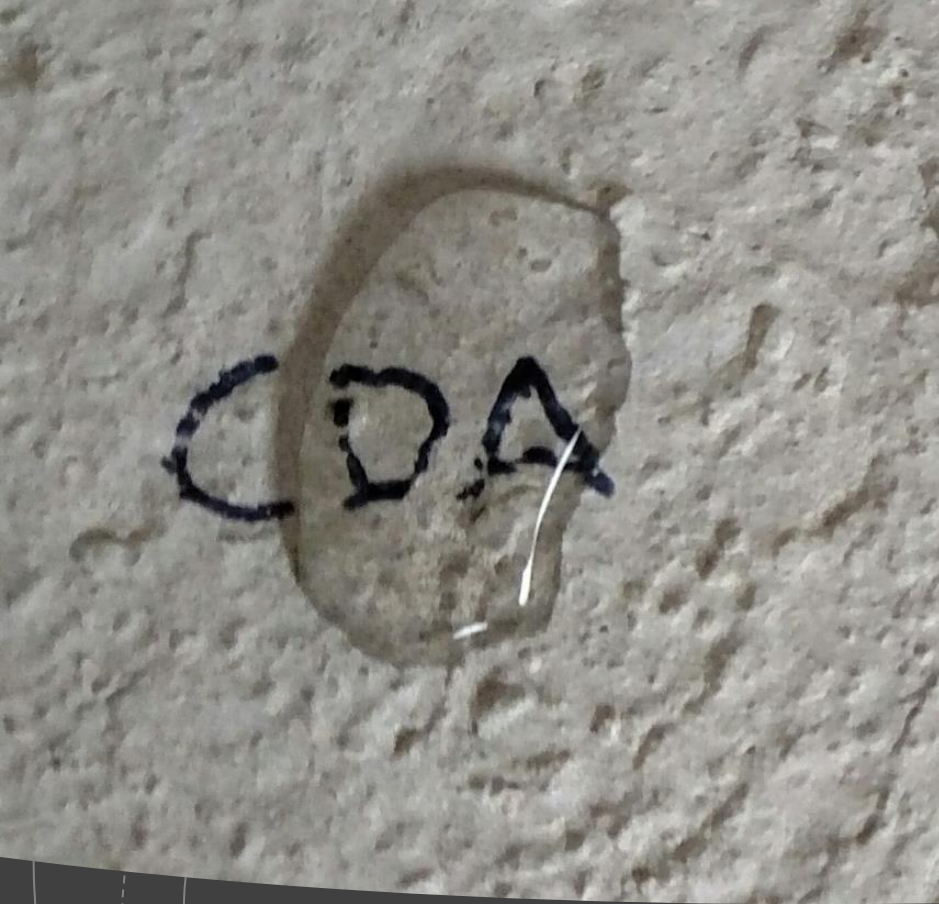
## Sealers for Concrete

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



# Crystalline Waterproofing

- 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

Questions?

Thank you!

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