Concrete Shrinkage and Joint Sealing

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Director, Canadian National Radon Training Centre

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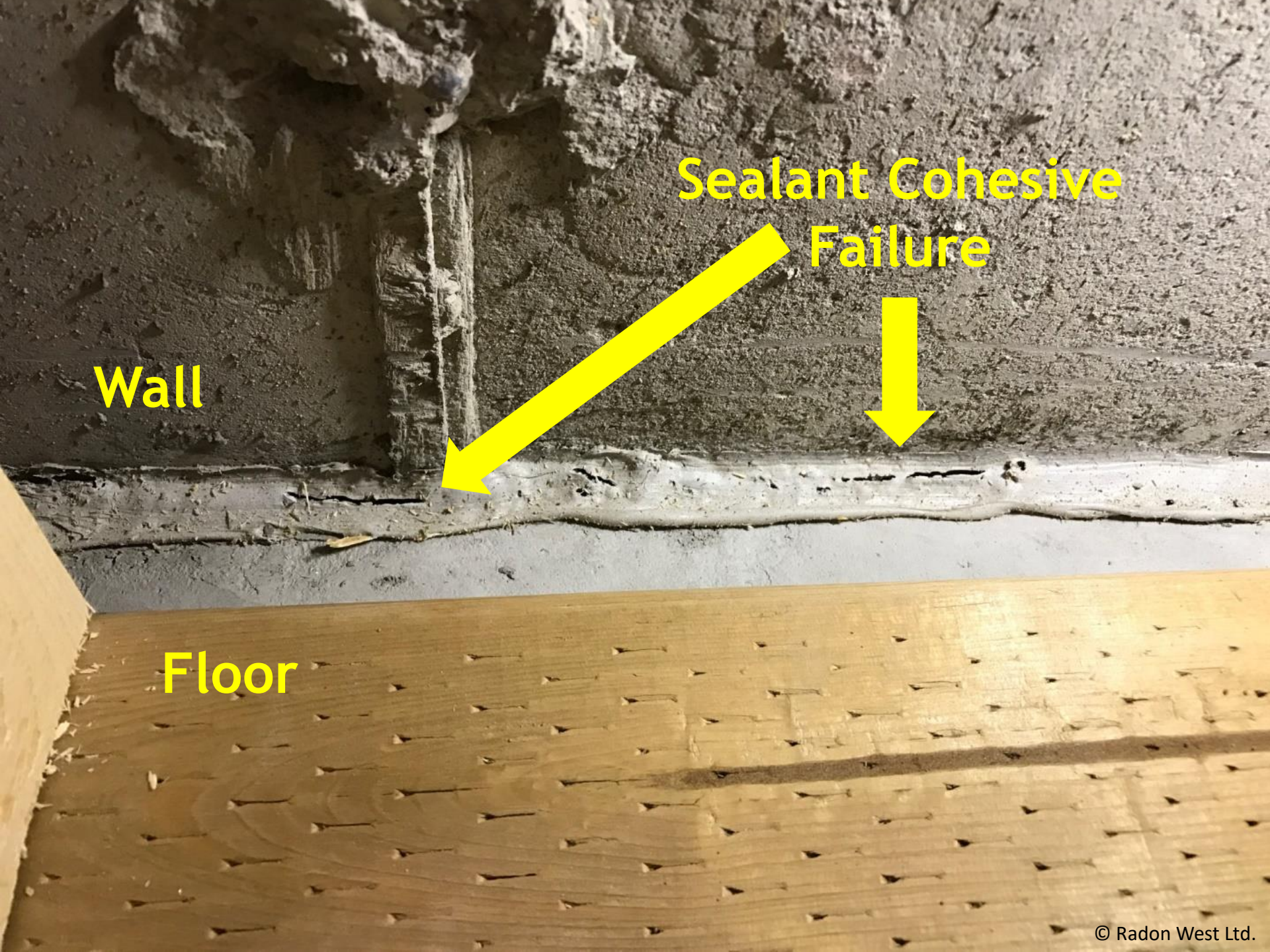
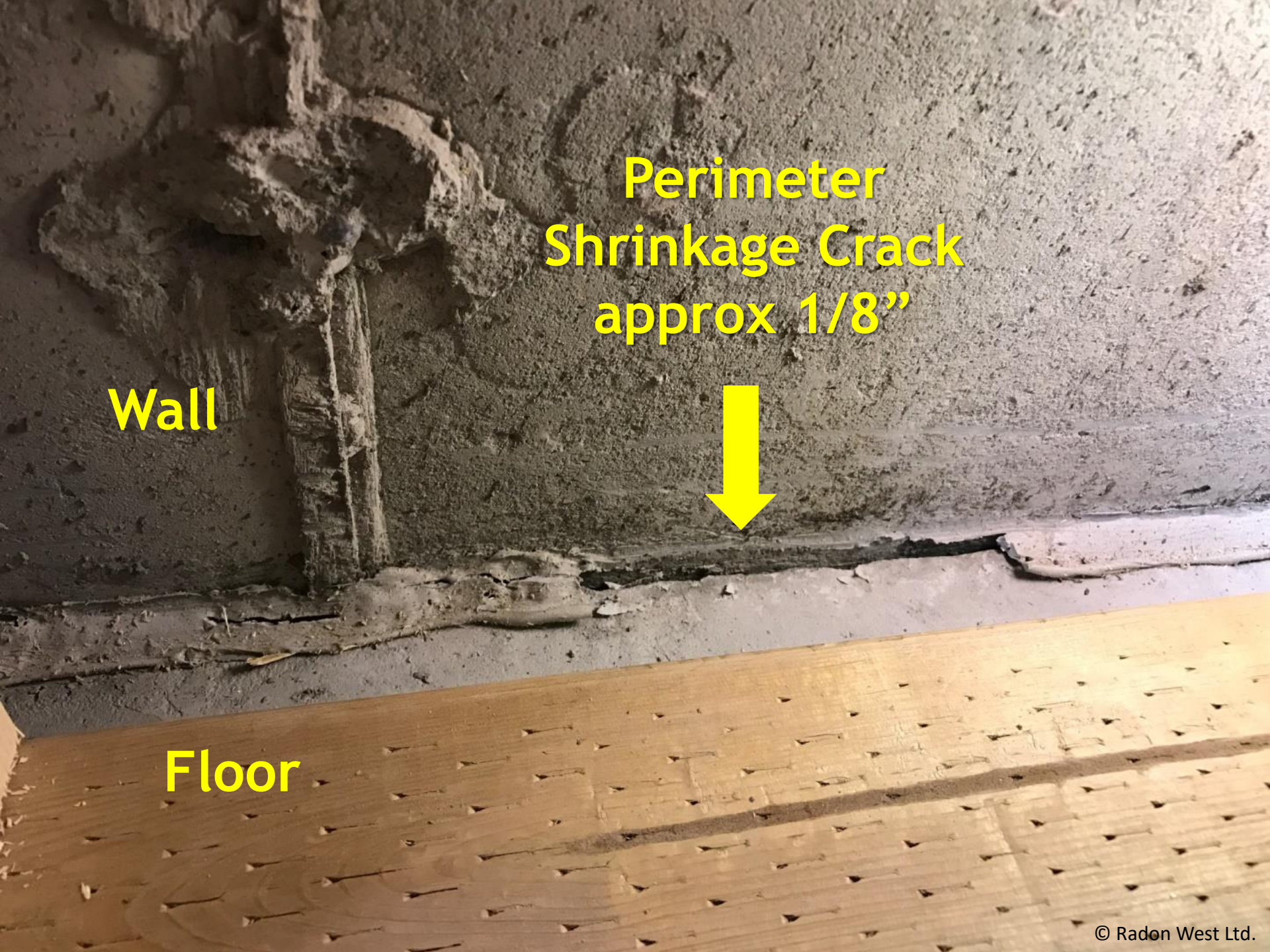
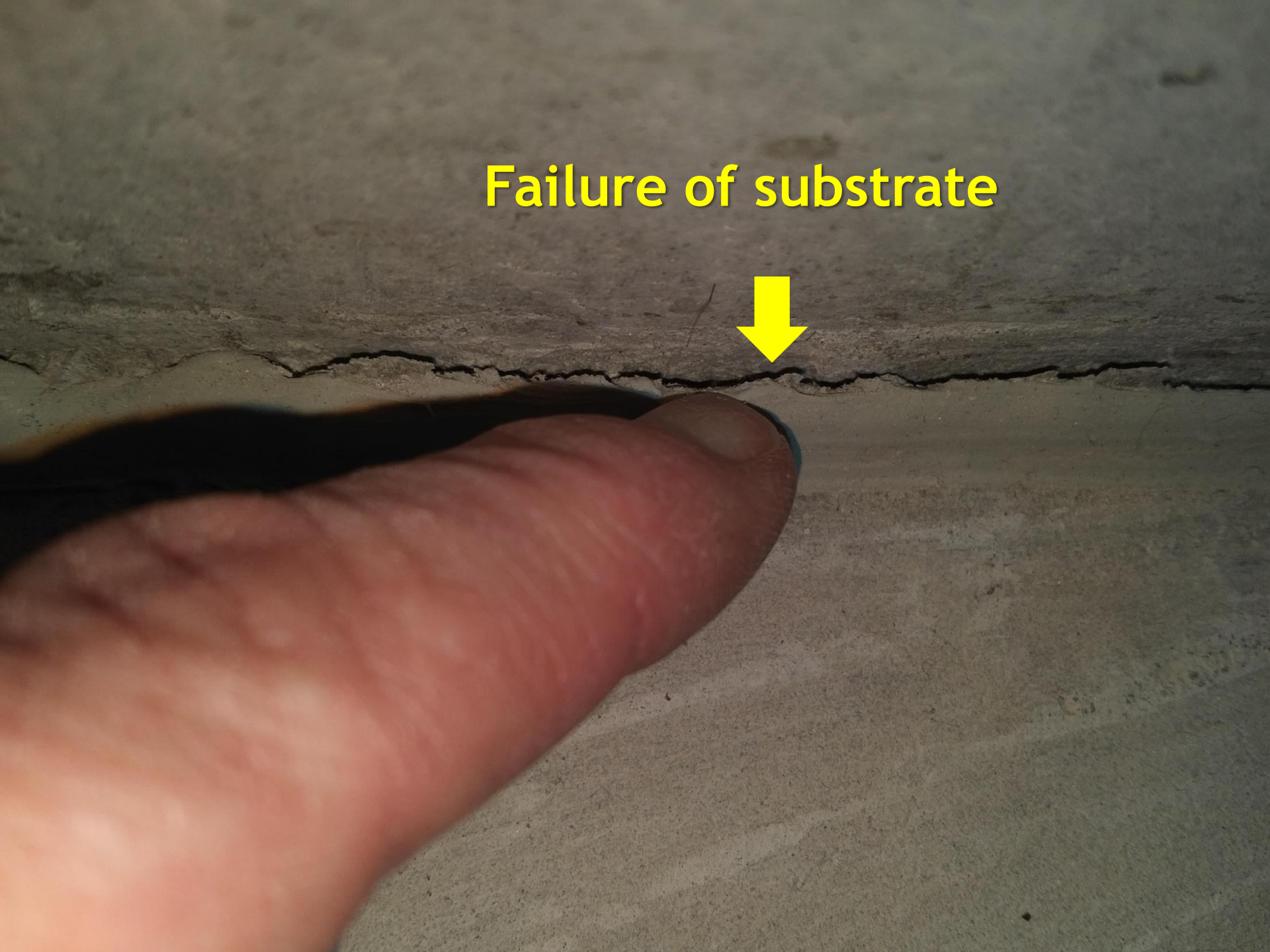
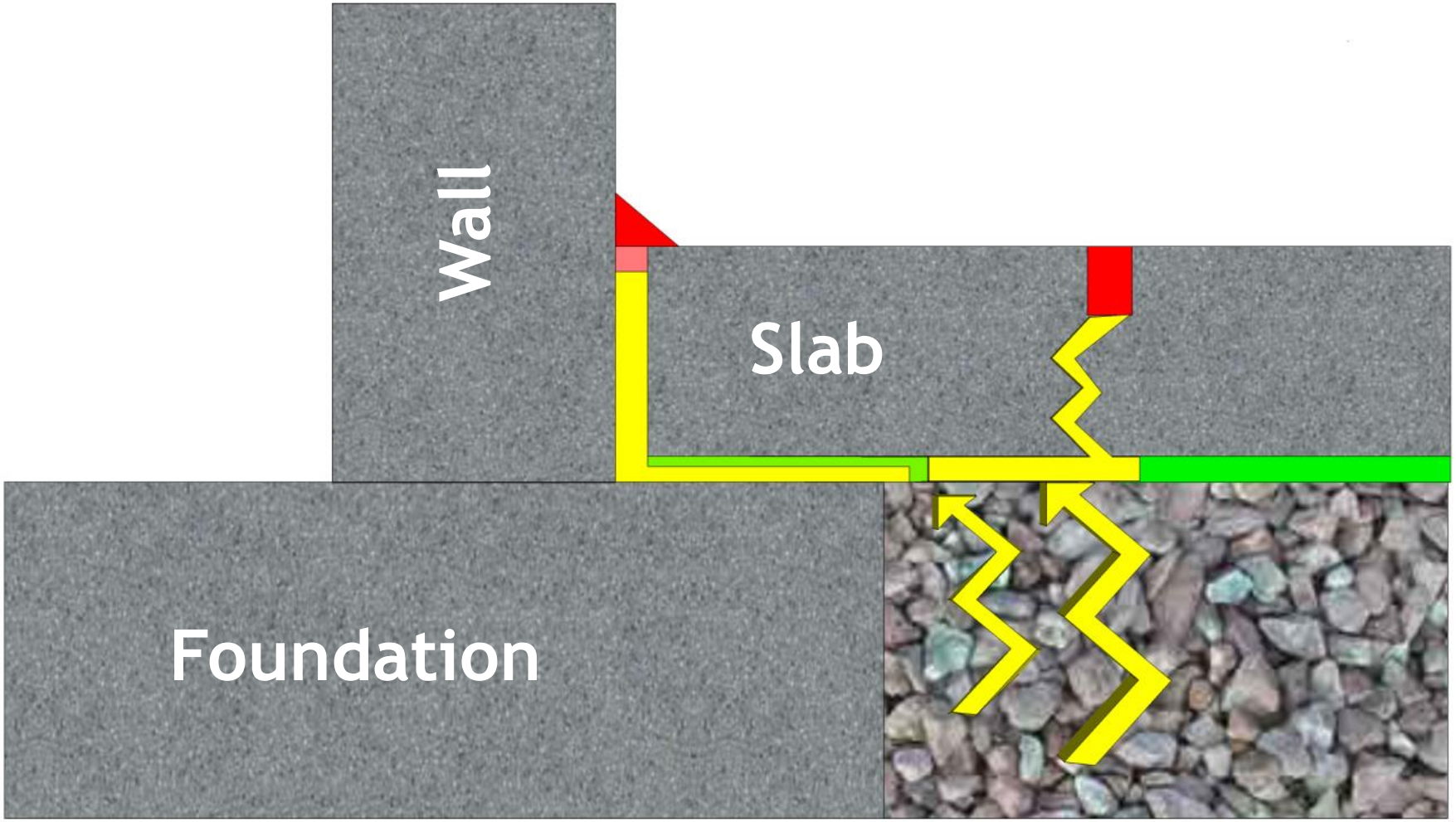
You Saw What in the Field?





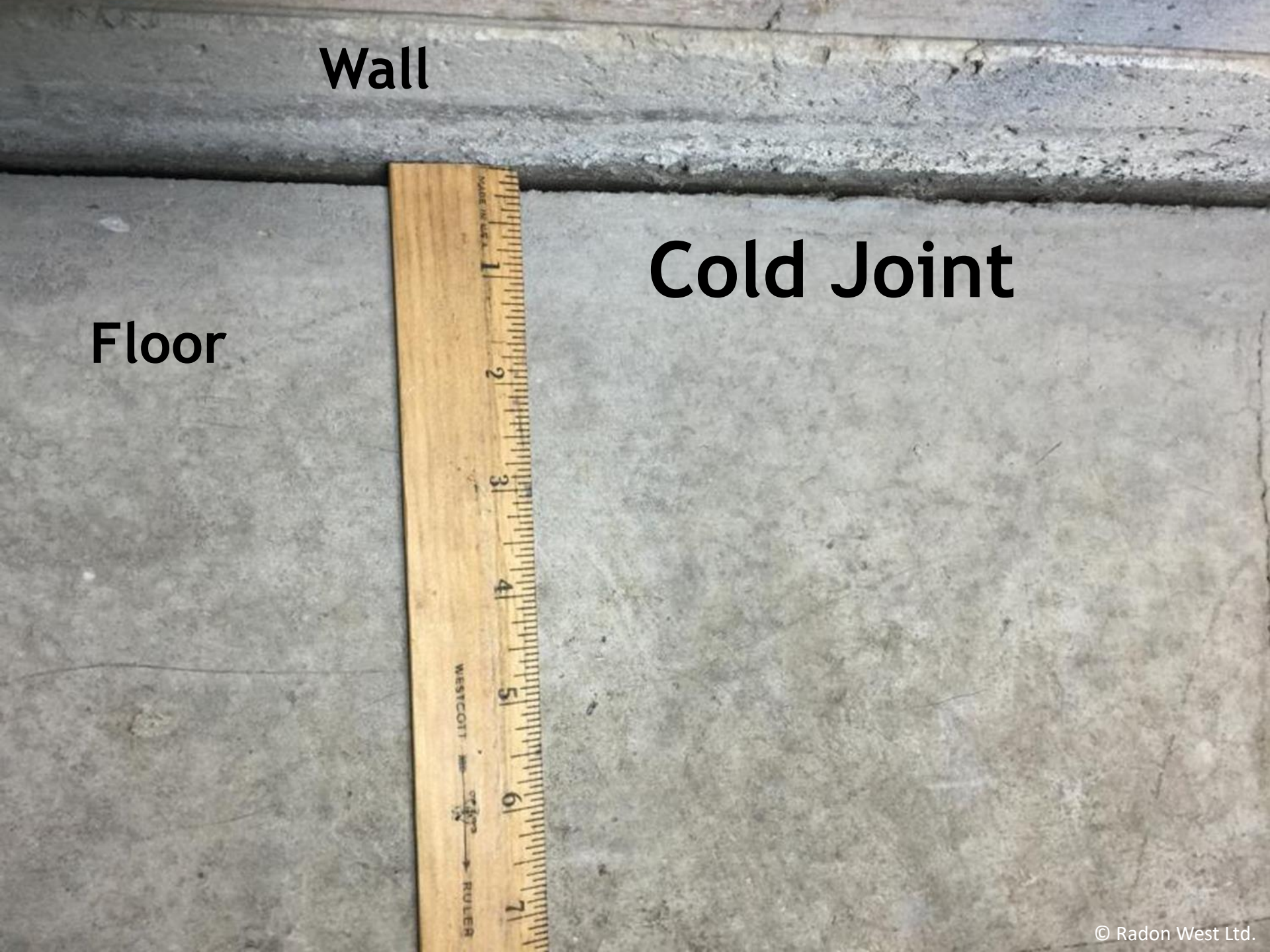

Failure of substrate

Understanding Concrete Shrinkage is Important



Where to Find Joints in Concrete

- Isolation Joints
- Control Joints
- Cold Joints



Control Joints

Cut in on purpose to control random cracking

Concrete Movement

- Drying shrinkage – average 0.0006 times length
- Thermal expansion/contraction

Identify if a Joint is a Moving Joint

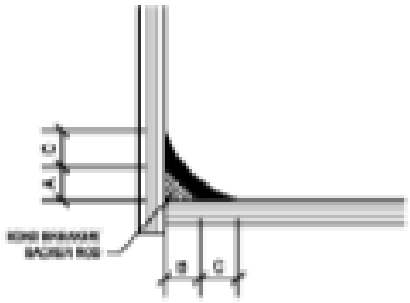
Age of Joint

Thermal Expansion and Contraction

Design Joint to Accept Anticipated Movement

Moving Corner Joints

Good Joint Design



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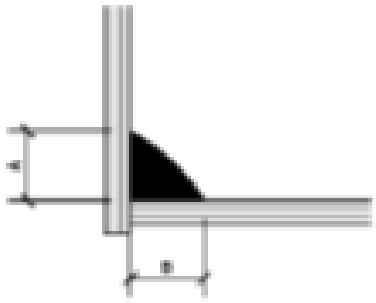
Poor Joint Design



Good Joint Design – Key Points:

1. Dimension A and B must be at least 1/4" (6 mm).
2. A bond breaker tape or backer rod must be present if joint movement is anticipated.

No bond breaker material therefore the joint WILL NOT accept movement

3. No bond breaker material; therefore, the joint will not accept movement.

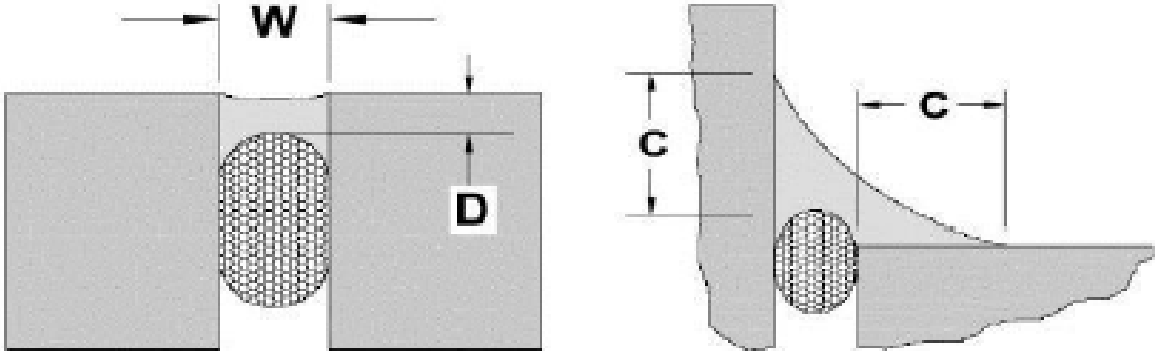
Source: Dow Corning Americas Technical Manual

Dymonic® 100

High-Performance, High Movement, Single-Component, Polyurethane Sealant

Sealant Dimensions

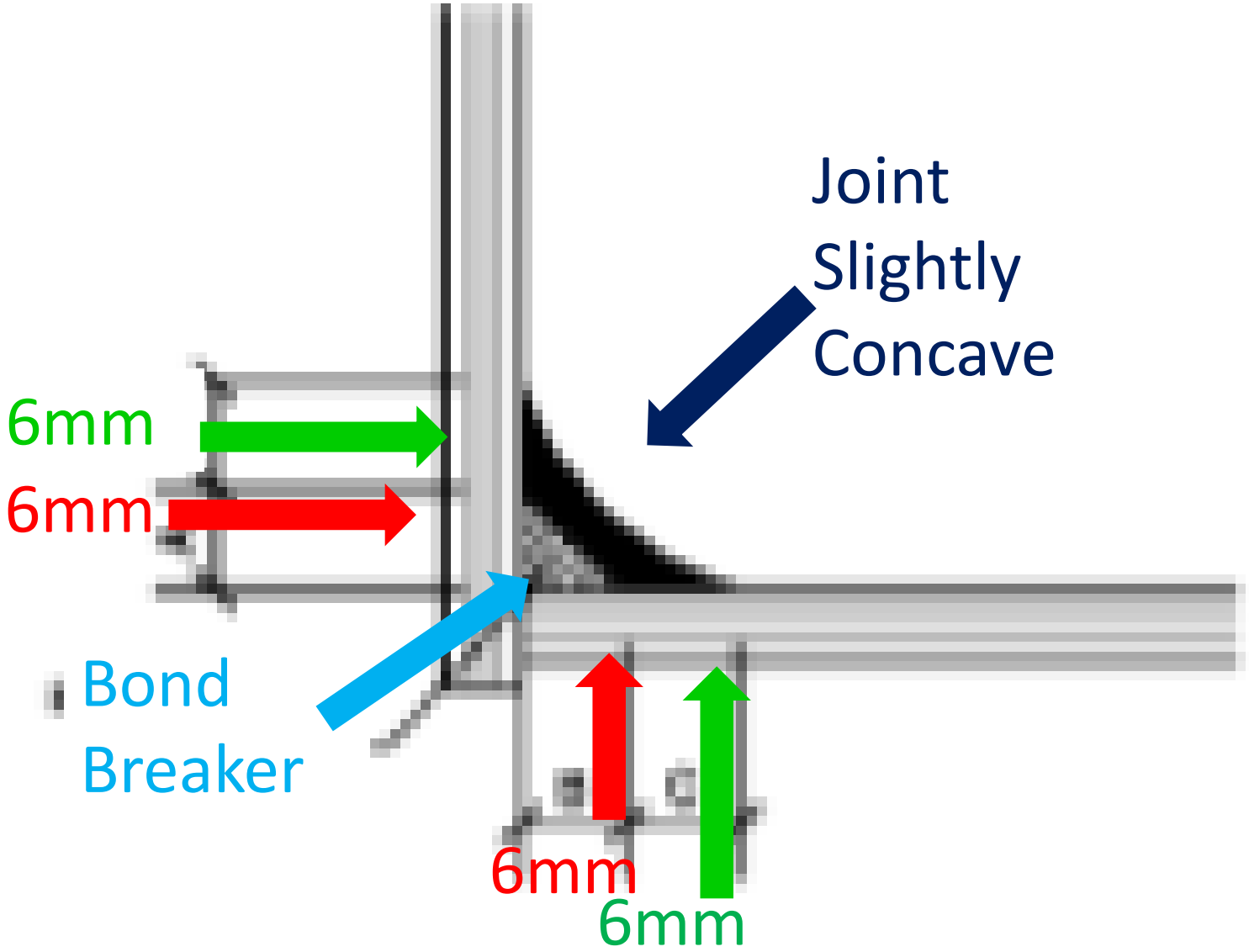
W = Sealant width, D = Sealant depth, C = Contact area.



Expansion Joints- The minimum width and depth of any sealant application should be 1/4" x 1/4" (6 mm x 6 mm). The depth (D) of sealant may be equal to width (W) of joints less than 1/2" wide. For joints from 1/2" to 1" (13 mm to 25 mm) wide, the sealant depth should be approximately one-half of the joint width. The maximum depth (D) of any sealant application should be 1/2" (13 mm). For Joints that are wider than 1" (25 mm) contact Tremco Technical Services or your local Tremco Sales Representative.

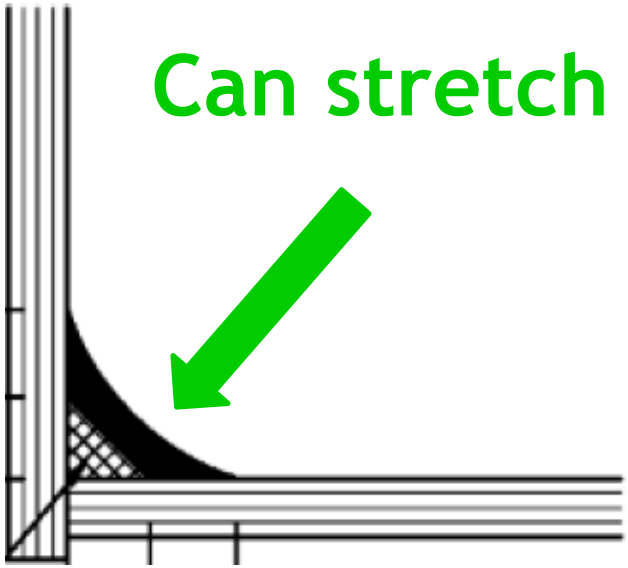
Window Perimeter- For fillet beads, or angle beads around windows and doors, the sealant should exhibit a minimum surface contact area [C] of 1/4" (6 mm) onto each substrate, with provisions for release at the heel of the angle using backer rod or bond breaker tape.

Good Joint Design



Shape is Critical

The thin parts needs to stretch



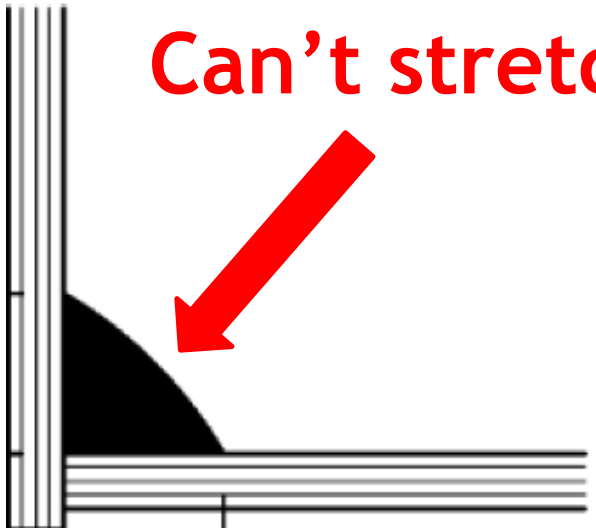
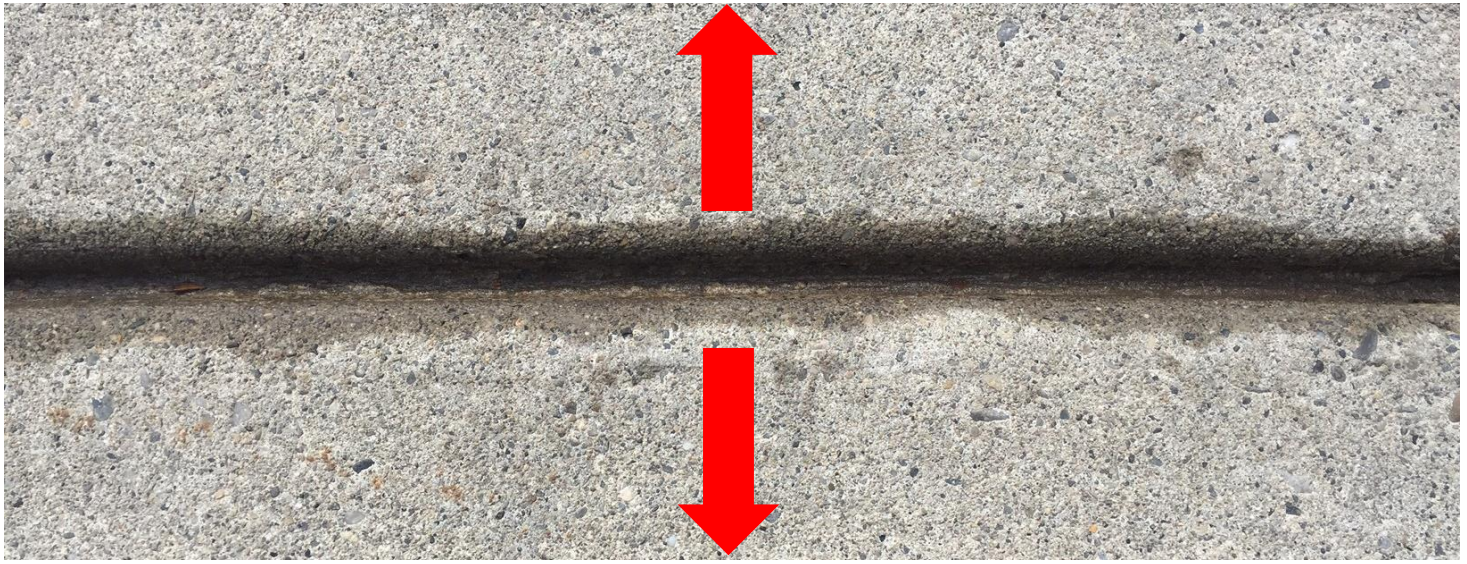


Diagram courtesy Dow Corning

STEP 1 - Determine Joint Movement

40 feet X 0.0006 = 1/4” total

(1/8 ” each side)



Step 2 - Assume min ¼” Bond Breaker and Calculate Caulking Expansion Capability Required

E.g.

% expansion = 1/8” / 1/4” X 100% = 50%

For this joint any caulk with 50% or more expansion capability will work

Understand Sealant Movement Capabilities

- Not all elastomeric sealants are the same
- Different sealants have different movement capability ratings

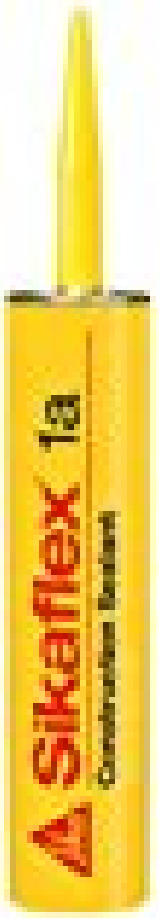
DAP Dynaflex 230

Typical Physical & Chemical Characteristics:

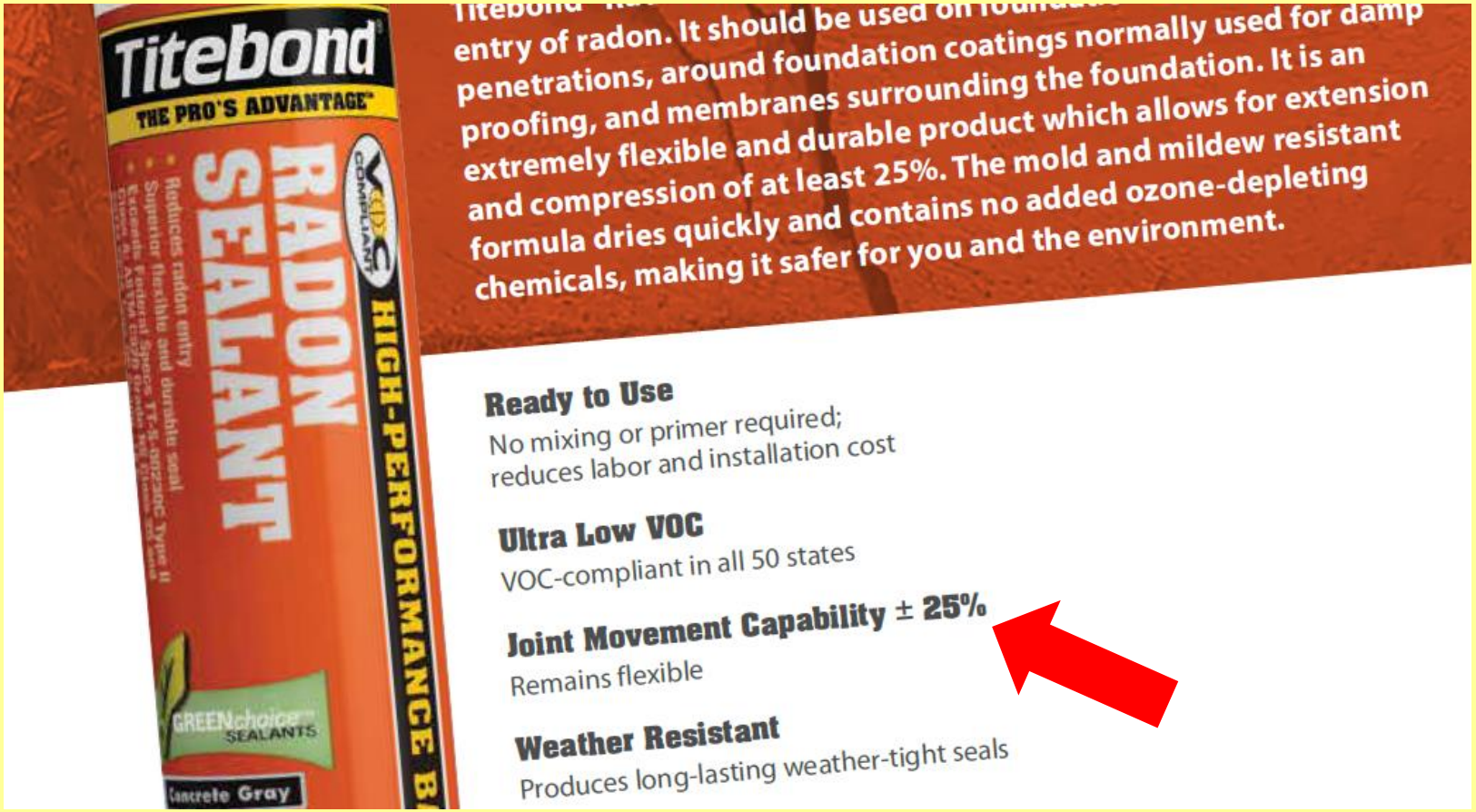
Tooling Time:	10 Minutes
Tack-Free Time:	30 Minutes
Dynamic Joint Movement:	± 25%
Paintable:	Yes
Odor:	Very Mild
Consistency:	Smooth and Creamy
Vehicle:	Advanced Acrylic Polymer
Volatile:	Water
Flash Point:	None
Filler:	Calcium Carbonate
Density:	1.04
Solids:	59.0% by weight
Weight per Gallon:	8.7 lbs./gal. (1.04 kg/L)
Temperature Service Range:	-30°F to 180°F (-34.50 to 82.20°C)

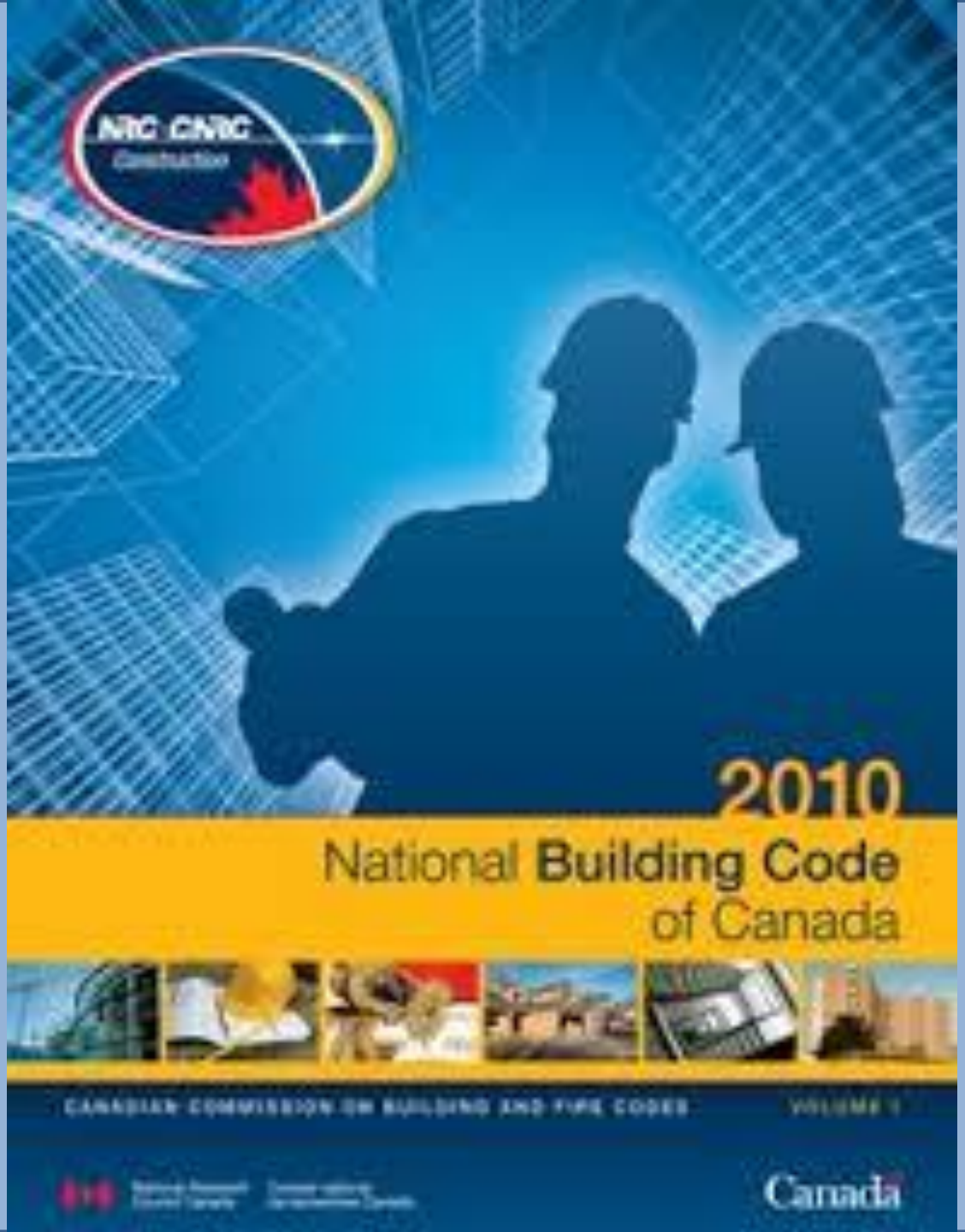
Sikaflex 1a

- Eliminates time, effort, and equipment for mixing, filling cartridges, pre-heating or thawing, and cleaning of equipment.
- Fast tack-free and final cure times.
- High elasticity - cures to a tough, durable, flexible consistency with exceptional cut and tear-resistance.
- Stress relaxation.
- Excellent adhesion - bonds to most construction materials without a primer.
- Excellent resistance to aging, weathering.
- Proven in tough climates around the world.
- Odorless, non-staining.
- Jet fuel resistant.
- Certified to the NSF/ANSI Standard 61 for potable water.
- Urethane-based; suggested by EPA for radon reduction.
- Paintable with water-, oil- and rubber-based paints.
- Capable of ±35% joint movement.



Titebond Radon Sealant





Appendix Notes and Illustrations

A-9.25.3.4. and 9.25.3.6. Air Leakage and Soil Gas Control in Floors-on-ground. The requirement in Sentence 9.25.3.3.(6) regarding the sealing of penetrations of the air barrier also applies to hollow metal and masonry columns penetrating the floor slab. Not only the perimeters but also the centres of such columns must be sealed or blocked.

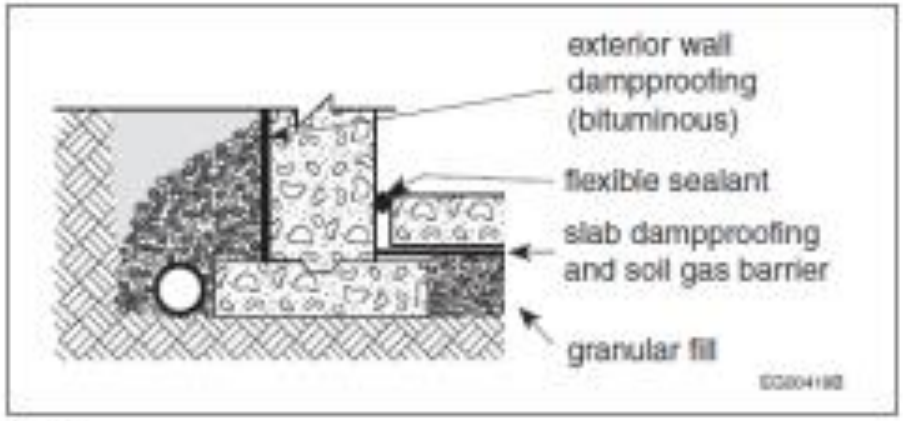
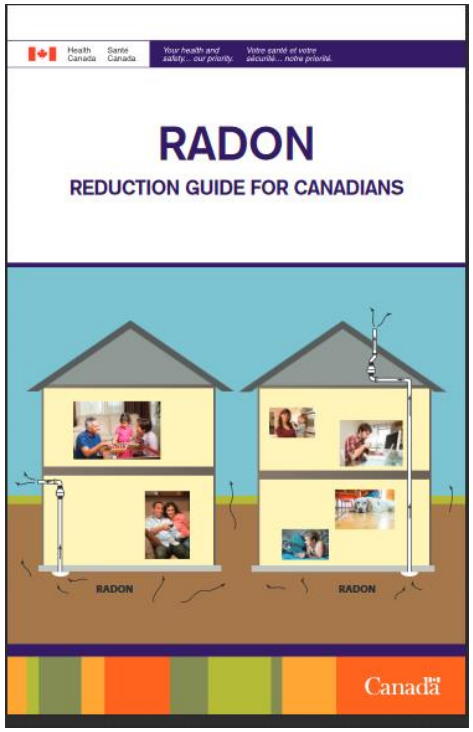


Figure A-9.25.3.4. and 9.25.3.6.-A
Dampproofing and soil gas control at foundation wall/floor junctions with solid walls



Floor Wall Joint - If accessible, the joint between the foundation wall and basement floor can be sealed. This joint can be a major contributor to the radon levels in a home.

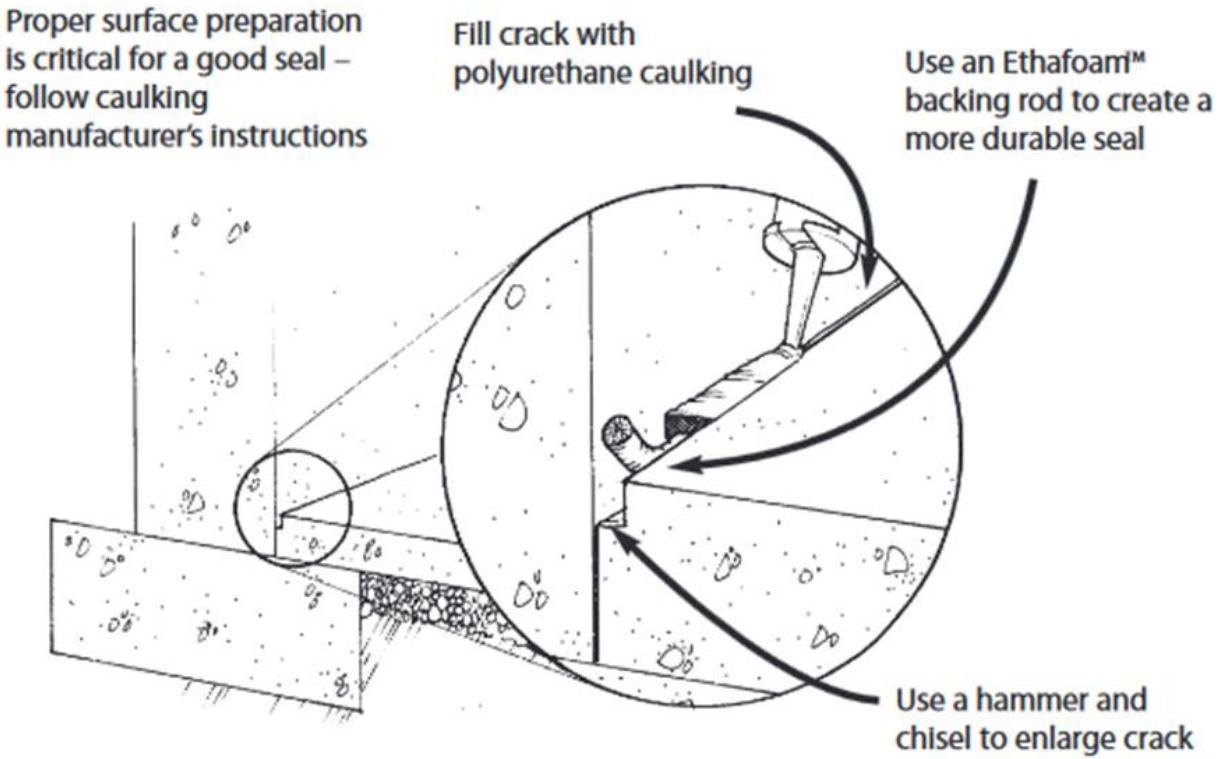


Figure 3 ↑
Sealing foundation wall and basement floor joint.


That’s the right way.
shutterstock

Thank you
and wishing you all low
levels of radon in your home
and workplaces.

Colin Dumais B. Sc., NABCEP, C-NRPP

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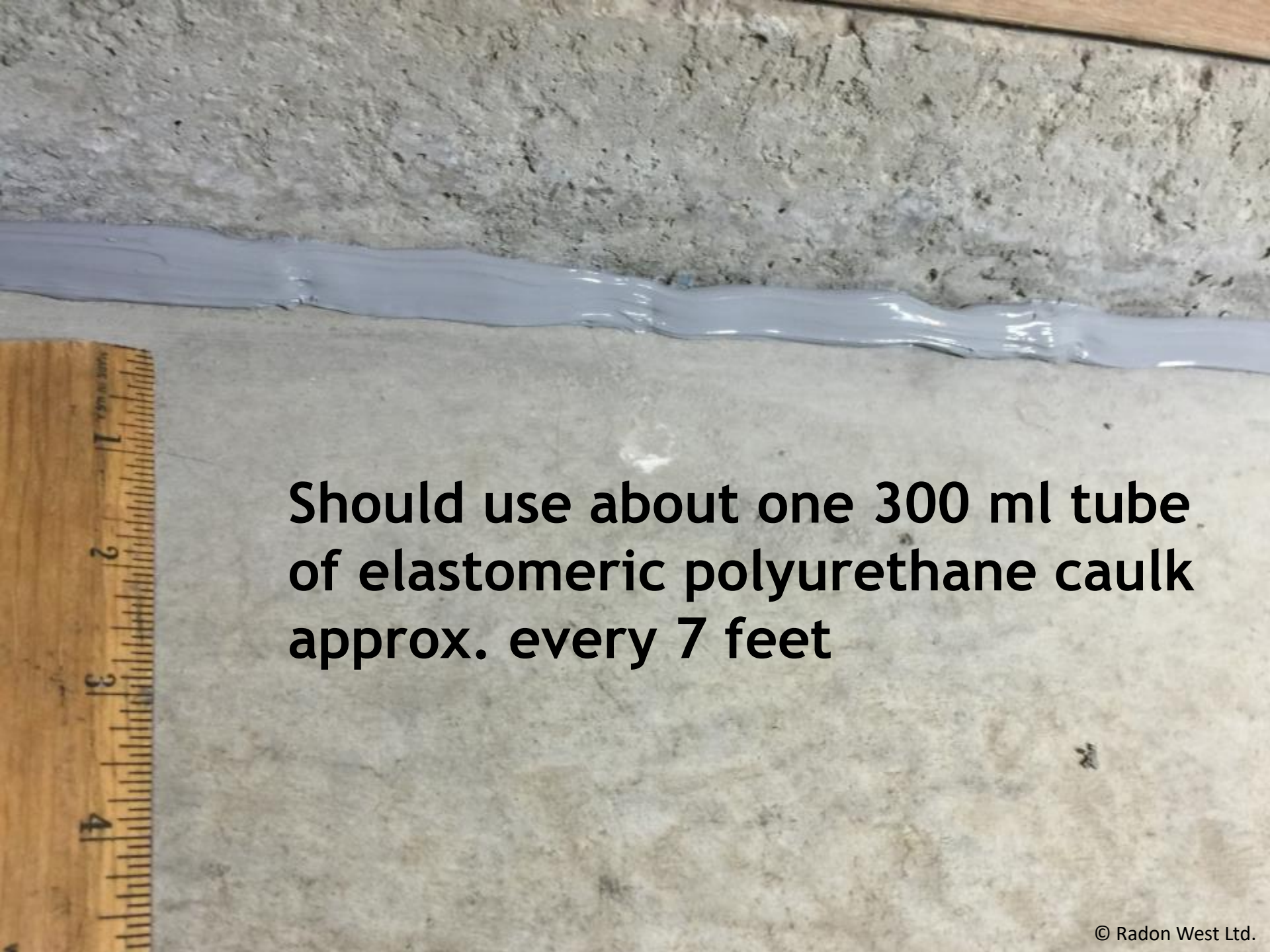
Prepare the Joint



Concrete Shrinkage

Type	Curing	Drying
Factors	Chemical reaction	Temp and moisture
Percentage		
Process Complete		18 months