Caulks & Sealants 101
Caulks and Sealants

TODAY’S LEARNING OBJECTIVES

- Discuss proper sealant joint design
- Illustrate proper application procedures
- Recognize and understand causes for sealant problems
- Compare and contrast sealant types.
PART I: Sealant Technology

Sealants vs. Caulks

Sealants
- Prevent passage of air and water
- Aesthetics
- Accommodate differential movement plus or minus 25% or greater
- Structural integrity
- Fire and smoke barrier

Caulks
- Prevent passage of air and water
- Aesthetics
PART I: Sealant Technology

Elastomeric Joint Sealant Types

- Polyurethane
- Silicone
- Silyl-Terminated Polyether
- Polysulfide
- Acrylic?
Joint Design

**Dynamic**
- Joints that exhibit change or movement, *i.e.* construction, control isolation and expansion joints

**Static**
- Joints that exhibit little or no movement – a misnomer?
Joint Design

Typical Dynamic Joints

- Butt Joint
Joint Design

Typical Dynamic Joints

- Angle Joints
Joint Design

Joint Movement

- Measuring Joint Movement
  - Joint Movement is measured in fractions of an inch and expressed as % change

![Diagram showing joint design and movement](image)

- Nominal width 1/2"
- +25% to 5/8"
- Normal Compression 25%
- Backer Rod
- -25% to 3/8"

- 50°F As Installed
Coefficient of Linear Expansion

Precast Concrete
Gravel Aggregate
Concrete
Lightweight
Structural Concrete
Aluminum
Glass
Lexan
Plexiglas
Granite

Movement per inch per 100°F change

- Granite
- Glass
- Aluminum
- Lightweight
- Structural Concrete
- Gravel Aggregate
- Concrete
- Precast Concrete
- Plexiglas
- Lexan

Movement per inch per 100°F change
Joint Design

Sealant Dimensions

- Sealant Depth = 1/2 width of joint.
- Minimum Sealant Depth is 1/4" (6mm).
- Maximum Sealant Depth is 1/2" (12.5mm).

Backer Rod under 25% compression
Hourglass shape; Tool, tool, tool.
Joint Preparation

The most critical factor in application and a common cause of sealant failure

JOINTS MUST BE ...

- Clean, Dry, Sound
- Free of contaminants (blown in dirt, oil, asphalt, sealers, form oils)
Joint Preparation

MECHANICAL METHODS

- Wire brushing
- Sand blasting
- Grinding
- Sawing
Joint Preparation

SOLVENT WIPE

- Use clean solvent
- Use clean white rags
- Follow solvent wipe with dry wipe
- Change rags frequently
- Do not spread contaminants
Primed

Prime only sides of the joint.
Primer outside of joint may stain substrate. Test.
Prime and seal the same day.

Proper primer application with brush
Bond Breaker

**Backer Rod**

- Controls sealant depth
- Prevents 3-sided adhesion
- Provides base for tooling
Backer Rod, Bond Breaker Types

- Closed Cell
- Soft Cell
- Expansion joint filler
- Open Cell
Correct use of backer rod in joint
Bond Breaker

Incorrect use of backer rod in joint

[Diagram of sealant and backer rod]
Bond Breaker

Joints without bond breaker
Mockups & Testing – Specify It

**Preconstruction Mockups**

- Especially important on larger full-system replacement projects
- Typically required by manufacturers for warranty
- Determines the necessary joint prep procedures for various conditions
- Establishes a standard for practice and appearance throughout project

**Initial & Periodic Testing**

- Perform tests per industry accepted ASTM standard procedures
- Ensures the cured sealant demonstrates adequate adhesion and cohesion
- Determines whether or not a primer will be required for adequate adhesion
- Period testing ensures continued quality installations and accounts for possible variances in existing substrate conditions.
Adhesion Testing

Always test for sealant adhesion and cohesion

- Test actual substrates on site
- Document locations and times

**Substrate Adhesion Testing**

1. Cut both sides of joint
2. Pull sealant strip down at 90° angle or more
3. The sealant should tear cohesively before it loses adhesion
PART III: Troubleshooting

- Adhesive vs. Cohesive Failure
- Bubbling and Out-gassing
- Staining
Troubleshooting

Adhesive Failure
Adhesive Failure

Causes
- Surface prep.
- Contamination
- Improper installation
- Improper priming

Remedies
- Grinding
- Proper cleaning
- Proper priming
- Proper tooling
Troubleshooting

Cohesive Failure

Causes
- Joint design
- Improper W/D ratio
- Wrong sealant

Remedies
- Width = 2x depth
- Choose the right sealant
Substrate Failure

Causes

- Weak Substrate
- High Modulus Sealant on EIFS
- Caulking to acrylic EIFS Finish Coat

Remedies

- Grinding/Wire Brushing
- Lower Modulus Sealant
- Caulk to EIFS Basecoat
Troubleshooting

Bubbling (Outgassing)

Causes

- Caused by punctured closed cell rod
- Open cell backer rod
- Moisture
Troubleshooting

Staining

Causes
- Porous Surface
- Heavily Plasticized

Remedies
- Careful Selection
- Testing
Considerations for Remedial Work

- Try to re-establish a virgin substrate
- Consider the effect of sealant residue
- Generally, stay with the same chemistry as existing unless strict quality control procedures ensure complete removal of existing
- Always perform pre-construction mockups and testing to various substrates using various preparation procedures and materials available
PART IV: Sealant Types & Uses

POLYURETHANE

- Movement, generally +/-25%, some +/-50%
- Good adhesion to porous surfaces
- Low price
- Unlimited colors
- Non-staining
- Good abrasion resistance
Sealant Types & Uses

POLYURETHANE

- Durability only 7 to 10 years
- Paintable?
- Non-UV resistant
Sealant Types & Uses

**SILICONE**

- Good elongation, +100%, -50%
- Versatile glazing sealant
- Durability, UV resistant
- 20-year warranties
- Colors available
Sealant Types & Uses

**SILICONE**

- Higher cost
- Not paintable
- Poor abrasion resistance
- Dirt pickup?
- Staining???
Sealant Types & Uses

SILYL-TERMINATED POLYETHER

- Not for structural glazing
- Higher cost
- Shorter U.S. history
Sealant Types & Uses

POLYSULFIDE

- Water immersion
- Chemical resistant
- Paintable
- Expensive
- Difficult to work with
- Poor abrasion resistance
Sealant Types & Uses

ACRYLICS

- Interior caulk
- Low movement capabilities (+/- 12.5%)
- Limited durability
- Low cost
Summary

Matching the sealant to the application

- Movement, high or low?
- Short or long life cycle of building?
- Color an issue?
- Chemical resistance needed?
- Will the building be painted?
- Is staining a concern?
- Underwater application?
Summary

You want to remember this …

- Always recommend pre-construction mockups & testing;
- Utilize random pull tests throughout project;
- Call on the sealant manufacturers.
PCM Overview

Built for Property Managers

- Since 1992 we have served property managers throughout the greater Washington-Baltimore Region
- Now over 200 employees strong, we self-perform a full range of parking lot, interior, and exterior services for your property to deliver the responsiveness, expertise, and quality you expect
- Solution oriented, highly trained specialists in all of our trades
- We have always been 24/7/365 to be there when you need us and to work around your tenant’s needs
- The bottom line: We make your life easier, while enhancing your tenants’ experience

“Exceeding Client Expectations”
Built simply for you...

Property Managers

- One call
- Solution focused
- Specialists in each trade
- All project sizes
- Emergencies
- 24/7/365

PCM SERVICES

- Exterior Building Services
- Interior Building Services
- Parking Lot Services
Outside your building…

Experts in…

- **Concrete** – steps, side walks, curb & gutter, stairs, ADA compliance, dumpster pads, drains
- **Masonry** – Tuck pointing, wall repair & restoration, pavers
- **Waterproofing** – Leak investigation, caulking/sealant, waterproofing
- **Pressure Washing** – Façade cleaning & restoration, garages, graffiti removal
- **Painting** – Full building exterior, walls, roofs, soffit, rails, window, garages, dryvit repair
- **Garage Restoration** – Spall repair, route & seal(partial & full depth repair), Traffic coating, expansion joints
- **Electrical** – Wall packs, bollard lighting, spotlights, signs, garages, retro fits & upgrades
Inside your property…

Experts in…

**Painting & Flooring:**
- Tenant Improvements
- Common Areas
- Drywall Replace/repair
- Specialty Finishes

**Construction Services:**
- Tenant Improvements
- Design Build
- Common Area Upgrades
- Special Projects

**Electrical**
- LED upgrade and retro fit, All interior lighting maintenance and service, infrared scanning
For your parking lots...

Experts in...

- **Asphalt** – Lots, drive lanes, paths, full mill & overlay, patching, crackfill
- **Sealcoating**
- **Pavement Marking** – Lines, curbs, stencils, ADA
- **Concrete** – Walks, curbs & gutters, steps, dumpster pads, ADA
- **Power Washing**
- **Electrical** – Pole lights, ground lighting, all parking lot electrical service work
Partial Client List

Akridge
BOZZUTO
Cassidy Turley
CBRE
Colliers International
Combined Properties
COPT
Federal Realty Investment Trust
FIRST POTOMAC REALTY TRUST
Foulger-Pratt
THE GEORGE WASHINGTON UNIVERSITY
JBG ROSENFELD RETAIL
Jones Lang LaSalle
McShea
The Peterson Companies
Rappaport
Regency Centers
Simon Property Group, Inc.
SUNRISE Senior Living
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Vornado Realty Trust
Westfield
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