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

Sealant

1/4" (6mm) Min

Backer Rod

1/4" (6mm) Min.
Joint Design

Joint Movement

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

Diagram:
- Nominal width 1/2”
- +25% to 5/8”
- -25% to 3/8”
- Normal Compression 25%
Coefficient of Linear Expansion

Movement per inch per 100F change

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

Movement per inch per 100F 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
Part II: Application

Hour glass 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
Priming

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

Correct use of backer rod in joint
Bond Breaker

Incorrect use of backer rod in joint
Bond Breaker

Joints without bond breaker
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
PART III: Troubleshooting

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

Adhesive Failure

- Primer
- Sealant
- Backer Rod

Movement

No Adhesion
Troubleshooting

Adhesive Failure

Causes

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

Remedies

- Grinding
- Proper cleaning
- Proper priming
- Proper tooling
Cohesive Failure

Causes

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

Remedies

- Width = 2x depth
- Choose the right sealant
Troubleshooting

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
Troubleshooting

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

- 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

POLYСULFIDE

- 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

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

You want to remember this …
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PCM SERVICES

- All project sizes
- Emergencies
- 24/7/365

Exterior Building Services
Interior Building Services
Parking Lot Services
Exterior Building Services

- **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
Interior Building Services

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
- Interior Lighting Maintenance
- Infrared Scanning
Parking Lot Services

- **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**
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