TECHNICAL BULLETIN 7

LIQUID SEALANT TYPES AND USES

INTRODUCTION

1. Liquid sealants are:

- Elastomeric materials used in exterior and interior wall construction to prevent the passage of liquids and gases between two components where differential movement between those components is anticipated.
- Typically provided in a viscous fluid or paste-like form which cures into a pliable elastomeric rubber after installation.
- When cured can accommodate various movement between the materials which they are bonded to, commonly confused with "caulking", sealants. Sealants are often confused with "caulk," which is utilized to simply fill a void between components or to fill a void within a component to make it whole and do not accommodate movement.
- Single component products moisture cure while multi-component products cure through a chemical process. Other additives may include color packs or accelerators, which should be used strictly in accordance with the sealant manufacturer's recommendations.
- Be aware of false performance advertised for liquid sealants by manufacturers in material product data sheets. Consider studying installed sealants in your area to monitor their performance and aesthetics.

2. Types of Sealants: There are two primary types of sealants in the construction industry:

A. Organic sealants are typically carbon-based and include urethanes, acrylics, butyls, polysulfides and other copolymer materials and are available in one component and multi-component versions.

B. Inorganic sealants are primarily manufactured utilizing silicone resins and are also available in one component and multiple component versions depending on the substrates and what type of service the sealant will be exposed to.

C. Modified versions of organic sealants are also available on the market to meet specific needs for a variety of installations. Please consult with an SWR Institute sealant manufacturer for more information on what is available.

D. One and Two Component Sealants:

1. Single component products cure through exposure to air and moisture.
2. Two-part sealants cure by mixing the catalyst with the sealant prior to installation. Other additives may include color packs or accelerators, which should be used strictly in accordance with the sealant manufacturer's recommendations.
3. While this Technical Bulletin deals only with liquid sealants, other Technical Bulletins are available for a variety of other joint sealants including preformed boots, extrusions, mechanical joints, traffic bearing joints, etc. Please contact SWR Institute for further information or to order additional bulletins.

FEATURES & BENEFITS

1. Able to conform to a wide variety of joint configurations and sizes and movement requirements.
2. Suitable for most substrates currently in use. Refer to manufacturer for primer requirements.
3. Some liquid sealants are resistant to submerged environments and certified to the NSF/ANSI Standard 61 for contact with potable water.
4. When exposed to chemicals, some liquid sealants are not degraded.
5. Wide range of standard colors available. Custom colors also available.
6. Multiple methods of packaging are available to meet most project needs and preferences.
7. Due to their popularity, availability is widespread and experience is industry wide.
8. Liquid sealants are available to meet most installation and performance environments.
9. Little to no maintenance required.
10. Once cured, almost all liquid sealants can be kept clean through maintenance and many can be painted.

APPLICATIONS

1. Practically anywhere two components of a structure meet, including but not limited to:
   a. Expansion joints in vertical and horizontal applications
   b. Control joints in vertical and horizontal applications
   c. Substrate transitions
   d. At the perimeter of framed-openings, i.e. windows, doors, vents, louvers, etc.
   e. Flashing joints, copings, parapets, fascias, etc.
   f. Curtain wall joints
   g. Structural and non-structural glazing

DESIGN CONSIDERATIONS

1. **Exposure:** Organic and inorganic sealants perform differently under certain ambient conditions. Therefore, temperature and exposure, i.e. ultraviolet light, acid rain, etc. will have some bearing on the proper product selection.
2. **Location:** Many sealants are not suitable for immersion applications or below-grade uses. Specialty sealants are available for immersion.
3. **Traffic:** Sealants to be used in both traffic and non- traffic bearing locations require different physical properties and should be specified as such. Traffic joints often require unique joint design and that is as important as the sealant selection.
4. **Movement Capability:** Different sealants have different movement capabilities and varying "stiffness" or modulus of elasticity. This can affect the stress on the joint substrate and should be taken into consideration. , i.e. EIFS manufacturers recommend the use of a low modulus liquid sealant in EIFS joints.
5. **Odor:** Almost all liquid sealants give off some type of odor, during installation and curing processes. This can be a a potential safety hazard when working in confined spaces or around building occupants. Check to see if the sealant presents a health or safety problem.

6. **Aesthetics:** Some liquid sealants pick up dirt more than others. Additionally, not all liquid sealants can be painted and not all are available in custom colors Service: Most sealants are intended as weather seals. Structural applications require special considerations and design. Consult with manufacturer for structural applications.
7. **Fire Safety:** Not all liquid sealants have fire ratings and most require special backing for a fire rating.
8. **Security:** Not all liquid sealants meet "Security Sealant" specifications.
9. **Compatibility:** Compatibility with substrate materials needs to be considered.
10. **Substrates:** Liquid sealants may require a primer to promote adhesion to certain substrates. Both primers and sealants can potentially cause staining of certain substrates ,particularly dimensional stone or porous substrates.
11. **SWR Institute Validation** means, the technical data provided by the sealant manufacturer has been validated through an independent laboratory. For a list of those products that have been validated please contact SWR Institute or a local member.

INSTALLATION CONSIDERATIONS

1. **Temperature:** All manufacturers provide recommended installation conditions, including the temperature of both the air and the substrate to which the sealant is being applied. Also, lower temperatures will typically prolong curing times.
2. **Surface Preparation:** Make sure the installer will be able to perform the level of surface preparation necessary for the specified material.
3. **Substrate:** Must be dry, free of moisture, clean and structurally sound.
4. **Aesthetics:** While the as-installed surface appearance of liquid sealants lies solely with the installer and their abilities, the substrate finishes also affect the final appearance.
5. **Backing:** Proper backing must be installed to set joint depth and prevent 3-sided adhesion. Different sealants require different backing materials to allow proper cure of the sealant.
6. **Configuration:** Sealants are designed to perform under specific depth-to-width ratios that should be closely adhered to.
7. **Sequencing:** Make sure that the sealant work can be properly sequenced with other trades to ensure substrate cure times are followed and joint locations are accessible.

APPLICATION PROCEDURES

1. **Substrate:** Substrate must be dry, clean and free of any impurities, i.e. release agents, oils, asphalt, etc., and within the sealant manufacturer's recommended temperature range. Masking of adjacent surfaces is usually optional but may be necessary due to the use of a primer and/or the skill level of the field technician.
2. **Priming:** When required, primers should be mixed or prepared in small quantities in strict accordance with the sealant manufacturer's recommendations and applied only to the face of the joint substrate. The primer should be applied prior to the joint substrate to prevent contamination of the backing. Application rates should be in strict accordance with the manufacturer's recommendations. If necessary the joint should be masked prior to application of the primer.
3. **Backing:** Backer-rod, bond-breaker tape or other type of release mechanism is installed to properly set the joint depth at one-half the joint width and to prevent 3-sided adhesion of the sealant. Backer rod should be about 25% wider than the joint and care should be taken not to damage, puncture (if closed cell), stretch or twist the backer rod during installation. Bond breaker tapes should be well adhered to the substrate to prevent tape movement during the sealant installation and tooling.
4. **Mixing:** Multiple component products should be mixed in strict accordance with the sealant manufacturer's recommendations. Mix only as much sealant as can be installed within the specified pot-life of the material.
5. **Gunning:** Select the proper nozzle to ensure that the joint is properly filled and both sides are wetted by the sealant.
6. **Tooling:** Proper tooling ensures proper wetting of substrate to promote proper adhesion of a sealant to the joint substrate by use of mechanical pressure. It also determines the final appearance of the joint. Tooling should always be done with a dry tool without the use of wet tooling aids. Tooling aids can affect adhesion and may also promote dirt retention on the sealant by slowing the curing time. Joints are typically tooled to a concave shape, but other finishes can be acceptable.
7. **Clean Up:** Clean up should be done on a daily basis and different sealants require different cleaning procedures. Consult the sealant manufacturer for recommended clean up procedures and solvents.
8. **Mock-ups:** A mock-up of all the various joints and sealant details should be completed prior to commencing work on a project to establish acceptance criteria. This is for the protection of all parties and will not only create a working standard for the project, but will also be necessary to perform preliminary adhesion testing to ensure a successful project.
9. **Field Testing:** Field quality control can be maintained by frequently probing and testing of installed joints. Destructively tested areas can be easy repaired and should not affect the appearance or performance of the sealant

For more information contact:
SWR Institute
400 Admiral Blvd
Kansas City, MO 64106
(816) 472-7974 phone
(816) 472-7765 fax
www.swrionline.org.

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