Selection of sealants

The proper application of sealants involves not only choosing the material with the correct physical and chemical properties, but also ensuring:

- The good understanding of the joint design,
- The substrates to be sealed,
- The performance needed,
- And the economic costs involved in the *installation* of the joint sealant.

**Typical considerations** in selecting a sealant type for the construction industry are:

- **Joint Design:**
  - The specifics of the joint design and configuration must match up with the sealant's movement capabilities in installed conditions.
  - The practicality of placement and aesthetics also need consideration.

- **Physical and chemical properties:**
  - Mechanical properties of the sealant like
    - Modulus of Elasticity,
    - Stress/strain recovery characteristics,
    - Tear strength,
    - And fatigue resistance are all factors—
      - That influences the sealant performance in a joint.
      - The polymeric composition along with other additives will affect the regulatory compliance of the product.

- **Durability properties:**
  - The adhesion properties of the sealant to the specific substrates—
  - The aging properties of the cured sealant—
    - as they relate to its resistance to:
      - ultra-violet radiation,
      - moisture, temperature,
      - cyclic joint movement
      - and bio-degradation
    - Can profoundly influence the service life of the installed sealant.

**Application/installation properties:**

- Considerations important to the consistency of the sealant include:
Key Features of Sealant Chemistries
Joint sealants come in many different types, and include:

**Liquid Applied in the Field**
- **Latex** (water-based, including EVA, acrylic)
  - Used mainly in residential and light commercial construction applications
  - Interior and/or exterior uses
  - Premium products meet ± 25% movement (ASTM C 920, class A)
  - Excellent paintability (with latex paints)
  - Very good exterior durability
  - Exhibit some shrinkage after cure
  - Sometimes referred to as caulk
  - Not used for exterior applications on high rise construction or for applications undergoing significant cyclic movement

- **Acrylic** (solvent-based)
  - Used in residential and light commercial construction, mainly for exterior applications
  - Generally meet ± 12.5% movement (ASTM C 920, class B)
  - May need special handling for flammability and regulatory compliance
  - Can be painted
  - Short open time; difficult to tool
  - Exhibit some shrinkage upon cure
  - Often used for perimeter sealing; low movement joints

- **Butyls** (solvent-based)
  - Excellent adhesion to most substrates
  - Limited movement capabilities, generally up to ± 10%
  - Excellent weathering
  - Good use as adhesives in industrial and packaging applications
  - Sometimes used in curtain wall applications where adhesion to rubber compounds is needed
  - Most are stringy and difficult to apply neatly
  - May show some shrinkage after cure; may harden and crack over time on exposed surfaces

- **Polysulfides**
  - First "high performance" sealant chemistry; mainly used in industrial applications
  - Poor recovery limits their use in joints with high cyclic movements
  - Can be formulated for excellent chemical resistance (especially for aviation fuel)
  - Good performance in submerged applications
• Require primer on almost all substrates

**Silicones**
- Structural bonding and stop-less glazing of glass to frames
- Very good joint movement capabilities; can exceed ± 50% ([ASTM C 920](#), class A)
- Excellent UV and heat stability
- Good adhesion to many substrates especially glass; often a primer is recommended on many substrates, particularly porous substrates
- Not paintable
- Used in protective glazing systems and to insulate glass to improve thermal performance (reduce heat loss). Also designed for missile impact and bomb blast situations)
- Acetoxy chemistry based sealants have strong odor, but newer chemistries have very low odor
- Adhesion is adversely affected by less than perfect application conditions
- High, medium and low modulus materials available
- May stain some types of natural stone without primers

**Polyurethanes**
- Used in industrial and commercial applications
- Excellent movement capabilities, up to ± 50% ([ASTM C 920](#), class A)
- Not used in structural glazing applications (avoid direct contact to glass)
- Excellent bonding, generally without a primer for many surfaces
- Can be formulated for good UV resistance
- Paintable
- Some formulations may contain low levels of solvent
Factory Molded

- Gaskets and seals
- Strip-seals
- Compression systems

The following table shows different sealant formulations, rated for selected applications: (1=no rating, 2=poor, 3=good, 4=excellent)

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<thead>
<tr>
<th>Use</th>
<th>Latex</th>
<th>Acrylic</th>
<th>Butyl</th>
<th>Polysulfide</th>
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