

# **Installation Guide For Baiyun Silicone Sealants**

## **INTRODUCTION**

The successful performance of a building exterior is frequently defined by its ability to keep rain and the elements outside, away from the building's occupants. One of the critical links to ensuring a weatherproof building is the joint sealant. Building joints can be sealed effectively by following a few simple guidelines for designing workable joints, selecting the correct sealant, performing appropriate surface preparation, and performing quality checks to ensure proper performance. This guide addresses design, sealant selection, surface preparation, job site adhesion testing and BAIYUN silicone sealant application procedures.

## **JOINT MOVEMENT**

The dimensions of joints in typical construction applications change daily as a result of solar heat gain and building sway, and throughout the year due to seasonal changes. The movement in a sealant bead installed on the sun-side of a building or during the hottest portion of the day will be almost entirely in extension during the cold season or cycle; while the movement of a bead installed during the coldest condition will be almost entirely in compression during the hotter season or cycle. In addition to these above movements, the designer should consider the effect of construction tolerances in his/her project to minimize the occurrence of over-sized or under-sized joints during construction. All moving (dynamic) joints must be designed so as not to allow three-sided adhesion of the sealant to occur (reference ASTM C1193). Three-sided adhesion hinders the ability of the sealant to extend and compress freely as desired and can lead to early joint failure.

## **JOINT WIDTH**

When using BAIYUN sealant & adhesive, the designed joint width must be at least twice the total anticipated joint movement. For example, if the total anticipated movement in an expansion joint in which BAIYUN sealant & adhesive is to be installed is 1/4" , the designed joint width must be at least 1/2" . The designer may want to consider additional width to accommodate construction tolerances (reference ASTM C1472). Large panels or lites should allow a minimum width of 1/4" for the sealant bead, mostly to allow for a proper installation (very small/ narrow beads become difficult to install and can accommodate less movement). Glazing of plastic or larger-sized metal panels may require larger than usual joint widths due to the greater movement potential (higher coefficients of thermal expansion). Consult with BAIYUN Technical Services for recommendations on large or unusual applications.

## **BUTT JOINTING**

A thin installation of silicone sealant can better accommodate more movement than a deep installation, as the deeper bead will result in additional stress being imposed on both the sealant and the bonding surfaces during joint movement. Figure 1 illustrates the general guidelines for installation of BAIYUN sealant & adhesive into a typical butt joint configuration of widths up to 2".

- 1.) The recommended sealant profile is an hourglass shape with the depth of the

sealant over the crown of the backer rod to be no thinner than 1/8" and no thicker than 3/8", and

- 2.) A minimum of 1/4" of adhesive bonding contact must be made to all surfaces to which the sealant is intended to adhere.

When used in joints exceeding 2" in width:

- 3.) The recommended sealant profile is an hourglass shape with the depth of the sealant over the crown of the backer rod to be no thinner than 1/4" and no thicker than 3/8", and
- 4.) A minimum of 3/8" of adhesive bonding contact must be made to all surfaces to which the sealant is intended to adhere.

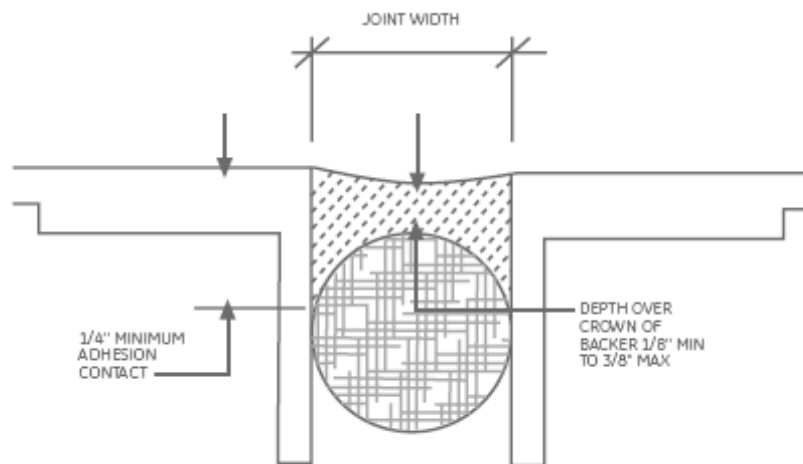


Figure 1

#### **BAIYUN WILL NOT:**

- Design sealant joints.
- Provide long-term performance data.

The design professional has final responsibility for the determination of sealant joint dimensions based on project conditions, glass or panel sizes, anticipated thermal, seismic or other movement of the system.

#### **JOINT BACKER MATERIALS**

Backer materials, typically backer rod, provide the following benefits to aide in the correct application of BAIYUN sealant & adhesive.

- 1.) To control and provide the desired sealant depth.
- 2.) Create a formed joint cavity that allows for the desired hourglass sealant shape.
- 3.) Provide a firm backup which helps attain full wetting of the substrates when the sealant is tooled.
- 4.) Act as a bond breaker to eliminate adhesion on the backside of a joint (three-sided adhesion).

Non-gassing polyethylene, polyolefin or polyurethane foam rod is the recommended back-up material for use with BAIYUN sealant & adhesive. If the joint is too shallow to allow foam rod, use a polyethylene tape (as a bond breaker to eliminate three-sided

adhesion). On EIFS and porous substrate applications, a closed cell backer rod is recommended (open cell backer materials absorb and hold water which can affect long-term sealant adhesion on these materials). Backer rod should be 25-50% greater (confirm with manufacturer of backer rod as to type selected) than the width of the joint, thereby providing continuous pressure against the joint walls, and expanding and contracting with the joint movement without pushing the sealant out of the joint during the compression cycle or falling away during the extension cycle. Rubber backup materials may stain the sealant and are not recommended, unless tested and verified for compatibility.

## **INSTALLATION**

Sealants may not adhere or maintain long-term adhesion to substrates if the surface is not prepared and cleaned properly before sealant application. Using proper materials and following prescribed surface preparation and cleaning procedures is vital for sealant adhesion. IN ALL CASES IT IS IMPORTANT TO CONFIRM THE ACCEPTIBILITY OF EACH SEALANT-SUBSTRATE COMBINATION WITH A LAB OR SITE ADHESION TEST PRIOR TO PROCEEDING WITH PROJECT INSTALLATION. BAIYUN can provide lab and field adhesion testing information and suggestions to user upon request.

### **Adhesion Testing**

BAIYUN will evaluate the adhesion of its products to materials that are representative of those to be used on the project. Upon completion of this testing, BAIYUN will forward in writing, product recommendations, surface preparation, and primer recommendation (if required). Testing takes approximately four weeks from receipt of samples.

### **Compatibility Testing**

Incompatible glazing accessories (gaskets, spacers, backer materials, setting blocks, etc.) can lead to sealant discoloration and/or loss of adhesion to the substrate. To ensure compatibility, BAIYUN tests the compatibility of project specific accessory materials with its silicone sealants. Results of the compatibility test will be forwarded in writing. Testing takes approximately four weeks from receipt of samples.

### **Non-Stain Testing**

If natural stone is being used on the project, BAIYUN can test and evaluate the performance of its sealants to determine if fluid in the sealant has the potential to migrate into porous substrates such as granite, marble, travertine and limestone. Job site representative samples of the stone need to be tested using a modified ASTM C1248 procedure. For each stone type and sealant to be tested, supply two samples of the dimension 1" by 3" (25 mm by 75 mm) the thickness of the stone. Larger samples can be cut for testing. Testing takes approximately six weeks from receipt of samples.

## **Surface Preparation**

### **Porous Materials (Concrete, Masonry, Brick, Stone, etc.)**

- Joints must be clean, dry and sound prior to application of the sealant. All contaminants, impurities, or other adhesion inhibitors (such as moisture/frost, oils, concrete form release agents, old sealants, asphalt and other surface treatments,

etc.) must be removed from the surfaces to which the sealant is intended to adhere.

- Clean where necessary by wire brush, mechanical abrading, grinding, sanding, saw cutting, blast cleaning (sand or water), or a combination of these methods to provide a stable clean surface for sealant application.
- Remove dust and other remaining loose particles with a soft bristle brush or by using an oil-free air blow.
- Polished stone surfaces and smooth sawn edges can be cleaned using a solvent dampened rag (allow sufficient time for solvent to evaporate prior to application of the sealant). When handling solvents, refer to manufacturer's MSDS for information on handling, safety and personal protective equipment.
- Cleaning of surfaces should be done within 1 to 2 hours of when the sealant is to be applied.
- Since porous materials can absorb and retain moisture, it is important to confirm that substrates are dry prior to application of the sealant.

#### **Non-Porous Materials (Glass, Metals, Plastics, Ceramics, etc.)**

- Clean by using a two-rag wipe technique → wet one rag with solvent and wipe the surface with it, then use the second rag to wipe the wet solvent from the surface BEFORE it evaporates (allowing the solvent to dry on the surface without immediately wiping with a second cloth can negate the cleaning procedure because the contaminants may simply be re-deposited as the solvent dries). In all cases where used, solvents should be wiped dry with a clean, white cloth or other lint-free wiping materials. Change the cleaning rags frequently, as they become dirty. It is easier to see the dirt accumulating on the rag if white rags are used. Do not dip used cleaning rags into the cleaning solvent as this can contaminate the solvent (cleaning with contaminated solvent can result in sealant adhesion issues). Always use clean solvent-resistant containers for solvent use and storage.
- When cleaning deep, narrow structural glazing cavities, wrap the cleaning cloth around a clean, narrow-blade putty knife. This permits force to be applied to the cleaned surface.
- Isopropyl Alcohol (IPA) is a commonly-used solvent and has proven useful for most non-porous substrates encountered in architectural construction applications. Xylene and Toluene have also been found useful on many substrates. When handling solvents, refer to manufacturer's MSDS for information on handling, safety and personal protective equipment.
- Architectural coatings, paints and plastics should be cleaned with a solvent approved by the manufacturer of the product or which does not harm or alter the finish.
- Cleaning of surfaces should be done within 1 to 2 hours of when the sealant is to be applied.
- Difficult or nearly impossible to see on a joint substrate, frost is likely to develop on substrates when temperatures drop near the freezing point. Since frost and moisture will interfere with proper sealant adhesion, it is important to confirm that substrates are dry prior to application of the sealant.

### **Exterior Insulation and Finish Systems (EIFS)**

- The use of an appropriate silicone primer is required on all EIFS substrates. Consult BAIYUN Technical Services for sealant primer-substrate recommendations.
- Confirm with the EIFS supplier which finish the sealant should be applied to (*i.e.*, base coat or base coat with EIFS primer).
- All EIFS surfaces must be clean, dry and sound and in an acceptable condition to receive sealant. Confirm with the EIFS supplier or project architect or consultant, what joint conditions are considered acceptable for sealant installation to proceed. If unacceptable conditions are found, cease installation of sealant until corrections are made.
- To clean EIFS, lightly abrade the joint surfaces using a synthetic brush or pad and then remove dust and other remaining loose particles with a soft bristle brush or using an oil-free air blow.
- Cleaning of surfaces should be done within 1 to 2 hours of when the sealant is to be applied.
- Since EIFS materials can absorb and retain moisture, it is important to confirm that the EIFS materials are dry prior to application of the sealant.

### **Priming**

BAIYUN sealant & adhesive attains primerless adhesion to many commonly encountered construction materials. However, some materials with variable surface characteristics may require the use of a primer to help obtain durable long-term adhesion. Prior to use, trial applications should be made to check adhesion to the specific materials to be used on the project. See the BAIYUN primer datasheets for product specific information on use and priming instructions. **PRIMER APPLICATION IS NOT A SUBSTITUTE FOR SURFACE PREPARATION.** Consult BAIYUN Technical Services for sealant-primer-substrate recommendations.

**CAUTION:** Primers may contain solvents. When handling solvents, refer to manufacturer's MSDS for information on handling, safety and personal protective equipment.

### **Masking**

The use of masking tape is recommended where appropriate to ensure a neat job and to protect adjoining surfaces from over-application of sealant. Masking tape can prevent contact of sealant with adjoining surfaces that otherwise would be permanently marred or damaged by such contact or by cleaning methods required to remove sealant systems. When tooling, use care not to spread the sealant over the face of the substrates adjacent to the joint or masking as the silicone can be extremely difficult to remove on rough or porous substrates. Do not allow masking tape to touch clean surfaces to which the silicone sealant is to adhere (adhesive on masking tape can interfere with adhesion of silicone). Masking tape should be removed immediately after tooling the sealant and before the sealant begins to skin over (tooling time).

### **Sealant Application**

- Apply sealant in a continuous operation, horizontally in one direction and

vertically from the bottom to the top of the joint opening, applying a positive pressure adequate to properly fill and seal the joint width.

- Tool or strike the sealant with a concave tool applying light pressure to spread the material against the back-up material and the joint surfaces to ensure a void-free application.
- In glazing applications, tool the sealant at the sill so that precipitation and cleaning solutions will not pool.
- Excess sealant should be cleaned from glass, metal and plastic surfaces while still uncured. On porous surfaces the excess sealant should be allowed to progress through the initial cure or set-up. It should then be removed by abrasion or other mechanical means.
- Due to the smooth consistency of BAIYUN sealant & adhesive, tooling agents such as water, soap, or detergent solutions are not necessary or recommended. Dry tooling is recommended.
- Sealant application is not recommended when the temperature is below 40°F (4 °C) or if frost or moisture is present on the surfaces to be sealed.
- Application of BAIYUN sealant & adhesive is not recommended to surfaces above 122°F (50°C).
- The cure rate of this product is dependent upon temperature and the availability of atmospheric moisture. Under Standard Conditions (relative humidity of 50 ± 5% at an air temperature of 73.4 ± 2°F [23 of ± 1°C]) this material can attain a cured thickness of 2-3 mm per 24 hours (assuming ample access to atmospheric moisture). As temperature decreases, the cure rate slows down (and vice versa). Low moisture environments will also reduce the cure rate. Near-confined spaces which limit the overall access to atmospheric moisture will cure only from that surface which has access to the atmosphere. Colder temperatures can significantly increase cure times and can open the possibility of sealant irregularities if joint movement occurs while sealant is not fully cured. The following reference provides additional information on Movement-During-Cure of sealant joints: ASTM C1193 – Standard Guide for Use of Joint Sealants; section 12.5.