

Installation Guide For Baiyun Silicone Structural Sealants

PROJECT REVIEW¹

BAIYUN professionals are available to assist you in selecting the correct sealant for your specific application. All silicone structural glazing applications using BAIYUN adhesives should be reviewed on a project-by-project basis by our technical service staff prior to sealant specification. The review and testing must be successfully completed before BAIYUN can issue a 10-year Structural Adhesion Limited Warranty.

The following services are offered by BAIYUN:

Product Recommendations

After reviewing project drawings and specifications, and having performed the necessary laboratory testing, BAIYUN will assist in the selection of the correct BAIYUN silicone sealants.

Drawing Review

Structural glazing industry guidelines (ASTM C1401) suggest that drawings and details are to be reviewed by all parties involved in the manufacture of an SSG system and for each building project. BAIYUN must review all structural details before any approval or acceptance is given.

Silicone contact width and thickness (see Figure 1) will vary by project with the design wind load and glass size. Contact width can be calculated using the following formula: [Design Wind Load (PSF) x Longest Short Span of Glass or Panel (Ft.)] divided by 480. A minimum sealant thickness of 1/4" (7mm) between substrates is required to accommodate thermal expansion and contraction (see Figure 2) of most systems and should be used in order to assure that sealant can be injected into the structural cavity obtaining full contact with both the glass and metal surfaces while remaining free of air voids. Greater joint thickness may be required to accommodate movement in some larger-sized SSG systems. BAIYUN can be contacted to assist in determination of proper joint thickness to accommodate expected movement in structurally glazed applications.

¹ Any review, recommendation, or statement, made on behalf of BAIYUN relating to an engineering design, architectural drawing, product formulation, endues specification, or similar document is limited to the knowledge of product properties as determined by laboratory testing of material produced by BAIYUN. Any comments or suggestions relating to any subject other than such product properties are offered only to call to the attention of the engineer, architect, formulator, end-user or other person, considerations that may be relevant in his/her independent evaluation and determination of the appropriateness of such design, drawing, specification, document or formula. BAIYUN assumes no responsibility for the comments or suggestions relative to subjects other than such product properties, and expressly disclaims any warranty or responsibilities for same.

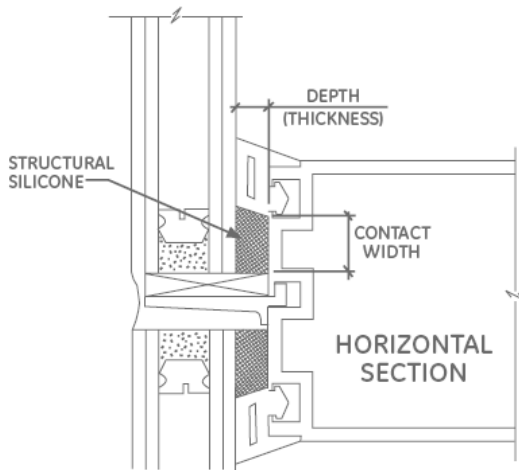


Figure 1

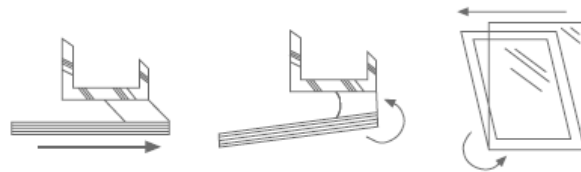


Figure2 Movement from thermal expansion and contraction and/ or glass rotation.

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.

BAIYUN WILL NOT:

- Design sealant joints.
- Provide comments on the structural integrity of overall framing system(s).
- Provide long-term performance data.

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

PRODUCT QUALITY

BAIYUN performs extensive quality assurance testing in our manufacturing facilities in accordance with ISO 9001 standards. This section is intended to provide the end-user with simple screening tests to verify that the material, as received at the project site, is suitable for the proposed application. Should the results in your facility differ significantly from those listed in the following test methods, **write down the corresponding lot numbers of the product(s) involved, and contact your BAIYUN Construction Office for assistance.**

One-Component Structural Silicone

The following procedure outlines a series of steps to ensure that the quality of BAIYUN one-component Structural Glazing Sealant is acceptable for structural sealant applications.

Shelf Life and Storage Conditions

When stored at or below 27°C (80°F) in the original unopened containers, BAIYUN one-component Structural Glazing Sealant has a usable life of 9 months from the date of manufacture.

Skin-Over Time / Elastomeric Test

For one-part sealants, a skin-over and elastomeric test should be performed once per day and on every new lot of sealant used. The purpose of the test is to check sealant working time and to ensure the sealant cures fully. Any variation (excessively long times) in the skin-over time may indicate an out-of-shelf-life sealant. This test is performed as follows:

1. Spread a 2 mm thick layer of sealant on a sheet of polyethylene.
2. Every few minutes, touch the sealant film lightly with your finger.
3. When the sealant does not adhere to your finger, the sealant is said to have skinned over. Note the time required to reach this point. If a skin has not formed within 2 hours, do not use this material and contact your BAIYUN Construction Office.
4. Allow the sealant to cure for 48 hours at 23°C & 50% RH. After 48 hours, peel the sealant off of the polyethylene sheet. Stretch the sealant slowly to see that it has cured to an elastomeric material. If the sealant has not cured correctly, contact your BAIYUN Construction Office.
5. Record the results in the project log book. This testing must be completed and results recorded, retained and be available for review upon request.

Two-Component Structural Silicone

Shelf Life and Storage Conditions

When stored at or below 27°C (80°F) in the original unopened containers, both the base and catalyst product of BAIYUN two-component Structural Glazing Sealant have a usable life of 9 months from the date of manufacture.

Pump Procedures

A pump must be used to airlessly meter and mix BAIYUN two-component Structural Glazing Sealant. The specific operation and maintenance procedures for the pump should be supplied by the equipment manufacturer. The applicator must have a start-up, shutdown, and maintenance procedure set up for the pump to properly apply structural glazing adhesives. When starting the pump, the curing agent line should be opened and material pumped through the line until the sealant exiting the dispensing gun ceases to be white or streaked. Instead, it should be a consistent black colour, indicating correct mixing of the base and curing agent components. Before shutting down the pump, the static mixer and hoses should be purged with base material or flushed using a suitable solvent or machine cleaning agent. The amount of wasted

material resulting from the start-up and shut-down of the pump varies with the type of pumping equipment used. As the volume of the hose after the static mixer location decreases, so will the amount of wasted material resulting from start-ups and shutdowns. Regular maintenance of the mixing nozzle by use of cleaning solvent will improve over-all system operations, and may be used as an alternative cleaning method for the mixer unit each time the equipment is shut down.

Quality Control Testing

Quality control testing to be performed includes the butterfly test, mixing ratio measurement, and the snap-time test. A description of each follows. Results of these tests must be recorded in a logbook similar to the example in the documentation section.

Glass or Butterfly Test

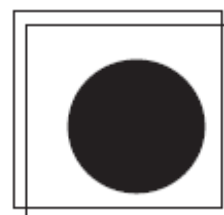
The glass or butterfly test must be performed every time the pump is started up, including startups that occur after extended breaks. The purpose of this test is to check for an adequate mix of base and curing agent components. The test is performed as follows:

Glass Test (see drawing)

The preferred method is to place a bead of mixed BAIYUN two-component Structural Glazing Sealant on a piece of glass, approximately 10 cm × 10 cm, and place another piece of glass on top of the silicone, pressing the two glass pieces together. The resulting sample forms a sandwich - permitting a clear visual inspection of the mixed sealant. If streaks are present, then more material must be pumped through the lines to improve the mixing quality. If the sealant smear is a consistent black colour, the sealant is properly mixed and ready for use. If grey or white streaks continue, equipment maintenance may be needed. This problem can often be corrected by cleaning or changing the mixer system, dispensing hose, dispensing gun, system ball check valves controlling the mixing ratio. Consult the equipment manufacturer for maintenance requirements. Under no circumstances should streaked material be used for production.



insufficient mixing



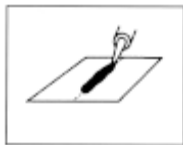
properly mixed

Butterfly Test (see drawing)

Previously, the following procedure was the only recommended method for visual inspection of the mixing quality:

1. Fold an A4 piece of stiff white paper in half.
2. Apply a bead of BAIYUN two-component Structural Glazing Sealant to the crease or fold in the paper.

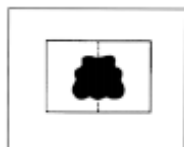
3. Press the paper together, smearing the sealant bead to a thin film.
4. Pull the paper apart and visually inspect the sealant smear formed.
5. Inspect the mixed sealant using the same criteria mentioned above.



1. Apply sealant to creased white paper



2. Press together



Well-mixed sealant



Poorly mixed sealant with white streaks

Snap Time

Once proper mixing of the two-component sealant is achieved (as confirmed by the glass or butterfly test), a snap time test should be performed. This test must be performed each time the equipment has been shut down and restarted. The snap time test relates the base-to-catalyst mix ratio to the cure rate of the sealant and provides an indication of working time (one-half the length of the snap time) and deep section cure time. The snap time is performed as follows :

1. Fill a small container with mixed BAIYUN two-component Structural Glazing Sealant.
2. Place a stick or spatula into the sealant. Note the time.
3. After 5 minutes, pull on the stick. As the sealant becomes more cured, pull on the stick every two minutes.



4. If the sealant does not tear within itself (cohesively) when the stick is pulled out (sealant is still semi-liquid and stringy), the sealant has not snapped. The time at which the partially cured sealant tears cohesively when the stick is pulled out is termed the “snap time” . Note the snap time on the log sheet.
5. The snap time will vary depending on the ratio of base to catalyst. Atmospheric conditions affect the snap time slightly. A snap time varying more than 15 minutes from what is expected may indicate an equipment or sealant problem. Such problems include plugged hoses, bad check valves, catalyst overly exposed to atmospheric moisture, or out-of-shelf-life sealant. Consult BAIYUN and the pump manufacturer before continuing to use this material.

Mixing Ratio Measurement

Each time the equipment is started, or each time a new kit of sealant is put on the machine, a physical measurement of the mixture ratio of the two components should be recorded prior to performing any other tests. Most variable ratio pumping equipment provide a set of valves that can be opened. Hold a disposable cup

underneath each valve outlet, open the valves for a set time (10 seconds, with a minimum of 3 strokes of both the base and catalyst pumps). The collected samples of each material can now be weighed to determine the dispensing ratio by weight. The acceptable range for the volume ratio of base-to-catalyst for BAIYUN two-component Structural Glazing Sealant is 9:1 to 11:1.

INSTALLATION

This application procedure is a general guide for applying BAIYUN silicone construction sealants. If you follow these procedures closely, you will help ensure optimum sealant performance. Whether the application be for weather sealants or structural glazing, these basic steps should be followed. Since BAIYUN silicone construction sealants are applied in many different environments and situations, this procedure is not meant to be a complete quality assurance program. It is a starting point, and BAIYUN is willing to assist you in putting together a quality assurance programme for specific applications. Please contact your BAIYUN Construction Office for details.

The basic steps for correct joint preparation and sealant application are:

1. *Clean* - **Joint surfaces must be clean, dry, dust free and frost free.**
2. *Prime* - If required, primer is applied to the clean surface(s).
3. *Place* - The glass or panel to be glazed is set in place according to standard practices. Depending on the specific design, a spacer will be installed during glazing or a backing material will be packed into the joint.
4. *Apply* - Adhesive/sealant is applied by filling the joint cavity completely, being careful to not leave “air pockets” .
5. *Tool* - Tooling techniques are used to strike the sealant and making certain the sealant has the proper configuration and fully contacts the joint walls.
6. *Check* - Adhesion testing is performed after the sealant cures.

The following sections are intended to provide more detailed information in each of these areas.

Surface Preparation

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. BAIYUN can provide quality control information and suggestions to user upon request.

Materials

- Use clean, fresh solvent as recommended by the sealant manufacturer’ s test report. When handling solvents, refer to manufacturer’s MSDS for information on handling, safety and personal protective equipment. Isopropyl Alcohol (IPA) is commonly used and has proven useful for most substrates encountered in SSG systems. Xylene and Toluene have also been found useful on many substrates.
- Use clean, white cloths free of lint or other lint-free wiping materials.
- Use a clean, narrow-blade putty knife when tooling structural silicone into the cavity.

- Use primer when required.

Cleaning Procedures

- Remove all loose material (such as dirt and dust), plus any oil, frost or other contaminants from the substrates to which the structural silicone will be adhered.
- Do not use detergent to clean the substrate as residue may be left on the surface.
- Clean the substrates receiving the sealant as follows: 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 solvent to dry on the surface without wiping with a second cloth can negate the entire cleaning procedure because the contaminants may be re-deposited as the solvent dries.
- Change the cleaning rags frequently, as they become soiled. It is easier to see the soiling if white rags are used. Do not dip used wipe cloths into solvent as this can contaminate the solvent. Cleaning with contaminated solvent can result in sealant adhesion issues. Always use clean containers for solvent use and for solvent storage.
- When cleaning deep, narrow joints, wrap the cleaning cloth around a clean, narrow-blade putty knife. This permits force to be applied to the cleaned surface.
- Clean only as much area as can be sealed in one hour. If cleaned areas are again exposed to rain or contaminants, the surface must be cleaned again.

Primers

BAIYUN structural glazing adhesive will bond to many clean surfaces without the aid of a primer. For difficult-to-bond substrates, the use of a primer or special surface preparation should be evaluated. An evaluation should be made for each specific application/substrate to determine quality of bond. When properly used, primers help assure strong and consistent sealant adhesion to surfaces that may be difficult to bond. Most primers are a blend of organic and inorganic chemicals, resins and solvents. Obtaining the proper materials, as well as following the prescribed procedures, is vital to ensure the successful use of primers. **PRIMER APPLICATION IS NOT A SUBSTITUTE FOR SURFACE PREPARATION.** Consult BAIYUN primer datasheet(s) for specifics and recommendations for use.

CAUTION

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

Masking

- To simplify clean up of excess sealant, use easy to release, pressure sensitive tape to mask adjacent surfaces before applying the structural silicone sealant.
- Start from the top down and overlap the runs. Tool in direction of over-lap so that masking is not disturbed during tooling.
- Remove masking immediately after application of silicone or as soon as possible or practical.
- Drop cloths can be used to cover any surfaces likely to collect excess sealant removed during tooling operations.

STRUCTURAL GLAZING

One-part Sealant Application

- Apply the sealant by pushing the bead ahead of the nozzle and making sure that the entire cavity is filled. Tooling should be done neatly, forcing the sealant into contact with the sides of the joint, thus helping to eliminate any internal voids and assuring good substrate contact. AIR POCKETS OR VOIDS WITHIN THE STRUCTURAL CAVITY ARE NOT ACCEPTABLE.
- Due to the smooth consistency of BAIYUN structural glazing 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 50°F (10 °C) or if frost or moisture is present on the surfaces to be sealed.
- BAIYUN structural glazing adhesive works best when applied to surfaces below 104°F (40°C).
- BAIYUN structural glazing adhesive should not be applied in totally confined spaces since the sealant requires atmospheric moisture from the air and release of cure by-products to cure properly and develop typical properties. In a typical SSG cavity, cure depths up to 3/4" from an air interface will generally cure satisfactorily and reach maximum properties within several days. Cure depths > 3/4" may take significantly longer time to cure and when applied in a single application may not cure satisfactorily. Please consult BAIYUN technical services for additional information on depth of cure for this product.
- 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.

Method of Application

BAIYUN structural glazing adhesive can be dispensed directly from cartridges and foil sausage packs.

Two-part Sealant Application

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- Silicone Structural Sealant works best when applied to surfaces below 104° F (40° C).

Mixing, Pumping and Dispensing

- TWO-PART Silicone Structural Sealant should be mixed and dispensed using two-component mixing equipment, which is available from several equipment manufacturers. These mixing / pumping systems are specifically designed to meter precise proportions of A base and B catalyst, in an air-free environment, and mix and dispense material at proper pressures and volumes to insure thoroughly mixed air-free material.
- Consult equipment manufacturer or system handbook for startup and shutdown procedures that cover proper operating pressures, mixing devices, and purging requirements.
- Hand mixing of A base + B catalyst is not recommended.
- Kit matching of the A and B components of TWO-PART Silicone Structural Sealant is not required.
- TWO-PART Silicone Structural Sealant has been used successfully in both “In-line” mixing systems and on “purgeless” after-the-gun mixing equipment. Consult equipment manufacturer and/or BAIYUN for information on mixing device options.
- When properly mixed, the material should be solid, homogeneous black. If incomplete mixing is noticed, cease use of the material until equipment has been adjusted and confirmed that complete mixing is being attained.

Curing

- When mixing A base + B catalyst at approximately a 10:1 ratio by Volume, the material will become tack-free at about 1 hours under ambient conditions of 73° F (23° C), 50% R.H. Under these conditions approximately 80% of strength should develop within 24 hours. Development of maximum properties requires full evaporation of cure by-products and will normally be achieved within 7 days.
- Work life and cure rate may be adjusted by changing the A base to B catalyst ratio. Ratio must be within recommended range to achieve desired cured material property profile.
- Work life and cure rate can be affected by temperature and humidity levels. Mild heat (i.e., around 120° F/49° C) will shorten the work life of the material, but will not significantly reduce the time required for complete cure. Cooler temperatures and lower humidity (i.e., <40° F/4° C and <30% R.H.) tend to slow the cure and adhesion process.
- The B catalysts are sensitive to prolonged exposure to atmospheric moisture and the storage containers should be kept tightly closed whenever possible to

maximize useful life.

- The catalyst may require mixing before placing container in pumping equipment if settling of components has occurred. Contact BAIYUN technical services for additional information.

Adhesion

Development of maximum bond strength will depend on substrate finish, joint configuration, primer use, adhesive thickness, substrate preparation and ambient conditions at location of use. Minimum stress should be applied to the adhesive bond for 24 hours. The adhesive strength of the bond should eventually exceed the cohesive strength of the silicone rubber adhesive. Maximum bond strength will typically be reached within 7 days.