

SA-2100 Application Guide

Introduction: SilverThane SA-2100 is a unique two-part polyurethane sealant-adhesive. There is nothing else available like it. It cures overnight in any thickness to a very tough flexible rubber. Moisture cured products take several days to cure and can take weeks to “through cure” in thicker sections or areas away from air contact. Furthermore, these products may solidify in opened cartridges rendering them useless. This loss becomes part of the cost of the product: If you have to throw half of a moisture cured cartridge away then your cost for what you used is double what you paid for the cartridge new! SA-2100 tubes and cartridges may be recapped and used months later without product degradation. SA-2100 is unaffected by weathering and UV degradation. Moisture cured urethanes turn various shades of brown after sufficient UV exposure. Partially cured SA-2100 may be removed from skin and tools with mild detergent and warm water. Moisture cured urethanes generally require flammable solvents.

SA-2100 is a tenacious bonder to many substrates including difficult to bond plastics. It is flexible at temperatures well below zero does not melt once cured. Its toughness makes it difficult to remove when cured. This quality suggests planning for removal (if necessary) before application as described in this brochure. The product is bright white. Our tests show that it can be painted with most paints without surface preparation. This makes it very different than silicone adhesives, which are impossible to paint. While we recommend that it be applied to a dry substrate it will cure in the rain once applied.

Decide prior to using SA-2100 what you want it to do in terms of future release. You can use it as an adhesive for permanently bonding two parts, bond it to either of the two parts and prepare the other so that it releases when screws or bolts are removed or prepare the parts so that it bonds to neither and only acts as a gasket. In either case (bonding or releasing) proper surface preparation is important.

Curing Characteristics: Sealant and adhesives cure through either solvent/water evaporation or chemical reaction. Moisture cured urethanes cure through a chemical reaction of the isocyanate in the sealant reacting with moisture in the air. This reaction polymerizes the isocyanate to make a polyurethane rubber. The isocyanate in SA-2100 Part A reacts with the polyalcohol molecules in the Part B to make polyurethane rubber. Because the two parts of SA-2100 are intimately mixed the reaction proceeds uniformly throughout the mixed product. This is akin to the way an epoxy resin cures. Like an epoxy, SA-2100 takes several days to reach full strength and should not be strained until it fully cures. Strain can result from mechanical stress as well as from differential expansion and contraction (heating and cooling) from bonding dissimilar materials. From a stress-strain standpoint SA-2100 is most vulnerable immediately after it becomes tack free. Keep bonded parts from moving relative to each other until SA-2100 has cured for several days especially in the case of dissimilar materials.

Adhesive Use (bonding): SA-2100 readily bonds to some surfaces with little preparation while in other cases the surface must be properly prepared. Regardless, all surfaces must be clean, dry and free from oil or grease. What follows is a guide based upon our observations. We urge the user to test the product for adhesion himself for critical applications.

SA-2100 bonds to all woods, stainless steel, mild steel, polycarbonate (Lexan) and plastic laminate countertops, epoxy and polyester resins with no special surface preparation beyond the above.

It bonds poorly to untreated aluminum but extremely well to acid etched (Alumiprep) aluminum. It also bonds to acid etched and chromate surface treated aluminum (Alodine). Acid etching alone is sufficient as in our tests the SA-2100 ripped off the brown chromate surface.

The bond to copper, brass bronze and zinc is fair to poor.

The bond to untreated polyacetal (Delrin), polystyrene, ABS, PVC, acrylic (Plexiglas), and PETE (polyethylene terephthalate) is fair to poor. The bond to untreated polyethylene and polypropylene is poor. However, the bond is excellent to very good on all these materials once they have been flame treated.

Flame treating is the act of very quickly passing a flame (a propane torch, for example) five or so inches away from the surface. Search “flame treating” on You Tube (www.youtube.com) to see examples of this in action. The hot oxidizing portion (yellow) of the flame oxidizes the surface of the plastic thus raising the surface tension. This allows the SA-2100 to “wet out” and bond to the surface. Note that the flame should not melt the surface. Melting is seen as a glossy surface. If this happens sand the surface with fine paper to dull it and re-flame. Water will bead up on an untreated surface but flow out on a properly flame treated surface. Bond immediately to the treated plastic surface.

It is not possible for us to evaluate the use of SA-2100 on every conceivable surface using all preparation techniques. In case of doubt, we urge users to test for adhesion by placing a dab of mixed SA-2100 on a prepared surface, allow curing for several days and then try to pry it off.

Sealant Use: Here the purpose of SA-2100 is to keep water from passing between two attached surfaces. Simple bonding as described above accomplishes this with the caveat that it may be impossible to get the two materials apart because of the tenacity of the bond. So, this section will discuss strategies that will provide the desired seal yet enable one to remove fasteners mechanically holding the parts together at a later time. Here the SA-2100 is acting more like a gasket, which may be attached to one or the other side or neither. Two things are important here: First, the SA-2100 must be thick enough so that the fasteners may be tightened to affect a seal if leaking occurs in the future. Second, a suitable “mold release” must be used so that SA-2100 does not stick where it is not wanted. Neither of these factors are particularly important when both sides are bonded.

The easiest way to insure bond line thickness is to use SA-2100 to make shims. Here is a way this can be done: A dab of SA-2100 is put on a thick, flat, smooth piece of polyethylene. (It will peel from this unless the polyethylene has been flame treated.) Wood spacer sticks of the desired shim thickness (1/8 to 1/4 inches) are placed on the sheet away from the dab of SA-2100. A second piece of polyethylene is placed on top of the dab and pushed down until it rests on the shims. The now flat pad of SA-2100 is allowed to cure overnight. Next day remove the polyethylene, peel the cured SA-2100 and use scissors to cut the material into small shims. To use these shims “butter-up” the surfaces to be gasketed with SA-2100, imbed the shims every inch or so and close the joint by hand tightening the fasteners. Tighten the fasteners after several days of curing. Be sure to use the mold release (or something similar) described below on the fasteners so that they are not bonded to the SA-2100.

SA-2100 generally does not bond well to the non-adhesive side of packaging tape. Nor does it bond to wax paper. Tape and wax paper are useful to prevent a permanent SA-2100 bond to a flat surface. However, neither conforms well to compound curves. An effective SA-2100 “mold release” can be made from a 50/50 mixture of paraffin canning wax and petroleum jelly (Vaseline). Carefully melt the wax and when melted add the petroleum jelly. Stir together until well melted and homogeneous. This will solidify to a soft paste that can be applied to any smooth surface and SA-2100 will not bond to it. However, a bond may form if the surface is rough as undercuts may exist that the SA-2100 can flow into. Liberally use the mold release on rough surfaces to fill any undercuts. Paste wax will work the same way as the home-made version above.

By using spacers and releases on both mating surfaces one can make a custom gasket. SA-2100 is used as described above. After several days of curing remove the fasteners and new gasket. Clean up any flashing with scissors and clean the surface to remove any mold release. Install the new gasket and tighten down the fasteners. Snuggly tighten the fasteners but do not over tighten as this will simply deform the SA-2100 and may lead to leaking.

SA-2100 gaskets can be on the thick side when they are used on non-moving parts in compression only as would be the case on a through-hull fitting on a boat. The film thickness should be less on stanchion base plates and even less on winches or other highly stressed parts where the load comes in from the side. Thick gaskets in these cases will allow the part to tilt or rock under load. This could be detrimental to the function of the part. Our preference here would be to use the release on the winch or stanchion base plate and install the part without using release on the fasteners. Most of the SA-2100 will squeeze out when the fasteners are tightened but enough will be left after the part is properly torqued to keep any water out. The part can be removed as the SA-2100 will bond to the deck. A sharp chisel used carefully will remove the SA-2100 without gouging the deck.

Suggested Application Areas: SA-2100 was originally developed as a better alternative to moisture-cured marine urethane sealants. It will do everything that these products will do in the marine area and has the advantage of being unaffected by UV light. SA-2100’s excellent weatherability combined with its ability to through cure in any thickness away from (or in contact with) moisture suggest its use in many non-marine areas. Here is a partial list to help suggest other uses;

Pool and hot tub repair

Repair of leaking roof gutters

Sealing "through" holes in concrete

Sealing concrete to wood joints

Corrosion barrier between dissimilar metals

Bonding dissimilar materials

"Form-in-place" gaskets

Non-skid plant pot pads

Vibration dampers for many things

Sealing riveted seams (boats, tubs, etc.)

Expansion joints in concrete, metal and the like

Plugging holes in siding

Weatherproofing outdoor electrical connections

Fixing ABS and fiberglass canoes

Bonding laps seams

Non-skid pads for chair legs, furniture