# Choosing a Sealant for Double Planking

In double planking, the seams between adjacent inner planks are covered by an outer plank with a sealant between the inner and outer planks. Thus, water that enters a seam between outer planks cannot migrate to an inner-plank seam because of the sealant. Consequently, one of the benefits of double planking is that the system is water-tight without the need to caulk the seams.

The choice of sealant, therefore, is important if the system is to remain water-tight in service. Desirable properties include:

- ☐ Viscosity high enough to prevent joint starvation due to squeeze out, but low enough to be easy to apply.
- ☐ Thixotropic. So that the sealant doesn't sag while working on vertical surfaces.
- ☐ Good but not tenacious adhesion. Someday you might need to repair a plank.
- ☐ High flexibility. I spite of Nevin's Rules recommending resorcinol, there is some evidence that rigid bonds result in broken planks.
- ☐ Long open time. When hanging the plank, a lot of work needs to be done before the sealant sets up.
- ☐ Inexpensive (ha, fat chance!)

Back in the day, builders used white-lead paste or shellac, with or without a fabric membrane; however, modern polyurethanes or polysulfides should be better. After substantial research, I've decided on Sikaflex 291 LOT (a polyurethane), where LOT stands for Long Open Time. Sikaflex 291 has a viscosity about like peanut butter and is thixotropic. It has moderate adhesion with an ultimate elongation of 700%. The LOT version remains workable (in my shop) for upwards of 4 hours. It's not cheap, however, and a primer is recommend, which adds to the cost. At this point, I don't have enough experience with it to estimate coverage, so I'll postpone my final decision.

Update: 8/29/2015
Sikaflex 291 LOT costs about $14/tube and it takes almost a full tube per plank. The 215 primer is about $40/250 ml, which is good for about 2 planks. So it's not cheap but it seems to work very well.

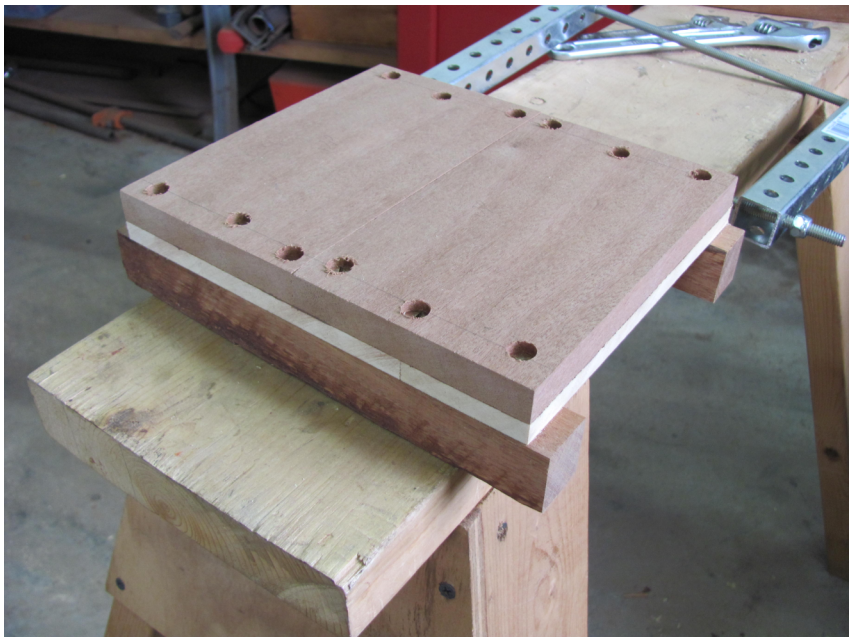
The flexibility of the sealant is an important property, typically reported as an ultimate elongation. But a sealant with a high ultimate elongation might not achieve good flexibility if the joint has insufficient sealant; e.g., 700% of 0 is still 0! Insufficient sealant can occur by squeeze out due to excessive clamping pressure (or low viscosity), or just not enough sealant in the first place.

Sika recommends applying 291 with a triangular notched trowel (2mm). When compressed, the triangular ridges of sealant will form a layer between .5 – 1.0 mm. When clamping, I suggest that you apply just enough pressure to see a little bit of squeeze out. Then let the sealant cure. After full cure, you can then tighten the clamps.

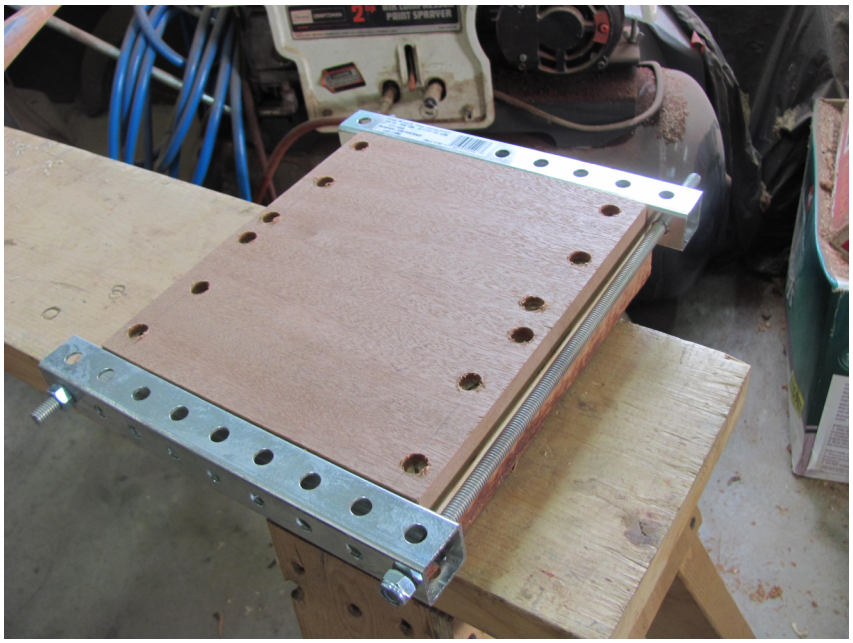
In some cases, full clamping pressure is required immediately. In that case, some form of mechanical shim should be inserted into the joint to limit compression.

Update: 8/29/2015
Employing light clamping pressure until cure is not practical when hanging a plank. Also, even with heavy clamping (e.g.; from the fasteners) very little squeeze out occurs. I suspect that the viscosity alone is enough to limit squeeze out.

To gain some experience with this sealant, I decided to perform an experiment.



The picture above shows a sample of double planking with two 5/8” x 4” Wana outer planks on top of three 3/8” Alaskan Yellow Cedar inner planks, with Sikaflex 291 LOT between the two layers (about .6 mm; no primer). The planking is then screwed to two H. Mahogany frames.



A metal frame is provided to simulate the presence of surrounding planking. The initial moisture content of the Wana was 13.3% and the AYC was 11.5%.

The sealant was allowed to cure for 7 days and then the sample was immersed in water for 7 days. Actually to simulate what the planking would experience in service, only the outside surface of the Wana outer planking was in contact with water; however, water ultimately reached the AYC anyway.

After 7 days of immersion, the sample was allowed to dry for 7 days at room temperature and low relative humidity. The picture above shows the sample after this drying period.

Note that the seams for both the Wana and the AYC have opened up (they were tight originally). Also the frame is now loose, where it was snug at the start of the experiment. This is evidence of compression set – failure of the plank to return to its original width because it was compressed beyond its elastic limit.

Although not visible in the picture, the planking also shrunk away from the frames (compression set due to the fasteners).

Overall, the gaps caused by compression set were less than 1/32", which is less than I anticipated. In my boat, some of the outer-plank seams have opened up as much as 1/8", causing the inner planks to split. I plan to repeat the cycle over a longer period of time (2 weeks wet/2 weeks dry) to see what happens. (Ideally, I would like to monitor the moisture content over time, but I don't have an accurate scale that can handle the weight of the sample.) I'll then unscrew the plank from the frames and try to separate the inner/outer planks to see how well the sealant held up.

Update: 8/29/2015
Although I didn't repeat this experiment (too many other things to do), I'm encouraged by what I've seen. I did remove the screws from one the outer planks and tried unsuccessfully to separate the planks by hand.