



Screen Printing Guide for 3M™ Scotch-Weld™ One-Part Epoxy Adhesive 6101 Off-White

Technical Bulletin

February 2020

Product Description

3M™ Scotch-Weld™ One-Part Epoxy Adhesive 6101 Off-White is a one-part epoxy exhibiting a low temperature cure or fast high temperature cure with long room temperature pot life. It is flexible and toughened, resulting in high impact performance.

Application Techniques

Due to its long room temperature stability, 3M™ Scotch-Weld™ One-Part Epoxy Adhesive 6101 Off-White can be applied using a variety of methods including screen printing, needle dispense, and jetting. This guide will provide details on screen printing

1. Handling procedure

1-1. Prepare for Use

Thaw for one to two hours at room temperature before using. Do not heat syringe above 27°C when warming.

Use this adhesive directly without dilution or additives.

1-2. Open Time

Product is stable for 4 weeks at 25°C.

1-3. Cure Profile

Typical cure conditions are:

- 65°C for 20 min
- 90°C for 3min.

1-4. Container and Storage Recommendation

For short term storage (< 3 months), close cap tightly for storage and put into 0°C refrigerator.

For long term storage close cap tightly and put into -20°C freezer to maintain 12 month shelf life.

Pot life (opened) at 25°C is about 4 weeks.

Avoid returning used adhesive to container after printing work. And also do not put dried adhesive inside of container.

2. Preparation of screen printing mesh

Select screen mesh based on required adhesive coating thickness, printing precision, printing durability and cleaning performance.

2-1. Screen mesh

2-1-1. Materials of wire

Stainless steel, polyester and nylon wire can be used for screen mesh materials. Stainless steel wire mesh makes thicker coatings because larger wire diameter. Polyester and nylon wire mesh is suitable for making precise pattern because of its finer wire diameter. Generally, polyester type wire mesh is used because of its better durability in heavy duty printing work.

2-1-2. Number of mesh

#380 mesh number can be used for printing 6101 off-white. The higher the number of mesh such as #400, the thinner in adhesive coating thickness due to reducing opening between wires. The smaller in number of mesh such as #70, the thicker coat but it is not good in precise pattern coating. Table-1 below shows the relation between the mesh number vs. the approximate dried adhesive coating thickness.

Table-1 Mesh number vs. Dried adhesive coating thickness.

mesh number*1	6101 OW approx. dry coated thickness
#225	60µm
#380	40µm

*1 stainless steel mesh

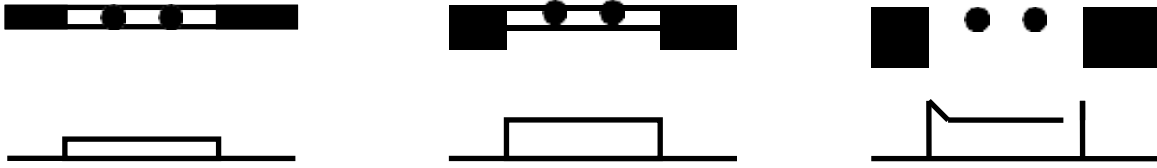
2-2. Masking

2-2-1. Materials for masking

Acrylic type masking is recommended because of better durability and ease of cleaning due to its smooth surface.

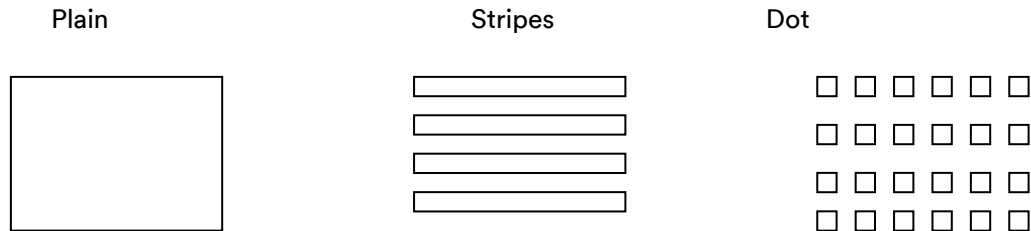
2-2-2. Thickness of masking

The thickness of masking is suggested as 30 to 70 µm plus wire diameter. Thinner masking will result in lower coating weight, and thicker masking may not make uniform pattern in edge line, especially in wider pattern.



2-3. Printing pattern

There are several types of printing pattern. Generally, adhesive thickness depends on mesh number. But to use stripe or dot pattern can make thicker adhesive coating in case of making masking thicker.



2-4. Suggested specification of screen. (Table 2)

Item	Specification	Recommended
Screen Material	Polyester or Stainless steel	Polyester with AB Hardener
Mesh number	#225-400	#380 or #225
Masking thickness	thickness of mesh plus 30 to 70 μ m	50 μ m

3. Substrate surface preparation

To optimize the performance the substrate surface preparation is critical.

Surfaces can be prepared by one of the following procedures (listed in order of increasing effectiveness):

1. Degrease only.
2. Degrease, abrade, and solvent clean. (For solvents, follow the instructions found on the supplier SDS and product label)
3. Degrease and chemically pre-treat.

After cleaning, care must be taken to avoid contaminating the pretreated surfaces prior to bonding. Contamination may be caused by finger marking, or by cloths which are not

perfectly clean, or by using sub-standard degreasing or chemical solutions. Whatever the pretreatment procedure used, it is good practice to bond the surfaces as soon as possible after completion of the pretreatment when surface properties are at their best.

4. Printing Conditions

Table 3 shows the typical conditions for screen printing work of 6101 OW

Table-3. Typical Screen printing conditions.

Item	Range	Ideal	Remarks
[Squeegee] Material	synthetic rubber	Polyurethane	
Shape of blade	square, straight edge	Straight edge	Square type makes sharp edge in pattern.
Hardness* ¹	80 - 90 durometer	83	Harder rubber produces thinner coating.
Set angle	60 ⁰ - 70 ⁰	65 ⁰	Tilt up makes more adhesive throughout.
[Scraper or Flood Bar] Material	aluminum, stainless steel	aluminum	Optimum flood bar pressure will depress the screen mesh approximately 0.32cm (1/8in).
Set angle	90 ⁰	90 ⁰	Control gauge level enough to spread adhesive on the mesh.

*1 Some squeegee is identified its hardness by its color such as red (50-60 durometer), green (62-68 durometer), blue (70-75 durometer), yellow (80-85 durometer).

Above are the controlling method before printing. Once running there are only squeezing speed and pressure for controlling.

5. Printing Procedure

5-1. Set-up

- (1) The condition of working room should be controlled 20 to 25°C, and as close to 50% RH, (CTH room) but not higher to get consistent screen printing performance over time.
- (2) Attach screen printing plate, squeegee and scraper.
- (3) Set printing condition according to Table 3 above. The surface of screen plate should be wetted by wiping with wet cloth before starting.
- (4) Place adequate amount of adhesive along with squeegee on the screen plate. Avoid putting adhesive on the mesh area.
- (5) The squeegee rest position of cycle run should be set on the side where it is after spreading by scraper to avoid drying adhesive on the mesh when changing sheet.

5-2. Notice in working

- (1) Run printing work constantly.
- (2) Remove adhesive and wash screen plate with Methyl Ethyl Ketone (MEK) when stopping work with current adhesive or if switching to a different type of adhesive. After cleaning resume placing the adhesive and start. Note, when using solvent, follow the instructions found on the supplier SDS and product label.

5-3. Finishing work

- (1) Remove adhesive immediately from the screen plate, squeegee and scraper as much as possible.
- (2) Used adhesive should be disposed of properly. Do not return used adhesive to original container.
- (3) Wash and clean screen plate, squeegee and scraper according to Section 7 below.

5-4. Troubleshooting

When encountering the trouble in printing such as plugging in mesh or poor releasing of sheet, it is recommended following operation for solving these troubles.

5-4-1. Void or rough pattern

It seems poor in adhesive throughout mesh when small void or rough pattern is found. Increase squeegee pressure or reduce squeegee speed. Add adhesive if running low.

5-4-2. Plugging in screen mesh

Remove adhesive and clean screen plate immediately when the mesh is plugged. See Section 7 below regarding cleaning. Test printing before re-starting.

6. Cure conditions

Adhesive will not cure at room temperature. The sheet printed adhesive should be cured sufficiently and curing time is shortened with increased oven temperature. It takes 20 min at 65°C or 3 min at 90°C in an oven for screen coated with #380 mesh. Note - Oven times can be shortened but allow for a full 24 hours at room temperature to be fully cured. *Note: sample must reach a minimum of 65°C to initiate cure.

7. Clean Up

- (1) Adhesive on a squeegee and screen plate should be removed as much as possible by scraper.
- (2) The excess cured adhesive should be removed by swelling with Methyl Ethyl Ketone (MEK).
- (3) For excess uncured, use brush or plastic blade to remove heavy amounts of adhesive after swelling sufficiently with MEK. But be careful to clean without damaging mask.
- (4) The adhesive in screen mesh can be removed by wiping both sides with cloth wetted with MEK. Using ultra sonic cleaner is more effective in case of heavy contamination.
- (5) Repeat procedure of (3) and (4) until all adhesive is removed.
- (6) Adhesive can be removed by wiping with ethanol or isopropyl alcohol if it is still sticky on the screen plate.
- (7) Dry screen-print parts at room temperature until free of solvent.
Note when using solvents follow the instructions found on the supplier SDS and product label.

8. Other information

Store adhesive in original container at -20°C (-4°F). This adhesive will return to its original form and will maintain the 12-month shelf life at this temperature. It will have shortened shelf life or pot life when stored above 25°C – See section 1-6 for more storage recommendations.

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