

Counter Top Epoxy Resin

1. Overview

Manufactured by Smooth-On in the USA. Manufacturer's Brand Name: Tarbender Clear, UV Stabilised (slow to yellow compared to non-stabilised resins).

Cast in thin layers between 1-3mm thick, usually for counter tops and resin art.

A fairly high viscosity resin (thick with low flow).

Cured castings are glossy, hard and strong.

Not approved for food contact and not suitable for heat contact or exposure above 80°C.

Mixing ratio is 100 Resin : 41 Hardener by weight or 2 Resin : 1 Hardener by volume.

2. Safety and Health

- Epoxy Resins are an irritant to skin, eyes and mucous membranes.
- Avoid breathing fumes. As a minimum use them in a well ventilated work area. The use of a respirator is strongly recommended and essential for larger projects and regular users.
- Avoid eye contact. Wear protective eye-glasses.
- Avoid skin contact. Wear rubber gloves and long sleeve shirt. Over time, skin contact can cause sensitisation (this basically means one can become allergic to the chemicals).
- Do not clean resin off your skin with solvents. This can accelerate penetration of harmful substances through your skin. Use soap and water to clean skin.
- Do not swallow. Keep out of reach of children.
- The harder (Part B) is corrosive and may cause severe eye damage and skin burns. It is a sensitizer that may cause dermatitis from skin contact and exposure to fumes.
- If sanding or machining cured resin then wear a dust mask to prevent dust inhalation.
- First Aid:
 - In the event of eye contact, wash eyes under running water for 15 minutes and get medical attention.
 - In the event of skin contact, wipe clean with white vinegar then wash with soap and water. Get medical attention if irritation develops.
 - If fumes are inhaled or if breathing becomes difficult, move to fresh air. Get medical attention if symptoms develop or persists.
 - If swallowed do not induce vomiting. Drink 1-2 glasses of water and seek medical attention.

3. Key Parameters

- Cast in layers between 1mm - 3mm thick (See dangers of heat below)
- Pot Life* : 45 minutes (for 300g batch) at 23°C
- Cure Time: Expect a cure time of 24 hours. Cure time of thin layers will be longer in cold weather. Note that with this resin a subsequent layer can be applied after only 6 hours (wait longer in colder weather).

*Pot Life

Larger volumes and containers with lower surface area reduce the pot life. The pot life will be reduced in hot weather. You can extend the pot life by pouring the mixed resin into flat trays. If you leave the resin too long it will start to thicken and air entrainment and heat generation will become a problem. Never leave mixed resin unattended as it can start to generate excess heat, give off toxic fumes and even become a fire danger. If this starts to occur then move the resin to a safe place outdoors and don't try to use it.

Don't mix more than you can use in a relatively short space of time.

4. Maximum casting thickness and dangers of heat

The curing chemical reaction between epoxy resin and hardener generates a significant amount of heat (exothermic chemical reaction). When this heat cannot escape it increases the temperature causing the epoxy to cure faster and generate even more heat. The higher temperature increases differential shrinkage in the casting which may lead to induced stress and cracking. A potentially massive build-up of heat can cause the epoxy to crack and discolour.

Uncontrolled exotherm may cause the epoxy to foam, smoke, give off dangerous vapours, crack and generate enough heat to melt its container or cause nearby items to catch fire.

- Never exceed the recommended maximum thickness or volume of a resin system as this may lead to overheating. Use mixed resin before it starts to thicken or increase in temperature.
- The maximum thickness applies to resin used at ambient room temperature of 23°C with relative humidity below 85%. Warmer temperatures will reduce pot life and may also influence the safe casting thickness. If temperatures are warmer than 25°C, reduce maximum casting thickness by 50% or as appropriately required to avoid excessive exothermic reactions.
- If you pour resin into a closed mould then the heat build-up will be greater than when using a flat open mould with a large surface area for the resin to lose heat. Reduce film thickness when using relatively closed moulds.

There is no limit to the number of layers that you can cast on top of each other.

5. Typical Applications

- Used for thin layer **resin art** on tiles, glass, wood etc where a thick (lower flow) resin is desired.
- Used to give a durable glossy finish to **bar counters** and similar tops. It can be used clear or with pigments added to create metallic appearance or other effects. This is a fairly high viscosity resin (thick with low flow) which allows counter tops to be coated without building sides to retain the resin.
- Used to **encapsulate objects** by pouring the resin over them. This can only be done with a thick, low flow resin that cures in thin layers such as this one.
- Poured over photos, paper and fabric as in decoupage art. Paper should be glued down or sealed first.
- Poured over acrylic art to create a glossy finish. Do not use over oil based paints or varnishes.

See directions for these various applications later in this document.

6. Protecting surfaces

- Apply 3-4 coats of RAMWAX® or equivalent onto surfaces that you don't want the resin to adhere to. Apply wax, allow 15 minutes for solvents to evaporate, polish to a high gloss and then apply next coat of wax and do the same. Use a lint-free cloth (Important!).
 - If making a river table then coat the entire melamine box with wax for easy removal.

7. Equipment Required

- Two Plastic or metal containers. Containers must have smooth continuous sides for scraping. (Do not use foam or glass containers.)
- Scale (it is usually better to measure resin by weight rather than volume).
- Stirring sticks with square edge and straight sides that reach to the bottom of all containers.
- Isopropyl alcohol (rubbing alcohol) for cleaning up. Remember that this is flammable.
- Ensure that all containers and tools are free from dust, grease and other contaminants.

8. Surface Preparation

- Ensure all surfaces are completely dry and free of dust, oils and contaminants.
- Non-porous surfaces such as tiles and glass do not need priming.
- Porous surfaces (such as wood and cement) should usually be priming to prevent air bubbles being released from the surface when resin is applied. But as this resin is applied only in thin layers it should be possible to pop all bubbles by torching shortly after casting. You can also prime, to remove air from porous surfaces, with a water based paint. Never use an oil based paint under resins.
- Apply wax to all surfaces that you require the cured resin to release from. See section above "Protecting Surfaces".

9. Mixing

Proper mixing is a key requirement for a successful resin project. Poor mixing will lead to defects which may often be cloudy streaks or patches in the cured resin. These defects cannot be removed.

It is better to measure the components of resin systems by weight rather than by volume.

- The ratio **by weight** of Resin and Hardener is **100 Resin : 41 Hardener**
 - e.g. 50g Resin with 21g Hardener.
- The ratio **by volume** of Resin and Hardener is **2 Resin : 1 Hardener**
 - e.g. 300ml Resin with 150ml Hardener.
- Accurately measure out Resin into the mixing container then measure out the Hardener.
- Stir together well for 3-5 minutes using a square edge stir stick. Include scraping of the sides and bottom of the mixing container several times. Do not mix in a manner that introduces air.

- Transfer entire content to a second clean mixing container and mix for another minutes again scraping the sides. Failure to scrape sides sufficiently will lead to streaks.
- Your resin is now ready for pouring and it must be poured before it starts to get thick or hot.

Mixing can be done by hand or with a drill fitted with a mixing unit. Drill mixing can help mix larger quantities but should be set to low speed on a variable speed drill so as to avoid making a vortex that will pull in air. A drill mixer will not scrape the sides so manual mixing with scraping of side and bottom of the container is still required for 2 minutes. If drill mixing introduces air, time will be required to allow the air to rise.

If the mix quantity is large it may start to thicken and/or generate heat prior to pouring. This indicates that curing is underway. The heat generated can reach dangerous levels. You can extend the pot life by pouring the mixed resin it into large flat trays where heat can more readily escape.

10. Adding liquid colourants or powder pigments

Bastion Paint Allure Liquid Colourants and Pearlescent Pigments stir in very easily. These can be added at any time. Some other pigment types do not mix in as easily and these should be mixed as follows: Pigment first, add Part A to pigment and mix then add part B and stir. A mixer fitting on a drill can give the required mixing force for difficult to mix pigments. Don't add more than 6% of the total resin mass unless you have tested it.

11. Including rocks, stones and crystals

Wash these and dry them thoroughly. Porous items should be oven dried at 100°C for an hour and cooled before use. For larger items it is a good idea to dip them into mixed liquid resin to pre-coat them prior to pouring the liquid resin over them (this is because poured resin may not get underneath them).

12. Removing air with a propane torch

Torching to remove air shortly after pouring is important if air bubbles are present. Do not hold the torch closer than 8cm from the resin surface as too much torching will burn and discolour the resin. As this resin is fairly thick it will require torching shortly after casting to remove air.

13. Prevent dust contact during curing

Dust and air-born debris are an enemy of all curing resins. Pour and allow to cure in a clean area. We recommend covering your pour with something like a sheet draper over a suspending frame. Do not cover with something that traps fumes or heat.

14. Adding subsequent layers

There is no limit to the number of layers that can be added. The bond between layers will be permanent and invisible. Allow at least 6 hours for layers to cure before adding new layers (longer in cold weather). If too much time passes before adding a subsequent layer (more than 72 hours) then the layers may delaminate. If more than 72 hours has passed then wash with soapy water, sand and wash again before applying the next layer.

- If amine blush develops you must wash with soap and water, sand and wash again. Then allow for proper drying before applying a subsequent layer. Failure to do this will ruin your project. Amine blush can be identified as the surface being cured (hard and resisting finger nail indentation) but feeling tacky. A milky or "oil on water" appearance also indicate that amine blush is present.
- After any washing, always make sure that the resin has fully dried before pouring a subsequent layer.

15. Storage

Store in cool area. 23°C is the best storage temperature. Both resin components have an expiry date.

16. Coating a bar counter:

Do not coat over oil based stains or varnishes. Make sure the surface is level in all directions. Calculate the resin required for a first layer of about 1.6mm and apply this. Pour along entire length of bar top and spread as evenly as possible and then allow self-levelling.

Use a propane torch to pop any air bubbles.

We suggest applying another 1 or 2 layers each with about 1.6mm thickness. Allow 6 hours for curing between coats. The minimum total thickness of resin for a bar counter is 3.2mm (2 or 3 layers).

17. Encapsulating 3-D items

Pour a thin 1.5mm resin layer onto the surface that you want the item permanently adhered to. Allow this to cure for 4 hours then place the item onto this surface, prepare a small amount of resin and pour this directly over and around the item. At each stage use a butane torch lightly to remove air.

18. Pouring over paper, cardboard etc.

You can laminate paper beforehand. The resin, however, does not adhere to plastic so the laminated area should be a small portion of the total area. Alternatively you can also secure and seal the paper with white wood glue but wait 16 hours for the glue to dry before pouring resin over it.

19. Cleaning spills

The best chemical to clean small spills effectively is isopropyl alcohol. Rubbing alcohol and some hand sanitisers are fine. Clean spills as soon as possible before curing. Don't clean resin off your hands with these types of solvents; use soap or hand cleaner and water to clean skin.

20. Useful Parameters

Mix Ratio By Volume	2A : 1 B
Mix Ratio By Weight	100A : 41B
Mixed Viscosity - Mixed (ASTM D2393)	1100 cps
Specific Gravity – Mixed (ASTM D1475)	1.09 g/cm ³
Pot Life of 300g mass at 23°C (ASTM D2471)	45 minutes
Thin Film (1.6mm thickness) Working Time	2 hours
Thin Film (1.6mm thickness) Tacky Recoat Time	6 hours
Thin Film (1.6mm thickness) Tack Free Time	8 hours
Cure Time	16 hours
Shore D Hardness after 7 days @ 23°C (ASTM D2240)	75

21. How to calculate the amount required

We recommend using a scale and resin mass as this is normally more accurate than using volume.

For a roughly square or rectangular shape multiply as follows:

Resin required in kg = Surface length in m x Surface width in m x required resin film thickness in mm x 1.09

For a roughly circular shape multiply as follows:

Resin required in kg = 3.14 x Circle radius in m x Circle radius in m x required resin film thickness in mm x 1.09

Example

If your rectangular surface is 1.2m x 60cm and you require a film thickness of 1.6mm

Resin required in kg = 1.2m * 0.60m * 1.6mm * 1.09
= 1.26kg of resin

(If you select to measure out the components using volume then don't multiply by 1.09:

Resin required in Litres = 1.2m * 0.60m * 1.6mm
= 1.15 Litres of resin

Now work out how much of Part A and how much of Part B you need to give you the total requirement of 1.26kg

Ratio for this resin is 100A to 41B

To get 1.26kg total resin:

kg Part A required = 1.26/141 * 100 = 0.894kg (or 894g)

kg Part B required = 1.26/141 * 41 = 0.366kg (or 366g)

22. More information and videos

This particular product can be found at <https://www.smooth-on.com/products/tarbender> (watch videos here)