

## Bottle Walls

Can and bottle walls — literally walls made out of mud or cement, with cans or bottles set like bricks — are one of Mike Reynolds' time-tested innovations, a building technique that can have amazingly artistic results.

Can/bottle walls look and act like normal walls, except that they can't bear heavy loads. They're much, MUCH faster to build than tire walls, but don't have the benefit of thermal mass. They're used in earthship construction for room dividers, garden walls, and other non-load-bearing verticals.

## Materials

You'll need:

- For a can wall: a whole crapload of not-too-crushed cans
- For a bottle wall: a bunch of "bottle bricks" (see below)
- Cement or earthen render mix, a nice sticky consistency that balls up in your hand but doesn't crumble. (Note - cement is better for outdoor walls, but mud or clay render is usually cheaper)
- Rubber gloves to protect your hands.

If you want your wall to be extra stable, you should need footings to provide a solid base, just as with any other wall. Recycled tyres filled with an earth/clay mix and pounded solid are fine; sand is not.

## Bottle Bricks

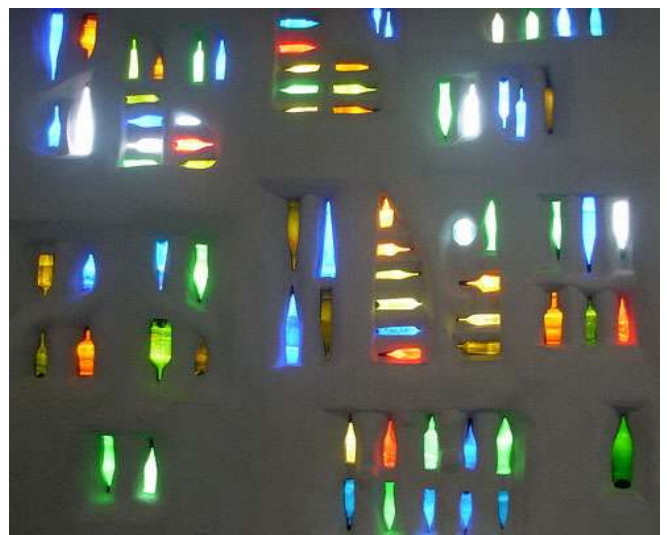
The concept here is that cans and bottles have a strong structure which resists crushing. They can act like bricks, and you are laying them in mortar. The cans or bottles will provide a framework around which the mud/cement forms. Lay them in a staggered grid, just like bricks, and they create a truly strong wall.

Bottles are generally used for their artistic value, but cans are far more plentiful and are easy to work with. Therefore, most walls start with a base of cans, which can be left exposed or plastered over to look like a normal wall.

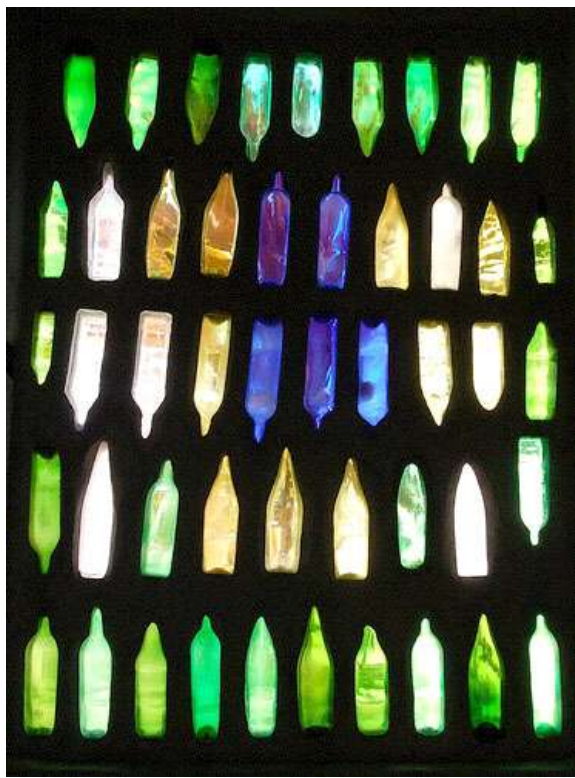
Cans can be used as-is, laid end to end for a wider wall. Bottles, however, can be used in multiple ways.

## Vertical

It is possible to use entire bottles, as-is, laid vertically (or, sometimes, horizontally, into a wall. These walls are, by necessity, no thicker than the width of the bottles used. Care must be taken when stacking the bottles to ensure stability, and this method may use more mortar than horizontal bottle bricks.







## Horizontal

Bottles can also be laid as-is horizontally, alternating top to bottom for stability. This method may leave the bottle necks exposed, in which case care must be taken that the empty bottles do not become nesting sites for insects, or the necks may be plastered over – in which case the stained-glass effect of allowing light through the coloured glass is removed.



Bottle bricks can be created by cutting bottles (e.g. with a wet tile saw) and taping them together with adhesive stainless steel tape used for duct sealing. Make sure that all the 'bricks' are the same width, and that it's the width you want your walls to be. Although you can technically use any bottle, wine bottles are usually much thicker than your typical bottle. Beer bottles in particular are very thin and more likely to break and cut you.





# Cutting Glass Bottles for Bottle Bricks

## Wet Tile Saw

Many home improvement stores offer wet tile saws; which are intended for use in cutting tiles for mosaic and other projects such as backsplashes, counter tops, bathrooms, kitchens, etc. It is an electrically operated saw which works with water.

This tool uses the scoring method which "cuts" a line around the bottle. Glass of course has a crystal structure to it and can't really be cut at room temp but rather broken in a controlled manner.



In choosing a bottle to cut on your tile saw, keep in mind that lumpy, bumpy or odd shaped bottles are a little more difficult to cut straight. Once you begin cutting into the angled neck of the bottle, it is more difficult to keep the bottle flat and straight, thus you must rely on your hands to hold the bottle straight for cutting.

Wear gloves and eye protection! Make certain your saw is plugged in and on a stable, level work surface. Ensure the water reservoir is full, make sure it stays that way every chance you get.

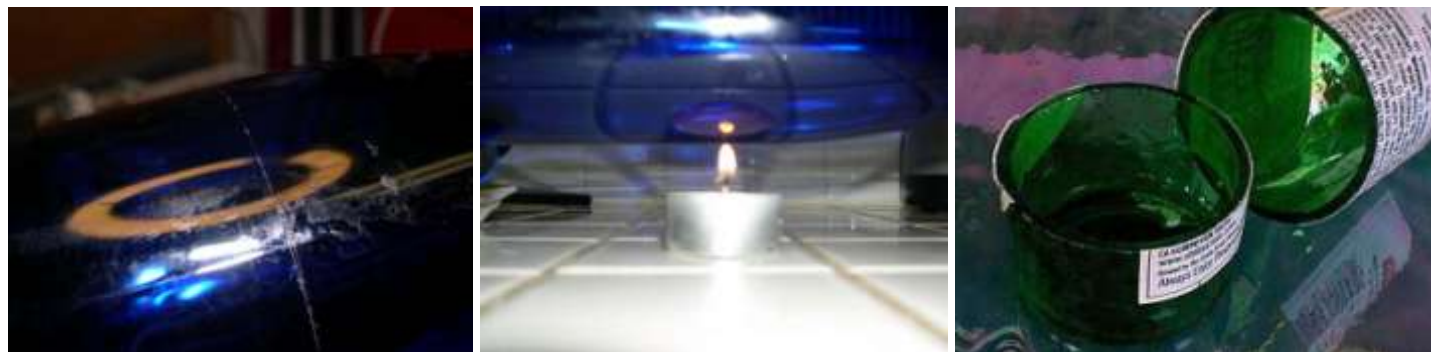
Holding the bottle firmly, but not in a death-grip, slowly move the bottle toward the blade. As you should have ear plugs in, you should still be able to barely hear the glass hitting the cutting wheel.

Once the cutting wheel (or blade) has entered the bottle, slowly turn the bottle back towards you, as though you were going to roll it off the table towards your body. Slowly, don't move too fast. Keep in mind that thicker bottles will require more cutting time. Don't rush it. Let the tool do the work.

## Score and Heat

Any tool which can score a line in the glass can be used for the first step. This tool "cuts" a line around the bottle. Do not go over the scored glass more than once. If you go over your score more than once you will create deeper cuts that could result in pathways for the glass to take off on.

Using a candle and some patience, carefully heat the bottle at the scoring mark rotating the bottle as you heat it. Hold the bottle with both hands, one on each end. Heat the bottle for about a minute and then drip cold water on the area, run an ice cube over the area, or dip it into a bucket of cold water. Repeat the process until the bottle suddenly breaks apart. You will actually hear slight cracking of the glass as you do this.



Be careful, the cut edges are **EXTREMELY SHARP!** These sharp edges can be finished, as described below, or you can simply gaffa tape two cut bottles together to form a brick. Be very careful handling these bottle bricks.

**Finishing:** Using a Dremel tool, you can rough up the sharp cut using a Silicon Carbide conical grinding tip. Wear a dust mask, as you don't want to be breathing ground glass! Roughly grind the inside and outside of the edges using the Dremel. Continue to smooth out the edge using drum sanding attachments. After a while, you'll have a fairly smooth edge that although usable, it is still kind of rough. This can be sanded by hand using 200 grit sandpaper or finer.

## Wrap and Burn

This method is similar to the score and heat method, but no pre-scoring is done. Instead, the heat is applied along the selected break line. This method will generally result in a more jagged break than the other methods.

1. Fill a bucket with cold water.
2. Soak a piece of string in acetone and wrap it around the chosen bottle several times.
3. Light the string on fire and rotate the bottle so that all sides are heated evenly.
4. When the acetone is about to burn out, place the bottle in the cold water. It should split where your string was.
5. Sand down rough edges.



## Boiling Water

Carefully score a line around the bottle. Do not go over the scored glass more than once. If you go over your score more than once you will create deeper cuts that could result in pathways for the glass to take off on.

Pour boiling water gently over the score line, then follow with cold water. The lower temperature of the boiling water, compared to the much higher temperature of the flame used in other techniques, yields a much cleaner fracture line with next to no chipping or cracking.





# Construction

If you're building this wall on concrete/cement, wet the base first to help the new material bond. If you're not, just go ahead & start.

- Grab a handful of mud, and put it somewhere. CONGRATULATIONS YOU'RE BUILDING!
- Make a nice thick layer of mud; you don't want any can or bottle to touch anything except the mushy stuff. You'll get a feel pretty quickly for how high you can pile cement/mud, but eventually you'll have to let it dry for a while, and move on to another section.
- Next step is putting down some cans or bottles. Bottles are generally used for their artistic value—those amazing stained-glass designs—but cans are far more plentiful and easy to work with. Therefore, most walls start with a base of cans, which can be left exposed or plastered over to look like a normal wall.



- Take your cans and make a small crimp along one side, which will keep them from rolling once you've placed them. Put them, crimp-side-down, into the mud. Place them solidly enough that they won't easily blow away. Leave 2 – 10cm between each can: they should never touch each other. The cans will provide a framework around which the mud/cement mortar forms. Lay them in a staggered grid, just like bricks, and they create a truly strong wall.
- Cans and bottles are always laid with the solid end toward the exterior. This protects the interior from the elements: no water can get in, preventing damage. And obviously, it looks better this way.



Once your wall is built, it's a simple matter of plastering over the cans and bottles. You can cover them completely to create the appearance of a normal wall, or leave the ends exposed for artistic detail. Cement or natural plaster can be used, depending on your personal taste and the placement of the wall.





## Example Structures, Patterns, Designs and Finishes













