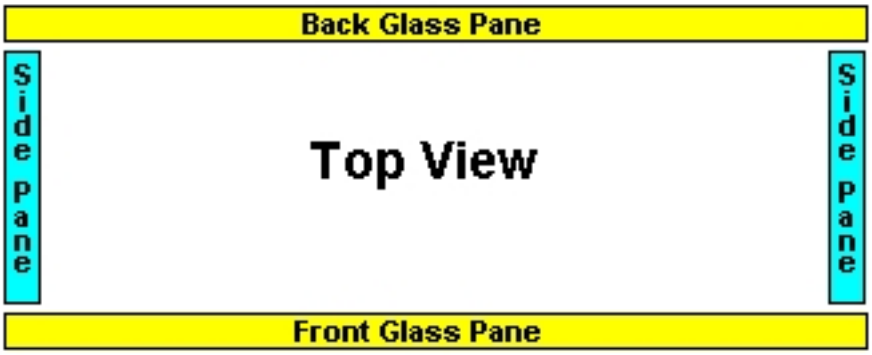
DIY Glass Aquarium Plans

by Stan & Debbie Hauter

So, you were walking through your local pet shop contemplating the purchase of an aquarium. You could picture in your mind how great it would look in that unused corner of the living room. You measured the "hole" in the décor and knew exactly what you wanted, but when standing there waiting for the sales person to come over you suddenly thought, "Hey, I could make that! It's just six pieces of glass glued together. Piece of cake." Welcome to the Do-It-Yourselfer's Aquarium Club! You realized that, if they can do it, you can too.

If you are up to giving it a try, building a tank from scratch can be fun, as well as challenging. You can use these DIY aquarium plans to build a tank up to 55 gallons in size with 1/4 inch glass, or you can choose to work with acrylic. Deciding on which material to use and knowing how to work with it is important, so here are some tips to keep in mind before getting started with building a glass aquarium.

- Don't build a tank more than 14 inches high with 1/4 inch glass.
- Plan ahead before cutting the glass by drawing a good schematic.
- Use **precision** measurements. This will insure a proper fit.
- The end pieces should be fit **inside** of the back and front panes, as shown in the diagram below, and the front, back, and two side panes should set on **top** of the bottom base pane.



- You can always have a professional glazier cut and prepare the glass for you.
- Use only a **non-toxic** 100% silicone sealant appropriate for aquarium use.
- Undoubtedly you will be putting a lighted hood on your tank, so design it accordingly. **Do not** put a solid glass cover on top of an aquarium, as this restricts the oxygen-carbon dioxide gas exchange efficiency, resulting in poor or inadequate aeration of the aquarium.
- Other common mistakes to avoid!

Now, what will you need to build your aquarium and how do you construct it?

Here is the parts list, and if you haven't already done so, read our tips on common mistakes to avoid, as well as the tips from Page 1 prior to jumping into this project. Now, review the following instructions carefully, before you begin assembling the tank.

- **Order of Construction:**

  Start with the bottom base pane, install the sides, and lastly the back panel.
  - Construction Tip: For a larger sized aquarium (above 30 gallons), we recommend adding a "brace" at the center of the tank. This can be done by using a six inch wide piece of glass siliconed to the top edges of the front and back pieces of glass. For extra strength, you can pancake two brace pieces together, using silicone to glue them together.
- **How To Install the Glass Panes:**

  As each pane is installed, as you go along you will be applying a thin but adequate **solid line** of silicone to each **inside** edge of all areas to be joined, then, at a **slight forward angle**, align and inset the piece of glass onto the bottom glass pane, and slowly tilting it upright, press it lightly, but firmly down into the silicone, fitting it solidly into

position. Do not wipe off any excess silicone that might squeeze to the outside edges of the glass. This can be cleaned up or trimmed later on, once the silicone has fully cured.

- **Before Assembly:**
  - Buff all the raw glass edges, just enough to take off the sharpness, with emery cloth or silicone carbide sandpaper.
  - Clean all the glass pane joint areas and edges about 1/2 inch inward (any place where silicone will be applied) with acetone on a paper towel.
  - Cut 16 strips of duct tape, about 5 inches long, and stick them to anything close by within easy reach that has a clean surface to it, that the tape won't stick to too much, with at least half of the tape hanging down freely. If during assembly you run out of pieces of tape, before installing another panel, cut some more pieces.
    - Tape Tip: If at any time during construction you have trouble with the tape not sticking to the glass, just clean the area with some acetone on a paper towel and try again.

How To Assemble The Tank

1. After all your glass pieces are cut and prepared, lay or arrange the pieces out so you know which piece is going where. Once placement of the panes has been determined, to help keep track of where each piece goes (which edge or side of the glass pane is going to go up or down, inside or outside, etc.) you can mark them with words or directional arrows using a washable felt tip marker.
2. Take the bottom base piece of glass, place it on a **flat, non-abrasive** surface, and firmly press and stick 8 pieces of the duct tape (2 pieces on each side) to the glass from the bottom side with the sticky sides up (Diagram View 1). Tip: This is easily done by lifting up the glass from each side just enough to stick the tape pieces in place.
3. Using the **How To Install the Glass Panes instructions above**, install the front glass piece (Diagram View 2). Once the front glass is in place, fold the 2 bottom pieces of duct tape upward and stick them to the front of the glass. Tip: This step is much easier to do with an assistant to hold the

front glass pane upright and in place while you complete installation of the first side piece in the next step.

4. Using the same installation method, install the first side panel (Diagram View 3), fold the 2 bottom pieces of duct tape upward and stick them to the front of the glass, and secure the side piece to the front piece of glass by wrapping 2 additional strips of duct tape around the corner from one side to the other (Diagram Right End View Example).
5. Following the same procedure as above, install the other side piece, and finally the back panel.
6. With all the pieces in place and the tank constructed, run a thin but adequate **solid line** of silicone into the eight joint areas on the inside of the tank, then run your thumb over the silicone from one end to the other of each seam, preferably in one continuous motion, to smooth the silicone down and force it into the joint areas. (Install the "brace" here, if adding one).
7. Allow the silicone to cure for 24 hours.
8. Refill the tank with fresh water and allow it to sit for at least 12 hours, 24 is better. This gives you a good test period, and you will feel much more confident of success when you finally fill the tank with saltwater, put it all back together and add your inhabitants. If you find that something happened and you have a minor pin hole leak, you can fix this by following our simple instructions for repairing small leaks.

As you can see, building a tank from scratch is really not all that difficult to do. Just plan ahead, take your time, and follow our tips and guidelines provided and you'll have one put together in no time at all. For more tips and other information about building or repairing an aquarium, refer to the **More About** section below.

Making Glass Aquarium Repairs

Why Leaks Occur & Common Mistakes to Avoid When Making Repairs

A couple downsides to having a glass aquarium is the potential for springing a leak and glass breakage to occur. You can figure out for yourself how breaks happen. For leaks, most are usually caused by a flaw or failure in the sealant, either generated during construction of the tank, or over time becomes weak and begins peeling away from the glass. This can lead to leaks of a small annoying pin hole size, up to and including a major seam blowout, like ones that result in an empty tank, a soaked carpet, and water leaking through the floor down into the basement.

Most often pin hole sized leaks can be fixed from the outside, without having to totally drain or tear the whole tank apart, but for major leaks or glass breakage, this requires some reconstruction of the tank. The good news? Repairing a leak is actually not a difficult task, whether it be a major or a minor one. When we began building glass aquariums for our fish collection business in 1989, we were treated to our fair share of leaks. However, learning from our mistakes lead to great success in building, as well as repairing our aquariums over the years. Even today the 55g aquarium in our living room is one of the originals we built, and many of the others we gave away are still in use as well.

Common Mistakes To Avoid

- Don't use the wrong kind of silicone sealant; use

only a **non-toxic** 100% silicone sealant appropriate for aquarium use.

- Not cleaning and preparing the glass surface properly or adequately enough.
- Not pinpointing the **exact** location of where a small leak is coming from. Water will always be present at the bottom of the tank (gravity rules), but the source may be somewhere else up higher or sideways along the joint or seam.
- Not repairing a large enough area up, down, or around where the actual leak generates from.
- Not using enough silicone sealant.
- Not allowing the silicone to dry long enough.
- Not aligning or placing the glass pane edges flat and evenly together.
- Don't make major repairs under humid conditions. Duct tape will not stick to glass when it is humid, therefore, the glass may move before the silicone can set up. Humidity slows the silicone curing process as well.
- Not having the aquarium sitting on a flat surface doesn't cause bad repairs, but one time we had an aquarium crack all the way across the bottom pane of glass, which wasn't broken when we started out. How do you think we figured out how to make a complete break repair?

So what will you need, and how do you go about repairing a leak?

Making Glass Aquarium Repairs

Page 2 - Parts List & How To Repair Small Leaks

Here is a list of items what you'll need for fixing leaks, as well as build a tank from scratch.

- Single edged razor blades.
- Acetone.
- A **non-Toxic** 100% silicone sealant. We have used NAPA (part #765-1336) with good results for years, or use All-Glass® Brand 100% Silicone Sealant or a similar type aquarium sealant.
- Paper towels.
- A washable felt tip marker.
- For repairing major leaks or building a DIY aquarium, a roll of duct tape.
- For building a DIY aquarium, some emery cloth or silicone carbide sandpaper.

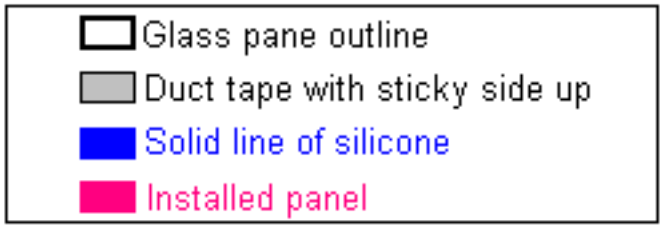
Keeping the common mistakes to avoid in mind that we discussed on Page 1, you are now ready to get started.

- How To Repair Small Leaks in 9 Easy Steps
- How To Repair Major Leaks or Replace Broken Glass
- How To Build a DIY Glass Aquarium (up to 55 gallons in size).

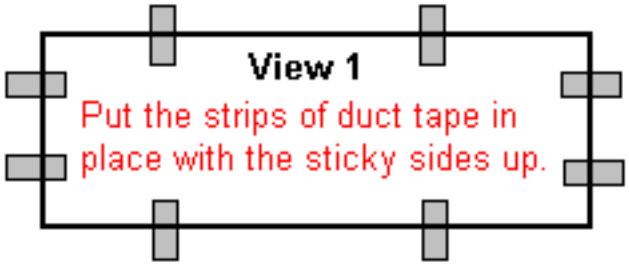
For more tips on patching or repairing aquariums, read Fixing a Small Aquarium Leak from the Aquatics Unlimited

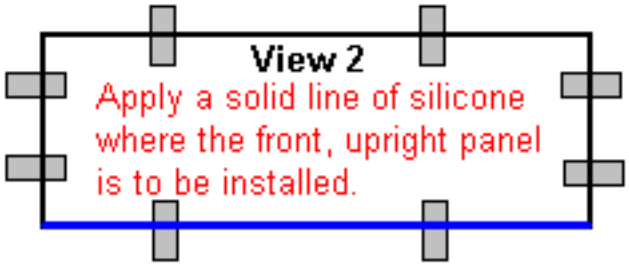
DIY Glass Aquarium Plan Diagram

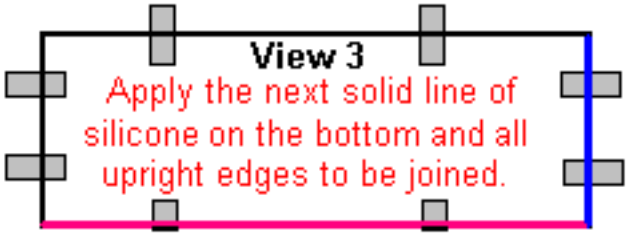
by Stan & Debbie Hauter



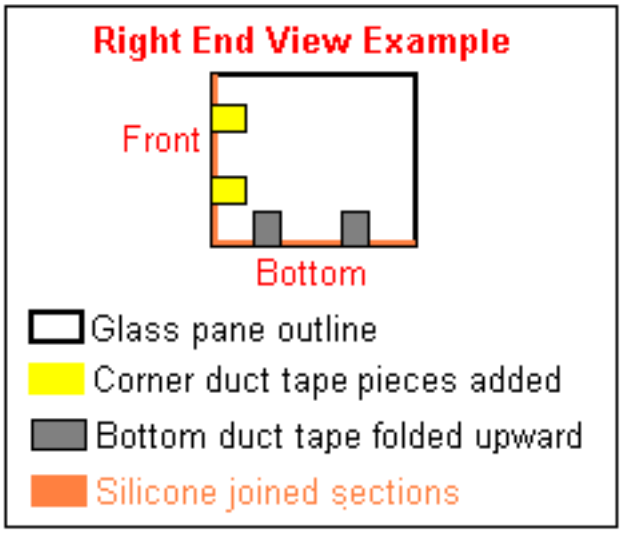
Top Views of Bottom Glass Pane







After each glass pane is installed, fold the 2 pieces of bottom duct tape upward, and wrap 2 additional pieces around the corner from one side to the other, as shown below.



How to Repair Small Leaks in Glass Aquariums

With a few inexpensive items and a little time, you can easily repair small or minor leaks in a glass aquarium using these simple instructions.

Here's How:

1. Locate the exact source of the leak and mark it with a felt tip marker.
2. Reduce the water level in the tank until the leak stops.
3. Thoroughly dry and clean the area of and around the leak with a paper towel, or soft cloth.
4. With the razor blade, scrape the existing silicone from the leaking area, and an additional one inch area around the source of the leak.
5. Clean the scraped area with the acetone applied to a paper towel, being careful not to over staturate it or allow any acetone to run or drip down into the aquarium, and let dry for a few minutes.
6. Apply the silicone sealant to the cleaned area, working it into the glass joint area.
7. Allow the silicone to cure for at least 12 hours, 24 is better.
8. Refill the tank with water to the desired level.
9. Check for leaks.

Tips:

1. Not all sealants are suitable for aquarium use. Use only non-toxic 100% silicone sealants, such All-Glass® brand.
2. Pinpoint the **exact** location of the leak. Water will be at the bottom of the tank (gravity rules), but the source may be somewhere else up higher or sideways along the joint or seam.
3. If patching the leak from the outside of the tank does not stop the leak, try patching it from the inside.
4. If patching the leak from the inside does not work, follow the diretions for making a major leak repair.

What You Need:

100% silicone sealant
acetone
single edged razor blades
power towels
felt tip marker

How To Repair Major Leaks or Replace a Broken Pane of Aquarium Glass

Making repairs on a major leak or replacing a broken pane of aquarium glass is a little more involved than repairing a small leak, but not really that much more difficult to do. Before getting started, be sure to:

- Read about common mistakes to avoid.
- Obtain the parts list.

The following instructions are much like those in our DIY glass aquarium plans, but you are just taking an existing aquarium apart, rather than starting from scratch.

1. Locate the section that needs repair and mark it, using some type of material that will not easily wipe off with water, i.e. a piece of masking tape, a felt tip marker that can be removed later with windex, etc.
2. Remove all inhabitants, drain the tank, and remove the substrate.
3. Rinse out and clean the tank with freshwater, then turn it upside down and allow the water to drain out and dry. You can wipe it out with a clean cotton cloth to speed drying if you desire.
4. Relocate the section to be repaired and again mark the pane to be removed so you know which side of the glass is inside, outside, right, left, up and down, etc. This way when you reinstall it, it will be going back in the exact same way it came out!

5. Take a razor blade and run it between the panes of glass to sever the silicone, and completely remove the pane. Be very careful and don't rush this step, and do not try to pry the glass pieces apart. Allow the razor blade to do the job, just working at it until the pieces separate pretty much on their own. Glass breaks very easily when pressure is put on it, and the edges can chip, making your repair job a much larger task if the glass gets damaged.
6. After the pieces are separated, thoroughly scrape all the old silicone off with the razor blade, dry the joint areas, clean the surfaces with acetone, and allow all areas to dry for a few minutes.
7. Cut 4 strips of duct tape, about 5 inches long, and stick them to anything close by within easy reach that has a clean surface to it, that the tape won't stick to too much, with at least half of the tape hanging down freely.
8. Apply a **thin** but **adequate solid line** of silicone to the **inside** edge of the glass areas to be joined together, then, at a **slight angle**, place the piece onto the bottom base glass pane (in the exact way it was taken out), slowly tilting it upright and pressing it lightly, but firmly, down into the silicone.
9. Secure the piece of glass from moving by taping it into place with two pieces of duct tape, each placed about 1/4 of the way from the top and the bottom, wrapping them around each corner from one side to the other. If you have trouble with the tape not sticking to the glass, just clean the area with some acetone on a paper towel and try again.
10. Apply another **solid line** of silicone sealant along each of the inside glass joints, and run your thumb over the silicone from one end to the other of each seam to the smooth the silicone down and force it into the joint areas.
11. Allow the silicone to cure for 24 hours.
12. Refill the tank with freshwater and allow to sit about 12-24 hours. This gives you a good test period, and you will feel much more confident of success when you finally fill the tank with saltwater, put it all back together and add your inhabitants.

For replacing a broken pane of glass, remove the broken piece using the procedure in Step 5. Once removed, measure the piece carefully for proper precision fitting, then cut, or have a professional glazier cut a replacement piece. Ask the glazier to lightly smooth or buff the sharp edges, or you can do it yourself with a piece of emery cloth or silicone carbide sandpaper. Continue on from

Building Your Own Tanks

Some questions have been asked of late about tank building, while I do not claim to be an expert, I have built many tanks.The following is a basic guide on putting a tank together.

First things first!. When cutting , try and cut to the center of the glass, if you try and cut off a 1" strip (for example), the break would not be square, but would lean towards the narrow strip. When assembling the tank, the sides, front and back are placed on TOP of the base. Silicone can be any 100% silicone, I use DAP, and GE brands from the builders supply.

As far as precision, the front and back can be cut close, as the sides fit inside these pieces. The two sides must be cut exactly alike. After cutting, place the two sides together, and place on edge on a piece of glass. If the edges do not aline,(one slants away from the other), then turn one piece only and try to re-match.If this still fails, try turning that same piece end over end. If that fails, try cutting another!! The easiest way to cut in my opinion is with a Square.

After cutting, "sand" the edges to take off the cutting edge. You can get silicone carbide sandpaper from a glass company. If you are doing a few, it is worth ordering a belt for a belt sander. You have to keep the belt moving, but it is a lot faster.

No jigs are used during assembly, clean the glass and stack in "like pieces." Place the base in a position where you have room to work arround it, and place a box about 1" behind it. The back is the first piece to glue, run a bead along the bottom edge, and stand it in place on top of the base. Lean it against the box for support. Next run a bead along two edges of one side. Stand it in place on the base, and raise the back into an upright position against the side. Gently squeeze the two and remove the box. "Wipe" your index finger along the bead to smooth and press into the corners, inside and out. Wipe once only, if you try to wipe again later in the process, the silicone will ripple. Next bead two edges of the other side, and stand in place, and wipe the joints. Bead the base of the front, and the edges of the sides, and stand in place. Wipe again , and then do a final alignment of the pieces. You will be able to slide the pieces for about 5-10 min depending on temp.The entire assembly process will take about 10 min after practice.

Glass thickness depends upon tank dimensions, I use 1/4 " Plate Glass for tanks up to 30 gal. A 40 gal can be built with this glass, but a center brace would be needed. I recomend 30 as the largest size for 1/4" glass. When buying thicker glass, the price goes UP!

It goes without saying, glass is very sharp, and you will cut yourself until you get the feel for it. Then you will cut yourself even worse!!

Be careful and wear safety glasses...Ian

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Working with Acrylic

by Ken Weiss, krweiss@ucdavis.edu

This information is extracted from a pamphlet published by CYRO Industries, manufacturer of Acrylite acrylic sheet. I did my best to keep the information accurate to the source, but hey, I don't do this for a living or anything. I got the original brochure from my local acrylic dealer (Is that a transparent drug lord? Why are drug lords bad, when drug czars are good?).

Characteristics of the material

- Half the weight of glass
- Impact resistant
- Unaffected by sun or salt spray
- Temperature range of -30 to 160 degrees F for continuous service

Cleaning

Wash with mild soap or detergent, with plenty of lukewarm water, dry with soft cloth or chamois.

Grease, oil or tar can be removed with hexane or kerosene. Solvent residue should be removed by washing immediately.

Do Not Use window cleaning sprays, scouring compounds, acetone, gasoline, benzene, carbon tetrachloride or lacquer thinner.

Masking

When working with the material, leave the paper masking film on the sheet as long as possible. Except for intricate detail work you should remove the masking only when your project is completed.

Working with acrylic sheet

DO

- Keep masking on as long as possible.

- Use metal cutting saw blades and drills which are ground for acrylic sheet.
- Make sure all tools are sharp.
- Use water or drilling oil as a coolant when cutting sheets over 1/8" thick or drilling sheets over 3/16" thick.
- Wet the material before cleaning.

DON'T

- Use saw blades with side-set teeth. Saw teeth ideally should be ground with 0 degrees of rake and be of uniform height and shape.

Cutting Acrylic Sheet

Cutting with a knife or scriber

Acrylic sheet up to 3/16" thick may be cut by a method similar to that used to cut glass. Use a scribing knife, a metal scriber, an awl, or a utility knife to score the sheet. Draw the scriber several times (7 or 8 times for a 3/16" sheet) along a straight edge held firmly in place. Then clamp the sheet or hold it rigidly under a straight edge with the scribe mark hanging just over the edge of a table. Apply a sharp downward pressure to break the sheet along the scribe line. Scrape the edges to smooth any sharp corners. This method is not recommended for long breaks or thick material.

Cutting with power saws

Special blades are available to cut acrylic. Otherwise use blades designed to cut aluminum or copper. Teeth should be fine, of the same height, evenly spaced, with little or no set.

Table and circular saws

Use hollow ground high speed blades with no set and at least 5 teeth per inch. Carbide tipped blades with a triple chip tooth will give the smoothest cuts. Set the blade height about 1/8" above the height of the material. This will reduce edge chipping.

When using a hand held circular saw, clamp the sheet to the work surface and use a length of 1x3 wood to distribute the clamping pressure and act as a guide for the saw.

Feed the work slowly and smoothly. Lubricate the blade with soap or beeswax to minimize gumming from the masking adhesive. Be sure the saw is up to full speed before beginning the cut. Water cooling the blade is suggested for thicknesses over 1/4", especially if edge cementing will be performed.

Saber saws

Use metal or plastic cutting blades. The blades you use to cut acrylic should never be used for any other material. Cut at high speed and be sure the saw is at full speed before beginning the cut.

Hand saws

Good results are possible, but very difficult. Be sure the acrylic is clamped to prevent flexing. Flexing at the cut may cause cracking.

Routers and shapers

Use single fluted bits for inside circle routing and double fluted bits for edge routing. At the high speeds at which routers operate it is critical to avoid all vibration. Even small vibrations can cause crazing and fractures during routing.

Drilling

For best results, use drill bits designed specifically for acrylic.

Regular twist drills can be used, but need modification to keep the blade from grabbing and fracturing the plastic. Modify the bit by grinding small flats onto both cutting edges, so the bit cuts with a scraping action. If the drill is correctly sharpened and operated at the correct speed, two continuous spiral ribbons will emerge from the hole.

Finishing Acrylic

Scraping
: The first step in getting a finished edge is scraping. The back of a hacksaw blade is perfect for scraping. Simply draw the corner of the square edge of the blade along the edge of the acrylic.

Filing
: A 10 to 12 inch smooth cut file is recommended for filing edges and removing tool marks. File only in one direction. Keep the teeth flat on the surface, but let the file slide at an angle to avoid putting grooves in the work.

Sanding
: If necessary, start with 120 grit sandpaper, used dry. Then switch to a 220 grit paper, dry. Finish with a 400 grit wet/dry paper, used wet. Grits as fine as 600 may be used. Always use a wooden or rubber sanding block.

  When removing scratches be sure to sand an area larger than the scratch. Sand with a circular motion, and use a light touch and plenty of water with wet/dry papers.

  Almost any commercial power sander can be used with acrylic. Use light pressure and slower speeds.

Polishing
: Final polishing will give acrylic a high luster. Power-driven buffing tools are recommended without exception. Buffing wheels are available as attachments for electric drills.

  A good buffing wheel for acrylic consists of layers of 3/16" carbonized felt, or layers of unbleached muslin laid together to form a wheel. Solidly stitched wheels should be avoided.

  The wheel should reach a surface speed of at least 1200 feet per minute. Speeds of up to 4000 feet per minute are useful for acrylic.

  Acrylic should be polished using a commercial buffing compound of the type used for silver

or brass, or you can use a non- silicone car polish that has no cleaning solvents in it.

First, however, tallow should be applied to the wheel as a base for the buffing compound. Just touch the tallow stick to the spinning wheel, and then quickly apply the buffing compound.

To polish, move the piece back and forth across the buffing wheel. Be careful not to apply too much pressure. Keep the work constantly moving to prevent heat buildup.

Never begin polishing at the edge of the sheet. The wheel could easily catch the top edge and throw the piece across the room or at you.

Forming Acrylic

Acrylic can be heated to make it pliable. It will become rigid again when it cools. Never heat acrylic in a kitchen oven. Explosive fumes can accumulate inside the oven, and ignite.

A strip heater is the best tool to form acrylic. This tool will only form straight line bends. Buy one from your acrylic dealer. The strip heater will heat just the area to be formed.

Heat the sheet until it begins to sag at the bend line. The bend should be made away from the side exposed to the heating element. Sheet thicker than 3/16" should be heated on both sides for a proper bend. Use forming jigs or clamps for best results, and wear heavy cotton gloves when handling heated acrylic.

Forming other than straight line bends will generally require specialized equipment and jigs.

Joining Acrylic

Solvent cement is recommended for joining acrylic. There are two techniques for solvent cementing, capillary and dip or soak methods.

Capillary cementing

This is the most popular method for joining acrylic. However, this method will not work at all unless the parts to be joined fit together PERFECTLY.

Make sure the parts fit properly. Then join them with masking tape or clamp them in a form to hold them firmly in place. It is important that the joint be in a horizontal plane, or the cement will run out of the joint.

Apply the cement carefully along the entire joint. Apply from the inside of a box-corner joint, and on both sides of a flat joint. A needle-nosed applicator bottle is recommended. The thin cement will flow into the joint through capillary action and form a strong bond. Maximum bond strength will not be reached for 24 to 48 hours.

Soak or dip cementing

This sounded like a real pain in the butt, and is suggested only for thick joints.

Viscous cementing

Viscous cements are used for joints that can't be cemented with capillary or soak cementing, either because the joint is difficult to reach or because the parts don't fit properly. Viscous cement is thick and will fill small gaps. It can make strong transparent joints where solvent can't.

You can make your own viscous cement by dissolving chips of clear acrylic sheet in a small amount of solvent.

Apply a small bead of cement to one side of the joint, join the pieces, and tape or clamp in place until cured.

Disclaimers

Neither CYRO Industries, Ken Weiss, or anyone or anything else connected with this posting really know what they are talking about. If you believe a word of this posting, it's at your own risk. Hey, if you had any sense you wouldn't be spending all your spare cash and time on a box full of water anyway, would you?

Fixing a Small Aquarium Leak

To fix a slow leak in a small aquarium (gushing leaks and tanks larger than 40 gallons may require more extensive repair):

1. **Make sure it is the tank that is leaking.** Sometimes a hang-on power filter is overflowing or leaking, or an airstone is spraying water out the back corner, or a piece of paper, cloth or tubing is dangling into the water and "wicking" water out.
2. **Empty the water** - and everything else - from the tank. The sealant will need to applied to the inside of the aquarium, where it will be pushed into the seam by water pressure.
3. **Remove old sealant** with a razor blade scraper. If the leak is apparent on a side seam, remove all the sealant from the entire length of seam. If water appears mysteriously at the tank's bottom, scrape out all four bottom seams.
4. **Prepare the seam.** Some aquarists use rubbing alcohol to remove oily fingerprints, others simply wipe with a damp rag. It is essential that the area be extremely clean and completely dry.
5. **Buy silicone sealer.** It doesn't matter if you get it at the local fish store or hardware store, but make sure the packaging plainly indicates that the product is safe for aquarium use. Some products contain toxic mildew-retarding chemicals that will kill fish.
6. **Apply sealer.** Hold the tube at an angle and push it forward while squeezing out the sealer, forcing sealer into gaps. Some hobbyists then run their fingers down the bead, further pushing the sealer, but sealer is extremely difficult to remove from skin, so this is not recommended. If you feel a need to manipulate a wet seal, lay clean, dry plastic bags over the seals first. Leave bags in place until sealer is dry; they will then peel off easily.
7. **Allow to cure.** Follow sealant manufacturer's directions as to how long to wait before re-filling tank. Adding water too soon will weaken the seal and possibly contaminate the water.

Submitted by: Jim Kostich

Acrylic or Glass?: The dilemma of aquarium materials

Author: **Winston Vaughan Schoenfeld**
Published on: **January 17, 1997**


Related Subject(s): Not Indexed

I often get questions from aquarists asking me what the best aquarium material is. This is inevitably due to the growing interest of building one's own aquarium. The bottom line is that there are two major materials which are generally used to make aquariums - glass and acrylic. So, which is better? The truth is that "it depends". In this article, I will give a brief list of the pros and cons or each, from which you should be able to determine what would be the better for you.

I will begin with glass. Glass is by far the most popular of the two materials. This is mainly due to cost. Relative to acrylic aquariums, glass is cheaper. Glass aquariums are held together by silicone sealant, which allows for a strong bond and more importantly, expansion when the aquarium is filled with water. In addition, glass aquariums are very scratch resistant, thus preserving the clarity of the aquarium sides.

The down sides of glass aquariums are basically the positive sides of acrylic. First, unlike glass, acrylic allows for a large number of shapes and sizes of aquariums. Thus, if you have a non-standard shape in mind, acrylic might be for you. In addition, acrylic allows for easy adjustments for filtration feed throughs. When one wishes to do the same for glass aquariums, special tools are needed to cut the glass so that it doesn't crack.

This brings me to the next point. In places, such as bars or other public areas, acrylic is by far the better choice. Glass has little resistance to the occasional bump, and thus poses a great amount of liability. Acrylic, however, can withstand many bumps and bruises without cracking. Acrylic is also lighter than glass. This is more important for larger aquariums, which can easily get very heavy.

So why is glass so popular? For two reasons: it is cheaper, and it is very scratch resistant, unlike acrylic. Removing scratches from acrylic can be a little tough, and requires sanding with decreasing grades of sand paper. Most aquarists don't require odd shaped aquariums, and are not worried about public display liabilities - thus, they choose glass. Those who require odd shapes, or are planning on displaying the aquarium publicly tend to go with acrylic.

How to Calculate the Glass Thickness for your Aquarium

Author: Warren Stillwell

Introduction

For too long now the thickness of glass required to make an aquarium has been a mystery. There are various tables and guidelines that specify the thickness of glass for a given size aquarium. The major drawback with the information is there is no indication of safety factors for the specified glass thickness or any indication of how the suggested thickness was calculated.

This article is intended to help those people who are serious about aquarium design to calculate the correct thickness of glass based on what is an acceptable safety factor for them. There are other points to consider as well as the formula that will also be covered.

This information is intended as a guide only, and is in no way a guaranteed formula for success. It is based solely on proven stress calculation methods and does not account for manufacturing defects or construction faults.

The Nature of Glass

Glass is a totally brittle substance. It will bend a very small amount, but has no capacity like most metals to deform. It will bend to a point and then break. It is this bending stress that is the focus for calculating the thickness.
Glass also has a wide variability in strength. Testing samples of uniform manufacture has proved this (see specifications for glass, - Tensile Strength 19.3 to 28.4MPa).
Glass is weak in tension, is elastic up to its breaking point, and has no ductility. It is not capable of being permanently deformed, and does not give any pre-warning of impending failure by showing a permanent set after an excessive load has been removed.
An important characteristic is its ability to carry an impulse load approximately twice its rated load (i.e. banging the aquarium with your hand quite hard). This is inevitably what saves many aquariums when they are accidentally knocked.

The variability of the strength of glass due to limitations of the manufacturing process means a suitable safety factor must be used when calculating glass thickness. The factor commonly used is 3.8. While not a perfect guarantee, it will remove all risk bar that of damaged or very poor quality glass. The main damage that will cause failures is scratches and chips. Also a point load on the glass surface will cause it to fail. For this reason a soft packer like polystyrene is used under aquariums to stop the point loading of dirt and grit.
Also when manufacturing an aquarium, the joining compound (commonly silicone) must have a minimum thickness (0.5-1mm) to allow for irregularities along the glass edge. When glass is cut it is not flat along its edge unless it has been specially ground.
It is possible to use a lower safety factor if the glass is of excellent quality and has no internal stress. It is at the designers risk however to lower the safety factor.

Toughened glass is considerably stronger than standard glass. It cannot however be cut. If toughened glass is to be used it must first be cut to size, have its edges finished and then be send away for toughening. The thermal

resistance properties of glass are also improved by toughening. Standard 6mm glass will rupture if plunged into water at 21'C if the temperature of the glass is more than 55'C hotter or colder. Toughened glass will rupture at approximately 250'C difference. Toughened glass also has a tensile strength greater than 5 times that of standard glass. Standard glass has a very important advantage when used on aquariums. It tends to fail in a non-spectacular manner, - typically a vertical or diagonal crack. Toughened glass however will fail completely, much like the old style car windscreen (100% shattering).

Glass has a much lower coefficient of linear expansion that most metals. This is important if a metal frame is to be used as part of the structure of the aquarium. If so, the aquarium should be built and stored at a temperature similar to that which it will run at. The length of the aquarium will decide how much elasticity will need to be accommodated by the sealing compound used. Silicone Rubber is the most common sealing compound today. The thickness of the sealing layer needs to be changed as the seal length increases. A general rule of thumb is to allow 2-3mm per meter of joint length. This allows the silicone to take up the stretching forces between the glass and steel.

Glass Physical Characteristics:

Density:	approx 2.5 at 21'C
Coefficient of linear expansion:	86 x 10-7m/'C
Softening Point:	730'C
Modulus of Elasticity:	69GPa (69 x 109 Pa)
Poisson's ratio:	Float Glass .22 to .23
Compressive Strength:	25mm Cube: 248MPa (248 x 106 Pa)
Tensile Strength:	
Tensile Strength (toughened glass):	19.3 to 28.4MPa for sustained loading 175MPa.

Design Considerations:

The calculations that follow expect the glass to be supported around its perimeter on all four sides. The calculation is the same regardless of whether the perimeter join is in compression or tension. Typical all glass aquariums have all their joins in either tension or shear or both. This method of construction relies 100% on the strength of the silicone holding it together, and is also the weakest join type when using silicone. Steel frame aquariums have the silicone under compression. The silicone is not required to have any strength for this type of aquarium and serves only as a sealer and packer. The thickness of the bottom glass is covered by the second set of calculations, but does not cover an aquarium which has a bottom glass that is well supported from below the aquarium in an even uniform manner. The surface must be very level. On very large aquariums this can be difficult to achieve and self-leveling filler may be needed between the polystyrene and the base. This should be applied just prior to fitting the aquarium to the base so that the aquarium's weight levels out imperfections. Significant time must be allowed for the filler to fully cure before the aquarium is filled. If the bottom glass is only to be supported by all four edges then use the second set of calculations. The same thickness glass can be used on a uniformly supported bottom as well and this will significantly improve the safety factor. If the aquarium is to be supported from below in a uniform distributed manor, then the same thickness glass that is used for the largest side panel may be used. To do so requires the supporting base to support part of the load so therefore it must be VERY strong.

NOTE: The calculations only consider the water to the top edge of the glass. If the glass is a window below the surface then it is outside the scope of this article.

Calculations

Terms Used:

Length in mm (L):	The length of the aquarium.
Width in mm (W):	The width of the aquarium from front to back.
Height in mm (H):	The overall depth of water that is in contact with the glass, but does not exceed its upper edge.
Thickness in mm (t):	The thickness of the Glass.
Water Pressure (p):	The force in Newton's (N).
Allowed Bending Stress (B):	Tensile Strength / Safety Factor
Modulus of Elasticity (E):	Elastic Strength

The length to height ratio effects the strength of the glass. The table below lists alpha and beta constants to be used based on with the length to height ratio.

Table of Alpha and Beta Constants used in the Caculations

Ratio of Length to Height (L/H)	For Side Panels Alpha	Beta	For Bottom Panels Alpha	Beta
0.5	0.003	0.085	0.0444	0.2874
0.666	0.0085	0.1156	0.0616	0.3762
1.0	0.022	0.16	0.077	0.453
1.5	0.042	0.26	0.0906	0.5172
2.0	0.056	0.32	0.1017	0.5688
2.5	0.063	0.35	0.111	0.6102
3.0	0.067	0.37	0.1335	0.7134

When the ratio is less than 0.5, use Alpha and Beta values for 0.5.
When the ration is greater than 3, use Alpha and Beta values for 3.
Note: For bottom panel, use Length to Width ration (L/W).

The water pressure (p) is directly proportional to the Height (H) x the force of gravity
(approx 10 (9.81 for people who want to be exact)).

p = H x 10 in N/mm2

The bending stress allowed (B) is equal to the Tensile Strength of glass / safety factor.
B = 19.2 / 3.8 = 5.05N/mm2 (Safety factor = 3.8)

Calculations for Front and Side Glass Panels:

The thickness of the glass (t) is proportional to the (square root of width factor (beta) x height (H) cubed x 0.00001 / allowable bending stress (B)).

so; t = SQR (beta x H^3 x 0.00001 / 5.05) in mm.

Select beta and alpha from the previous chart based on the length to height ratio.

The deflection of the glass is proportional to (alpha x water pressure (p) x 0.000001 x Height^4) / (Modulus of elasticity (E) x Thickness (t) cubed).

Deflection = (Alpha x p x 0.000001 x H^4) / (69000 x t^3) in mm.

Example: (Warren's new tank)

Aquarium Length = 3000mm
Aquarium Height = 950mm
Safety Factor = 3.8 L/H>3 therefore Beta = 0.37 and Alpha = 0.067

p = 950 x 10 = 9500N/m²

Side Thickness:
t = SQR (0.37 x 0.950^3 x 0.00001 / 5.05)

= 25.06mm

Deflection = (0.067 x 9500 x 0.000001 x 950^4) / (69000 x 25^3)

= 0.48mm

To top

Calculations for Bottom Glass Panel:

There is a small difference when calculating the bottom panel thickness. Beta is now calculated from the Length/Width. The Height is still used to calculate the pressure. Be sure to use the Bottom Panel Alpha/Beta values.

The thickness of the bottom glass (t) is proportional to the square root of width factor (beta) x height (H) cubed x 10-5 / allowable bending stress (B), - the same as the side panels.

t = SQR (beta x H^3 x 0.00001/5.05) in mm

Select beta and alpha from the previous chart based on the length to width ratio.

The deflection of the glass is proportional to (alpha x water pressure (p) x 10-6 x Height^4) / (Modulus of elasticity (E) x Thickness (t)cubed).

Deflection = (Alpha x p x 0.000001 x H^4) / (69000 x t^3) in mm.

Example: (Warren's new tank)

Aquarium Length = 3000mm
Aquarium Width = 900mm
Aquarium Height = 950mm
Safety Factor = 3.8 L/W>3 therefore Beta = 0.7134 and Alpha = 0.1335

p = 950 x 10 = 9500N/m2

Bottom Thickness:
t = (SQR (0.7134 x 950^3 x 0.00001) / 5.05)

= 34.8mm

Deflection = (0.1335 x 9500 x 0.000001 x 950^4) / (69000 x 34.83^3)

= 0.355mm

Common Sized Aquariums

Length	Height	L/H Ratio	Minimum Glass Thickness	Glass Deflection	Saftey Factor
1200	500	2.4	6.8	0.93	2
1200	500	2.4	9.3	0.35	3.8
1800	600	3.0	9.1	0.99	2
1800	600	3.0	12.6	0.38	3.8
1200	300	4.00	3.2	0.70	2
1200	300	4.00	4.4	0.27	3.8
600	600	1.00	6.0	1.15	2
600	600	1.00	8.3	0.44	3.8
300	600	0.50	4.4	0.40	2
300	600	0.50	6.0	0.15	3.8
1400	500	2.80	6.9	0.91	2
1400	500	2.80	9.6	0.35	3.8
1600	600	2.67	9.1	0.99	2
1600	600	2.67	12.6	0.38	3.8
2400	600	4.00	9.1	0.99	2
2400	600	4.00	12.6	0.38	3.8
2400	500	4.80	6.9	0.91	2
2400	500	4.80	9.6	0.35	3.8
1800	700	2.57	11.5	1.07	2
1800	700	2.57	15.8	0.41	3.8
2030	830	2.45	14.4	1.19	2
2030	830	2.45	19.9	0.46	3.8
1200	940	1.28	15.0	1.32	2
1200	940	1.28	20.7	0.51	3.8
400	300	1.33	2.7	0.75	2
400	300	1.33	3.7	0.29	3.8
600	300	2.00	3.0	0.73	2
600	300	2.00	4.1	0.28	3.8
600	450	1.33	5.0	0.92	2
600	450	1.33	6.8	0.35	3.8
1000	700	1.43	9.6	1.14	2
1000	700	1.43	13.3	0.44	3.8

About Building DIY Custom Glass Aquariums

How To Calculate What Thickness of Glass to Use, Economize on Construction, and Other Constructing Tips

The basic nuts and bolts of constructing a DIY glass aquarium for either salt or fresh water use are pretty straightforward: Plan ahead, measure accurately, prepare the glass, use the right adhesive, apply the adhesive and install the glass so as to have continuous, bubble-free seams which will not fail under use. The only difference in building a larger tank compared to a smaller one, of 55 gallons or less in size, is that the bonding process must be near perfect, and the glass thickness must be sufficient to withstand the added water pressure with a margin of error for the unexpected (Little Johnny winging his new Tonka truck at the Queen Angel in your tank in a fit of rage).

Once the basics of construction are mastered, the biggest concern most people have with building their own custom aquarium is determining the right glass thickness. Using glass which is too thick means spending money you don't have to, and too thin means spending sleepless nights listening for the telltale sounds of cracking glass and running water. There are a few ways in which you can economize on the construction of your new aquarium with little to no loss in strength or utility, but first let's cover some important factors about glass.

About Glass Quality, Characteristics & Thickness

The quality of glass is determined by the individual manufacturer's methods and techniques of producing the glass. Testing samples of uniform manufacture has

How To Economize on Construction

As an example for economizing we'll use the basic 4' long x 15" high 55 gallon tank, which is an average size that most of us either started out with or are very familiar with. This tank is normally constructed of 1/4" (6mm) glass, that according to the calculations displayed in our aquarium glass thickness calculator has a Safety Factor of 2.92. Many DIYers have found that they can increase the Safety Factor for a given thickness and tank size by installing a 4" wide glass brace from front to back of the top of the glass, essentially turning their tank into two 2' tanks, increasing the Safety Factor to 3.38. Rather than go to a thicker glass to increase the Safety Factor, you can *economize on construction* in this manner.

You can also economize by designing your tank stand so that it fully supports the entire bottom of the tank by using a styrofoam or polystyrene pad between the tank and stand. The pad will keep the tank from failing due to a point load on the glass surface which can be caused by dirt or grit on the stand surface. If the tank bottom is fully supported, you can also use a thinner than normal piece of glass for the tank bottom, since the stand will be adding strength and support, keeping the glass from bending.

Yet another trick is to compute the required thickness for the end pieces of your tank. In all likelihood, the required thickness will be less than the longer front and rear pieces of glass.

Other Construction Tips

Glass preparation is even more important than normal when you are building larger tanks. Make sure that you sand the glass edges with emery cloth to remove the sharp edges and clean the bonding surfaces with either keytone or acetone to remove dirt, grease and other matter, which could prevent the silicone adhesive from properly bonding to the glass.

When you apply the silicone down on the glass, run a continuous 1/4" bead, with no gaps or bubbles. Apply only as much silicone as you can work with in 3-5 minutes for the best bond, because after this the silicone tends to "skin over" and won't bond well to the glass. Over the years we found that laying down a bead of silicone on the bottom glass for the rear and one side glass panel, and on one side edge of the back panel, installing the back glass panel on the bottom, then the side panel to the bottom and rear panel worked well to begin with. Smooth out the excess silicone, then apply silicone to install the other side panel and front panel in the same manner. If you are going to be using cross braces, install them last. Secure the glass panels in place with duct tape as you go along and let the whole tank cure overnight.

The supporting surface of the tank base must be very level. On very large aquariums this can be difficult to achieve, and self leveling filler may be needed between the polystyrene and the base. This should be applied just prior to fitting the aquarium to the base so that the aquarium's weight levels out imperfections. Sufficient time must be allowed for the filler to level and fully cure before the aquarium is filled with water.

Once your tank has been built and allowed to cure overnight, fill it with freshwater and allow it to sit for a day or two. Check the bonded sections for any type of leaks. Even pin hole leaks can turn into a disaster if they are not taken care of. Refer to our making glass aquarium repairs article for details on repairing various types of leaks.

~Debbie & Stan Hauter

140 GALLON AQUARIUM CONSTRUCTION

This is a good tank for live rock grow out

Geothermal Aquaculture Research Foundation, Inc

YOU CAN MAKE THIS AQUARIUM ANY SIZE YOU WANT. IT IS GREAT FOR FRESH AND SALT WATER. DO NOT MAKE THE TANK ANY TALLER WITH 1/4" GLASS. I HAVE MADE OVER 100 OF THESE AND THEY WORK GREAT. I HAVE ONE IN MY LAB THAT IS 17 YEARS OLD.

COMMON QUESTIONS

Where do I get the paint?
You can get the epoxy at stores that sell swimming pool supplies.

Where can I get the glue?
The glue is used to make boats and fine cabinets

Can I make the tank taller?
Yes, but you need to use 1/2" glass for tanks up to 28" tall.

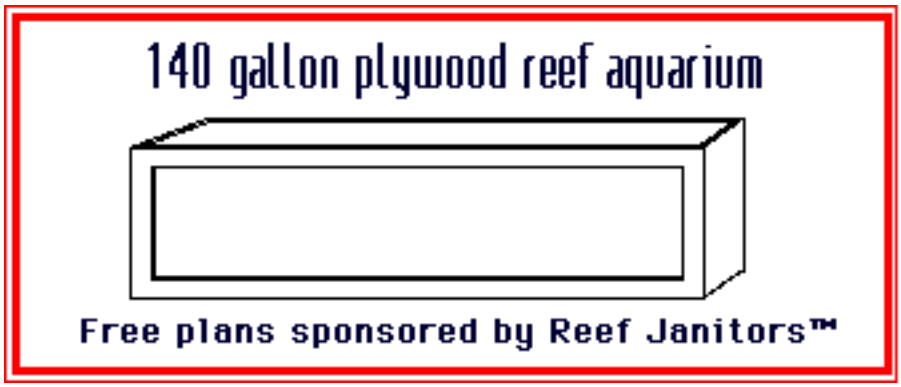
Can I make a window on both sides?
Yes

How long will this type of tank last?
We have used some for almost 20 years.

Do I paint both inside and out?
That is a good Idea.

Can I make this tank wider?
Yes, just use very good center supports.

1321 Warm Springs Ave.
Boise Idaho 83712
U.S.A.



ALGAE CONTROL CENTRAL

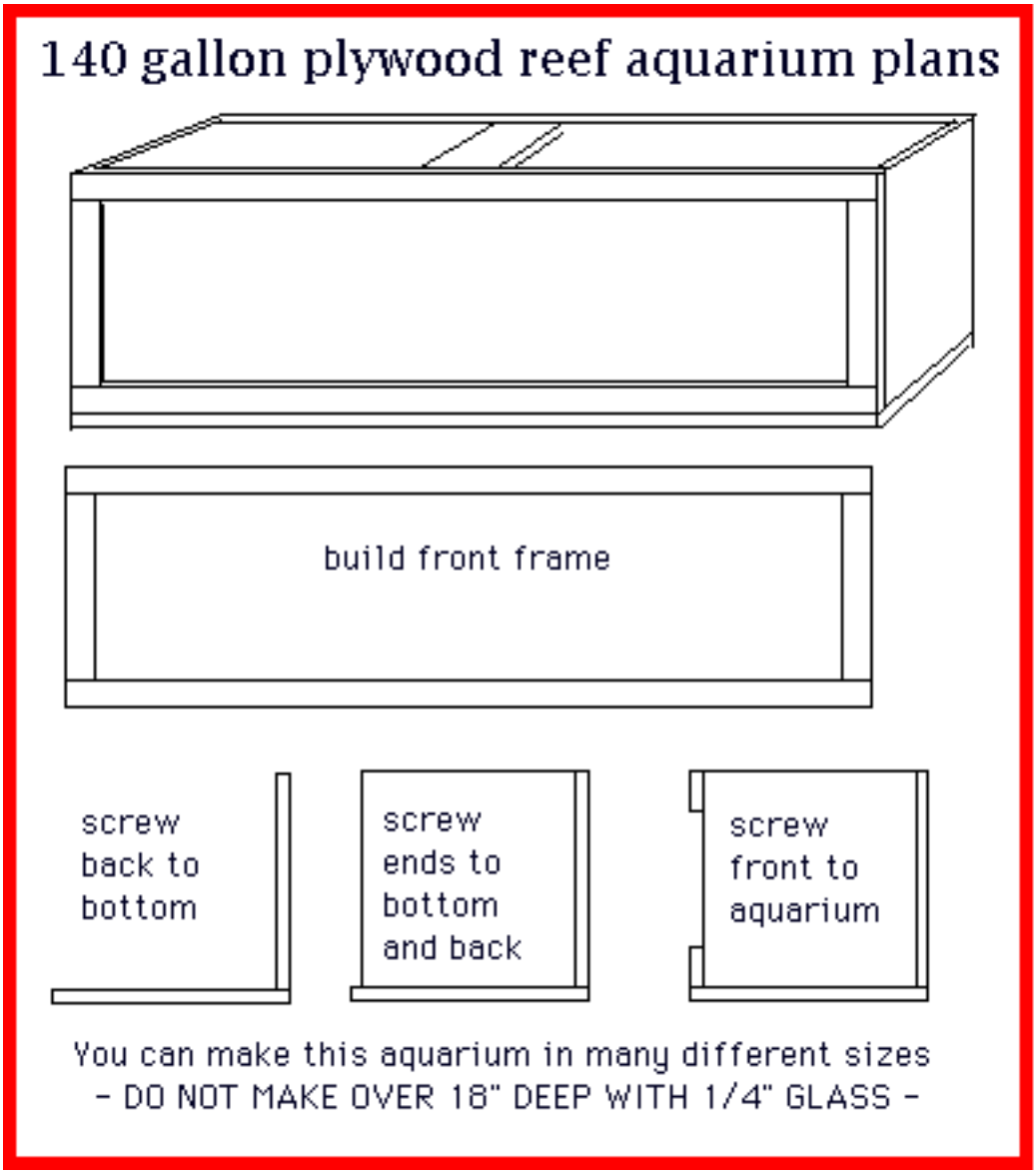
REEF JANITORS ALGAE CONTROL CENTRAL

Use this site to solve your reef aquarium algae problems, and help support our research!!!

CONTENTS

140-GALLON GROW-OUT TANK CONSTRUCTION

- (1) Length: 96 inches (94.5 inches inside)
- (2) Width:24 inches (22.5 inches inside)
- (3) Height: 16 3/4 inches (16 inches inside)
- (4) Water capacity (.75-inch freeboard): 140 GALLON



PLEASE PRINT THIS PAGE FOR LATER USE

TANK IS A 2-3 PERSON PROJECT

Tools

- a. 1- portable or table power saw
- b. 1- screw gun, with Phillips bit
- c. 1- orbital or belt sander, with medium grit
- d. l-caulking gun
- e. 4- 4-inch paint brushes, one for each day of painting [KEEP BRUSHES IN FREEZER TO REUSE]
- f. 2- 16-inch stanchions (May be boxes, or anything of this height, used to support the plywood pieces during construction)
- g. 3-6 Various containers for mixing glue, putty, and paint

MATERIAL LIST

Materials List (Sufficient to build two [2] tanks)

- a. 3- 4-foot by 8-foot sheets, 3/4 inch, AC EXTERIOR plywood
- b. 2- 94-inch by 14-inch glass, 1/4-inch plate
- c. 1.5-pounds, 2-inch drywall screws (Approx. 240 count)
- d. l-two-can container, Resorcenol waterproof glue
- e. l-gallon, autobody putty w/ hardener
- f. 5- gallons, two-part epoxy paint
- g. 2-tubes, silicon caulking, non-toxic aquarium suitable
- h. l-gallon, Xylene glass cleaner
- i. 1- pint, commercial glass cleaner
- j. 6-sheets, 120 grit sandpaper
- k. 2-sheets, 220 grit sandpaper
- l. 2-packs, paper towels Sufficient for more than two tanks

CUTTING LIST

Plywood Cut List (Sufficient to build two [2] tanks)

- a. (2) 24-inch by 8-foot (bottom panel)
- b. (2) 16-inch by 8-foot (backpanel)
- c. (4) 3-inch by 8-foot (upper & lower face frames)
- d. (4) 3-inch by 10-inch (left & right face frames)
- e. (4) 16-inch by 22 1/2-inch (endpanels)
- f. (2) 12-inch by 22 1/2-inch (top brace)

Work Area

A clean, dry work area is needed, indoors if necessary to insure cleanliness, out-of-doors if possible. Secondary, well ventilated, warm area for final tank drying after construction.
TANK ASSEMBLY

Single Tank Construction Procedure, Tank Assembly

a. Inspect all plywood pieces for rough or flawed edges, which might later affect tank integrity. Sand as needed.
b. Lay bottom panel on the 16-inch stanchions.
c. Apply glue along all four edges of bottom panel, sufficiently heavy to accommodate the edges of the backpanel, endpanels, and face frame.
e. Raise backpanel up under bottom panel, mating long edge of backpanel into glue along edge of bottom panel. Insure that edges are flush, and that they make a 90-degree corner.
d. Turn bottom panel over, glue side down, centered on stanchions so that all edges of bottom panel

are accessible.
f. Using screwgun, screw backpanel to bottom panel, inserting 2-inch drywall screws at 3-inch intervals along entire length. INSURE THAT ALL SCREWS ARE FULLY SEAlED, AND TIGHT.
g. Apply glue along one 16 inch edge of each endpanel.
(h) Raise each endpanel up under bottom panel, and screw tightly to both bottom panel and backpanel. Place drywall screws at three inch intervals.
i. Apply glue along inside edges of face frame, where they will mate with the endpanels. Raise lower face frame up under remaining edge of bottom-panel, and screw into place to bottom panel and endpanels.
j. Use three (3) screws in each end, and normal three-inch intervals along length. Insure that all edges are flush, and tight, after final tightening of screws.

***** WIPE EXCESS GLUE FROM ALL JOINTS AFTER FINAL TIGHTENING, AS IT IS VERY DIFFICULT TO CHIP OR SAND AWAY AFTER IT IS HARDENED. *****

k. Turn partially-completed tank right side up on stanchions for inspection. At this point, all panels screwed together should rest on the bottom panel, for the strongest possible base.
If this is not the case, quickly disassemble the pieces before the glue sets, and reassemble properly.
1. Turn the tank face-up on the stanchions.
m. Apply glue to FRONT exposed edges of endpanels.
n. Lay upper face frame in place, and screw to edge panels, using three screws in each end.
o. Check short face frame pieces for proper fit, sanding if necessary. THEY MUST FIT TIGHTLY WITHOUT SPRINGING UPPER AND LOWER FACE FRAME PIECES APART.
p. Apply glue to ends of short face frame pieces.
q. Lay short face frame pieces into place, and screw firmly to end panels, insuring that the outer edges are flush with the ends of the tank.
r. Recheck all work, wiping away excess glue, and insuring that corners are square, true, and not pulled open by later construction.
s. Allow to dry overnight if possible, though this is not critical.

TANK PAINTING

Single Tank Construction Procedure, Painting --

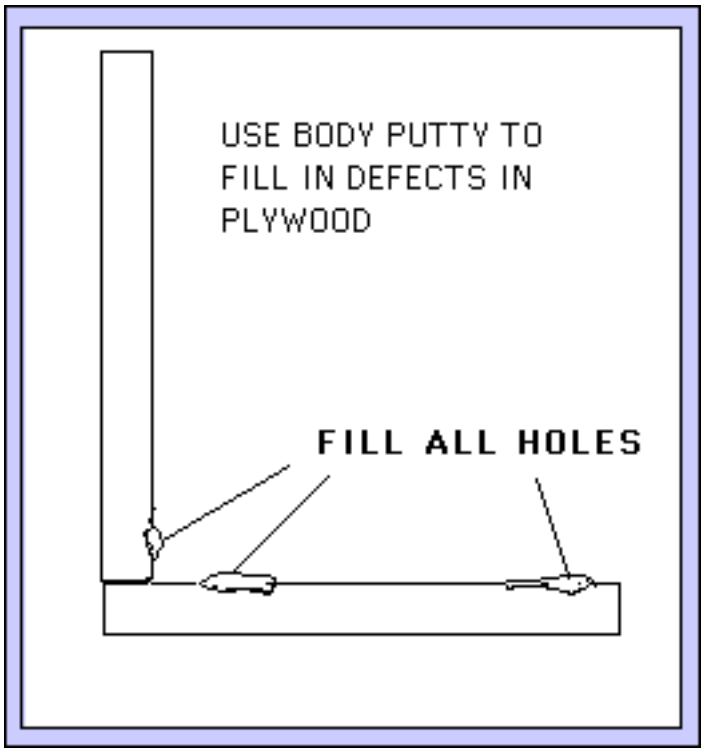
Precautions FOR ALL PROCEDURES INVOLVING EPOXY PAINT, THE FOLLOWING PRECAUTIONS MUST BE ADHERED TO.

- 1. NO SMOKING
- 2. DO NOT LET BRUSHES DRY
- 3. DO NOT BREATH FUMES

APPLY PAINT IN A WELL-VENTILATED AREA, PREFERABLY OUT-OF-

DOORS, AND MOST ESPECIALLY AWAY FROM THE AIR SUPPLY INTAKE. THE FUMES ARE HIGHLY TOXIC, AND MAY RESULT IN SERIOUS RESPIRATORY PROBLEMS IN HUMANS IF THEY ARE CONCENTRATED AND EXPOSURE IS PROLONGED.

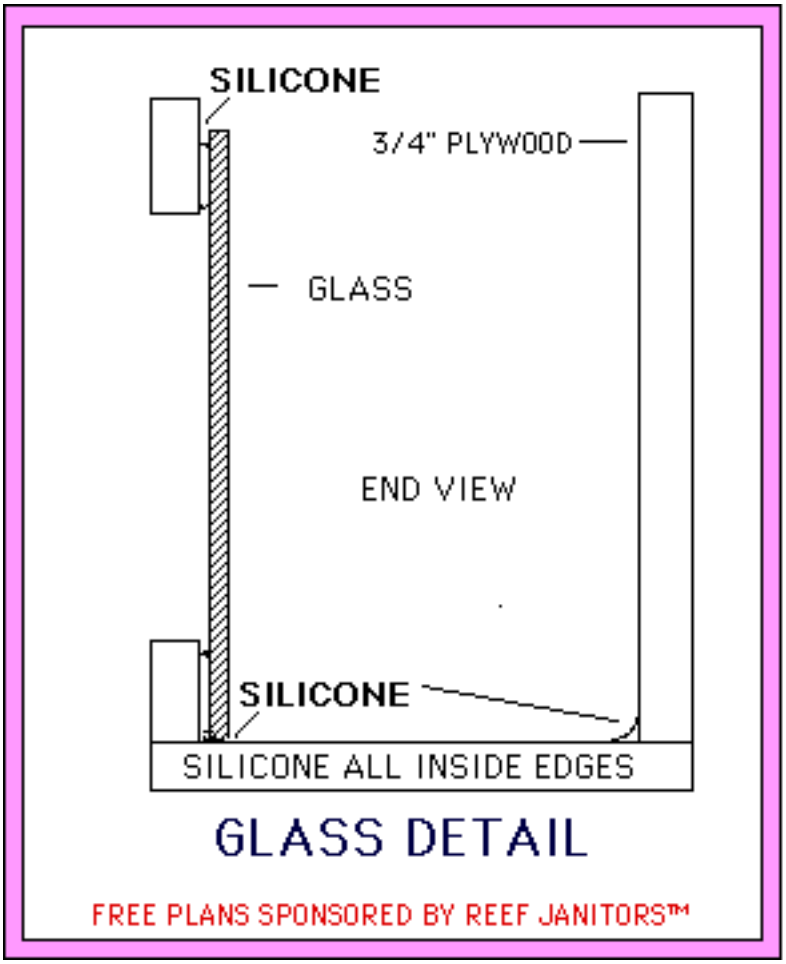
a. Apply epoxy paint to all exposed wood surfaces of tank.
b. Make coat of paint as thin as possible, while covering the wood surfaces completely, because the paint runs easily.
c. Allow coat to dry overnight.
d. Fill all cracks and holes with autobody putty, making as smooth a surface as possible.



e. Sand entire surface, using 120-grit paper or power sander, and apply second coat.
Again, insure that the coat is as thin as possible, to avoid running paint.
f.SANDING DETAILS
Use the 120-grit sandpaper for sanding the first two coats of epoxy paint.
220-grit for sanding the third coat, in preparation for the fourth or final finish coat.
(If power sander is used. then the sanding pressure applied would be less for the last coat.)
Repeat procedure in steps until four (4) coats of the epoxy paint are applied.
Allow tank to dry in well-ventilated, warm area for 24 hours before proceeding.

Glass Installation

Single Tank Construction Procedure, Glass Installation --



a. Turn tank face down on level, flat surface, insuring that entire face frame is supported.
b. Use 220-grit sandpaper to rough up a two-inch strip of the epoxy paint on the inside of the tank, around the glass opening. This rough area will serve as a bonding area for the silicon glue.
c. Sand or file all corners of the glass panel, to avoid later injury to either workers or fish.
d. Clean entire surface, and edges, of glass panel with Xylene cleaner, and then commercial glass cleaner.
e. Apply 1/2-inch bead of silicon caulking around entire opening in face frame, on inside of tank. The bead should be approximately one inch from edge of opening, except along the top, and there the bead should be approximately one-half inch from edge of opening.
f. Install glass on inside of tank, insuring that the lower edge of the glass is resting full-length against bottom panel of tank for support.
g. Press evenly on glass to remove all bubbles and gaps from silicon caulking seal.
h. Recaulk glass, along all edges. pressing caulking with finger firmly into the corner formed by glass and face frame. Final caulking seal should be smooth, rounded, and gap and bubble free. Wipe any excess caulking away after seal is finished.

FINAL FINISH

Single Tank Construction Procedure, Final Assembly Points

a. Using three screws for each end of brace, install tank top brace, centered, spanning from top, inside edge of backpanel to top inside edge of upper face frame.

b. Apply heavy bead of silicon caulking into all interior corners of tank, again smoothing the seal with finger, removing all gaps and bubbles, and wiping away excess caulking when finished. Allow tank to dry for 48 hours in warm, dry area before adding water.

FEED BACK AND QUESTIONS

Please enter your name:

and your email address:

If you need any questions answered please fill out text box.

Thank You For Your Input. Submit Query Reset

From: dxf6@po.CWRU.Edu (Dean Fear)
Date: 21 Jan 1993 23:04:01 GMT
Newsgroups: rec.aquaria
Subject: Re: Building aquariums

In a previous article, A20076@waccvm.corp.mot.com (Dan Whitaker) says:

>I built a 90 gallon aquarium several years ago. I had no idea what
>kind or thickness of glass to use so I played it safe and used
>half inch plate glass with all the edges sanded smooth. It ended
>up costing me more than I could have bought it for at that time.
>It was a good experience though. I would like to attempt it again.
>Has anyone any idea about what is the best kind of glass and what
>thickness for different dimensions? Are there other suitable
>materials available? How about Plexiglass?

A couple of years ago, I attended a seminar at the local aquarium. They provide us with information about building your own tanks. They suggested using marine plywood for the sides back and bottom, and glass for the front. (This reduces the cost greatly.) The wood is painted with epoxy paint(?) the stuff they use for swimming pools, (making sure it is non toxic.) Joints are sealed with silicone.

The basic assembly order was:

Build the wooden box
Paint it
Seal it
lay box on back side
place bead of silicone one front edges of the box
place glass on top, clamps are not necessary weight of glass is sufficient
let cure 24 hours
tank is ready to use!

They assured me that they have built many tanks this way.

As for the thickness of the glass, I am sure one of the engineers (amateur or professional) out there can give us some info on the strength of glass and water pressure etc. I would check to see what thickness of glass comparable commercially made tanks use.

I have never tried this, but it sounds like it will work. I suspect that

this method is more cost effective the larger the tank. It probably
wouldn't be worth doing for anything <= 55 gallons.

Dean dxf6@po.cwru.edu Feel free to e-mail or post comments!
>
>
>

From: dbailey@bcarh673.bnr.ca (Douglas Bailey)
Date: Wed, 7 Apr 1993 20:01:10 GMT
Newsgroups: alt.aquaria,rec.aquaria
Subject: Re: tank fabrication

In article <1993Apr7.021918.25096@doug.cae.wisc.edu>, rudolf@cae.wisc.edu (Rob Andrew Rudolf) writes:
|> The dimentions will be 8ft X 2ft X 2ft
|>
|> I know that All Glass and Oceanic both make 7ft versions of this tanks but
|> I would like to know what thickness of glass to use or what thickness of
|> acrylic.
|>
|> Thank you.

I just happen to have a copy of "The Living Aquarium" by Peter Hunnam in my
office. This book has a variety of information concerning the construction
of aquaria. Unfortunately, the graph which shows glass thickness only covers
panels up to 2m long. However, I can extrapolate easily enough.

For a panel 8ftx2ft, you would need glass 1/2 in thick for a side panel, or
3/5 in thick for the bottom of the tank.

--
Doug Bailey
(dbailey@bnr.ca)

From: scol@scottsdale.az.stratus.com (Scott Colbath)
Date: 9 Apr 1993 14:10:05 GMT
Newsgroups: rec.aquaria
Subject: Re: Need Advice: 1)Resealing and 2)Driftwood

In article <1993Apr7.173240.18886@zoonews.bnr.ca> dbailey@bcarh673.bnr.ca (Douglas Bailey) writes:
> In article <1993Apr7.093020.1@ualr.edu>, mlstrother@ualr.edu writes:
> |> Hi, everyone! I've been reading the group for about a month...
>
> welcome.

>
> |>
> |> 1 - I've never resealed a tank, and have just bought a used 55g which
> |> has a leak, so am undertaking to reseal it. I'm supposing that
> |> it makes more sense to do the whole tank now rather than patch
> |> this hole now and probably have another in a new spot later? Do
> |> y'all agree? Does anyone who's done this have any suggestions
> |> in addition to (or instead of) carefully following package directions
> |> on the tube of sealer? Helpful hints or warnings? Is it maybe not
> |> as big a deal as I'm afraid it's going to be? (I've caulked a
> |> bathtub before; is it much more difficult than that?)
>
> - More moderate suggestion: cut out all of the silicone inside
> the tank, but leave that which is gluing the glass together,
> then re-seal all inside corners (the original silicone acts
> as glue, the new silicone acts as a seal, and it doesn't
> matter if they bond together).

The above suggestion is what I did on my 55 gal for the office and it worked like a charm. I would suggest that the old silicone be removed with a straight edge razor and make sure to get every last bit out of all the corners and joints. The better you do preping the tank, the more likely it is that it will remain leak free. Apply two coats. The first being *very* thin, acting as a filler for the joints and corners, and a second heavier coat to spread the silicone over a wider area. Mash the silicone in with your finger. You will find that it spreads very nicely. Take your time, do a good job. Test for leaks after the silicone cures. I filled my tank in the garage in %25 increments over two days until it was full, constantly looking for leaks. I found none.

|> Thanks for any help! And thanks for being here. It's great to find
|> kindred souls!

I agree %100.

****

Scott Colbath
Stratus Computer
Phoenix, Az. (602)852-3106
Internet:scott_colbath@az.stratus.com

From: john <j_mul@hendrix.jci.tju.edu>
Newsgroups: sci.aquaria
Subject: Re: Wooden tank
Date: Tue, 27 Feb 1996 09:42:29 -0500

David Ward Rusnak wrote:
>
> Hi All,
>
> I'm looking to build a 35g tank and exploring all possibilities. One is
> wood. It should be pretty cheap. Any advice?

Check out "Captive Seawater Fishes" by Stephen Spotte - It has a large
and in depth section on tank construction - I remember seeing wood as a
building material. For tank so small though your best bet is just to buy
one - it'll cost you more to build a tank of this size on your own...
good luck - john.

From: pdeitik@bcm.tmc.edu (Philip Deitiker)
Newsgroups: rec.aquaria
Subject: Re: Building Aquaria
Date: Tue, 27 Feb 1996 18:40:50 GMT

ccastwb@prism.gatech.edu (Bill Bouverie) wrote:

>Hello. I am considering building an aquarium. I was thinking of starting
>small, but I am wondering if anyone has any information or has had any
>experience building aquariums greater than 100 gallons in volume. I am
>particularly intersted in methods for ensuring a tight seal and what
>type(s) of sealer should be used as well as setup time. Recommendations
>for glass or acrylic would also be greatly appreciated. Thanks in advance,

For a first time builder I recommend glass. Make sure that the side
pieces set on top of a bottom piece of glass. Starting with the bottom
piece on a level flat surface, place a bead of silicon down on one
side approximate 1/8 in thick. Very carefully lower the side down on
the bead, and fix its position perpendicular. Next, place a bead of
silicon on the one side of the new piece and along the adjacent bottom
side and very carefully add the next side, and make sure all angle are
exactly 90'. Add the next 2 pieces in the same way.
  Inorder to build the aquarium properly you might consider using a
wooden form to tape the peices to will working with them. I recommend
a caulk gun with spring loaded pressure release, else the silicon
continues too ooze after manual pressure is released. Silicon
containes an acetic acid irritant (My nose suggests that the carrier
solvent is floro or cloroacetatic acid). I'm aclimatized to working
with it but most are not so use in well ventilated area. For large
tanks the glue needs to dry at least 48 hours before its ready for

water.
Use general Household silicon, clear (general electric), as the selant. Allow 48 hours to dry. To select the glass, Allglass has provided imfo for and aquarium faq Look for weights measures and conversion tables in the aquaria faqs table of contents. If your unsure read the label it will tell you its applications and drying times for specific articles.

Philip

From: zzyyzz@mixcom.com (Vincent Mulhollon)
Newsgroups: rec.aquaria.tech
Subject: Re: [Q]They do it with Mirrors?
Date: 5 Jul 1996 01:36:08 GMT

moi (garyoa1@microserve.net) wrote:
: Ok, can we get pros and cons here? A lot of kits are out there to put behind a
: tank to dress it up and to block sun etc. Is there any reason a mirror
: couldn't be placed behind the tank? Seems to me it would be much cheaper than

It'll make all the algae and crud that inevitably builds up on the glass look twice as bad as you'll be able to see both sides of it now. So you'll have to clean twice as often or it'll look twice as cruddy.

This also has odd interior decoating problems, as most folks set up their plants and stuff to look good only from the front, and the reflection from the back will look weird.

This setup may be psychologically hard on the fish. Most mammals like dogs and cats are smart enough to figure out what a mirror is and not get territorial about the other critter in the mirror. My sevrum used to look pretty weirdly at the mirror, however. Schooling fishes don't seem to care. I hear "Siamese fighting fish" really dislike mirrors.

Fishes are probably built to understand only a single, point light source. With a mirror, maybe you'll have two, and twice the shadows may confuse bottom feeders. Also, skittish fish that get spooked by movement now will have twice as much movement to hide from.

Finally, please please please do not turn the glass into a mirror by plating it. Someone did that to my first (used) tank, and it

drove me insane trying to remove the mirror finish from the glass.
I gave up on scraping and solvents and saved until I could buy
a new tank. Just put a hanging mirror behind the tank or something.

After dealing with a mirror for about two years, I now have a
backdrop of black construction paper. But hey, your tastes in
decoration may not be the same as mine, so do what works for you.

--
Vince Mulhollon N9NFB

From: poora93@octarine.cc.adfa.oz.au (Richard Poole)
Newsgroups: rec.aquaria.freshwater.cichlids,rec.aquaria.freshwater.misc,rec.aquaria.misc,rec.aquaria.misc
Subject: Re: [Q]They do it with Mirrors?
Date: Thu, 04 Jul 1996 21:38:22 GMT

garyoa1@microserve.net (moi) wrote:

>Ok, can we get pros and cons here? A lot of kits are out there to put behind a
>tank to dress it up and to block sun etc. Is there any reason a mirror
>couldn't be placed behind the tank? Seems to me it would be much cheaper than
>most of the idiotic scenes available and would add a lot of depth to a tank.
>Not to mention hiding the hangon paraphenalia on the back of the tank, if one
>gets one cut to size. I tried holding a smaller one behind mine and IMO, it's
>quite impressive. The question is, would it have any adverse affect on my
>African Cichlids, or any others, for that matter?

I was in a aquarium shop in Queensland Aust. last year and what they
had done was put the sort of tint that is used in double glased
windows so if the light is shining from one side, that side becomes a
mirror. They did this so that the fish couldn't see out and therefore
wouldn't get spooked by people staring at them all day. Anyway, the
fish didn't seem too afected by it. Some of them would try
'attacking' their reflection but they didn't appear to be doing
htemselves any harm and it kept them from attacking their real tank
mates.

Rick

From: Frank Manno <frankie@zip.com.au>
Newsgroups: rec.aquaria.freshwater.cichlids,rec.aquaria.freshwater.misc,rec.aquaria.misc,rec.aquaria.

misc
Subject: Re: [Q]They do it with Mirrors?
Date: Sat, 06 Jul 1996 01:30:54 +1100

Matt Anderson wrote:
>
> i've seen several tanks in stores with mirrored backs...one thing that i've
> always wanted to try is to tint the front to make it so that i can see in, but
> they can't see out...

The problem with mirrored backs on tanks, is that if you have even the smallest spot of dirt or alge or whatever, it's going to stand out like dog's balls.

The back of my tank is black and even when the glass there is filthy, it still looks clean :)

-Frankie

From: dspicer@chattanooga.net
Newsgroups: rec.aquaria.marine.misc
Subject: Re: Plastic Laminate Liner for Big Plywood Tank
Date: 9 Aug 1996 02:57:09 GMT

In <4u73ni$5d3@news.preferred.com>, dgiles@preferred.com (Doug Giles) writes:
>Does anyone have any experience using plastic kitchen countertop laminate
>to line the inside of a large DIY Plywood marine aquarium? I've heard of
>using thin sheet acrylic, but laminate is cheaper and much easier to work
>with. I'm thinking of building either a 6x2x2 or a 8x2x2.
>

I have a tank that I lined this way. I used silicone sealer to glue the laminate to the wood. The only problem that I see is the silicone on the inside of the tank seems to be losing its grip with time (a common problem with most plastics). You can reduce chances of leaks over time by placing a bead of sealer in the corners before you set the laminate in place.

- David Spicer
- dmspicer@chattanooga.net
-
- OS/2 Warp
- Going boldly where no
- documentation has gone before!

From mar-facil-error@ac.dal.ca Fri Apr 25 03:32:48 1997
Date: Fri, 25 Apr 1997 15:48:22 +0900
From: "Corey R. Johnson" <fish@uriel.net>
Subject: calculating aquarium panel thickness
To: MAR-FACIL@ac.dal.ca
Errors-To: mar-facil-error@ac.dal.ca
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Content-Transfer-Encoding: 7BIT

Dear mar-facil'ers,

I am hoping we could start a discussion about aquariums and engineering. In fact I was just working over a formula last night that I have to calculate how to size, in thickness, an aquarium panel. I'll provide the formula below and the source were I got it from and hopefully somebody could propose a better one.

Here goes..

David Miller wrote an article in the May, 1969 edition of Drum and Croaker an article entitled "Glass for Underwater Windows".

in this article he puts forth a formula which he ackknowledges is a liitle flawed but says will work.

t= thickness
W= design load in lbs/sq. ft.*
B= Short dimension of glass in feet
F= the safety Factor (8-10 recommended)
S= average breaking stress of glass (3000 PSI for polished plate, 15,000 PSI for fully tempered polished plate for panels over 10 square ft.)

N= the number of plys in an equal laminate <- assumes you are laminating glass

Alpha= b/a

a= long dimension of the panel

b= short dimension of the panel

*design load may be calculated as follows:

d of c * D

d of c = distance from horizontal centerline of window to top of water

D = 62.5 lbs/sq.ft. or 64 lbs/sq.ft. for salt water.

when the top of the water is below the top of the window, the design load (lbs./sq.ft.) = 1/2Pofd *D

where p of d = the distance from the top of the water to the base of the window
t= the square root of 0.75 * W * B squared * F

$$\frac{}{S\,(1 + 1.61 * \text{alpha} * 3)\,N}$$

Now I want to calculate an aquarium panel made from acrylic so I looked up the mechanical properties of acrylic from two different sources, they are:

Specific Gravity 1.19
Tensile strength
rupture= 9,000-11,000 PSI
elongation,rupture % 4.0-4.8
modulus of elasticity = 400,000 - 500,000 PSI

Flexural Strength
rupture = 14,000 - 16,500 PSI
modulus of elasticity = 475,000 PSI

Compressive strength
yield = 18,000 PSI
Modulus of Elasticity = 400,000 - 480,000 PSI

Compressive deformation
under load
4000 PSI, 122 F.,24 hr. = 0.7-0.8%

the formula is actually used to calculate the thickness of a beam suppoted at each end under a uniform load. Since an aquarium panel is supported on all 4 sides or at least 3, it is a very different situation. This formula does not cover the increasing load on vertical panels as water depth increases. Also it assumes that you want to use laminated glass. I want to clculate for one panel of acrylic.

Can anyone suggest a more suitable equation?

supposedly Walter West, a NFCA engineer has proposed a better equation.

Corey R. Johnson
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From news.fsu.edu!gatech!192.26.210.166.MISMATCH!sunqbc.risq.qc.ca!wesley.videotron.net!weber.videotron.net.POSTED!not-for-mail Mon Mar 23 22:37:10 1998
Path: news.fsu.edu!gatech!192.26.210.166.MISMATCH!sunqbc.risq.qc.ca!wesley.videotron.net!weber.videotron.net.POSTED!not-for-mail
Message-ID: <350D6DD5.14B1@videotron.ca>
From: axxess@videotron.ca
X-Mailer: Mozilla 3.01Gold (Win95; I)
MIME-Version: 1.0
Newsgroups: rec.aquaria.marine.reefs,rec.aquaria.tech,rec.aquaria.marine.misc
Subject: Re: 1000+ Gal tank
References: <350A9BFA.45E8@carolsgifts.com> <890062771.24772.0.nnrp-11.c1ed9d0e@news.demon.co.uk>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit
Lines: 26
Date: Mon, 16 Mar 1998 18:23:57 GMT
NNTP-Posting-Host: ppp180.118.mmtl.videotron.net
NNTP-Posting-Date: Mon, 16 Mar 1998 13:23:57 EST
Xref: news.fsu.edu rec.aquaria.marine.reefs:41345 rec.aquaria.tech:9405 rec.aquaria.marine.misc:15534

Simon Hunt wrote:
>
> 1000 Gals ! WOW! and I thought my 250gal was adventurous.
>
> I really hope this is a misprint and you are looking at 1000 litres. What
> dimentions are you considering? Remeber if you go more than 36 " deep you
> need 14mm glass all round, go up to 40" and you are going to need a slate or
> concrete base.

Only 14mm of thickness for 36 inches high ?

In my opinion, I would use 1/2 inch glass up to 30 inches high. From 30

to 36 inches : 5/8 inch glass. Above 36 inches high : 3/4 inch glass plates.

Do you know how much those plates cost ???
Do you know how HEAVY those plates are ?

Bob

P.S. I found a document published in 1994 by an European Research Center about "how to calculate the thickness of glass walls when you build a large aquarium". I have ordered that document and I should receive it in a few days. For those who are interested, I will let you know what is the right scientific method to calculate the thickness of the glass walls.

FAQs about DIY Tanks, Sumps for Marine Systems 1

DIY Glass Tanks

Bob I am new to your site and have looked through several of the FAQs but do not know where to post a question that you might be able to answer. So I hope you do not mind the email. If there is an appropriate place on your forums to post this please let me know.

<Hey Stuart, you've got Gage today. Feel free to shoot us emails with questions, there is a ton of info archived in our FAQs and many knowledgeable folks on our forums as well http://wetwebfotos.com/talk/ >

I am interested in building a large tank, 94 by 36 by 48 inches high. Preferably out of glass.

<Never done it myself, I am considering plywood and glass myself, GARF does not recommend making the tank taller than 36inches.>

I am having trouble with the glass requirements. Different tank builders have told me different specs, and I do not know which is needed. One whom I am not sure I trust would uses standard ¾ inch glass. 2 others whose prices were in the stratosphere said they would use ¾ tempered glass..

<Error on the thicker heavier side. From what I understand you cannot drill tempered glass, are you going to want drilled overflows?>

So my question is; making the tank out of glass, with additional ¾ by 2inch gluing doublers, is ¾ inch glass adequate, or is tempered glass or thicker float glass needed? 3 top braces are planned. If so would an additional steel frame around the tank be required?

<Let me give you some links to some people who have more experience with this than myself.

http://www.garf.org/

http://www.ozreef.org/diy/index.html#TANK >

Thank you for your time. Any additional recommendations are welcome (I know don't build it yourself :-)) Thank you, Stuart

<No way, Go for it! Just be sure to test outside, thoroughly. A carpet cleaner with

good extraction power is always handy. Best Regards, Gage>

Paint for an aquarium

Hello Crew!
I am setting up a 180 gal tank and I would like to paint the back of the tank. Spray paint is out of the question as I cannot bring the tank outdoors. Is there a regular paint I can use?
<Glass or acrylic? With glass, enamel or latex depending on cure time. Latex is safer. With acrylic, only latex.>
Should I use a gloss black or a flat black?
<It won't matter, the surface will be the inside of the glazing, not outside, so it will be as glossy as glass or acrylic from what you will see.>
What should I clean the surface with?
<Depends on surface. Ammonia window cleaner will be fine for glass. I would use soap and water for acrylic and rinse well. This will help paint adhere.>
Great site! You do a great service to aquarists around the world.
Thank you, David Waitt
Glad you are enjoying yourself! Enjoy! Craig>

DIY Acrylic Tanks

Hi this is Abraham, my first time here. I'm looking to utilize acrylic sheets for marine fish holding systems. My question is how do you cement the sheets together, meaning which material is aquarium safe? In addition, which silicone sealant is aquarium safe? One more question, how do you figure the thickness needed of the acrylic sheets needed for reservoirs for the sump tanks? I understand that it depends on how much water is being held in one given place. So for instance, a holding system of 8 feet long by 2 feet wide and making several of these units tiered one above the other in relatively shallow pools, no more than a foot high. For example; what thickness of acrylic sheets is minimally needed. Understandably braces are needed on top as well. Please try to help me out with this as soon as you guys can. Thank you and I am gratefully appreciative of your time and efforts.
<Please begin here http://www.wetwebmedia.com/diytksfaqs.htm and follow on through the related FAQ files for the answers to your questions. You can also use the Google search engine at the bottom of each page to help you locate topics quickly. -Steven Pro>

Plywood Tanks

What is the best way to clean algae off of plywood epoxy sealed tanks and also acrylic fronts without scratching it?
<There are special acrylic safe cleaning supplies available from any fish store. The wood is another matter. I doubt anything in reason would scratch it. I would not use metal razor blades for sure, but any standard aquarium scrubbing material should be ok. -Steven Pro>

Large Reef Tank Design Questions

Gentlemen - I have written to you in the past with questions concerning things in one of my tanks (I have 4 - 1 large predator, Two Reefs, and a micro reef). I write today on a different topic and hope either you can help me or point me towards those who can assist me. Feel free to forward this to anyone you deem appropriate
I'm a high tech guy or had been for the last 15 years (until this years layoffs - No I opted out instead of fighting it out with the rats on a sinking ship, you know eventually they will turn cannibalistic). Any who to make a long story short, there are 9 of us good friends and coworkers who all sold their souls for stock options and

cash for a minimum of 10 years each. After opting out of this each of us was tired of the rat race of that lifestyle (constant travel to exotic foreign cesspools - aah vacation is so much different than work isn't it). All of us spent this time transferring the industry from the US to everywhere else it was cheaper to do it (quite a few strange places I will admit - Japan, Korea, Malaysia, France etc) so it is truly a sinking ship here domestically - We decided to form a group to build a business just for fun but that we could experience our old sense of self worth - So we created the Los Vatos corporation to build something similar to a Dave and Busters but less glitzy and more affordable to the average man (because even though each of us made 6 figures we all complained that a $250 night out with the wife and kids to have a good time is just plain outrageous).
I digress though so on with it - We created this corporation and are in the process of designing our first family entertainment center with the concept of letting everybody have fun at a fraction of these other places, while introducing our hobbies / interests to the world at large (cold beer, nice cars, video games, billiards, good food, water, fish). All but 2 of us a coastal creatures who grew up on or very near the water 4 from the Texas gulf coast and one each from Northern and Southern California. The poor guy from Phoenix doesn't know what he missed).
Where do you guys come into it ??? Well my partners know of my fascination with Saltwater (another partner is a freshwater guy with multiple biotope aquaria his best is a local Texas one) as such they gave me a space 40 feet long by 15 feet deep in our restaurant waiting area / entry bar to create an aquarium of large scale - Here is where you guys come in - I have this big space and a general idea of things, however I would like to do a more natural setup sliding away from technology as much as I dare to ensure my charges well being - I am collecting information on the "Ecosystem Approach" as my micro reef works this way - It had been running as such for about a year before I ever heard of it and it is generally agreed between my friends it is the best looking of all my tanks. Size constraints do not allow me to convert the other 3 tanks to this method to test it on a grander scale. All these run just as is Bob's book. In short while not on par with you or your cohorts I may actually know a couple of things, but I am smart enough to know what I don't. I've read about Richard Harker's 2000 gallon aquarium and envision it's construction along similar lines, but I wanted to pick you guys brains with the question --
<our pleasure to help>
If somebody walked up to you and said here is this space 40' X 15' X 12' - I want to build and aquarium for myself - What would you do?
<many possibilities here. I take great pleasure too in system planning and conceptual designs. I covered some such dynamics in the first chapter of my Book of Coral Propagation... even more dramatic designs in the second volume (early 2003). I have also consulted a few large public aquaria on top of many private systems as well. It would be my pleasure to dream with you. Without haphazardly spewing stream of conscious fantasy designs... let's do this up right. Let me trouble you to send me a simple photograph of the allotted space (or draw a diagram if you like). I'm looking to get an idea of the surrounding environment and its likely integrity/functionality with the system and its application... looking for access to drains, water supply, electricity, etc.>
I eagerly await your input or direction and fully respect that this is not a question so easily answered
<agreed... not in a simple e-mail. Lets see a basic floor plan or photo of layout and that will open the floodgates for the imagination. Fair warning... expect dramatic from me :p >
and I also want to add I want to do this myself not to save cash in a commercial venture but more along the lines of I dream of it.

<understood and admired, my friend. I believe this to be true for what so much floor space could otherwise be used for commercially. I'm looking forward to chatting more. I also noticed that you are in Texas... I'll be in Dallas 9/26-9/30 at MACNA (www.dfwmas.com). Perhaps we can chat even more there if you'll be making the trip to that great marine conference.
With kind regards, Anthony Calfo>
PS: feel welcome to call me at 412-795-XXXX. We can chat more
So you don't think I'm a crank with nothing better to do than waste your time - Here is my personal information - (512) 257-XXXX if you call I will be happy to call you back and expand a little on things - It's tough to catch my vision in an email. 37 years old Electronics Engineering degree (specializing in the manufacture of semiconductor chips from sand to Pentium 4)
XXXX North Cannes Drive, Cedar Park, Texas (Austin suburb) 78613
Ric Raley
<Do not be afraid to try new things Amateurs built the Ark
Professionals built the Titanic>

Building a tank (particularly coloring the back/ground)
To WWM crew,
I am planning on building a large tank, by my standards, (at least a 8x2x2). I was planning on building it with plywood. More than anything else I was concerned about how I should paint the inside of the tank. I was thinking about an epoxy based paint, I am really not sure which one would be safe to do this with. I would like to use the tank either as planted freshwater tank or a saltwater shark tank. In the case of the saltwater tank I am even more concerned about the material that I can use to build the tank. I do realize that I have to have no metal in the construction of the tank if I want a shark in it. But I am not sure how to put the tank together without the screws being made of metal. My other concern is the metal in the lighting system how would that effect a shark.
I would appreciate any input you may have.
<I would skip on using any sort of paint here. Instead, look into the colors that can be added to resins... and coat the inside (and maybe out) with a good quality of laminating type... along with placement, lapping of fiberglass cloth stripping in all corners/joints. Bob Fenner>
Thank You, Ali

Homemade Aquarium Supplies
Robert,
<Steven Pro answering today.>
I've been researching through the internet to find tips on do-it-yourself or make-it-yourself aquarium supplies, mainly to cut down the cost of some of the manufactured products like filter bags/cartridges, gravel/substrate, and decorations. I have lots of different types and sizes of filters (Marineland Penguins, Aquaclears, Whispers and recently 2 canisters: a Fluval 303 and a Magnum 350), but I don't have any filter media or cartridges for them. I'm also pretty short on substrate material and decorations like rocks and wood. Do you have any recommendations for books or websites addressing make-it-at-home aquarium supplies and decorations?
<There are plenty of DIY sites, but those are usually about actually building something like a light, tank, sump, overflow, etc. not a filter cartridge. You are probably best of buying mail-order in bulk.>
Any advice on creating my own filter bags/cartridges/media?
<I have used polyester pads and other materials used for HVAC applications for

prefilter material in aquarium trickle filters and pond filters.>
How can I get or make activated carbon in bulk?
<You can buy it many places, making it is a completely different thing. It is processed at extremely high temperatures and for part of the process in a vacuum, not something you could do in your kitchen.>
Can you offer any tips regarding gravel, rocks, wood, metals, etc. that are easily obtainable, cheap, and safe for fish?
<Metals are categorically bad. Many rocks and gravel contain metal as a contaminant. You will need to research the rock you want to use and identify their makeup to see if they are safe. You may also want to consider doing a bio-assay (as Bob says) and test the material in a tank with a few inexpensive fish.>
Thanks in advance for any help you can give.
<Your best bet is to look in the back of trade magazines for ads aimed at freshwater hobbyists with fish rooms, buying in bulk. -Steven Pro>

Re: Glass Weight
Steven, Good link RE glass thickness, tank building etc.
<You are welcome.>
What is your opinion on building plywood - glass tanks? It just seems too easy and cheap to be true.
<I have had the same thoughts.>
If I thought I could make it from plywood in this manner, I would construct something in the order of 6x3x30"..... do you think they are a good idea?
<I don't know. There are a lot of people on GARF that have built similar tanks. You should look at their plans and experiences regarding.>
Cheers, Matt
<Good luck! Please report back with your results. -Steven Pro>

DIY Glass Tank
Hi Steven,
Thanks for the reply RE the maculosus angel.
<You are quite welcome!>
Quick question..... do you know a site where to read up on DIY all glass tanks etc, design including how to calculate the weight of glass required etc.....
<I would look at http://www.ozreef.org/ They have a ton of DIY plans and links to other peoples' plans.>
Cheers, Matt
<Have a nice weekend! -Steven Pro>

Frag setup
Anthony
<cheers, my friends>
My name is Carl Newbar. My wife Lacy and I are very thankful for you last email and the input you provided. We both agree that if we do go for autotrophic coral we will use a refugium for them. We believe that our current design will provide ample space for the addition in the future.
<very well, and still consider that inline with "low-nutrient" heterotrophs may still be a bad/challenging idea. A dedicated display is likely best>
As an attachment I have sent a document of my cheep-o design. Please look over and be brutally honest if you must. I just made a take off of the design for an aquarium stand you would find at many stores.
The first picture is a front view looking at the finished product. More importantly I wish to have an dialogue about the second picture. That is looking at the base from

above. I would use 1" thick particle board or MDF (what ever is cheapest) as a base. 48"X18" that will be framed by 1 1/2" thick board (again what ever is available for the right price) that will be a good 1 1/2" above the base board.
<do resist the particle board entirely (despite mfg common use)... it absorbs water plain and simple. A laminated plywood will serve you much better in the long run>
With that framing around (dark brown in the picture) I will use blocks to support the 1" side, back and center wall (the sand color in the picture.) That would be more then enough to support the 20 long tank above I hope.
<if blocks means "blocking" with 2X4's then I agree and it looks sturdy indeed>
The third picture is of the top piece looking from above. The top piece will not be nailed to the wall supports.
<this is arguably a flaw... much strength to be had by tying the top into the vertical walls. Create a decorative "lip" above that if you still desire>
It will have a lip to frame a 48" X 18" piece of 1" thick board. The same dimensions as the base really, only this will have a lip that will go down and "hug" the walls. In theory I hope that is what they will do.
<hmmm... do consider a simple 2X4 framing project that you dress with a facade afterwards. It is stronger (built with screws) and gives you a lot of freedom on the decorative dressing>
As far as adding a refugium I could see doing it for the 20 gallon long tank. To the right there will be space to add on. I could build a stand that would let a 10 gallon tank be above and to the side of the 20 long. Right now we think the Montipora will be in the 20 long, the Ricordea (Yuma I hope!) in one cube and the xenia and possible other softies in the other 20 gallon cube.
<are all three of these tanks tied together? If so... the two lower tank being on the same plane will be a small plumbing nightmare>
Lighting will be a 175 watt 10K MH bulb for the 20 long along with 55watt actinic VHO. We thought the same lighting could be done with the Ricordea because the lighting would be 12" + above the waters surface. The other cube that would hold the xenia would have 110 watts of VHO lights. Would that be sufficient?
<sounds like a fine beginning... some experimentation to be had, but very good>
No rush on a return reply. I would like to thank you myself for you willingness to help. It is an honor to have you thoughts and input.
Carl & Lacy Newbar
<my great pleasure... and since you are inclined towards DIY, do check out www.ozreef.org (Australia)... they have a great site with a serious collection of DIY plans (http://www.ozreef.org/diy/index.html). Keep in mind that the est prices quoted are in inflated Australian dollars (2-3X). Best regards, Anthony>

DIY reefing and MACNA

Anthony- Thank you so much for the last email. My husband is at H.D. now getting supplies. We have found a acrylic DIY page that shows how to make HOB refugiums. We will be making one for each of the tanks. I just hope we are savvy enough to make them work. We should be done by the end of the weekend with the stand and we hope we will have the refugiums done by then end of the following week. We will send pictures soon.
<excellent... I'm looking forward to it>
Another question that has nothing to do with our setup. My husband and I wanted to know if you and Bob and other WetWebMedia workers will have a booth at MACNA next month. I think my husband got a hint of an idea from reading your daily Q&A that your group will be attending.
>yes... in fact, Steve and I are confirmed, Di Fenner and Daniel Knop too (!), Bob has several places to be and hasn't worked out his schedule yet>

We would love the chance of taking you and your significant other out for a drink in thanks for all that you are doing now and for what you book has done for us.
<Aww.. thanks kindly, but your company will be more than enough. Do stop at our booth and say Hi! Steve's wife has been given a reprieve from Steve that weekend and I am just an unmarried orphan :) We will be hunting for a sushi bar however (heehee... in Texas, that's funny)>
We just decided to go now that we want to learn more about the business part of this hobby. What better place to start.
<it will be an incredible eye opener for you... I assure you that you will be hooked. Bring lots of notepaper and pencils, laptops, whatever!>
Lacy & Carl
<best regards, Anthony>

Custom Aquarium
Bob,
I am building myself a custom aquarium. It will be 100"Lx 48"H x 42". The back, bottom, and sides will be made of pre-laminated 1" plywood. All the seams will be reinforced on the outside with Steel Angles. The front, viewing area, will be a sheet of 1" prelaminated plywood with a window 92"L
x 44"H and a 96"x48" sheet of glass "siliconed" to the inside of the "window". Finally there will be 3 evenly spaced 3" cross ties tying the front of the tank to the back. I am struggling with determining the thickness of the glass. Is 1/2 sufficient or should I go with the 3/4? Any insight you can give would be
greatly appreciated.
<I would spend the extra money on the thicker glass... Look into some of the fancy laminated brands (Starbrite for instance)... as these may be fine at 1/2", though not cheaper than 3/4" cast... Bob Fenner>
Please respond to my home email address. Thanks, Mike

Marine Goop
Guys,
I am at the stage where I am going to be bonding my acrylic baffles to my 40 gallon breeder sump. I would like to have something a little stronger than silicone as I have had a baffle come out, in the past, while using it.
<More likely due to the acrylic and its bowing than due to the silicone.>
I have had mixed reports that Marine Goop is a good bonding agent for this application. My question is, do you think this stuff will leach chemicals and cause any toxic stress on reef inhabitants.
<I am unfamiliar with "Marine Goop", but have read several reports of various marine life showing adverse reactions to underwater epoxy. I am guessing this "Marine Goop" is something like the epoxy.>
If so, do you know of any other materials the would be better for bonding baffles to glass?
<Why don't you try glass instead of the acrylic? It is cheaper than acrylic and works just as well. This is one reason I prefer to use glass tanks as sumps vs. Rubbermaid tubs and such.>
Many Thanks. Jeff
<You are welcome. -Steven Pro>

plexi glass glue
Hi there once again,
I have a question about the type of glue people use to put together plexi glass.
<Most folks use a commercial acrylic solvent... like Weld-On>

I hear that the best way to glue two pieces together is to use a solvent called Methylene Chloride.
<This is a principal ingredient. Toxic, flammable, not generally available to the public.>
can't seem to find it in Home Depot or Lowe's. Do you know where it might be available?
<Check with the businesses listed in your phone directories who sell or do plastic fabrication>
I also wanted to ask if you know whether this solvent (Methylene Chloride) can be used to glue plexi
glass+regular glass together, or is it just for plexi glass+plexi glass?
<Only the latter>
On another note, I'd like to thank you for responding so quickly, and for being real informative. It's advise like this, that I wish I had for everything I come across. Your help is greatly appreciated. Thanks, Hamilton, Riverside, CA
<Glad to be here helping. Bob Fenner>

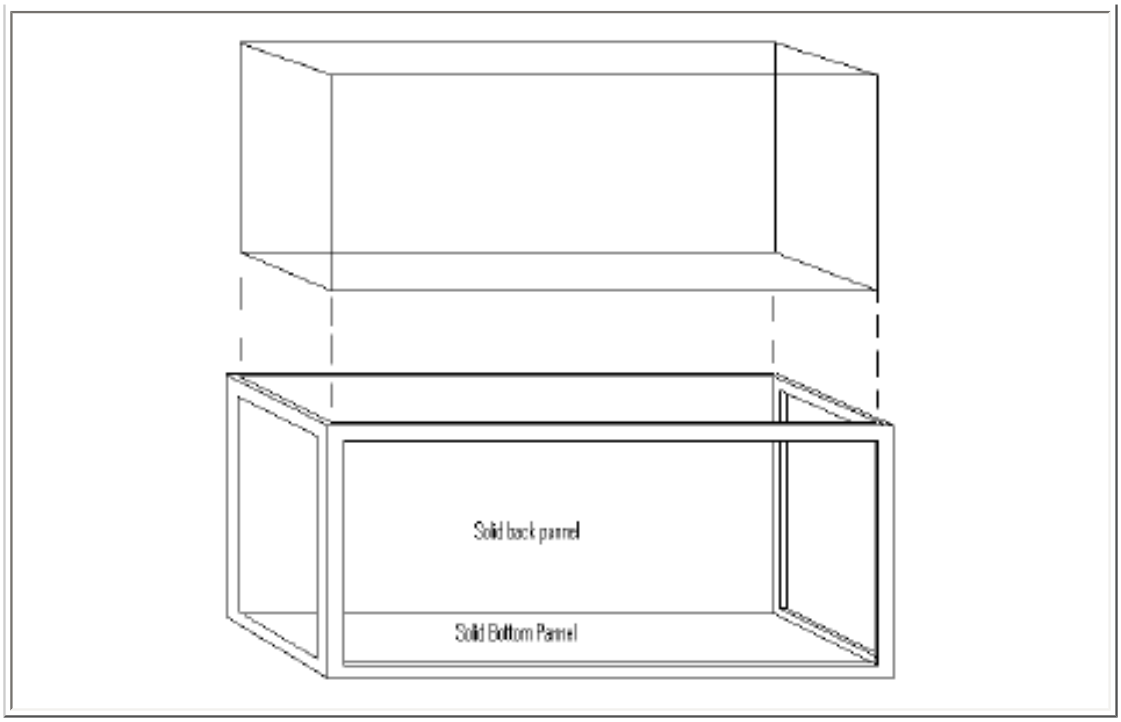
Re: plexi glass glue
Thanks for your help, but I'm not quite sure about what you meant by (only the latter).
<The last statement... these solvents are only for acrylic to acrylic bonding>
Can you describe this in another way? And is (Weld On) safe for fishes. Well I guess it is since you said everybody else uses it. Thanks for your help.
<Safe after cures (a day or so)... it actually "leaves"... melting/melding the Plexi as one piece. Bob Fenner>

DIY Overflow
Hi,
<<Hello,>>
I've been reading your FAQs since I started my first marine aquarium this year. It's just a 29 gallon tank with a couple fish, some crabs, and just recently 2 anemones. I figure that this is my learning tank before moving on to something larger. I have a Prizm skimmer, Penguin Bio Wheel power filter with a Fluval surface skimmer attached, and a Zoo Med powerhead behind the rocks for extra circulation. Anyway... I just added a new 200 watt Ebo Jager heater (also behind the rocks), and a CustomSealife SmartLite to the mix, and I realized that space is getting tight... Because of the light I can't reach the skimmer to adjust the flow without removing the light, and I don't like the heater laying across the bottom of the tank. I realized that I have several 10 gallon tanks collecting dust in the garage, so my natural thought was that it's time to add a sump to my learning experience. That would allow me to move all the mechanical devices below the tank except for the power head (which is the only piece I've really been able to conceal well anyway). I've been looking at overflow boxes, and the ones that are available are way too big for this little tank, and too expensive to boot, since when I do get a larger tank it will be drilled for a sump anyway, so why blow $70 on something that I won't be able to use on a new tank down the road. After looking through the DIY plans online I just had an interesting idea about making an overflow box, and am seeking an opinion as to whether it would be a good idea. I read one of the plans where a person used an old power filter as the outside box. all the parts were gutted, and the hole where the pump goes was used to place the bulkhead for the plumbing. My thought was... Why gut the filter??? Add the overflow box onto the front leaving the filter tube in place so that it's inside the box (cut down if too long), and why remove a perfectly good pump??? Just add a piece of acrylic to divide the media chamber drilling the

opposite side from the intake for the bulkhead. Now you have an overflow with a priming pump built in... Just plug it in until the siphon starts, and then unplug... If the siphon breaks you can just plug it in to re-prime it. Any problem with this that I'm missing? <<Only if you forget to unplug the pump... the pump mechanics would also reduce flow when the pump is shut off. Although this is a neat idea, it's probably not optimal.>> Aside from the fact that it would be limited by the diameter of the intake tube, but for a small tank it could be just the thing, and who doesn't have an old power filter or two laying around wasting space?
<<True.>>
Thanks, Jeff Cowles
<<Cheers, J -- >>

Building an acrylic aquarium

I was wondering if you could help me with a few questions. I am thinking about building an aquarium about 55 gal or so and I have read many articles about what thickness of acrylic to use for what height aquarium and so forth. I was wondering if you could use thinner acrylic if you were to frame the tank with a plywood box. (please see attached drawing)
<Not really... the thickness should be about the same or the same per height... If this is a "typical" 55 of 22" height (or even twenty inches), I would opt for a minimum of 3/8 inch (even half if you can afford it)... the bracing may well help to prevent bowing, even breaking... but the mid front and back will bow badly and result in noisome distortion if you try 1/4... or yikes, less thickness>
For example, could you use 1/4" acrylic on a 24" high tank in this manner. I have also read about the wood and glass tanks but I would like to keep at least 3 viewing sides open. The wood I could get free and the 1/4" acrylic costs significantly less than the 1/2" so I figured I'd ask someone else
what they thought before I flooded my garage. If it is possible to do this how substantial do you think the frame would have to be? Thickness of the wood 5/8 or 3/4?
<Not really practical here... though I have made many (hundreds years back) of glass fronted (and you could make cut-outs for the sides as well) and plywood, resin and fiberglass (stripping is best here, pre-made and available in rolls) tanks... with 3/4 and 1" ply and good brass screws (2 1/2 or three inch)>
and how much of the viewing area would I have to cover?
<For the glass et al. structures, a good three or four inch edge is good all the way around>
Would it be a good idea to pad the inside of such a frame and to give it rounded edges? If it did work it would then be very easy to incorporate a nice wooden hood. Thanks for you time, Great website!
Christopher C. Hehn
<I like the way your mind and writing presents it/themselves... do keep investigating. Maybe Oz' Reef: http://www.ozreef.org/ Great, one-stop DIY site for pet-fish types. Bob Fenner>



Re: Hello ? on DIY Tank

Hello Bob,

Thanks for the fast reply to my question, I have got in touch with an acrylic fab business here in town (Kalamazoo, MI) about bending the front and side panel. So far it sounds like it won't cost as much to have them do it and put it together then what it would have cost me for the 3/8th sheet($147).

<Yes... as I thought... much better>

As far as filtration I'm looking at a compact power filter (H.O.T) type. There isn't space for a sump unfortunately cause of the way the bar was built. I was even thinking of trying a skilter filter (not the best) but I had one on a 30 gallon a few years back and it seemed to work well for the smaller tanks.

Plus it has a protein skimmer in it, But I also have a larger one for maintenance. This will be saltwater with mushrooms and a max of 3 fish and maybe a few low light corals.

<A shame there isn't room below for a sump...>

Lighting I was thinking of having 2x30 watt bulbs in a 03 and 10,000k combo or 2x 50/50 for the corals as the fish don't really need intense light. There won't be a deep bed if substrate inch tops

and the live rock and substrate will be seeded from my 40 gallon reef that I have now. Let me know what you think about this stuff I have been doing saltwater for about 18 years, and sometimes we over look the obvious, know what I mean? Love the website!!!

<Do know what you mean (do so all the time)... the lighting should be fine. Bob Fenner>

Thanks again, James Wesley

DIY Tank

Hello I am planning on building a small tank to fit in the corner of a bar. It will be made out of acrylic not sure if 1/4 or 3/8(your advice) it shouldn't be any more then like 30-35 gallons I think.

<Can be calculated... take half the width as the average of the side lengths... multiply it by length, height, divide by 231 (cubic inches per gallon)... voila, gallons>

Because of the design (which I e-mailed an attachment) I don't think bending would be possible cause of the sharp angle or would it be better to bend the acrylic as opposed to having cut joints.

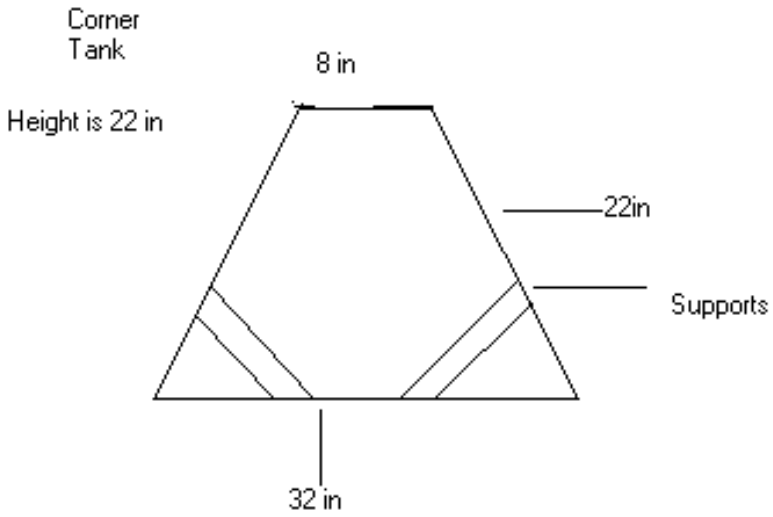
<Mmm, could be bent... or jointed. You might have folks in the fabrication business bid on this... look under "plastics" in your phone directories... or on WetWebMedia.com's links pages for long distance suppliers>

Everything I have read said bend to 90 degrees and have never read anything state a smaller angle like 45 or what ever. I have a rotozip cutting tool with a acrylic cutting bit, I was told these are one of the

better tools to cut acrylic with (Do you know?). Any info would be great...

<Mmm, not familiar with this tool/line. Not a cutting issue though... but one of heat-bending. I would like to continue this discussion further. I encourage you to brace this design more fully at the surface (if it were me, I'd use at least 3/8" material all the way around, router an oval in the top for access welding the top edge onto the top all the way around... and would like to chat over filter ideas... cut outs for overflows, returns... lighting? Bob Fenner>

Great site, keep up the good work, James



DIY Tanks, Lungfish

Is there a web site or information I can get to build a 250 gallon aquarium and what about the filter system. I would only have tropical freshwater .

Also I bought a African Lung Fish, but I can not find any information about this. Jack Blake

<Mmm, I would read over/through Oz' Reef (link on WetWebMedia.com's links pages) re the tank construction et al... and the fish... please read here: http://www.wetwebmedia.com/FWSubWebIndex/dipneusti.htm re the scientific name, onto fishbase.org and your search engines, likely BB's, chatforums (ours: http://wetwebfotos.com/talk/) re captive husbandry... Quite an investment to make w/o prior knowledge of its care. Bob Fenner>

Tank building

Is there a web site or information I can get to build a 250 gallon aquarium and what about the filter system. I would only have tropical freshwater.
Also I bought a African Lung Fish, but I can not find any information about this. Jack Blake
<hmmm... many sites/books on tank building. Many types of tanks, acrylic, glass, wood and glass, fiberglass, concrete, etc. Starting the endeavor with a 250 gallon is ambitious if you do not have any local help to support you/walk you through. Do seek a local aquarium society (keyword search by city on the internet)... many members with such experience likely. As far as specific sites... have you simply tried a keyword search on Google? Please do... the journey of enlightenment. Best regards>

Acrylic Thickness

I am looking into building an Acrylic Aquarium with the following dimensions: L=48" X W=24" X H=20" which will have a capacity of 100G. What would be the thinnest Acrylic I could use?
<1/2" with a capture/top piece.>
I would like to use 3/8" (.375 in) if possible as I can get a good price on 48"X48" sheets. Gregory A. Maher
<I would build a smaller tank. Something in the 36" long, 30 gallon range. -Steven Pro>
<<RMF thinks the 3/8" would be fine here... used for this height tanks in the industry>>

Most Everything You Ever Wanted To Ask/Know About Acrylic Aquariums

Dear Bob, I have tried to put all my questions in one list. Can you help me with any of these? Thanks for your help. Mike
<<Greetings, Mike. JasonC here, and I will do my best... >>
1) What thickness of acrylic is used for 20 gallon, 50 gallon and 100 gallon tanks?
<<Well... the answer depends on the actual dimensions of the tank. On a general rule of thumb, perhaps 3/8" for a 20 up to 1/2" for the 100 - if there were one long panel, perhaps 5/8" or up to 3/4" for larger tanks. Probably best to break out the calculator and the acrylic manufacturer's spec sheet and do some homework.>>
2) Are the top, bottom and sides of the tank all the same thickness?
<<Again, this depends on the desired dimensions of the tank. The safe assumption is that IF you are making a perfect cube, all walls can be the same thickness. If you start stretching the cube into a rectangle, then the assumption changes.>>
3) Do they use regular acrylic glue or a special glue?
<<As far as I know, it's a standard acrylic glue - creates a molecular bond.>>
4) Are the corners bent to a different radius for different size tanks?
<<Corners are bent to a different radius for different thicknesses of material and visibility.>>
5) Can a small tank be made that has glued corners instead of bent corners? <<Sure. >>
Why are bent corners usually sold?

<<Easier than jigging up and adhering four walls with perfect 90 degree joints.>>
5.5) What is the radius of the bend of 20, 50, and 100 gallon tanks?
<<Depends on the material.>>
6) Is the radius of the bend for strength or for looks?
<<Both... the material would maintain is strength for a while beyond a bend that ceases to look clear.>>
7) Is the acrylic bent on a specialized machine or is it heated with a local heating element and bent over a mold?
<<Depends on the application. On smaller panels, I have seen a blow torch used. On larger, curved aquariums a large walk-in oven is used.>>
8) Can the acrylic be trimmed to fit after it is bent or does it have to be bent perfectly?
<<Well... the whole job has to be done perfectly. Cuts, joints, bends, you don't really get a second chance on the same piece of material.>>
9) Is it very hard to bend acrylic over a mold and get a perfect bend?
<<Let's just say that it is a skill, and one that can be learned. But not so simple that you'd get it on the first try.>>
10) Are there any special tricks that you know that help in bending the front piece of acrylic?
<<Patience, lots of patience, that and a fairly exacting eye for detail.>>
11) After the front piece is bent, are there any special difficulties gluing on the top, back and bottom?
<<Well, you want the thing to hold water... it's not as easy as it might seem.>> What order is best?
<<Probably front to the back, and then that assembled piece to the bottom.>>
12) Have you heard of someone setting up a small shop to make acrylic aquariums?
<<Uhh... Jason Kim of Aqua C comes to mind. He makes a fine line of protein skimmers, but also makes custom tanks and sumps. If I'm not mistaken, he started out as a one man operation. His skimmers are quite popular, and so he's not a one-man-show any more.>>
13) What fraction of aquariums sold in the US are acrylic now?
<<Couldn't tell you... but a quick mental survey says: depends where you live. If you live in an earthquake zone, you might not have a choice. Acrylic tanks are more expensive than their glass cousins so income plays a factor.>>
14) What is the difference in wholesale price of glass and acrylic aquariums in the US? What is the difference between the internet price and the wholesale price?
<<I really don't have that information. You'd do best to ask the actual wholesalers and retailers.>>
14) What are the major advantages of acrylic?
<<Two come to mind... acrylic is a better insulator. That and it is also much more clear than glass tanks which become more green as the glass gets thicker.>>
Disadvantages?
<<There are three disadvantages. One, price - acrylic tanks are much more expensive than glass tanks of the same size. Two, acrylic is easy to scratch and it's easy to do with a large chunk of live rock. This also means you need special cleaning pads. Third, and if you keep a reef tank, coralline algae has a strong attraction to plastics, acrylics included. This means that you either need to clean the viewing panels constantly, or go after them with special scrapers when you can't see the inhabitants any more like I do ;-) >>
15) Approximately how many manufacturers of 20-100 gal stock acrylic aquariums are there in the USA: 5, 10, 25?
<<That's a good question, but I just don't know the market that well. I'd bet there are more than five, but not 25. Maybe more than 10 but not many more. Just a guess

though.>>
16) Is it better to use a router, table saw or a panel saw to cut the acrylic?
<<A precision table saw with special blades for cuts. Router for cleaning the edges. Hope that helps. Cheers, J -- >>

Aquarium Frames
I was thinking about building a 20 gallon long aquarium to use as an Hospital/ Quarantine tank. The only problem is I don't know where to find an aquarium frame for the tank.
<A frame...>
Would you happen to know where I could find one?
<Such plastic edging can sometimes be purchased from manufacturers like All Glass Aquarium, Oceanic... perhaps by way of your retailer...>
Are they required to have a tank like that? If not is there any other way I could put my hood on the top?
<Not required... by and large not functional... used more to put the glass, silicone together (like a jig)... you can build a system w/o such a frame, insert/silicone some glass strips to support a light unit. Bob Fenner>

I used the wrong Silicone sealant
Hi Bob, I was just reading the articles on "One hundred percent Silicone... no mildewcides, other additives" under Building your own tanks, enclosed is a picture of the tank setup I made using 3/4 marine ply oak faced, then fiber glassed, epoxy painted and then I used silicone for Bath and Kitchen.
<To just place the viewing panel?>
It of coarse made me sick when I read the thread on mildewcides. My question is the equipment, base rock and live rock which was in this tank , I have the rock in a new tub with fresh saltwater "hoping" and the equipment has been clean completely What is your feeling on any of these items being reused in another tank ?? Thanks Tony
<Mmm, should be fine. But I encourage you to cut away the exposed sealant and silicone over the old with 100% if/when you have all out of this aquarium. Bob Fenner>

Re: I used the wrong Silicone sealant
Hi Bob,
Yes the viewing area as well as a skim coat over the rest
<Really? Over the rest? I/we've made a bunch of fiberglass and resin tanks over the years... if a couple of feet or less in height we only applied strip (can be bought as such, thank goodness) cloth and applied in corners... applying resin (and hardener natch) over all...)>
:(I'm thinking of lining the rest with glass which is the way I should of gone in the first place . It certainly wasn't a cheaper way to go doing it the way I did "Could of bought two 180gals by now" heehee But live and learn. Thanks for the info awesome site by the way, I wish I'd of know of it before my giant screw up. The size of the tank is 30"HX30"WX96"L forgot to include that last email. Again Much Thanks Tony
<Thanks for the follow-up... Silicone is almost impossible to get anything to "paint over", stick to it... Your suggestion might be the best... alternatively you might save some money using very thin acrylic sheet in its place. Good luck, life. Bob Fenner>

Building Tanks
Hi everyone,
<everyone in my head? or are you just referring to the WWM crew at large?>
First off I 'd like to say thanks to Anthony for previous advice about my flower pot (Goniopora). I have a new refugium and the coral is doing really well. No more dark spots and even some polyp extension.
<ahh... great to hear success/progress>
I read the FAQ's daily and absolutely love you sense of humor .. you were in rare form today/yesterday.
<HA! Thank you... that makes two people now that understand and appreciate it>
We have a 125 gal. tank which we have maxed out, so the natural answer is of course to get a bigger one. Would like to build one "in the wall" when we finish our cellar. I have looked around and can't seem to find any really good info on building the big (500-600 gal.) tanks. (Of course I found the 4,000 gallon tank with the scuba diver ... not quite what I had in mind!!) Curious about building the tank with cinder blocks with just the glass/acrylic for the display window. Any info you could point me to would be great.
<yes... I have a great friend who manufactures custom aquaria who has shared/taught much on this matter. Truthfully... what you would like to attempt is actually a difficult task for even experienced folk. I would strongly advise you against it (for perspective... I have personally built more than 100 aquaria 200+ gallons and I wouldn't try a concrete and glass structure). Such aquaria are dependant on a very thick flow that is EXTREMELY solid... no chance of even the slightest settlement (engineered/reinforced concrete, etc). Then we are talking about some skillful maneuvering of a viewing pane that is to be suspended/mounted as "floating" (not resting on the floor and rocked into place but literally swung, siliconed and clamped). Many public aquaria with older displays employ this type of vessel... in some cases the tank was filled just after the silicone and glass were set to use the mass of the water to support/hold the clamped pane in place! In many cases they leak and have to be resealed several times (although once a good seal is made they will go for many years assuming the blocks don't shift/crack). Even if this tank is in a basement where you can afford the leaks... it is a pain and an ancient technology. I would sooner see you make a wild saltwater pond with an island in the center (one

tree island with a mangrove tree under a spotlight... and a miniature shipwreck of the USS Minnow beached... Hmm... perhaps we'll have to rename the island then?!). Anyway... all glass 500 gallon aquariums can be made easily or even fiberglass units with a viewing pane (although also a little tricky). See if you can scavenge any good deals on 5/8" or laminate glass, or barrels of fiberglass resin <VBG>. I just saw a cool thread on Reef Central about a 1300 gallon glass aquarium...yeeha!>
Once again, can't say enough about your site! Thanks, Beckie
<best regards, Anthony>

Tank size (math puzzler)
Question: On a 4 x 8 sheet of 1/4" acrylic, what would be the largest tank that can be made and what would be the dimensions... if possible.
<Ah, a bit of a mathematical question... let's see, you need a top and bottom... front and back... and two sides... I would make the height 18 inches (about the best, "average maximum" for this thickness of acrylic, or glass for the matter), and the length 4 feet for the front/back, top/bottom (to cut down on "cuts"...) and the sides 19 1/2" wide (and 18" tall) to fit inside the top/bottom). Outside dimensions: 48" X 20" X 18 1/2" Bob Fenner.>
Thanks.

Acrylic Thickness
Are there any guidelines to follow when building an acrylic aquarium or for a 90H measurements of 48x18x24 what would be the acrylic thickness needed? Thanks
<Yes... some for structural strength... at least 3/8" (with an annealed top that serves as a brace), better 1/2" for the sake of cutting down of deflection/bowing. Bob Fenner>

Making a Fish Tank
What does one use to make a 2'x2'x5' fish tank? Glass or plastic thickness and type? Adhesive type and where to get it? Thank you for your time. Bud Davis
<You can find your answers here http://www.wetwebmedia.com/diytksfaqs.htm - Steven Pro>

Pond Liner for Salt tank set up?
Bob,
First off, LOVE THE site!!
Just found it and it's a wealth of info. I have a quick question for you.
I'm considering making a large salt tank and was wondering if the normal pond liners would be ok for constructing a salt tank used for sharks and rays etc..... If pond liner won't work is there any other material other than the Rubbermaid tanks etc..... I want an indoor pond but with sharks I figured the cheapest way to get a 6x12 tank would be to go pond liner..
Thanks and keep up the good work. and thanks in advance.
<You are welcome. I have built such "shark tanks" (and more) out of pond liners (nominal 20 mil. polyethylene ("water bed") types to 32 mil re-inforced, EPDM, Butyl Rubber... with good utility. The large Rubbermaid tm oval "troughs" are also very useful. A note of caution: Do make a complete, secure cover over either, as even apparently sedentary sharks can/will launch themselves out... Bob Fenner>
Regards, Robert C. Taggett

Suitable Epoxy Paint for Plywood Aquariums
Bob,
<Anthony Calfo in your service while Bob travels>

I've been looking over your fine website and have not yet been able to pin down any brand names for epoxy (or otherwise) paint to seal plywood tanks. I've made inquiries to various paint dealers here in Kansas City and they're all very gun-shy about selling epoxy paint for an aquarium--Sherwin-Williams wants me to have a meeting with the tech rep before they'll sell it to me! Thanks for any assistance! Mark Lynn
<Mark... for smaller aquaria under 200 gallons, tub&tile epoxy (advertised as Baby safe once cured) is commonly used in aquaria. Available from your local DIY store, it is convenient if not inexpensive. For a larger project, I would take the paint rep up on the offer to protect your investment. You'll want to avoid paints with anti-fouling agents in them (for mold and mildew...very toxic to aquatics). Best regards, Anthony>

Suitable Epoxy Paint for Plywood Aquariums II
Thanks--the tanks I'm working with are around 100 gallons. Is this a paint used for repairs to tubs, etc? MRL
<exactly, my friend. For cement laundry/wash tubs and the like. You may be a little restricted by popular home decor colors (grey, tan, white, black) but as long as it says Baby safe when cured as most do, you will be fine. Even if it doesn't you are likely safe if you are willing to test. Worst case scenario is you have to give another good coat over it. Best regards, Anthony>

Suitable Epoxy Paint for Plywood Aquariums III
Thanks, Anthony--I'll check out Lowe's and Home Depot tomorrow. I've also considered lining them with countertop laminate ($2.00/sq ft) and sealing the joints with silicon. I'll do some price comparison and go from there. Thanks again, Mark
<For what it is worth... I have used Olympic brand swimming pool paint in concrete ponds and know that they at least have a product that is fish safe. I'm just not sure if it adheres to wood as well. It was designed for concrete applications specifically.>

Suitable Epoxy Paint for Plywood Aquariums IV
I tried some UGL --formulated for concrete-- it seemed to work fine for several months, then I got a small leak. It looks like the paint cracked along some grain lines and the plywood got soaked. I let it dry for a couple of weeks, the gave it another couple of coats. Worked fine for a couple of weeks--until I added the rock--I think the extra weight of the rock caused the wood to flex just enough to make the paint crack again. MRL
<Ahhh.. yes, thank you. I'll remember that for the next query on the subject. We'll stick to ponds with it <wink>.>

big ass aquarium
Hey Dogfish -
<Hello Henry>
Remember that huge aquarium project that I wrote you about a few years ago?
<yes>
I've got a large piece of land to build a place on and am ready to go into some initial design work. I'd like to get together with you sometime and pick your brain regarding design issues, cost, filtration issues, lighting issues, water circulation issues, etc.
<okay>
I'm planning on using industrial building techniques, so I'll have a very large amount of square footage available (100'x100'x 30' high).
Hope to speak with you soon, it's been awhile, Henry

aka EatMe (piano playing hasher)
<Chat with you soon. Bob/Dog F>

Aquarium manufacture
Bob,
I live in Australia now and I noticed that all the aquariums for sale here are glass. I am wondering how hard it would be to set up a small facility to manufacture acrylic aquariums.
<Not hard. A few thousands of dollars on the low end to a few tens of thousands for more serious investment, production>
Do you know much about the manufacture of aquariums or do you know anyone that I could contact by e-mail who might know?
<We used to fabricate up to two inch thick acrylic tanks. Have several friends in the trade who do this>
I need information on how the front piece is bent, jigs and fixtures for manufacture, on exactly the type of plastic used (do they use regular acrylic or is it coated to be scratch resistant?),
<Not coated... some "brands", makes are a bit more scratch resistant, none totally>
the thickness of plastic for various sized aquariums etc.. Do you think it would be possible to set up a manufacturing facility?
<Possible, sure>
I think that it would be too expensive to import the tanks because they take up so much space, and the Australian dollar is very low so anything from the USA is too expensive.
<I do understand this. We're headed that way for a few weeks next month. Land, food, diving... a bargain>>
I like the pictures that you send out every day.
<Ah, am glad to hear>
Good luck, Mike Sweet
<Mike, a very good idea for you to investigate, invest your time if serious at this point. Here on the West coast of the U.S. or the U.K... (where friends are who will help), to learn first-hand what is involved. Let us keep talking this over. Bob Fenner>

HI AGAIN. (tank shapes)
Hi again, it's Amilton. I was thinking of using Art Deco style or Post modern
I don't like square things very much I like triangles and Smooth Shapes.
What do you think?
<These shapes can be made to work on aquarium designs, construction. Bob Fenner>

DIY info
Hello
<Cheers..Anthony>
Do you know were I can get some info. on building a acrylic self-contained tank with a sump and skimmer all in one. Thanks for your help and your time. Frank Thomashefsky
<many places on the Web... please try the DIY link on www.ozreef.org best regards, Anthony Calfo>

Tank Modification
Hey Bob, Bryan here.
<Hi Bryan, Steven here.>
I am in the process of redoing/upgrading my 75 gal tank. The last few days I've been coming up w/ some ideas. The main one I want to run by you is this. I was using a

CPR overflow down to my sump. I would like to drill a hole (or someone else) in the glass tank, attach a bulkhead with pvc and let gravity do the work, plus it would clean up the inside of the tank. I was thinking about a hole to fit 1" bulkhead w/ 1" pvc to the sump. Does this sound fine? Big question is how far up on the back should the overflow hole go...clear towards the top or about 2/3 of the way up going to use a mag drive 9.5 for main pump. Last and most important question.. can my glass tank even be drilled, I believe it is tempered glass. Thanks again, Bryan
<Tempered glass cannot be drilled. Check with the manufacturer as most do not make the entire tank out of tempered glass. Most times it is just the bottom or the long sides, but it varies by brand and model. Each 1" bulkhead can comfortably handle about 300 gph. I have and would recommend drilling 3 holes in a 75. -Steven Pro>

Acrylic
Real quick. With acrylic to glass contact, the 100% silicone I have read about in the F&Q's will work right?
<I wouldn't trust it for aquaria... but for little troughs/trays/filters...maybe>
And definitely for acrylic to acrylic.
<do use proper acrylic glue for this>
About cutting acrylic for bulkhead fittings. I have hole cutters for doors and such. this will work fine,
<yes if sharp>
and put the silicone on either side of the bulkhead and let stand 24 hrs.
<OK... but neoprene gaskets that come with many bulkheads compress nicely and are more reliable>
Great job guys, Bryan.
<thank you kindly, Anthony>

Cleaning magnet in tank, Eclipse Modification
Hello Mr. Fenner,
I just finished reading today's Q&A's & the last one about lighting for the Eclipse system. I started an experimental 25g Eclipse system a few months back & am thoroughly happy w/it. The CustromSeaLife retro powercompacts are terrific lights. And very easy to install. I cut the back of the plastic and have added a protein skimmer and a couple of power heads.
<Thank you for this input>
This little tank is supporting (I know you wont like this)-A mated pair of true Perc's, a flameback angel (African), a yellow assessor, a orange spotted blenny. All very small fish. Also, a torch coral, a hammer coral, an Alveopora, a frilly mushroom and a small bubble tip anem. Everything is thriving! I highly recommend this lighting setup.
On another note-My brother leaves his algae cleanup magnet in his 180g reef tank, set up in Nov.01, & now he is noticing that the corals are dying or not looking as great on the left side of the tank (where the magnet is).
Could there be a chemical reaction of some sort going on in that portion of the tank?
<Yes. Most aquarium magnets are safe for leaving in a system... but not all. I would pull these out when not in use... Please have your brother contact us re water chemistry checking, use of Polyfilter... as moves to correct the situation. Bob Fenner>
Welcome back & thanx in advance. Craig

Building a fish tank

Good Day Bob
I have decided to now build a 6 foot tank and just wanted to know if you have any suggestions as to what thickness the glass should be. I custom built my 4 footer and used 7 mm glass. But I just don't know what the stress factor will be on a tank of this size. Any other suggestions would be more than welcome e.g.. sealant etc.
<Please see WetWebMedia.com re Custom Tanks... starting here: http://www.wetwebmedia.com/diytksfaqs.htm and following the links outward. Bob Fenner>
Kind regards, Gavin Smith

Larger Aquarium questions
Bob, thanks for the repository of information and book.
<You are the reason for their making my friend>
Several questions. We're looking at setting up a larger FOWLR tank in our office. We're looking for the visual wow factor, so we're projecting it to be it at eye height (65-70" off floor).
<Wow! Nose-bleed heights>
To accomplish that, we're probably looking at tank stand of 36", and tank height of 30 to 36". Length will probably be 96" to 120". The question now is depth. It will be viewed on one side only (blue black against a wall), so we're trying to gauge what the best depth will be. Do we need to go to 36" or is 24 or 30" ok.
<Wider is better... but 30 inches is fine>
Obviously we like to give fish as much room as possible. 30/36 gives you the ability to give them a front and back area, but it may encourage too much unseen activity in the back ??
<Not likely a problem... one that will be solved by the livestock... they will learn to come out>
Any recommendations on depth at that size? Tank designers (most) are pushing for 36" (besides the additional cost, but that's minor) saying it gives a greater feel of 'depth'.
<It does... and for the height of the system, a pleasing space to aquascape the back wall... If you can afford the space in the room and cost... I'd opt for the wider system>
Also, the bio-load will probably be a bit heavy with a predator/carnivorous fish tank (lions, triggers, groupers, box/puffers, possibly an eel) - but we'll have a 540 to 675 gallon tank to work with. We do plan on having several hundred pounds of LR (probably not live sand though) supplemented with filtering. Do you recommend the CSR wet/dry (do they make a size that can handle this size) or possibly the CSR Cyclone line?
Also, what model Protein Skimmer (probably venturi based) do you usually like in this size
<I would build or have built your own... sump system.... a Euro-Reef Skimmer...>
(it'll probably be two here, possibly three). At this size, is ozone recommended?
<Yes>
Lastly, for acquiring livestock, say lions, triggers, groupers, boxfish, puffers, Tangs, is there an recommended size for acquisition in relation to the rest ? e.g. lions, groupers, triggers, box, etc, etc (in terms of smallest to largest). Thanks for any help. Ed
<Yes... all this is posted on the species, groups coverage on WetWebMedia.com Bob Fenner>

Re: Larger Aquarium questions
Bob, thanks for the responses. I thought I was deleted out of there :-),
but read that you were on a trip. Hope your trip went well.

<Yes, thank you... am holding off further sorting, labeling, scanning, placing of images/slides shot... as a "treat"... Must first "eat my Lima Beans here..."> Actually the aquarium specs have gotten larger. We're now at 10 x 3 x 4 (H). So its going to be a large one. We're got three overflows, and returns going through the overflows (probably two out of each Overflow in different directions).
<Four feet high, starting at three feet from elevation in the room? I hope/trust there are more than eight foot ceilings... I encourage you to stop at three feet of height... for ease of set-up, maintenance... and cost. Every foot taller about doubles the expense of the tank itself>
I'm worried that we're going to be creating all sorts of currents in various directions, but have been told that that doesn't make a difference. . .
<Correct, no difference>
We are having some issues with circulation. It looks like 8x is what you want to achieve in terms of water turnover. Using Marine Concepts top of the line skimmer, we're looking at a 2x water turnover for protein/fraction skimming. It'll draw from the 80 gallon sump and skim what it can I guess.
The returns are probably going to be 2x AmpMaster 3600, or possible 3.
That'll give about 4-5x water volume circulation. I presume that's enough on a larger tank. . . . Marine Concepts also indicated that they recommend the Iwaki 100, but the larger AmpMaster is usable as well. I was going to spec the Iwaki, but the AmpMaster looks to be a bit quieter, no reliability issues that I've heard of yet, and a bit more volume. If I can get away having 3 of the same pumps, it gives me some redundancy that I can switch around in there in case a pump fails.
<Yes... though there are other choices>
The width problem is still there. We're still debating between 30 and 36. At 36, we'll have a foot of working room behind the tank. At 30, it'll be 18".
<Make this at least eighteen inches>
Since most of the plumbing is underneath, the tank maintenance guys have told me there is minimal need to get behind the tank, if at all. I may just go with the wider one at that point.
<Depends on what you want to do from back there...>
I'm getting a medical tank and a acclimation/q tank ready now. Having some issues with temporarily holding my livestock :-). Not sure how, but somehow I cycled a tank in like 3-4 days using liverock from another tank of mine.
I figured there would definitely be an ammonia, nitrite spike, etc. I also have a massive CPR cyclone biofilter/skimmer on a 50 gallon tank (overkill, I know but I'm moving things around). Never saw the ammonia pass 1 ppm, nitrite never exceeded 0.5 (at least that I could see/test). Then again all the filtration could be in the LR and my 'bio filter' (which you advise taking out, I know, but I'm keeping it in, in case I have to medicate the tank and it may kill the LR), may not even be doing much.. . .
<Not much>
One issue I do have is a space crunch - I have to hold a 12" dragon eel, a 4" grouper, 4" clown trigger and 3" bursa trigger, and a lionfish (Volitans 4") for about a month. I have a 45 gallon tank and a 20 gallon medical tank. I know I can put the eel, the grouper and one of the triggers in the smaller tank. Do you think it has enough room for the small lion as well?
<Put a piece of large diameter PVC pipe or a fitting in there for it to hide/rest in>
This is not long term, only until I can get the larger tank set-up/cycled.
The eel shouldn't be an issue as he's small and pretty much sits at the bottom and there are plenty of LR for him to crawl around in. I think the grouper and trigger should be ok as they are both about 4" or so.
<Keep a sharp and continuous eye on the Clown Trigger, now and ongoing>
The lion mostly uses the top third of the tank and floats up there away from rocks

anyhow which the trigger/groupers float in/on top of. Then with the last small 3" trigger I can put him in the small tank or 'loan' him to a friend to terrorize his tank for a few weeks. . . I don't think a 45 is enough space for the two triggers together and that may be problematic. . . Your thoughts ?
<Only able to be ascertained through experience. See triggers coverage on WWM>
I'd prefer not to use the 20 as it doesn't give them good space to move around, whereas the 45 is quite roomy. . . your thoughts?
<Worth trying if this is your alternative>
Lastly, how does WetWebMedia sustain itself ? Are you guys predominantly just hosted and revenues are from advertising ? Thanks
<The "labor" is voluntary (none of us are paid directly), with income from our Sponsors. We spend the proceeds on web management and traveling together. Do have a few other related sites coming up... selling image work... Bob Fenner who is asking another large custom tank friend, Dan Freeman to respond to your queries as well. Dan?>
regards, Ed

Re: Larger Aquarium questions, Dan pls take a look, respond
Bob/Dan (don't have his email).
Thanks again. We'll look at the 30" possibility. The design of the stand has actually been lowered to 30", for a total height of 6'6" at 4' aquarium height. The ceiling is 10' high or 10'5" (office lobby).
<Very impressive dimensions for a tank... mainly intended to be viewed while standing?>
It was actually recommended to me to keep the height above 6' in a lobby environ unless its built into a wall (another guy who has an aquarium in his lobby).
<Yes, agreed>
He basically indicated, that people try and reach into the water if its not high enough and also try and put things into the tank when your receptionist isn't looking. That and having lionfish stings when people place their hands in the tank. . . . Now, he has a nice and high tank, the only thing he sees is cigarette butts, potato chips, Cheetos, bubble gum, and mints on top of the tank that people tried to toss in (but failed because of the enclosed top). He just has his maintenance guy clean that off every two weeks making sure nothing gets into the tank.. . . . Wonderful human nature isn't it ???
<Devise a complete cover>
Usually the additional ft in height from 3 to 4, increases the cost significantly as it moves up in acrylic thickness (from 3/4 to 1").
However, since we're at 1" now anyway for the tank due to safety and it being 10' (8' tanks are usually at 3/4 which is much cheaper), the additional cost for 4' vs. 3' is quite mile (5% more).
<Cheap>
That and I've been told acrylic comes in 4' sections anyhow. . .
<Yes, stock sheets are four by eight feet... like plywood>
Yes, the maintenance could be an issue, but the maintenance guy pretty much said, there isn't much difference between 3' and 4'. he's probably going to have to go in there every once in awhile anyway, and he'd rather have 36" width and forgo the additional 6" in the back rather than 30" and having 18 back there. I agree with you that 18" makes it almost workable back there vs. 12" which means you can only slither. . . its going to be dark blue do you like blue or black for fish tanks ??)
<Both... but Blue is better in general>
back anyway back there and plumbing is coming up through the bottom 2" thru

hulls, sorry bulkheads (I'm used to boating terms).
<Equivalents>
Overflows are sized at 8 x 10", so I've got plenty of room to do anything in them, and are placed in the back corners and middle of the tank.
<I strongly encourage you to fashion/have fashioned overflow weirs/towers in the corners... with the through puts arranged under/in the corners>
The 4' height is going to make it a bastard to aquascape though isn't it? Vertical height is always a pain to fill in, otherwise you end of with dead space.. . .
<Not hard to do>
Regarding the holding tank. Is it possible that this tank is fully 'cycled' after 4 days ?
<Yes... please read through WWM>
I guess it doesn't really need much cycling since we're importing 6 big pieces of LR from another tank. . . If I get an ammonia increase, it should have happened or started already ? I I don't see it and I have a trigger (who is eating and generating ammonia) and two small damsels (which the small trigger can't swallow, yet. . . .) in there, there should be good measurable traces of ammonia. Salifert tests are reading <0.5 ppm (white results, no yellow).
The eel, grouper and lion are zero problems. The clown so far is fine. I will be watching him now and ongoing. Obviously with the larger home later, lesser problems are probably going to arise just from space. He hasn't picked on the lion yet, which is the thing I'm concerned about if I move him to the 45 gallon holding tank. In terms of space, the 45 is plenty for these small guys, just don't know in terms of 'attitude' just yet, so we may have to play as you suggest.
Thanks for the responses. You can forward to Dan as well, since I don't have his email. I was inquiring into your hosting as I can usually get/give good deals on dedicated hosting. Not sure how you were handling the sponsors and how you managed your servers or who does. Again, many thanks.
<I don't make others e-mail addresses available w/o their express consent... Dan is a very busy neurologist, but does indeed have many important things to say to you, your situation, having a spectacular system in his waiting room. Bob Fenner>
regards, Ed

New idea for Tank
Dear Bob
This is the first time I have ever sent an e-mail, so I hope it reaches you!
<Yes my friend, welcome. We are strangers but once>
I have a new idea, or you could say old idea, for constructing a tank. I plan on building a new reef tank to replace my 70 gallon all glass tank. It will be 5.5' long, 2' front to back and 2.5' high.
<Quite a structure>
Because acrylic is so expensive and easy to scratch, I am going to use glass. Instead of using very expensive 15mm glass, I want to use 10mm glass.
<I encourage you to investigate the suggested maximum height with this thickness, make of glass... and not approach it... I would not make this aquarium taller than two feet... for looks, function and safety>
So my idea is to construct a stainless steel welded frame from 40mm angle and line it with 10mm glass. I think this will look original and be more robust especially where the kids are concerned!
<Yes>
I've already constructed the 40 gallon sump with Plenum and built the cabinet. My wife is now eager for me to finish the system so that we can bring the other settee back into the lounge!
What do you think of this idea? Have you seen it done before?

<Making tanks with angle metal? Yes... have done it myself even>
The only thing I can't decide on is how to place the bottom glass, either siliconed to base frame with 5mm ply taking up the void between base of frame when it is placed on a polystyrene bed. Or, to use 3/4" plywood in the base of the frame with polystyrene on top and then place the bottom glass on this. What do you think?
<The former. Do record your efforts in writing, images... and consider writing all up for the hobby press. Bob Fenner>
Eden Maddocks

Thickness of the glass
Dear Bob,
Thanks for your quick reply again. Yes I am thinking of a frame of sorts running lengthwise would be a similar 14ft x 5" bracing. (21.5mm laminated also??)
<If can be cut in one piece, entire length, yes, but would cross-brace as well (over the top, front to back)>
So with this how thick should the front to back bracing need to be? Will 4" at one ft interval be enough?
<Would rather it was eight inches at two foot intervals myself>
When you are talking circumference that only includes the top right? Do I need any bracing for the top to bottom bracing at the 4 90 degree bends? I have seen people use glass rods..?
<External... a good idea for a few reasons. Yes, I would have a/the "frame" run all the way around, but not underneath the structural tank. Hope this is clear. Bob Fenner>
Also do I have to repeat the same thing at the bottom of the tank to be on the safe side?
<No>
Okay just checking because I once had a tank 4' x3' 2ft wide. The tank maker repeated the same kind of circumference bracing at the bottom too....
Thanks again for your quick reply, John

Re: Thickness of the glass
><External... a good idea for a few reasons. Yes, I would have a/the "frame" run all the way around, but not underneath the structural tank. Hope this is clear. Bob Fenner><
Dear Bob,
I sort of lost you on the last statement
It is quite difficult to find glass rods for the four corner. What I mean is you know the internal 4 corners?
<I wouldn't be so concerned re bracing the tank (made of glass versus acrylic) internally, or in this fashion... The external framing will lend some strength, but mainly protection to the glass edges...>
Where the four pieces of glass of the tank join together, do I need to re-inforce with additional material like a small piece of glass plank?
<I would, on the top... run a width of glass... the four inches you stated... with the top cross-bracing on top and set inside the top front and back bracing strips... and the other cross bracing siliconed to the top of the front and back top bracing. If you have a drawing, please send this along here or fax it: 858-578-7372 in the USA.>
So with all the bracing running at the top I suppose I have to get a slightly taller glass as it will eat into my 30" viewing space right?
<No... the bracing is on top of the top edges of the tank... and on top of each other...>
Also with laminated glass the clarity is sort of diminished right? Like I would need

more light to sort of see through the tank compared to a normal 12mm float glass?
<Much better clarity and strength with laminated glass>
I think when the tank is done I will snap some pictures for you to see, before I fill it up. Like that if you think I need extra bracing you can tell me.....safe than very sorry :)
<Yes. Bob Fenner>
Thanks again, John

Thickness of the glass
Dear Bob,
Here I go again.....!:)
I have been doing some last minute digging around and found out that so far most of the big tanks that I know of like a 14ft x 2.5ftx2.5ft and a 8'x4'x4'
are all using only 19mm tempered glass.
So am I going overboard by specing 21.5mm laminated glass? the size I am happy with is 14'x2.5'x2.5'.
<Not overboard>
So how, please advice because if I can save a bundle I will like to .
<Better as the saying goes "to be safe than sorry"... theoretically (I always feel ill at ease starting off with this adverb) only height of a given system determines (or shall I preface this word with "should") what thickness of a given material viewing panel need be... the length and width of a system not figuring in as translatable torsional force... such is not the case in actual practice... longer, wider tanks do generally present "additional" stress on viewing panels... I'd go with the thicker material if it's not too dear>
Also the island where I live, there is so far only one group of people that I know that can get the tank together (experience I mean)
They want to charge me $1700 US just to glue the tank like labor charges. Is that too much?
<If you have the money, no>
I have to supply the rest like the reinforcement bars and silicon. Sigh.....
<I would, to make sure they're up to specification, yours>
The reinforcement bar I am told cannot be 12mm because that will not be thick or strong enough to do this job is it through?
<No... if I understand what you mean... I would at least double the thickness of the glass for the top braces, silicone together>
So for the top how wide a bar do I need, like usual I see for a 6ft is 2 additional front to back glass beams with a width of 2 inches
For my 14' do I have to have wider bars at every 1 ft interval? to prevent the front from bowing out? Can you recommend a design?
<Better to have fewer, but wider supports... is this entire system going to have a frame of sorts about the circumference/edges? If not, you need to have substantial bracing (like two feet wide for every two, three foot "gap" to prevent bowing>
Also do I have to repeat the same thing at the bottom of the tank to be on the safe side?
<No>
Sorry for the long one.....
Problem is here those who know how to do it will never tell me, sort of like a trade secret.....
<Not really secrets of this trade, but of structural engineering. I would contact my friends at RK2 for a further referral: http://www.rk2.com/ as well as the other "custom aquarium manufacturer" companies listed on WWM's links pages: http://www.wetwebmedia.com/links.htm and possibly who you can find there who is a real

engineer. Bob Fenner>
Regards, John from Marineangels.com

aquarium manufacture
Dear Bob,
I knew you a long time ago at the fish club in San Diego. Currently I live in Australia.
<Ah yes, you lucky pug. Which part?>
I have noticed that most of the aquariums for sale there are glass and look like they were made in someone's back yard. I was wondering how hard (and expensive) it would be to set up a small facility to build acrylic aquariums.
<Not too hard... considering/stipulated you can secure the sheet, solvent to meld... and relatively simple tools (for a small volume of business) like a table saw, blades for cutting plastic, clamps, propane burners for burnishing...>
Most of the small aquariums for sale in the USA have bent corners instead of glued corners. Is that for looks or for some other reason?
<Mainly looks... (though time to make tanks reduced, a bit stronger... like castle keeps.) heat-bending is simple once you have the heating gear, jigs made up, timing down...>
I think that it would be too expensive to import aquariums to Australia from the USA due to the low value of the Oz dollar.
<How about the cost of acrylic itself...? And is there some sort of market currently, one you could hope to create... within a few years?>
Do you know anyone I could contact about this subject? I will be in the USA until December 29.
<A bunch of folks... who would likely help you themselves. Please contact Craig DeWalt of CASCO/SeaClear: c_dewalt@seaclear.com, check out their site, www.seaclear.com on the net re your wishes, visit. We are old friends/associates... make that middle-aged ones, so please do mention my name.>
Are you still living in Mira Mesa?
<Yes... moved a whole couple of miles to the north recently... sigh. But we're hauling down to the "land down under" this March...>
I was in Fiji two years ago and went out diving with Walt Smiths' collectors a lot. They were very friendly to me. I heard that you came out to give a talk.
<Yes, folks so nice they put up with even me...>
Unfortunately, I couldn't attend. I hope that all is going well with you. I like your web site.
<Hope to dive with you soon! Bob Fenner>
Mike Sweet

Silicone sealant...
Bob-
Do you know of a specific brand of sealant in cartridges that is safe for use in a tank. I bought one at Home Depot that is made by GE and is 100% silicone. Since it did NOT say mildew resistant on the tube (where others do specify it) I thought it might be ok. Once I got home and put my glasses on to read the fine print on the back, it says not for use in aquariums.
Thanks. Happy Holidays! Andy
<Mmm, my long standing point on such matters... 100% is 100%... though the label may state something like "not for aquarium use"... have used the HD re-labeled products, RTV, other 100% silicones for aquariums for decades... One hundred percent... no mildewcides, other additives... Please take a stroll over the WetWebMedia.com site using the Search Tool and the word: silicone. Bob Fenner>

Tank Construction

Greetings from Arizona,
<Hello from sunny Southern Cal.>
I've searched the net high and low, and I still feel "lacking", perhaps you could answer this question for me.
Can Acrylic be "bonded" or make a water tight seal with Plywood? (can I use screws/ bolts in the acrylic?)
<Mmm, not "bonded" at the molecular level as in melded to other sheets, but can be drilled, bolted, nestled in a bed of silicone... best on a flat panel with a cut out if using wood for the structural component>
Here's my situation - I'm constructing a Plywood Tank and I want to insert either an Acrylic or Glass front.
Current Dimension - 96"L x 30" W x 24" H (approx 299 Gallons)
Plywood Thickness - 3/4" AC Grade Plywood
Glass Thickness (IF USED) - 1/2" Plate
Acrylic Thickness (IF USED) - 1" (do you think I could go THINNER HERE??)
<Mmm, half inch would bow too much for my liking, appearances... 3/4" should be fine... if supported all along the face of the viewing panel>
Waterproofing Agent for Plywood - Epoxy Paint
Waterproofing Agent for Glass to Wood - 100% pure Silicon<e>
Waterproofing Agent for Acrylic to Wood - 100% pure Silicon??
<Yes, 100% silicone sealant>
I'm still in the planning stages, but I want to make the "right" choices the FIRST time. I know the differences between Glass/Acrylic and I think I would rather use Acrylic in this situation, but COST is a factor and so is the "waterproofing issue".
<I understand... and have made many such tanks over the last three decades>
Ohhh one last comment/question. IF I use acrylic, would you recommend that I attach a sheet of Acrylic or Wood (maybe 3"-4" wide) running the length of the tank on TOP of the Front of the tank for added support for the Acrylic front??
<A good idea, yes, drilled, screwed about every four inches... and such a brace on the back, inside sides as well.>
Thank you in advance for any advice you might give!! Soren
<Please contact me if you have further questions, concerns. Bob Fenner>

tank building questions

Hello -
First let me say that you site is packed with great info. I have been reading it for days.
<Wow! Glad you find WWM of use>
I like keeping large fish, and they require large tanks. I have built several on my own using 2 part epoxy floor paint over 3/4 plywood and sealed 1/2" glass to the front with 100% silicone (usually GE door and window - never kitchen and bath as it is mildew resistant).
<Neat, good for you>
Glass has become hard for me to get a decent price so I have been working with acrylic. I have two tanks with acrylic "windows" that are leakers. The first is a 360gal with 1/2", the second is a 630gal with 1".
<Mmm, I'd likely try resealing them...>
I have been talking to people about this for months and I think the problem is the sealant. Silicone doesn't bond to acrylic very well.
Options that I have come up with are drilling the acrylic and frame every 4-6" and bolting it in place, or looking for a better sealant. The better sealant I have found is Sikaflex. It is used on boats to seal windows at depths up to 10'. My original plan was the bolting but the acrylic shop recommended against it as it could stress the

acrylic on the holes. What do you suggest?
<Hmm, how tall are these tanks? I would likely drill and screw the acrylic, coating over the hardware in the tank with two-part water-proof epoxy, cut away the existing 100% silicone, let it dry for a day or two... wipe the surface down with an organic solvent (we used to use toluene, xylene...) in a well-ventilated setting... and then re-apply a nice, thick bead of silicone... maybe "feathering it out" with a plastic trowel (small ones available at Home Depot, Lowe's...). IF the tanks are only a couple (as in two) feet tall or so... Otherwise, I'm a bit nervous given the width of the wood and acrylic sheets myself. BTW, do look into used glass... especially "old glass doors" for your "humungo tanks"... sometimes these are available from companies that take down old buildings... for very little money>
For sealing the wood I have been using 2 part epoxy floor paint. I have been looking at using fiberglass. What are your thoughts on this? Epoxy or Polyester resin? Should I cover the tank with fiberglass mats or just pour the resin and hardener on?
<I have made many (hundreds) of tanks for science and industrial purposes using fiberglass cloth stripping (you can buy it as such... I would), and polyester resins... mix the hardener (likely MEK based) with the resin/s as instructions call for (do allow for temperature, time...) and lots of air circulation (have had the worlds worst "highs"/headaches from breathing in too much, too long... One coat, wetting the inside corners first, then apply cloth... wear clothes you really don't like, intend to keep... gloves... Have someone there to help "hand" you things...>
I'm also planning a large tank of about 16' long, 4' deep (with 30" window), and 6' wide. Should I go to cement for something this large?
<I would consider this approach... and gel-coated fiberglass shells, spun-cast polyethylene forms you might cut out, place a viewing panel in... Bob Fenner>
Thanks, John

Re: tank building questions
Thanks for the fast reply.
The current tanks are 2' deep (360gal) and 3' deep (630gal). I like the idea of using the screws/bolts.
<Do apply another 3/4 sheet to the front/face of the 3' deep tank for strength/ rigidity... I would drill pilot holes every six inches use 2 or if you can find them 2 1/4" brass screws, counter-sink the heads in the acrylic...>
What size would I need and how often do I need to bolt (i.e. every 4"?) I think the acrylic is thick enough. There is no bowing. The acrylic over hangs onto the tank by about 5" either side. Again, Thank you for the help. John
<Perhaps you should consider a career in the public aquarium exhibit design, fabrication business? Please take a look at the book reviewed here: http://www.wetwebmedia.com/afascfishpowell.htm
Know you would enjoy, gain by reading it. Bob Fenner>

acrylic questions
Bob,
A couple of questions for you regarding acrylic and its use in sump/tank construction:
1) What type/brand of acrylic would you recommend for aquarium construction. There are many types: Plexiglas, acrylite, Optix, etc, and I'm not sure which one (if any of these) are appropriate for aquariums (i.e.. transmit PAR light, maintain rigidity-avoid warping, avoid discoloration, etc).
<Hmm, actually most acrylics are pretty much the same. What people call them are more brand names then different formulations. I am a big fan of Reynolds as a manufacturer...>

2) What type of acrylic cement is best for capillary bonding acrylic in aquariums (Weld-on#3 ?).
<Weld-on for sure... Number three is okay... look for/use a "gel" type if this is one of your first tries at making acrylic anything>
3) What type of acrylic would you recommend for filtering UV while allowing other light to transmit freely (esp. PAR).
<Again, just whatever type you can find that is reasonably inexpensive of about the right thickness. I would not transmit "useful" light through the acrylic... shine it directly into the water>
Lastly, I've found a fluidized bed filter used in the shrimp aquaculture industry that's rated at handling 2 lbs of shrimp feed per day. Any guess at how much raw live rock this filter could handle if I used it in the curing process - along with heavy skimming (i.e.. skimmer output set to 5 times the number of gallons of water, with 1 gallon of water per lb of Fiji rock in the curing tank).
<A guess is "a bunch"... Shrimp are very dirty animals to culture... I'd guess if the folks who engineered this are saying "two pounds of shrimp feed", this equates to hundreds of pounds of live rock. Really. Bob Fenner>
Thanks!

FAQs on Acrylic Aquarium Repair

Related Articles: Aquarium Repair,

Related FAQs: Aquarium Repair, DIY Tanks,

-Removing scratches from acrylic tank-
Hello, I found your site while trying to figure out what to do with my 60 gal tank.. My wife was trying to be helpful and scrubbed the inside of my acrylic tank with one of those sponges that have the green scotch pads.. <Ouch!> Needless to say, the front of the tank now has a "clouded" look to it.. We have since moved from So Cal, to Grants Pass, Oregon.. While the tank is now drained I'd like to get the scratches "polished" out.. I have read of the product called "Novus" on your site.. Is this something I can do myself? <Absolutely, and I hear it works wonders.> Or is it something I have to have a supplier apply? Is there any supplier in the Grants Pass, Oregon area that I can purchase this from? <No idea, but I did find an e-tailer that carries it http://www.tropicalfishstore.com/careproducts.htm> Any help will be much appreciated! <Good luck! -Kevin>
Thank you,
George King

Removing Scratches on tank
Hi,
<Hello there>
I love your web site (Bob along with the WetWebMedia crew, along with your
book. It has helped me so much in my years of reef keeping.
<Ah, good. Our intention>
I am, however,
puzzled by one question. Whether or not I can actually use the Novus product underwater?
<Mmm, no... you must drain the tank down to below this point... though some water may remain in the tank... and the livestock too if there is

enough space for them>
In one post you claim it can not be used, and in
another you claim it can. I have cited each for you below. I know that toothpaste method works for certain to remove light scuffs inside the tank,
I have done this several times without any ill effect. I just wonder how safe Novus 3 or Novus 2 would be underwater, in a fully stocked reef with
corals, fish and inverts. I would hate to blow thousands or dollars just to remove a scratch. So, which do you recommend, using Novus underwater, or
not using it underwater. Thank you in advance for clearing this up.
Jon
<Sorry for the confusion. The second piece is not clear, but it is my intention to convey that the product itself is NOT toxic if it gets into the system/water to some extent (have done this myself), but does need to be worked, rubbed-in in the air... that is, with the tank drained down or emptied. No problem with some of the resulting "dust" getting into the water though. Bob Fenner>
Taking out scratches from the inside
Bob,
Do you know of any acrylic scratch removal kit that works underwater?
<No... all require draining the system at least down to the level of the work. Bob Fenner>
Thanks, Lee
Re: follow-up on removing scratches in acrylic tank using Novus, and visit
to Phoenix
Thanks, Bob, for your very prompt response!
It is comforting to know that your experience shows Novus 1, 2, and 3 can be
used on the inside of an acrylic tank without harm to the fish. I bought the Novus 1, 2, and 3 yesterday afternoon.
<Wish I had made these products!>
As a follow-up to my earlier email to you, can I leave my large jardinei in the
tank while I am working on removing scratches with Novus 2, and if necessary,
Novus 3. That is, from a chemically (nontoxic) safe standpoint?
<As far as I'm aware, yes. Have used these in "full tanks", fresh and marine, with impunity>
There will
be about 4 inches of water for him to stay wet;
<And not jumping out!>
the lowest scratch to be
removed is an inch above this water line.
Thanks in advance for your advice!
BTW, Phoenix has a dry heat this time of year ... and its been mild this week. Its the August monsoon that you want to avoid.

Steve
<Will be out there this Thursday with some friends/associates, giving a pitch at the DMS (Desert Marine Aquarium Society). Stop by if you'd like.
Bob Fenner>

Acrylic tank leak
Hello. I recently purchased a used 125 acrylic tank and it has a leak. There is a crack on the bottom right near the front of the tank. It does go all
the way through the tank and that is where the leak is. I was wondering if I
could glue another piece of acrylic or Plexiglas along the bottom of the tank
(inside) all along the front edge. If that will work, what would you use to glue it? Should I use crazy glue and activator on the crack first? Please help!!!
<You can solvent (not really a glue... as there is nothing left between the melded materials) a piece of acrylic here (look for "square doweling" at an acrylic outlet (it's only truly flush on two of the four sides, and you want to fit these two against the existing panels). Look for Weld-on products for solvent. Bob Fenner>
Thank you,
Ron

- Scratches in the Acrylic -
I have an acrylic TruVu aquarium and it is scratched on the outside and looks hazy in some parts. What can I do or use to take these scratches out? Yoquin
<There are several commercial 'acrylic scratch-repair' kits out there. Look on the online retailers and you will find them. Cheers, J -- >

Tough acrylic cleaning question
I have purchased an acrylic tank from a friend. He had applied some clear shipping tape to the openings in the lid. I have tried elbow grease and my credit card but the stuff just isn't coming off very well. I've looked around on your site and didn't find anything appropriate to my situation. I know not to use Windex or anything else ammonia based. I've thought about
goof off but that's petroleum based. Do you have any ideas.
Thanks
<I would try "citrus based cleaners" here first. Do with the tank empty and make sure and wash any residue from the surface. Bob Fenner>

RE: tuff acrylic cleaning question, repair
Thanks Bob,
I ended up having to use lighter fluid to clean this stuff off, it was caked on pretty good.

<As long as you're "right there" wiping off the excess (so it doesn't melt the acrylic) this works pretty well>
I have another question. I found two small chips on the corner of the bottom
plate, about 1/4" around and maybe 1/8" deep. The acrylic is 1 inch think at
that location so I don't think it will be harmful. Do you think that I can put some acrylic glue in the chip just to give it some strength in that area.
<Might help. Have you considered adding some "square doweling" in the corner. This stuff comes in stock sizes with two of the four sides "square" and the other two a bit concave. You solvent (as in with Weld-on) the two flat sides to the tank inside corners. Bob Fenner>
Thanks

Scratch removal and polish on inside of tank using Novus products
Great site for info!
I have a Tenecor 180 gallon acrylic tank that has numerous fine to moderate scratches in the upper half of the tank as a result of five large red hooks bouncing off the front panel when it tries to compete for food against a 20 inch jardinei.
<Neat>
I am removing the red hooks and want to remove the unsightly scratches inside the tank. Tenecor sells a group of products called Novus #1, 2, and 3 that is supposed to remove these scratches, as well as a micro mesh kit that does the same.
<I have used these products. They work... but the micro mesh reminds me of the Karate Kid series of movies... rub on, rub on... and takes about as long to remove the finer scratches it makes as re-watching the whole series!>
In doing the scratch removal, I would prefer to use the Novus products The micro mesh kit seems very tedious and I do not feel comfortable with the acrylic particles being sanded off and mixed in with the water and substrate.
<Me neither>
But is it safe (non-toxic) to use Novus on the inside of the tank after the water is taken out of the tank to the level of the lowest scratch; or am I stuck using the micro mesh sandpaper?
<I'd try the two grits of the Novus first>
If I can use the Novus product inside the tank, is there additional prep needed after the scratches are removed and the front panel is polished, before I can refill the tank?
<No further prep... just wipe up the bits of "scum" with a damp paper towel>
Thanks for the help!
Steve
<Thank you for writing, good luck. Bob Fenner>

Re: follow-up on removing scratches in acrylic tank using Novus, and visit to Phoenix

Thanks, Bob, for your very prompt response!
It is comforting to know that your experience shows Novus 1, 2, and 3 can be
used on the inside of an acrylic tank without harm to the fish. I bought the Novus 1, 2, and 3 yesterday afternoon.
<Wish I had made these products!>
As a follow-up to my earlier email to you, can I leave my large jardinei in the
tank while I am working on removing scratches with Novus 2, and if necessary,
Novus 3. That is, from a chemically (nontoxic) safe standpoint?
<As far as I'm aware, yes. Have used these in "full tanks", fresh and marine, with impunity>
There will
be about 4 inches of water for him to stay wet;
<And not jumping out!>
the lowest scratch to be
removed is an inch above this water line.
Thanks in advance for your advice!
BTW, Phoenix has a dry heat this time of year ... and its been mild this week. Its the August monsoon that you want to avoid.
Steve
<Will be out there this Thursday with some friends/associates, giving a pitch at the DMS (Desert Marine Aquarium Society). Stop by if you'd like. Bob Fenner>

Acrylic Tank Scratches

Hello all:
<Hi there>
Just a real quick question so I don't botch things up. We have a 125G acrylic that has developed some scratches on the front panel. I must have failed to notice a tiny bit of gravel in the pad while cleaning, as I am vigilant about making sure that no debris is in the pad before I use it on the panes.
<Good idea>
Nonetheless, I went on the website and found Bob's response to a similar query, where he recommended using a gritty toothpaste to remove minor scratches. I was wondering if this procedure can be done while the scratches
are under water. I can apply the toothpaste without any difficulty, as the scratches are within arm's reach. However, I am very concerned about the
effects, if any, that the dissolved toothpaste may have on my fish.
Thanks for the clarification.
Mitch
<Mmm, they may end up with "whiter, brighter teeth" and a "significant

reduction in dental caries", but should otherwise be fine. Bob Fenner>

RE: Acrylic Tank Scratches
Thanks, Bob...I am sure that my porcupine puffer, with his sizeable bite, will appreciate the brushing! I will try and get a paste that is recommended
"by 4 out of 5 members of the American (Fish) Dental Association."
Mitch
<Ha haha, heehee! Be chatting. Bob F>

Acrylic Scratches
A few months back you mentioned a way to remove scratches from acrylic aquariums even under water. Due to travel requirements I was out of town for the next few days and missed it if you elaborated on the subject. I have checked the web site I was directed to by Bob but still haven't found any specific
instructions. Can you please help me out? Thanks
<Alright, I hope you can find this one! Most scratches can be polished out, depending on depth.... There are kits available from most on-line suppliers carrying acrylic tanks that use abrasives in finer and finer grades to remove the scratches and restore a lustrous finish, even under water with some. You might start by searching for these products at some of our sponsors! Thanks for your patience.....Craig>

Invertebrates that scratch acrylic tanks 5/11/03
Hi can anyone tell me which invertebrates can scratch my new acrylic tank? And which ones won't do any damage to the tank? Thanks, Ron
<mostly limited to mollusks with a radula (hard rasping tongue-like aspect- Gastropods predominate.)... and some echinoderms. Generally not a big deal. Best regards, Anthony

Acrylic Tank Fabrication
Not really a question. Today's list of questions included some about making you own tank. TAP Plastics, a somewhat local firm that deals primarily in acrylic, has a website that includes a downloadable set of documents concerning how to work with acrylic sheet goods.
The link to their info page:
http://www.tapplastics.com/plastics/plasticsinfo/acrylic.html
Regards,
Charlie H.
<Thank you for this link. Will post. Bob Fenner>

Acrylic tank-?
I have built a corner tank with bent corners(had a fab company bend) which cost a pretty penny. I tested it out and there was a very small leak so i went back and applied more solvent and tested again, no leaks. I have had water in it for about 3 weeks just to see if there would be leaks after a period of time and there were none. In some of the seams though

there is some air bubbles i have tried to fill them in with solvent but it does not seep into the bubbles leading me to believe that the edges are sealed. Do you think that these bubbles could present problems in the future or what do you think?
<Likely not a problem if it hasn't been so to date. Bob Fenner>
Thanks for the info,
James Wesley

Acrylic tank cracks? (crazing)
>Hi all at wetwebmedia,
>>The crew says hello, Marina at your service.
>First I must confess your website has been a great help to me for the past year in looking up what to do when in doubt with my current trigger FOWLR set up.
>>What a confession. Now, what penance...10 lashings with a wet noodle, then eat the noodle.
>Now, on to the point...
>>Oh yes, there was a point. Having too much fun, back to work!
>I have recently purchased a used acrylic tank 76 1/2 x 15 x 30 (made by a local company). The tank has an overflow to the left side and that is why it is longer than 72 inches. Total volume
is 150 gallons. Now, the previous owner had attached a piece of plywood or strip of wood across the upper edge of the tank to support a DIY canopy. While I was cleaning the tank I removed
the wooden strip which was attached with adhesive tape. Immediately I noticed a series of parallel marks that looked like cracks on the outside of the tank. There are 3 clusters of
less than an inch marks/cracks on the upper side (roughly half an inch before the brace starts). I'm not sure whether I caused that my pulling the wooden piece , or whether it was there from before and the previous owner had attempted to conceal it.
>>Bingo, I think it was there and he wanted to conceal it.
>Also, the same marks appear on the back side of the tank along the upper side but they are not as long. This leads me to
believe that I did not cause the damage (if it is to be perceived as damage). Do you think if filled with water, it will cause a leak down the road?
>>Very well could be a problem. I have a recipe for filling such "tight" cracks (please, please, let's keep it clean here), but have never used it on a tank that is so peppered with these cracks.
>Should I make arrangements to have it repaired, or sell the tank? This will be a FOWLR tank with 1 niger, black patch, blue line
triggers. Currently, all are at 3-4 inches long. I would greatly appreciate an opinion on this...keep up the good work on wetwebmedia.
>>Well, if there is someone who can make good repairs and they can price them out for you, allowing that the repairs are not going to end up costing you the price of a new tank then I don't see why not go that route. I would first fill the tank in my yard, on a flat area, to determine

several things. First: is it going to leak? Second: are the cracks just so unsightly that I don't want this as a display tank. Third: are the repairs proposed (my recipe will only stop leaks, you'll still be able to see the cracks quite well) cost effective. At this point, only you can determine these things, then go on from there.
>>My recipe for repairing these cracks is that you must first ensure that they are completely free of any and all debris, including any mineral/salt deposits. Once the cracks are to a pristine state, you need on hand liquid cyanoacrylate (Superglue) and the catalyst used for acrylic nails, and a small metal stick (like the tool used to push back cuticles...hey, I'm a lady!). What you want to achieve is to get the Superglue to seep into and fill the cracks completely, then IMMEDIATELY place a drop or three of the catalyst onto it. These substances react with each other (the hotter and drier the weather, the more immediate and extreme the reaction) to fuse with the each other and the acrylic to form a tight bond. However, as I said, you will still be able to see the cracks--this is a method I've used on non-display tanks only.
>>Good luck! Marina
Location of marks

_____
| """" """" "" | Hope
this helps to visualize
| | what
I wrote above.
| |
| |
| |
| |
| |
_____ <--
front panel.

Front panel 1/2 inch thick. Bottom panel is 1 inch thick.

Acrylic tank cracks?
>Thanks for replying Marina,
>>My pleasure, Dimitris.
Well, I called the LFS that sold the tank to the person that I bought it from and the local guru there said that if those clusters of lines are not close to the seams or corners, I shouldn't worry about it. He said I might want to buff it with a 3500 rpm electric drill, but he thinks due to the thickness
of the front acrylic panel(1/2 inch) that it should be ok.
Personally, I could not see any of those surface lines |||| |||| |||| extend past the surface. They had no depth, just like those spider web like ones on the back panel. I guess I will fill the tank up with water to see if it will leak.
>>By your description, it sounds as though the only problems you'll have will be cosmetic. C'est la vies! Marina

Enlarging the access holes on the top of an acrylic tank

Greetings!

I started out with a 29 gallon reef, got a 65 when I found out the hard and soft corals don't get along, then got another 29 to keep the anemones and clownfish in, and my "quarantine" tank is now holding the huge evil red hermit crab I inherited that will eat anything ...this reef addiction gets out of hand quick, doesn't it?!! I no longer have the incompatible soft corals, want a bigger tank for more hard corals and flasher wrasses (the little sh**s can jump through the holes in eggcrate, will use an even tinier mesh screen), and need to get things consolidated for tank stability. I have only one non-knowledgeable fish-sitter available if I have to go anywhere, and the little tanks are too prone to fast crashes if the power goes out and the GFCI trips when everything tries to come on at once,

or to temperature or salinity fluctuations, or if anything dies....

Still no reef in the backyard (whaaa!), but came up with the next best thing (at least my checkbook thought so)--I got a great deal on a used complete saltwater setup, including a 180 gallon (Clear-vu?) acrylic tank (would have preferred glass for ease of cleaning, but oh well) 6' x 2' x 2' made of 5/8" acrylic. There are two top access holes on it, but I'm short and they are so small and far in that I can hardly get my arms and hands in

towards the bottom of the tank. When it's set up with a deep sandbed this will help reduce the depth, but even so, if I can't reach all the tank sides I'm rapidly going to have only scraped view holes of my reef through

the pink coralline algae! and even worse--if I can't reach in to all parts of the tank I may have to disassemble the rockwork every time I need to get

a dislodged coral frag or (please no) something that died out of the rockwork that I can't reach with tongs--not a pleasant thought.

I was considering cutting the holes in the top larger, so that they were at most 3" to 3.5" away from the edge of the tank (on front and sides--along the back are narrow openings for external filters that are already on the edge, so I don't know if I can go in any further), instead of the 6+ inches they are now. How close to the edge can I go without compromising the structural support of the top? (do you need a drawing or detailed measurements?) How wide does the middle bar need to be? (currently about

16") or ideally, is there some way to build a reinforcing braced edge along

the top so that I can cut out most/all of the top? out of what materials? Would I be better off building a glass tank like I was going to do in the first place? (between the chiller, MH lights, two big Iwaki pumps, 500 lbs of "live" (more like base) rock, and a full 50 gallon setup "thrown in" I'll get my money's worth even if I do have to scrap the tank)

Thanks for your time! My corals and fishes are looking greedily at the

Big
Tank, and at me as if to say "well, why aren't we in it yet?"
--Kari Yanskey
(and if Anthony is answering this, at least this time it's NOT the "Preamble to the Constitution", but you'll probably dub me the "queen of parenthesis" or something. Keeheeheeheehee!)
< I wouldn't mess with it here, you will likely just end up with bigger problems. Also since you are using metal halides you will want as much support as you can get because of the heat. You should be able to reach most of the algae you need to get at with a long handled scraper such as the one made by Kent. Best regards, Cody.>

Re: want to cut out top of acrylic tank part 2
ohh, sick sinking feeling--did I say the acrylic was 5/8" thick? in the message I just sent you? it's 3/8" thick--makes a real difference....
thanks! --Kari
<That's better! Cody>

Acrylic Nightmare
Hi,
<Hi there! Scott F. with you>
This is in response to a prior FAQ. I have an empty 55 gallon acrylic tank that's in need of some serious scratch removal. I wanted to know if the headaches in trying to do this myself is worth it. I've seen a few of the various kits that are available, but I want to know if there's any one particular kit that is recommended over another. If it's feasible, I'd like to get the tank professional restored but I don't have any clue where to take it. I live in the Orange County/Los Angeles area. Please help! Thanks so much.--Chris Sartor
<Well, Chris- "worth it" or not is a relative term, I guess. Depending on the severity of the scratches, it may be almost impossible to get 'em all without days on end of work. I won't kid ya- it's a very tedious process, and if you're doing a lot of scratches, it can become a "lost cause" at some point. However, if you have the time, and don't mind the effort- you can certainly pick up a tank at a good price and get it quite a bit nicer than it is now. As far as having it professionally restored- this may be one of those things that make it not worth the $$$. If you can find someone who can do it, they may charge enough to make purchasing a new tank look attractive! I'd try contacting a manufacturer or two for possible referrals. In the LA area, I think you could call Advance Aqua Tanks (Clear For Life), and see if they have some ideas. Good luck! Regards, Scott F>

Scratching His Head Over A Scratched Tank!
Aloha WWM Crew,
<Howzit? Scott F. with you today>
Thanks for all your help. The service you provide is second to none (no ka oi).

<Thanks for the props! Glad to hear that we've been helpful for you!>
I have written a few times about my 55gallon FOWLR. I'm thinking about purchasing a used 200 gallon acrylic tank, but I have some questions before I jump into such a big investment. First, the tank has many huge scratches on the inside as well as the outside of the tank. The current owner has many kids that destroyed the outside of the tank.
<Those darned kids... :)>
There are so many scratches that you can barely see into the tank. The tank is a SeaClear and seems to be in good condition
minus the scratches.
<An all too common problem with used acrylic tanks! But also a common reason why used acrylic tanks can sometimes be had for cheap prices!>
I was wondering if the tank would be worth the headaches of trying to remove all the scratches. Are there any other issues I need to be aware of? Could the scratches lead to a leak or cause the tank to crack?
<Well, Jeff- if they are basically surface scratches, they can actually be removed with a special sandpaper kit made especially for this purpose. It is a rather tedious process, unfortunately...but it does work! As long as the scratches are not "deep", or near the seams, then the tank is probably structurally sound...Do check on the condition of the chemical "welds" on the corners of the tank, to make sure there are no signs of them pulling away from each other. As long as the tank is structurally sounds, and as long as you're up to the challenge of sanding away the scratches (and if the price is damn good!), you may be able to score a killer deal on a tank that you can get lots of usage out of. Do check our sponsors for these acrylic refurbishing kits. There are other places on the net that offer these special grades of sandpaper. It's worth a shot.>
Mahalo Nui Loa-Thank you very much, Jeff
<Malama Pono and Ahu'i Hou! Regards, Scott F>

100 gallon acrylic tank bowing
Hi there,
<HI>
I have what may be a silly question for you guys. We just upgraded from a 30 gallon glass tank to a 100 gallon acrylic tank. We've got all the equipment setup and working, the tank is full, and we have noticed that the front and back seems to be "bulging" out about an inch or so. We figure this is probably normal due to the weight and flexibility of plexiglass, but are somewhat paranoid - that is a lot of water in there!
<It sure is a lot of water, and I would not want it on my floor. Acrylic tanks will bow a little bit, but an inch sounds dangerous to me. I would drain the tank and install a brace, possibly a padded bar clamp. We have some FAQs on acrylic tank repair you might want to check out.
http://www.wetwebmedia.com/acrylicaqrepair.htm
http://www.wetwebmedia.com/acrylictkrepfaqs.htm >
Can you tell me if this bulging is normal or if we should be worried about the impending flood?

<I'd worry, I tripped over a 5gal bucket dumping water all over my floor, and that was a pain to clean up, I would not want to imagine 100gal. - Gage>
Kristin, BC, Canada

PLEASE HELP!!!! <Acrylic tank coming apart>
I am panicking big time! I wanted to check with you to see if you had any ideas or suggestions. I have a 160 gallon acrylic tank. I got it about 6 months ago on EBAY and it has been absolutely wonderful. It looked very well made with the top being completely molded into the frame with just two cut outs as openings. It is not leaking at the moment but yesterday I saw something very disturbing happening. It looks like there is an extremely very slight separation in the seam of the side wall coming into the back wall. The separation is on the outside and air is getting into the seam. I feel no separation at all on the inside. No leaking water yet so it has not made it through the 1/2 acrylic to the inside I'm assuming. It started at the very top and is moving down quite rapidly. . . it moved about 1/2 inch during the night. I'd say from yesterday morning to this morning it is about 4 1/2 to 5 inches long. You can see it clearly looking in from the front of the tank because the air is reflecting light. Like I said so far no water leakage at all. We put clamps on it this morning because I just had nightmarish visions of the entire house being flooded when I went home from work. Were clamps the right thing to do? Have you ever seen this happen before?
<Have seen this happen before... the "whiting out" or crazing area is very bad news. DO IMMEDIATELY DRAIN the tank down at least half way. It may well separate at this seam!>
Am I freaking out for good reason or overreacting?
<I think you should (I would) freak out, and you're not overreacting.>
I'm guessing that I will need to get a new tank right away. . . so, I've looked into it and it will take approximately 2 -3 weeks for the store here to get what I need in. I'm just hoping that the clamps will hold!!!!!
<I would not count on this w/o lowering the water. Who is the manufacturer of this tank? Do contact them ASAP. They may well be able to expedite a replacement to you>
As far as what tank to get. . . I loved acrylic for the reason that it seems so much more durable than glass. . . but since this has happened I don't know. Would a 160 gallon glass tank be too dangerous -- should I keep going with acrylic?
<Both are "reasonable" (safer than driving on the road) technologies>
One other reason I found that I don't like acrylic is that it is so difficult to clean without scratching. I hate that but have put up with it because of the durability.
<Yes>
Can you offer some much needed advice? If I did go with an all glass tank what brands do you recommend? Is All-Glass on your list?
<Yes... as well as Perfecto, Oceanic... in the old days Atlas, Odell>
Also, please tell me if you would go with acrylic again for the durability.

<We mainly fabricated and installed acrylic in Southern California... due to earthquakes... their greater strength during "shaking". Bob Fenner>
Thanks so much! :)

Acrylic Tank coming apart
I've checked into it and I will have to wait 3 - 4 weeks for a replacement tank. I'm am so stressed at the moment I don't know what to do. If I drain the tank to below the crack I can't run the pumps. How long can my fish safely live without a filtration? P.S. I also have live rock. What to do???? HELP!!!!
<Think on ways to add a sump (even a plastic tote) where you can place some of your live rock, run the water back and forth. But do drain the tank down>
Thanks for any advice you can offer! :)
<Will your local fish store your livestock for you while you await the replacement tank? Do ask. Please see here re moving, storing your gear, livestock: http://www.wetwebmedia.com/movingaq.htm
Bob Fenner>

Acrylic Tank coming apart RE: PLEASE HELP!!!! (quick suggestion from Ananda)
<Ananda here, hoping to lend moral support...>
I've checked into it and I will have to wait 3 - 4 weeks for a replacement tank. I'm am so stressed at the moment I don't know what to do. If I drain the tank to below the crack I can't run the pumps. How long can my fish safely live without a filtration? P.S. I also have live rock. What to do???? HELP!!!!
Thanks for any advice you can offer! :)
<I'm going to let Bob answer, too, but I thought I'd pitch in with a suggestion. You could use 55 gallon Rubbermaid Brutes (the grey, white, and yellow ones are food safe) to hold some of your rock and water (and maybe even some of the fish -- don't know which species you have) until you get a new tank. Hang in there! --Ananda>

Cracked acrylic tank
Do you see anyway of repairing this type of thing? Could I drain the tank down and try some sort of glue? Is there anything I could try before giving this thing up completely?
<Sorry to hear of this major problem. I would contact an acrylic manufacturer about repairing this tank although I hold little hope for repair. You would be safer just getting a new tank. At the very least I would empty this tank ASAP and follow the suggestions from the last email. You don't want to put this off until the whole tank spills on the floor>
Thanks for your patience with me. :)
<No problem...That's what we're here for! David Dowless>

RE: PLEASE HELP!!!! <Acrylic tank separation)

Hello again. . . was hoping you could give me some more pointers. Here's what I've done so far. I've drained the 160 gl tank down to well below the crazing (however it still keeps creeping!)
<Keep draining till it stops>
and have transferred the fish to a 75 gallon and have hooked up all of my equipment (wet/dry, skimmer, sterilizer, etc.) to this new 75 gallon. I transferred some of their substrate and rocks too. They seem to be doing fine however I'm worried that they will think they are being punished for going to such a small tank!!! Will this stress them out?
<Not as much as living w/o water>
I've adjusted the flow rate (a Mag 9 is running the wet/dry) and have turned it down about a 1/4 of the rate it was going. Is that enough or is the flow rate too high for the 75 gallon?
<Should be fine>
Here's my dilemma. My VHO's and small power compact are hooked to the 160 gallon so I left a little water in there for the live rock and a pump circulating the water so that they could receive the benefit of the lights because the 75 gallon does not have any at the moment.
<Good plan>
Will the live rock survive with just the circulating water and lights for 4 weeks.
<Also should be fine>
I couldn't add the kalkwasser and calcium because there is no filtration, right? Or, would it be better to somehow rig up a little power compact to the 75gallon and transfer the live rock in there with the fish?
<You can measure calcium, pH and add supplements as you see fit>
Will my excess water (that I really want to save since I spent months getting it perfecto!) that is being housed in large plastic containers and some in the old tank be ok for 4 weeks with just a circulating pump? Will it still be perfect with no fish being in it for 4 weeks?
<Yes>
The new tank will most likely take the full 4 weeks. I've ordered another acrylic (has a lifetime warranty) from a reputable company (been in business 20 years) and have ordered the following dimensions: 72L x 18w x 34h -- is this ok as long as the acrylic is 1/2 inch?
<... 34 inches tall? I hope your arms are long... I would have preferred either thicker material (mainly to reduce the degree of bowing and improve looks, looking through...) or to have made the tank wider, but shorter... to work on, support life>
Would it be better to go with 3/4 inch? The 160 that cracked was 1/2 inch and was 72 x 18 x 28 so I'm just going 6 inches higher.
<Yes to the 3/4 (call and change if possible... NOW), six inches higher is a huge difference>
Sorry to be so long winded but I have lots of questions -- hope you are full of patience today! :)
<No worries>
Trying to figure out why the crack happened in the 160. What could have caused this?
<Almost assuredly construction defect... the folks who cut and assembled

the tank didn't make joints square, clean, did solventing in a high humidity (very common), or used defective solvent...>
The tank was perfectly (I mean perfectly) level and I use VHO lighting (4 ft. bulbs centered across the 6ft tank) as well as one small power compact in the center. I know MHs aren't smart to use with acrylic but I always thought VHOs were fine. . .am I wrong? The crazing happened in the right back corner where the VHOs are really over it???? Any ideas of what happened?
<Not much chance it was the lights, or anything you did... as stated, it is/ was the manufacturer>
Last question I promise!! I was thinking of adding an angel fish before all this happened. Would it be better to let my fish get acclimated to their new tank when it arrives and add the angel a few weeks after or should I add the new angel at the time they go to their new tank so everyone is claiming new territory?
(I'm thinking the Angel will need to go in a few weeks after the fish have acclimated so it won't get the "I'm the king of the tank" attitude and might be a bit humbled??
<I think you'll be okay to add the angel... if it's "ready to go" (certifiably clean of parasitic disease)>
Thanks for listening to me babble. . . I appreciate you more than you know!! Would welcome any advice you care to give. Thanks again!
<Bob Fenner>

Tank coming apart follow-up
Hello again. . . just a little update on the situation. . . all fish are doing fine and are acclimating nicely to their smaller 75 gallon. All of us are anxiously awaiting the arrival (still have three more weeks to anxiously await) of the new tank so our lives and living room can get back to normal. By the way, THANK YOU for all of your help during my crisis. I literally don't know what I would do without you!!!!! (PLEASE, don't ever get out of this business/hobby!!!!) :)
<Not likely, thank you>
A quick question. . . I've, of course, been keeping my left over water that wouldn't fit into the 75 gallon in large Brute trash cans in the living room with the base rock in there and pumps circulating the water. One trash can sat for about a day without circulation -- is that water ruined?
<No, should be fine to use.>
Secondly . . . . I've transferred all of the sand (not live sand) into buckets. They have a little water sitting on top but are not being kept in the huge trash cans being circulated. Is this ok?
<Yes>
Last question. . . I had been using a MAG 9.5 to run my 160 gallon. I've been using it as an external pump (it seems to be working great) but recently read in a MarineDepot.com catalog that MAG pumps are not to be used externally. Is this your opinion too? What would happen if I continue to use it externally?
<It may overheat, quit on you, but there are others who have used this

size, line pump externally with impunity>
But, this may be a moot point when you hear my next question. Since I am going 6 inches higher and 30 gallons more with my new tank coming in will a MAG 9.5 be sufficient to run this fish/live rock only tank? What if I wanted to start slowly getting into corals (have VHO/ PowerCompact lighting)? Would I need a larger pump now for the extra height and gallons (if so, please recommend some) or only if I were to go with more of a reef system? Thanks for your advice!
<It may be time to upgrade then>
I think that's it for now. Again, A HUGE THANK YOU!!! You are truly a lifesaver!! By the way, do you ever come to Tallahassee and lecture at Florida State University?
<Have not yet. Bob Fenner>
Elizabeth

Acrylic tank cutting
I would like to cut part of the top of my tank out and was wondering if you thought this was safe. I emailed to ask Clarity Plus, since they made the tank but did not get a reply. I would like to just cut where the red line is. Its a 125Gal, so what you see there is replicated on the other side, I only want to cut this one side tho. Due to the extreme bow and flex in this small piece, I think it will be ok...I just wanted a 2nd opinion. Going to post on the forum too tho not sure how to host the picture for that.
<Mmm, well, I would like to see there be a much wider (a few inches) long piece of acrylic be along the back edge where the original cut-out is... to strengthen the sides from bowing. But the present cut-out is what, where it is... It should be okay to make the cuts as you show them... but if you can, do consider "running a strip" of acrylic (like two-three inches wide, the length of the back of the tank) and annealing this to the top (with solvent) to brace the tank from bowing. Bob Fenner>
Mark

Acrylic Scratches
Bob-
<Scott F. here this afternoon>

I recently purchased a 65 Gallon acrylic tank. Not thinking I scrubbed the inside of the tank with a Scotch pad (green, abrasive cleaning pad).
<Made that mistake before, myself!>
I then installed my power compact lighting and turned it on and to my dismay I saw that I have tiny surface scratches all over the inside of the tank. Is there anything I can do to remove them? PLEASE HELP ME!
Thanks, Mike
<Well Mike- this has happened to just about everyone who's ever had an acrylic tank- so don't beat yourself up over it. There are "repair kits" available to remove surface scratches, but they do involve sanding with various grades of specialized sandpaper. The scratches can be removed, but the work is kind of tedious! Do consult the dealer where you purchased the aquarium for a source of these kits, then get to it! Good luck!>

Need help please (scratch, opacity from acrylic tank repair)
hi bob I bought a 60 Truvu tank and had a scratch in it my LFS gave me some srk-1 to remove it now I have a big smudge is there some thing you can suggest I can buy to polish that out thx for any info
<There are "finer" polishes (often scratch-removal kits come with more than one grade) to "polish around" such hazy areas... in a pinch, if the area is small, you can even use a gritty oral dentifrice (aka toothpaste) and a soft rag to buff out such blemishes. Bob Fenner>

Jim Dorsey, California Aquatics
Bob,
Oddly enough, Donna from Dr. Kaplan's office [Pediatric Urological Associates] called and, as you remember, you installed a Tru-Vu 75 Hex Tank
in -oh about 1982.
<Yikes! Yes, a very nice fellow, and great office staff as I recall.>
Well, one of the kids knocked off the canopy [again] and
we are having trouble finding Aquaplex. Did Bill Montgomery finally get how
of the business?
<I don't think so... but... pls see below>
How can we do that?
<Finally get out of the business? Wish I knew!>
Do you know of any other acrylic canopy manufactures?
<Yes. Have San Diego Plastics fabricate a sturdier replacement>
Thought you might get a kick out of this one!
Check out are site @ www.californiaaquatics.com
Jim
<Very nice. Be chatting, Bob Fenner>

plexi glass glue
Hi there once again,
I have a question about the type of glue people use to put together plexi

glass.
<Most folks use a commercial acrylic solvent... like Weld-On>
I hear that the best way to glue two pieces together is to use a solvent called Methylene Chloride.
<This is a principal ingredient. Toxic, flammable, not generally available to the public.>
can't seem to find it in Home Depot or Lowe's. Do you know where it might be available?
<Check with the businesses listed in your phone directories who sell or do plastic fabrication>
I also wanted to ask if you know whether this solvent (Methylene Chloride) can be used to glue plexi
glass+regular glass together, or is it just for plexi glass+plexi glass?
<Only the latter>
On another note, I'd like to thank you for responding so quickly, and for being real informative. It's advise like this, that I wish I had for everything I come across. Your help is greatly appreciated. Thanks, Hamilton, Riverside, CA
<Glad to be here helping. Bob Fenner>

Re: plexi glass glue
Thanks for your help, but I'm not quite sure about what you meant by (only the latter).
<The last statement... these solvents are only for acrylic to acrylic bonding>
Can you describe this in another way? And is (Weld On) safe for fishes. Well I guess it is since you said everybody else uses it. Thanks for your help.
<Safe after cures (a day or so)... it actually "leaves"... melting/melding the Plexi as one piece. Bob Fenner>

Acrylic
Do you know of any way to buff scratches out of an acrylic tank? Thanks! :)
<Yes... have spent a bunch of time trying to do so... slight liquefied abrasives, to papers to "heat burnishing". Please use the Google search tool on our sites homepage or indices (on WetWebMedia.com) with the terms "acrylic repair" or "scratch removal". Bob Fenner>
Elizabeth K. Birdwell

Cracked Tank
Hi there Bob I just cracked the bottom of my 180 gallon acrylic tank. Its okay it was empty. The crack maybe about 10"long. I would like to repair this problem if possible. Someone had mentioned to use "Weld On (I forgot the number) and attach a new piece of plexi-glass to the bottom, he also said that even if I glued the new piece on to the bottom the crack may continue to grow until it reaches the edge.
<Yes... I'd plan on this... you can likely make a good repair by solventing

(actually the process here... not gluing) another thinner sheet of acrylic onto the bottom of the existing one... over the crack and all else.>
To remedy this problem I thought about drilling a small hole at the two ends of the crack to stop the crack from growing. Do you think this is a good idea? or do you have any other suggestions?
I look forward to your input,
<Do ask the folks at acrylic fabricating shops in your area, over the Net what they would do as well. I would solvent a piece onto the bottom and router off the edges. Bob Fenner>
James

Re: 200 gallon tank (acrylic repair)
<<Greetings,>>
I was reading also something about drilling small wholes on the bottom where the side and bottom connects and fill those holes with the #40 solvent along with sealing the inside of the tank; is that true????
<<I've never seen an acrylic tank built this way, although I can see why one might consider this stronger than a typical 90 degree joint. For certain, these holes would need to be precision drilled - too close to the outer edge, and the material will be weakened. Too close to the inner edge and the tank will likely leak.
Cheers, J - >>

Re: 200 gallon tank (acrylic repair)
When I push the side and bottom together, do I put the #40 glue
<Not a glue... a solvent... melts the panel material together.>
on the inside and the out side on the tank. Is the #40 better that the #3 and #16.Below is what I saw in the article on the web site...
1) Clean the wound.
2) Push the crack together.
3) Glue with #3 solvent to make a good seal.
4) See if the fracture extended into the sidewall and seal that if needed.
<Depends on the width of the gap... if so wide you can actually see light through the space, a more viscous model would be better... In actual practice, it almost never matters... but if the gap area can be "squeezed" together by laying the tank on its side, placing a bunch of weight (finally a use for those encyclopedias!), I would do so. Bob Fenner>

Re: 200 gallon tank (acrylic repair)
I did ask one of the people there and they told me it wouldn't work but if I was to use it I would need to inject it on with a syringe...
<Please read over WetWebMedia.com using the search tool at the bottom of the homepage... with the terms "acrylic", "Plexiglas", "aquarium repair"... You need a version of the "whole picture" which you will not get by the current process. Bob Fenner>

Re: 200 gallon tank
How do I put this stuff on, because I hear that it is some powerful stuff....

<Ask the folks you buy it from... read the label... not difficult. Bob F>

100 gallon tank (repair)

I have a 100 gallon tank made by Acrylic Sea Clear Aquariums that is about 7 yrs old and the Silicone sealant has come off that separates the front and the bottom of the tank.
<Not made of silicone/silastic... these tanks are made by old friends of mine... of acrylic and solvent (Weld-On 40)>
What suggestions do you have on getting this fixed, to have a professional person do it (do you have any suggested repair places) or do it myself and if so what produce should I use. I live in the Washington, DC area.
<Actually, very easy to "do it yourself"... Look in your "Yellow Pages" phone directory of folks who retail Plexiglas, plastics... or do fabrication, and call, ask if they'll sell you a small amount of solvent. Clean up the joint, let it dry, and apply this material (with windows open on a nice breezy day or outside), let set for a day or so... fill up outside on top of a piece of newspaper (to test for leaks) and you're done! Bob Fenner>
Thanks
Glenn,

Re: 200 gallon acrylic tank repair

Do you know if this Weld-On 40 stuff will work on a 200 gallon tank as well....
<Yes... this is what many (if not all) fabricators of acrylic aquariums use... for all sizes of systems. Bob Fenner>

Scratches on Acrylic Tanks

Hi Bob,
<Good morning! Steven Pro in this morning.>
I have an old 125 gal. acrylic tank with scratches from rocks falling and coral pieces bumping into the tank.
<A common problem with this material.>
How do I remove the scratches?
<There are various products on the market for buffing/polishing the acrylic to like new status.>
The tank is empty now,
<Which makes this procedure much easier.>
and has been torn down for about a year. I would like to set it back up but I would like to try to make this tank look like new. Any information would be greatly appreciated. Thanks Kevin Shimabuku
<Check out any of the dry goods e-tailers for acrylic repair/polishing kits. -Steven Pro>

Scratches (acrylic repair)

Hi Bob,
I have a 300 gallon acrylic reef tank that has a few
scratches in it. I ordered some MicroMesh scratch

remover pads from an acrylics shop on the web that can
be used to "polish" out the scratches without using
any scratch remover compound.
Is it safe to use these polishing pads inside the tank
to buff out the noticeable scratches in a small area ?
<Yes... but does require that you lower the water level below the area to be smoothed out. Bob Fenner>
Thanks,
Chuck Spyropulos

Article on acrylic tanks
Since you were so kind about my article on BTAs, I thought I'd point you to another article I did for someone else about my experience with a cracked acrylic tank. It is at http://www.canreef.com/library/acrylic_tank/acrylic_tanks.htm <http://www.canreef.com/library/acrylic_tank/acrylic_tanks.htm> and there are no copyright issues. If this looks like something you'd like, I can send you a zip with all the pictures. I could do another model of my new tank with the alternate cutout arrangement and larger corner rounds.
<Sorry for the delay Marc. Have been and am in Australia (back 4/5). This does sound good. Will post and help you place on my return... saw your further sending but will have to wait... downloads, the Net is painfully slow here. Bob Fenner>

Article on acrylic tanks
Hi, Bob, If you'd like to post this, do use the zip I sent in a later email. It is updated for content (and some typos). For better or worse, I have no more articles lurking around ;-).
<Thanks Marc, will do so on return... soon>
Hope you had a good trip and the post-trip email backlog isn't too daunting.
<Am actually looking fwd to the effort (ask me a day or two into it...). Bob F>
Marc

Article on cracked acrylic tank
Hi, guys,
You were kind about my BTA article so here's another one. If you like it, feel free to post it on WWM.
This one is about my cracked acrylic tanks and what I learned about them while looking into this problem.
The root file is acrylic_tanks.htm
Marc
<Marc... of all things I can't open this file... Can you send as an attached one in Word fmt, or paste onto Hotmail? Bob F>

Re: Article on cracked acrylic tank
Marc, did find the link, the article. Posted: http://www.wetwebmedia.

com/acrylicaqrepair.htm
Do send this in (I would try FAMA first, let me know if you'd like help). Thank you for your input, sharing. Bob Fenner

RE: Article on cracked acrylic tank
Bob,
No problem; just fun with computers ;-).
<Mmm, agreed today... a few days/weeks from now when the "just been out on dive travel" wears off I'll be more vinegary re Billy.G et co.>
Looks like I somehow sent you my earlier version of the article. This one is
fine although it has a few typos and it has a link to someone else's webpage
(and I didn't confirm that it was okay to reference his page although I doubt that is a problem). I have another version with the typos corrected and the link reference removed. If you'd like it, let me know.
<Okay either way>
Glad you liked. Let me know if I can help with anything. Don't claim to be
an expert but I can do 3D models of stuff for you if you like (as long as it doesn't involve living things, it is pretty easy for me) and as for another article, I've been toying with a "things I learned the hard way" article.
Marc
<These are very popular, useful. Hope to see you producing more and enjoying the "big fame" and small dollars from their publication... and the almost all-consuming satisfaction of knowing you have helped others. Bob Fenner>

From: charleyb@gr.hp.com (Charley Bay (Contract))
Subject: Re: Cutting Hole in Tempered Glass
Date: Fri, 20 Oct 1995 17:48:14 GMT

: : THE PROSECUTOR (utpennington@cc.memphis.edu) wrote:
: : : i have been told by many people on this group that drilling tempered
: : : glass is suicide as it will just shatter. however, local glass
: : : companies, (who i would get to cut the hole
: : : for me) insist that they can CUT it with a special glass cutter with
: : : no problem.

: patrick timlin (ptimlin@lynx.dac.neu.edu) then said:
: : If they guarantee the work, then go for it, you have nothing to loose.

Right. Make them guarantee the work unless it's a cheap tank. (I bet they'll charge extra for the "insurance". In my town, none of the cutters will guarantee a tempered glass cut.

Finally, Kristi Bittner (kristi@sc.hp.com) said:
: Also, doesn't it take out the temper, if it's been cut? Do they
: re-temper it for you? (Or am I out in left field?)

No. Tempering the glass is heating and cooling. Simply by cutting it doesn't remove the fact that what remains was heated and cooled.

I've drilled tanks, and had my tanks drilled. However, I'm now reformed: I wouldn't do it again and I wouldn't recommend it. :^>

Tempering glass is like tempering most metals: Heat the item up and cool it off to get a more "crystaline" formation, or a more complete molecular binding (the heat provides the free energy to weaken bonds so they can re-attach more strongly).

You can temper to varying degrees: Heating iron to red-hot then cooling, blue-hot then cooling, or white-hot then cooling will give varying tempers to the item.

For metals, you usually know what you want: A lawn-mower blade has a weak temper: It holds a little edge, but is not that strong. However, the blade doesn't shatter when you hit a rock: it gets a ding, and you go sharpen it again. LESS-TEMPERED MEANS SOFTER AND WEAKER. On the other end of the spectrum, metal files for grinding are VERY highly tempered. It's tough to wear down the

edge, and knives made from these metal files hold an amazing edge (I have some I've made). However, these knives are also very brittle and can shatter easily. MORE-TEMPERED MEANS HARDER AND STRONGER.

There's a guy in town that I'm good friends with that has been in the glass/optics industry for decades. He has several glass manufacturing patents, and has been CEO of several large glass/optics manufacturing companies. After talking with him, I would never drill my tanks again (especially tempered glass).

Drilling glass, no matter how well done, introduces micro-fractures that grow with time. Recall the cracked car windshield: The cracks grow with time. Of course, a car windshield experiences lots of motion and vibration to accelerate the cracking process; On the other hand, the bottoms of our tanks are ALWAYS under terrific water pressure, which doesn't help any either.

Once you drill and introduce those micro-fractures, they are there and will grow forever. You can't stop them. Someday, it will grow enough to weaken the glass and the tank will leak or break. It's only a matter of time. Also, ALL CUTS introduce these micro-fractures; Nobody cuts glass, because they can't. Everbody grinds it, even if they are grinding a very small hole.

With tempered tanks, it's worse. The micro-fractures grow faster because the tank usually relies more on the stronger silicon bonds from the tempered pane, which are completely gone when a crack is introduced. Your tank will take less time to fracture.

I have a 180 gallon tank with two drilled holes. I wish they weren't there. The tank is fine and I have no horror stories, but there is a greater peace-of-mind knowing that in a worst-case scenario, all the water would stay in the 6'x2'x2' box because there are no holes.

Despite the potential convenience of a drilled bottom, I will never drill my tanks again. Hanging over-flow filter boxes and water returns are just fine, and are far safer.

--
--charley #include <stdisclaimer.h>
charleyb@gr.hp.com -or- charley@agrostis.nrel.colostate.edu

From: boheggus@usa.pipeline.com(Josh)

Newsgroups: rec.aquaria.tech
Subject: Re: OverFlow Box
Date: 2 Aug 1996 17:15:56 GMT

On Aug 01, 1996 16:01:49 in article <OverFlow Box>, 'lnorris@ionet.net (Larry Norris)' wrote:

>I am in the process of designing out a 75 gal. aquarium. I am an avid
>DIY'er and I'm planning on building just about everything except the
>tank and the live rock (but I'm open to suggestions). :)
>
>In any case, I'm going to use a sump for my skimmer and any other
>devices I want to put down there, and was wondering if anyone had any
>opinions on an overflow box vs. an overflow hole/pipe.
>BTW, I'm planning on using gravity to feed the sump, and two
>powerheads in the sump, one to feed my skimmer and one for return.
>
>My reservations are to both methods are;
>1. Drilling a hole in a perfectly good tank. This and having a
>non-adjustable and possibly low water level all the time.

I kicked this idea around when I set up my 125. I called around to several glass shops (this is one job I won't try myself) and while a couple of them agreed to do it, they wouldn't guarantee it. In other words, if the tank broke while they were drilling it I was SOL. This and the fact that drilling a tank will void the warranty made me decide against this option.

>2. Siphon on the overflow neck being broken and water all over my
>living room floor. That and the resultant non-too-happy wife..

Been there, got yelled at for that <G>, though not because the siphon broke. I run three overflow boxes on two different tanks and the siphon has never broken in the several years I've been using this technique. My problem has been with snails going through the overflow and getting stuck at the gate valve in the line to the sump. The trick to maintaining the siphon integrity is maximizing the flow through the U-tube. As long as the flow is at around 200-250 GPH, the water moves fast enough so that air bubbles don't accumulate, IME. Keep the flow rate in mind when you choose the powerhead for the sump return (I'd recommend a Rio). There are other tricks like attaching the venturi inlet of a powerhead to the peak of the U-tube so that any bubbles that do accumulate are sucked out but I've never tried it. Good luck!

Josh
-Ban anchors, not reef tanks!

From: J Hefley <jhefley@webzone.net>
Newsgroups: rec.aquaria.marine.reefs
Subject: Re: Drilling My New Reef Tank
Date: Fri, 04 Oct 1996 13:34:48 -0500

Jason Pook wrote:
>
> I am currently planning to set up a new reef tank and have aquired a
> new tank 48 x 15 x 18 and I would appreciate some advice about the
> safest way to drill glass to install a way to drain water to a sump
>
> Can the tank be drilled at the top to allow water can drain to the
> sump ratther than at the bottom and fitting a corner wier box?
>

Drilling a tank isn't really a DIY job IMHO, goto a glass shop and have them do it for a nominal fee (+/- $15 US) they have all the skills and tools necessary for the job. Also of course be sure that you don't have a tempered glass tank as these are not drillable. You can drill either the sides or the bottom, if you drill the sides you will need a bulkhead I would go for 1.5" or larger. Another option is a overflow that hangs on the back of the tank.
Good luck.
Jason

From: pRpLe <jrm@primenet.com>
Newsgroups: rec.aquaria.marine.reefs
Subject: Re: Drilling My New Reef Tank
Date: 10 Oct 1996 01:24:01 -0700

Jason Pook <jpook@glades.demon.co.uk> wrote:
: I am currently planning to set up a new reef tank and have aquired a
: new tank 48 x 15 x 18 and I would appreciate some advice about the
: safest way to drill glass to install a way to drain water to a sump

: Can the tank be drilled at the top to allow water can drain to the
: sump ratther than at the bottom and fitting a corner wier box?

: Many Thanks

: jpook@glades.demon.co.uk

Well, unless you have the proper tools (glass drills are WICKED expensive)
and LOTS of experience drilling glass, I have to tell you to take the tank
to a professional. Messing up on a job like this can cost a LOT of money.

Good luck

Rob

--

jrm@primenet.com

From: howardr@col.hp.com (Howard Rebel)
Date: 16 Feb 1994 01:22:26 GMT
Newsgroups: rec.aquaria
Subject: Drilling glass [Re: tank rack].

This article details how I cut holes in glass without
the use of commerical drill bits. It requires a
drill press and copper water pipe which can be purchased
at most hardware stores. If you are not the DIY type
skip this.

A Few Notes

You can not drill a hole in tempered glass.
You can drill a hole in untempered glass.
You can drill a hole in untempered glass and then
have it tempered.

It is more difficult to drill holes in aquariums after
construction.

I have cut holes in 3 20 gallon and 3 40 gallon tanks without
problems.

How to drill a prebuilt untempered tank

> It is good pratice to glue a small square of glass
> on the bottom side of the pane you are drilling.
> This will produce a cleaner hole and can serve to
> reinforce the glass if left in place.
> This is esp important when drilling 10 gallon
> tanks and it makes sense to leave the square of
> glass in place to beef up the thin glass used on
> small tanks.
>
> Support the back side of the glass at the drill
> location. I use a foam rubber block to push a
> square of plywood under the drilling site.
>
> Place the tank on a nonflexabile surface clamped
> to the drill press.

Keep the tank from moving by placing strips of wood on all four sides of the tank.

Drilling Holes for DIY Tank and Filter Builders

For those of you who want to drill holes in glass and build your own aquarium the following may be of interest.

Drill all holes prior to assembling aquarium. This way if you screw up you can get another piece of glass and start over.

Buy all glass cut to size at glass shop.

Used glass is cheaper if you can find it.

Use sandpaper to dull edges. Wear leather gloves and work slow using a lot of care. Note that newly cut glass is the sharpest.

Get a extra piece(s) of glass to practice on.

To drill holes:

Clamp a piece of plywood to the drill table to support the glass. Screw strips of wood around the glass to keep it from moving.

Place a second piece of glass under the one you are cutting. This will result in a cleaner hole.

Form the well to hold the cutting grit and coolant. Glue a 3/4" length of 3" PVC pipe to the glass where you want to drill the hole. Use silicon sealant.

Make the bit. Use copper pipe fittings with one or more notches cut into the rim (cutting edge of the bit). Adaptors can be used to get from the bit size to the size of your chuck.

You can also use brass tube to make bits, the notch(es) are still required.

Now you need to create something to pull down on the drill press feed wheel.
At first I just taped a string with a jug of water to a arm and adjusted the table to put the arm in a horizontal position. As the bit got shorter and the hole in the glass got deeper the arm would move out of horizontal and the pressure on the bit would change. This method works but you may need to reposition the table or adjust the quality of water in the jug.

To over come this I cut a circle from a sheet of particle board and cut three slots in the face of the circle to pass the arms of the drill press feed through. I then cut a slot in the edge of the circle. This slot carries the chain which holds the jug.

For cutting grit I use coarse rock tumbling grit. Fill the well about half full with grit. Add lubricant to bring the well to 3/4 full. I use water for lubricant but I have heard that oil or antifreeze (kills cats that drink even a little) may work better.

Fill the jug with water till the drill press will stay where you put it (bit up/down) with the motor off.

Turn on the motor and pull down on the drill feed. Listen to the sound the bit makes as you vary the pressure on the feed. You will hear the grit cutting the glass when the pressure is correct.

With the drill running add water to the jug to get the cutting sound without you pulling down on the feed lever.

Now let the drill do its work. It will take anywhere between a few minutes to an hour depending on how well you did the setup.

When the drill comes through it will retain the plug of glass it cut out. Remove this plug from the bit before cutting additional holes.

If the hole is tapered roll up a sheet of sand paper and ream it out.

--
Howard Rebel howardr@col.hp.com

FAX: 719-590-5701

From: Jason Madison <jmadison@nando.net>
Newsgroups: alt.aquaria
Subject: Re: I want to put a hole in my tank
Date: 18 Jun 1995 15:55:02 GMT

I just had the same question and Ian Buckley wrote me:

Concerning your desire to drill tanks,presuming that they
are glass, you can get all the equipment from "Aquanetics Systems Inc.",
5252 Lovelock St., San Diego, CA 92110. Phone 291-8444 voice, 291-8335
fax, area code 619.
Glass drills cost 10-20 dollars, depending upon the size. You will
also also need some Drilling Compound, 1/2 lb goes a long way.
I use a drill press, and apply a slow steady pressure.DO NOT RUSH.
In the past, I have used a portable press for an electric drill, adequate,
but not as good as the drill press. If you need any more info. or help,
e-mail me,
Buck

I also heard from Carl B. Kracht:
I paid around $50 for a one inch diamond bit here in Houston. I bought it
at a glazier's supply (in the Yellow Pages, where the glass guys go to get
stuff). once you have the bit of choice, you will also need to get some
modelling clay and some antifreeze, keep the kids and pets away from the
antifreeze, they can play with the clay.

You cannot drill tempered glass, so you need to make sure this is float
glass or plate. practice on some 1/4 inch (6mm) plate first to get the hang
of it. it is best to use a drill press for glass of 1/2 inch (13mm) or
thicker. I think Stanley or Black and Decker makes a thing to hold a
portable drill upright.

to drill: pick a spot at least 4 inches from the edge of the tank in each
dimension. form a clay dam (a donut) about 6 inches in diameter around the
proposed hole. squish it down to form a water tight seal with the glass.
fill the donut with a 1/2 inch of 50% antifreeze/water solution. the drill
MUST be at right angles to the glass. using nothing but gravity or VERY
gentle pressure (for the drill press) begin drilling. the glsss dust will
be removed by the solution and keep the bit cool. DO NOT RUSH the process.
(It's even harder to cut down 1/2 inch glass to make a smaller tank.)

it takes about 2 minutes to punch through 1/2 inch glass. if you do it
right the plug that falls out (along with the drilling solution) will not

have any sharp edges. if you drill crooked or rush it, it will have big flanges on the edge.

rinse out the antifreeze and remove the clay and wrap it in saran wrap or foil for storage.

now you can charge all your friends to drill holes in their tanks. to plug holes, i like to use Plumber's Goop instead of silicone and a 4-inch square of 6mm glass, at least.

have fun
-carl

--Just thought I'd forward my mail
Jason

Glass Thickness

Contents:

Glass thickness for home-made tanks

by "James Purchase" <jpp/inforamp.net>
Date: 28 Jan 1997
Newsgroup: rec.aquaria.tech

A number of people have been asking about glass thickness for home-made tanks and several people suggested a graph which appeared in the book "The Living Aquarium", which is now out of print. This may not be legal, but here it is anyway (so sue me).

from "The Living Aquarium", Peter Hunnam (AB Nordbok 1981)

Glass Thickness as a function of length and depth (Metric Scale)

	Length in cm -->																		
Depth	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**
90	d	d	d	e	e	e	e	e	e	f	f	f	f	f	f	f	f	f	f
80	c	d	d	d	d	e	e	e	e	e	e	e	e	f	f	f	f	f	f
70	c	c	d	d	d	d	d	e	e	e	e	e	e	e	e	e	e	e	e
60	c	c	c	d	d	d	d	d	d	e	e	e	e	e	e	e	e	e	e
50	b	c	c	c	c	d	d	d	d	d	d	d	d	e	e	e	e	e	e
40	b	b	c	c	c	c	c	d	d	d	d	d	d	d	d	d	d	d	d
30	a	b	b	b	c	c	c	c	c	c	d	d	d	d	d	d	d	d	d
20	a	a	b	b	b	b	b	c	c	c	c	c	c	c	c	c	c	c	c
10	a	a	a	a	b	b	b	b	b	b	b	b	b	b	b	c	c	c	c

Key:	Vertical	Base
a	4 mm (1/6")	6 mm (1/4")
b	5 mm (1/5")	6 mm (1/4")
c	6 mm (1/4")	10 mm (2/5")
d	10 mm (2/5")	12 mm (1/2")
e	12 mm (1/2")	15 mm (3/5")
f	15 mm (3/5")	20 mm (4/5")

Note: The original illustration featured a graph, not a table. I am just providing "eyeball guesstimates" of where the curves fell on the original graph. When in doubt about which thickness glass to use, err on the heavier side (choose the next thicker glass thickness.)

James Purchase
jpp-at-inforamp.net