CUSTOM CARTRIDGE, INC.

Precision Ultra High Performance Ammunition

Instructions for Making "Home-Made" Ballistic Gelatin

(December 2002)

Ballistic gelatin is a clear/yellowish "Jello," and is a standard medium for seeing and evaluating what happens to bullets on impact with soft tissue after being shot.

These instructions were written by Becky Davis and Howard Davis of Custom Cartridge, Inc. These are not official calibrated gelatin blocks, but are a reasonable alternative for evaluation of ammunition. We developed these instructions from numerous other sources we found elsewhere (online, the gelatin manufacturers, etc.). We wrote this to help others more quickly and easily make their own gelatin blocks for ballistic testing.

You probably want to read the entire instructions prior to starting so you are properly forewarned about all the possible problems.

Sources for materials:

Gelatin:

1. Specialized "ballistic gelatin" is available from

a. **VYSE**, http://www.vyse.com/contact.htm, sales@vyse.com, 5010 N. Rose St., Schiller Park, IL 60176, (847) 678-4780 or (800) 533-2152. They charge $4.65/lb. and require a minimum 25 lbs. purchase, plus you pay shipping. They do not accept credit cards; you must pre-pay with a company check or ship C.O.D. They require about three days' lead time.

b. Kind & Knox, P.O. Box 927, Sioux City, IA 51102, (712) 943-5516 or (800) 223-9244 (Lanette Tackett). They require a minimum 25 lbs. purchase at $10.80/lb. or about $300 with shipping.

We have used both. Both work fine and seem to give very similar finished gelatin blocks.

2. If you are making a small amount (less than 25 lbs.), it appears that plain old Knox unflavored gelatin will work.

The amount of gelatin needed is approximately 13 ounces per gallon of water. This results in a 10% by weight mix, as the specifications require. We usually make one larger block that we cut in half to get two rectangular blocks of the correct size. The amount of water required for this is about nine gallons, so you need 9x13, or 117 ounces of gelatin to make two blocks.

Mold:

The rough dimensions you want for either pistol or rifle ammo testing are 6 x 6 x 20 inches. The easiest way to get this is to go to your local K-Mart/WalMart and buy a large, clear, plastic storage container, approximately 12 inches wide, 12 inches high, by 20 inches long. These are cheap (less than $8), plentiful, and easy to find. Try to find one that has smooth (non-patterned) sides. Measure six inches up from the bottom of the container, and draw a line with a magic marker. Fill the container with water to that line using empty one-gallon milk jugs to measure the amount of water required to reach six inches. It will probably be about nine gallons if you are using a container with the dimensions suggested above.

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You also need:

• Cinnamon oil, available from any pharmacist. Use about one drop per gallon to help clarify the gel and prevent mold growth. It costs about $6 per three ounce bottle.
• Non-stick cooking spray (like Pam) to help release the gel from the container more easily.
• Plastic wrap for wrapping the blocks once they have set up.
• Heavy corrugated cardboard (about 6 x 20 inches) to support and transport the blocks more easily.
• Wood or plywood (about 12 x 20 inches) to support the plastic box. (Nine gallons will weigh over 70 lbs.).

Either plan to spend 20 minutes stirring by hand with a large, metal or wooden spoon, or find a variable-speed drill and put a piece of bent rod in it to use as a stirrer (and it is still going to take 20 minutes). We've bent a piece of cheap metal rod into a three inch triangle at the bottom, and it seems to stir very well. You also need a chilly garage or a large–*very large*–empty refrigerator space to cool this big block. Finally, we recommend you put your plastic box (which isn't very strong) on a slightly larger piece of plywood, so you can pick it up and transport it once you have it mixed and need to move it to the cool refrigerator or garage.

How to:

Your water should be about 105 degrees fahrenheit (warm tap water). We use a thermometer to make sure we don't go below 102 or above 108. According to Knox, higher temperatures result in cloudy gelatin blocks. Vyse, however, recommends you use 140 degree fahrenheit water. Mixing gelatin into luke-warm water takes longer than mixing it into hotter water, but we made clearer blocks by sticking with the luke-warm water. Spray the inside of the clean, empty container very lightly with Pam, wiping it off lightly after spraying. Too much Pam results in cloudy gelatin.

Then simply fill the container with 105 degree tap water up to the pre-drawn line. Have the gelatin and cinnamon oil ready to add, as well as whatever you are mixing it with (drill or big spoon). Make sure you are comfortable, because you are going to be stirring for a long time. Remember to place the wood under the container before filling it so you can move it once you are done. We use a clear pyrex kitchen measuring cup to add (sprinkle) the gel slowly, 8 ounces (1 cup) at a time.

It is important that you *very slowly sprinkle* the gelatin into the water, stirring constantly, to get it to dissolve completely. We've found that using two people, one stirring and one sprinkling, seems to work best. The stirrer never stops stirring, and the sprinkler takes about ten minutes to add all the gelatin, then continue to stir for another ten minutes. The cinnamon oil can be added about a third to half way through adding the gelatin. The final solution should look really clear (with some foam and bubbles on top) by the time you are done. Some foam and bubbles are normal, and can't be avoided. They are the stuff that has refused to dissolve into the solution. If you're adding the gel too quickly or aren't stirring constantly, you'll get more junk on top or a cloudier solution, so remember to go slowly.

When you've got it thoroughly mixed/stirred (after 15-20 minutes), then carefully scoop the foam and bubbles off the top (and into a plastic bag that you throw away). When you are done, it should look like a huge tub of clear/yellowish liquid with no bubbles or foam on top and no globs of undissolved gelatin visibly floating around.

Now you need to cool the block to about 36 degrees F. If you freeze it, it doesn't stay clear. If you don't chill it enough, it's not the right density for your tests. One easy option is a place in your garage that gets down to between 32 and 40 degrees F. Barring that, you must make a huge space available to fit the block into your refrigerator. (Hint: Check that you can fit the container into your refrigerator **before** you make the gel.) It needs to cool about eight hours, or overnight.

Once the gel has set up, carefully turn the container over on a large, flat, clean surface (kitchen counter or a big cookie sheet). Use your hands to help slow and guide it as it comes out of the container to avoid

cracking the gel. A large knife can easily be used to cut the block in half, making two long, narrow rectangles. Again, using two people is easier, as one cuts while the other gently separates the blocks behind the knife.

Then carefully wrap the two rectangles separately in plastic wrap, covering every surface. Any evaporation will change the density of the blocks, so you are doing this to maintain the moisture/density balance. We've found that cutting rectangles of stiff cardboard to slightly smaller than one long edge of the blocks, and then wrapping that inside a second layer of plastic wrap around the blocks makes them easier to transport. Return the wrapped blocks to the refrigerator or someplace where they will remain at 40 degrees or cooler.

They can be transported to the range in a big cooler, or anything that helps to keep them cool. However, don't over-worry it, as they seem to retain their temperature fairly well when you take reasonable precautions. About an hour at cool room/car temperature doesn't seem to hurt them.

Shooting:

Again, it's best to have two people move the blocks. There are few things more frustrating than spending all this time and effort to make the blocks and then have them crack before you shoot them. Be careful in unwrapping the plastic wrap from the blocks (again, danger of cracking). We placed them on a sheet of plywood on two sawhorses for our actual shooting. If you are shooting a block with a particularly powerful cartridge, we recommend you place a cement block directly behind it. The energy to the gel block from big calibers is such that it can cause the entire block to leap off the plywood onto the ground, especially if the surface the block is sitting on is smooth (little friction).

Normal tests are shooting from a ten foot distance into the gelatin block (a) "naked" (nothing on or in front of the block), (b) lightly clothed (two layers of T-shirt in front of the block), and (c) heavily clothed (two layers of T-shirt and 2 layers of jeans in front of the block).

Photos:

Paint the plywood white that you are placing the blocks on, and bring a thin, white sheet or garbage bag with you. It is easiest to see the wound channels and bullet fragments in bright sunlight. Having a plain, white background to photograph against seems to produce the best photos. However, you need to lightly shade the blocks to photograph them if you are in direct sunlight to prevent glare.

Other:

If you have any questions, please don't hesitate to call us at (805) 967-1138 (M-F, 1-4 pm Pacific time is best) or send email (sales@customcartridge.com). We're hoping that sharing what we've learned in this process will make it easier for others to avoid our early mistakes. Good luck!

