# Depth Rods for Aquatic AIM Sampling

## What is a depth rod?

Depth rods are used for measuring depths and heights following the aquatic AIM protocol. They are also essential as a wading aid, and facilitate moving safely and efficiently up and down a stream corridor. The depth rods used in aquatic AIM are made out of 1.5 meter+ broom handles, are marked with centimeter measurements, and have a basic level to assist with taking height measurements.

## How do you make a depth rod?

Depth rods are easy and inexpensive to manufacture.  In each step below, you will find a complete list of all required materials as well as detailed instructions on how to make a depth rod. The process of manufacturing a depth rod is not time consuming, but because it requires the use of fiberglass resin to protect the markings on the depth rods and to waterproof the wood, adequate time should be allowed to ensure the resin has enough time to cure and dry (2-3 days).

## Step 1: Mark the depth rod in 1 cm increments

### Materials

- ☐ Sandpaper
- ☐ Wooden Broom Handle with a threaded, metal tip (Figure 1)
- ☐ Tape Measure/Meter Stick
- ☐ Fine-tipped, Black Permanent Marker (e.g. Sharpie)

**Process:**
1. If the broom handle is coated with any sort of finish, lightly sand off the finish.
2. Starting at the metal end, mark each centimeter along the broom handle from 0-150cm. You will not be able to permanently mark the metal end, and since the metal end is typically 3-5 cm long, the first mark on the wooden portion of the handle will not be 0 cm (Figure 1).
3. Add index markings every 5 centimeters
4. Label every 10 centimeters.
5. At the 1m mark, make an extra thick line that extends around the circumference of the broom handle (Figure 2).
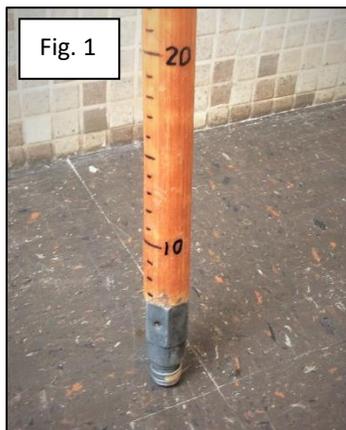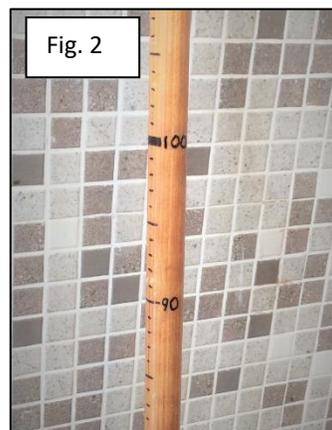


**Figure 1:** Markings start at 5 cm—the top of the metal tip. Note the index marking at 15 cm.

**Figure 2:** The 1 meter (100cm) mark is double in thickness. Extend this marking around the entire circumference of the rod. Not the index markings every 5 cm.

## Step 2: Apply Fiberglass Resin

***Safety Note:*** *Working with fiberglass resin is inherently dangerous. Only do so in well ventilated spaces & with appropriate protective gear, including long sleeves, nitrile gloves, and eye & face protection.*

| Fiberglass Materials | Safety Materials |
| --- | --- |
| ☐ Metal-tipped broom handle w/markings | ☐ Work shirt & pants (long sleeve) |
| ☐ Fiberglass Resin | ☐ Safety Glasses |
| ☐ Fiberglass Hardener | ☐ Nitrile Gloves |
| ☐ Mixing Container | ☐ Respirator |
| ☐ 1-2" Paint Brush | |
| ☐ Stir Stick | |

**Process:**
1. Set up work station in a warm, well ventilated space. Make sure to use all recommended safety equipment before working with fiberglass resin.
2. Thoroughly mix 2 cups of fiberglass resin with 1/8 oz. of hardener (roughly 120-180 drops)
3. Using your paint brush, apply a thin coat of resin/hardener.
4. Remove any excess resin with a paper towel or work cloth.
5. Let dry in a warm (>70 degree), dry and well ventilated space.
6. If desired, add a second coat after the first coat has dried.

**Troubleshooting:**
If the resin does not dry completely, or remains tacky:
1. Make sure the resin and hardener are thoroughly mixed. A cylindrical mixing container will be easier for adequately mixing the resin than a square bottomed container.
2. Curing the finished rods in a cool or damp location will prolong curing time, and can lead to an incomplete cure.

**Cleaning:**
1. Put on nitrile gloves.
2. Immediately upon completing a fiberglass job wipe all excess resin from the brushes.
3. Soak brushes in acetone or paint thinner, rub bristles with a work rag to remove all resin.
4. Alternatively, use cheap brushes and throw away & replace after each use.

## Step 3: Attach Level

| Materials: |
| --- |
| ☐ Sharp pocket knife |
| ☐ Needle-nose pliers |
| ☐ Metal-tipped broom handle (completed with markings and fiberglass resin) |
| ☐ Electrical Tape |
| ☐ 2 Zip Ties |
| ☐ 3" Plastic Line-Level |

**Process:**
1. Place the level on the broom handle, parallel to the handle. Determine if the level needs to be modified to allow it lie flush on the handle.

2. If necessary, modify the level to allow maximum contact with the broom handle.
3. Use the zip ties to tightly attach the level to the non-metal end of the depth rod, parallel to the depth rod, 1-2 cm from the top (Figure 3).
    a. Do not cover any portion of the level viewing window with the zip ties.
    b. It is best to have the locking mechanism of the zip tie close to the level (Figure 3).
    c. Use the needle-nose pliers to tighten the zip tie as much as possible.
4. Trim the zip ties so that they are flush with the locking mechanism (Figure 3b). This an important safety measure, as the ends of the zip ties are very sharp and can easily cut through skin if left exposed!
5. Tightly wrap the zip ties in several layers of electrical tape (Figure 4).
6. Your depth rod is now ready for use!
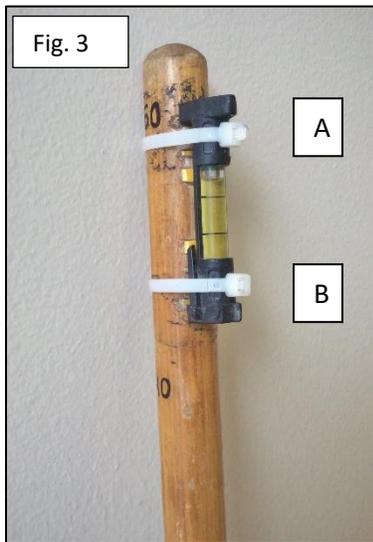


**Figure 3:** Zip ties used to attach the level to the rod. Be sure to cut the zip tie flush to the locking mechanism (B), and not to leave a jagged end (A).

**Figure 4:** Make sure to stretch the tape tight as you wrap it.

## Depth Rod Use and Maintenance

Depth rods are sued on a daily basis and experience a lot of wear and tear. They will typically need to be replaced every 2-3 years. Wear and tear is commonly experienced in one of three ways:

1. The level breaks or becomes detached from the depth rod. This is a very common occurrence. Technicians should always have access to a spare level, zip ties, and electrical to fix and replace levels.
2. The metal tip will wear down over time. The depth rod should measure periodically to determine the extent of the wear. If the loss in length is known, technicians can compensate for this loss by adding the number of lost centimeters to their depth measurements. Once the tip is completely worn down, the depth rod should be discarded.
3. The fiberglass resin will wear or chip off. The depth rods can periodically be sanded, re-marked, and re-coated in fiberglass resin if otherwise in good condition.