

Walkthrough of how to build Fiberglass Shafted Arrows

Here is what the Society standards require:

Pages 15 and 16 of the Society Marshal's Handbook:

G. Combat Archery Ammunition

1. All ammunition must have the owner's name & Kingdom displayed clearly on it.
2. No ammunition may be more than 10% covered in the color yellow.
3. No metal can be used as ammunition construction material.
4. All ammunition has a maximum length of 28 inches (71 cm) from the back of the blunt, to the string acceptor on the nock.
5. Ammunition may optionally have fletches as long as they are securely attached and made of a soft material. Fletches may not project farther than 1/2 inch (13 mm) from the shaft if they are less than 1.5 inch (3.8 cm) thick.
6. Light Ammunition (for use in Light bows or Light Crossbows)
 - a. Shafts of Light ammunition must be solid pultruded fiberglass of between 1/4 inch (6.5 mm) and 3/8 inch (9.5 mm) diameter.
 - b. Fiberglass shall be of a good quality, defined as significant 'bending' pressure applied by a marshal not causing the shaft to break.
 - c. The shaft must be covered from behind the blunt, to the front of the Anti-Penetration Device (APD), in a sturdy tear-resistant tape, such as strapping, electrical, or duct tape.
 - d. Anti-Penetration Devices (APDs)
 - i. APDs must be attached no further than 1/2 inch (13 mm) from the end of the arrow or bolt (including nock).
 - ii. APDs must be attached securely via tape, glue, cable ties, etc. The method does not matter as long as it is securely attached and will not come off during normal use. This will be tested by Marshals by grabbing and pulling on the APD with moderate force while twisting it slightly. If it detaches or moves lengthwise along the shaft, then it is unsafe.
 - iii. The following are the ONLY approved styles of APDs:
 1. Siloflex equivalent
 - a. APDs must be of Siloflex equivalent material with a pressure rating between 75 and 200psi. The outer diameter must be at least 1.25 inches (3.2 cm) or the inner diameter must be at least 1 inch (2.5 cm).
 - b. There may be no cuts in the back end of the APD.

- c. The length of the top edge of the APD must be at least 1.25 inches (3.2 cm) if the front is cut square, or 5/8 inch (16 mm) if the front is cut at a 45 degree angle.
- d. APD may have a channel routed in the bottom, and/or cuts made in the front edge for helping tape attachment.
- e. All sharp edges must be eased.

2. Asgard

- a. Asgard APDs have only the following modifications allowed: Cutting the nock off flush for use on a crossbow, making small holes for helping attachment, and roughing surfaces for gluing.

e. Blunts

- i. All blunts must be securely attached via tape, glue, cable ties, etc. The method does not matter as long as it is securely attached; however at least one piece of strapping, electrical or duct tape must extend over the blunt and be security attached to the shaft on both sides. This will be tested by Marshals by grabbing and pulling on the blunt with moderate force while twisting it slightly. If the blunt shows signs of moving off of the shaft (twisting around the shaft is ok), then it fails.

ii. Baldar Blunts

- 1. Baldar Blunts must be of a type designed for use on Fiberglass shafts (1/4 inch shaft acceptor), and can only be used with 1/4 inch or 6.5mm shafts.
- 2. Only the original 2-piece mold Baldar Blunt is allowed. Blunts must be attached in such a way that the blunt can be inspected for the parting line visible around the circumference of the thickest part of the blunt in the 2-piece molds. If no parting line is seen the blunt cannot be used.

iii. UHMW

- 1. UHMW blunts are constructed of at least 1.25 inches (3.2 cm) diameter Ultra-High Molecular Weight Polyethylene (UHMW) rod with a hole drilled in it to accept the shaft.
- 2. The shaft hole must be at least 1/2 inch (13 mm) deep, and there must be at least 1/2 inch (13 mm) of UHMW in front of the shaft.
- 3. At least 1/2 inch (13 mm) and at most 1.25 inch (3.2 cm) of resilient padding after taping must be added in front of the blunt and be at least the same diameter as the blunt.
- 4. The head must have a side-wrap of foam that extends from the tip of the padding to at least 1/2 inch (13 mm) over the UHMW that brings the total diameter of the head to at least 1.5 inch (3.8 cm) after taping.
- 5. The front edges of the blunt must be rounded over.
- 6. As long as all other requirements are met, the blunt may have material removed for aerodynamic or weight reducing purposes.

Here is how we create our arrows, which comply with all these requirements.

Materials you will need:

Ultra High Molecular Weight (UHMW) plastic: This forms the “blunt” or core of the arrow’s head, and must be 1 ¼” in diameter. It is available in longer pieces from a plastics manufacturer. We get ours in 5’ lengths from abbot plastics at <http://www.abbottplastics.com/>

Foam: closed cell foam, which may be composed of multiple stacked layers. We use blue camp foam mats, which can be found in the sporting goods sections of stores like Wal Mart or Target. We have found Wal Mart to consistently carry it and be least expensive. These mats can be cut down to appropriately sized circles.

More Foam: The side wrap is made of a thin craft foam that is slightly less than 1/8” thick. To get the required minimum ¼” addition to the diameter of each arrow head, you will need two layers wrapping around the entire head (adding 1/8” or slightly more to each side of the head.) The foam is often sold in bulk 100 sheet packs in craft stores or craft sections of large stores, and sometimes comes as “stickyback foam sheets” which will conveniently adhere, making it easier to have them stay in place while you apply tape.

Fiberglass shafting: pultruded fiberglass between ¼” and 3/8” in diameter. As there is a 28” maximum draw length limitation (measured from the base of the nock to the base of the head), you need to make sure your shafts are not too long. The arrow shafts we get measure 28 11/16”, and we get them from Sir Erika at <http://www.northstararchery.com>. Since the front of the shaft goes ½” into the UHMW, and there is additional strapping and cover tape in the way, the final draw length ends up being an acceptable distance. You can trim a small amount off (~1/4”), just to be safe, if you wish.

A nock with APD (Anti-Penetration Device) attached: The nocks and APD’s we use in this article are Asgard APD’s, available from Duke Baldar in Ansteora. You can find them at houseasgard.com. They will not work for a left-handed archer! To accommodate lefties, you will have to construct your own APD’s from plastic tubing. These homemade APD’s must be composed of siloflex equivalent plastic tubing, with a strength rating between 75 and 200 psi. The inner diameter of the tubing must be at least 1” or the outer diameter must be at least 1 ¼”.

Tape: You will need strapping tape to cover the shaft and to attach the head to the shaft. Clear packaging tape (not strapping tape) will also be needed, to cover the label in a way that it will be weatherproofed and legible. You will need a colored tape to mark the striking surface, and also a black or neutral colored tape to cover the rest of the head. We recommend and use cloth tape for both of these, as it is available in many colors and holds up better than duct tape on the battlefield. You may also want additional strips of colored cloth or electrical tape to place on the shaft like cresting, which will make visual identification of your arrows faster. Alternatively, paint can be used for individual shaft markings.

Labels: Each arrow must be labeled with the name and kingdom of the archer. We also add the group the archer is from on our arrows, to facilitate their return if lost or misplaced.

Glue: Marine goop, plumbers goop, amazing goop or sportsman’s goop seems to be the best adhesive for attaching APD’s. Any glue could be used, but it must be able to withstand heat and cold, and not be brittle. Keep in mind the kinds of abuse your arrows may encounter, and choose an adhesive that can stand up to these challenges. We specifically do NOT recommend Gorilla Glue, as it has failed on us in the past (too brittle.)

Step-by-step instructions:

Cut a 1" plug of Ultra High Molecular Weight (UHMW) plastic from a long, 1 ¼" diameter stock cylinder. Make sure the cuts are perpendicular to the cylinder and parallel to each other (so the front and back of the head are flat, not angled in any direction.)

Round the edges on both sides of the UHMW 1" "blunt." A grinding wheel or sander makes this step quick and easy, but it can also be done by hand with a file or sandpaper.

Drill a hole the same diameter (or slightly smaller) than the fiberglass shafting you are using. The hole should be perfectly centered on the plug, and should be exactly ½" deep. Exact specs in the rules say the hole must be at least ½" deep, and that there must be ½" minimum distance between the front of the blunt and the front of the shaft. Some people use 1 ¼" long blunts – in this case you would want to have the hole be ½ the length of the blunt (5/8".)



If your shafts seem "dusty," (which they usually are from the manufacturing process) you may wish to use acetone or rubbing alcohol to clean them off. Use a rag, gloves, and a well-ventilated area. Cleaning them will allow the glue and tape to adhere much better in later steps.

Place the shaft in the hole in the blunt. With the blunt on a flat sturdy surface, pound the other end of the shaft with a rubber mallet or rawhide mallet. Be aware that this may damage the surface of the mallet (you could place a piece of wood between them if you wish to preserve the face of your mallet.) Tap firmly until the shaft will no longer go into the blunt. Measure the shaft to make certain that the full ½" has entered the head – pound more if it has not. Using glue is not recommended, since it will make it so that your shaft does not go in as far. If your drilled hole is the appropriate size, the head will be fairly firmly attached, even before taping in subsequent steps.

Alternatively, you can make a ½" mark on one end of the shaft, and make sure that the UHMW goes all the way up to the line...



Drill a 1/16" hole in the side of the Asgard APD. This should enter the cavity that the shaft will go in to, and is placed near the bottom of the nock. The purpose of this hole is to allow for excess glue and air to squeeze out when the shaft is attached.

If desired, rough up the inside of the area of the APD that will be receiving the shaft. A wire brush or small dremel bit could be used. The idea is that glue will adhere better to a rough surface, but this step is not mandatory. If you do it, you may find your APD's will stay on for longer.

Place an appropriate amount of glue/goop in the APD's hole. Using an old nail is the strategy we employ. Get it all the way around the cylinder and all the way down to the base.



Place the APD on a board, with the nock hanging off the edge and pointing down. Make sure the board is on a sturdy surface. Place the shaft into the glued cylinder, and use a mallet to pound it into place. As the shaft goes into the APD, glue will squeeze out of the hole – you will want to have a paper towel/newspaper covering any surface you do not want to become glue-covered.



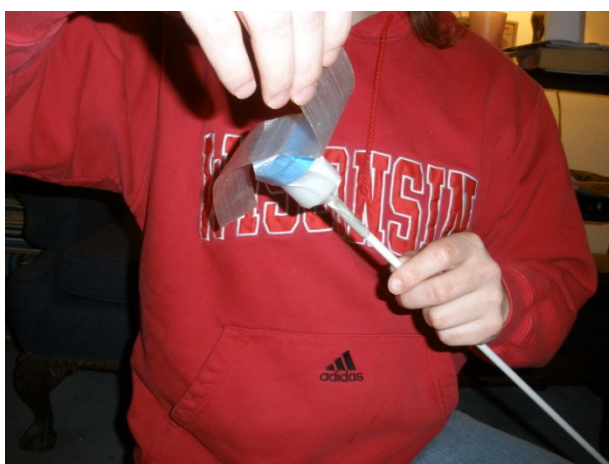
Using a paper towel, wipe excess glue/squeeze-out off of the APD (or off of anything else you've accidentally gotten it on.)

Note: you should give Goop a week to dry before using your arrows.

Cut out 1 ¼" to 1 ½" diameter circles from the blue camp foam. Each circle is ~ ½" thick. We do this step ahead of time, and cut out 100's of circles for later use. It is handy to sharpen the edge of a steel nipple and use it as a cookie-cutter tool. If you do this, we find it best to put the foam on a scrap wood surface for cutting, and to re-sharpen the tool as it tends to dull after many cuts.



Take two circles of blue foam and place them over the blunt. Use two pieces of 1 3/8" to 1 3/4" wide strapping tape in a perpendicular pattern to secure the foam to the blunt. Make sure the tape extends down onto the shaft about 2". These pieces should end up being about 10" long. If mass-producing arrows, we find it very handy to establish the lengths of tape you need, and to quickly cut multiple pieces of that length. You can use a marked board to facilitate this process (with marks at 25" for shaft tape, 10" for head tape, 4" for neck wrap.)



Using this same width of strapping tape, cut a piece that will wrap several times around the shaft (about 3 times around is good, which should be ~4") Near the base of the blunt, wrap this tape tightly around the shaft and other pieces of strapping tape. It will pull the strapping tape "x" tightly onto the foam and blunt, and will prevent the head from moving on the shaft.



Cut pieces of craft foam that are between 1 ½" and 2" wide. We use 1 ½". It must be wide enough to extend from the front of the foam head to at least ½" over the UHMW blunt. Wrap

this foam around the side of the head, until the total diameter of the head is at least 1 ½". We find two layers of foam wrapping around the entire head to be sufficient. You may have to use multiple strips of foam.

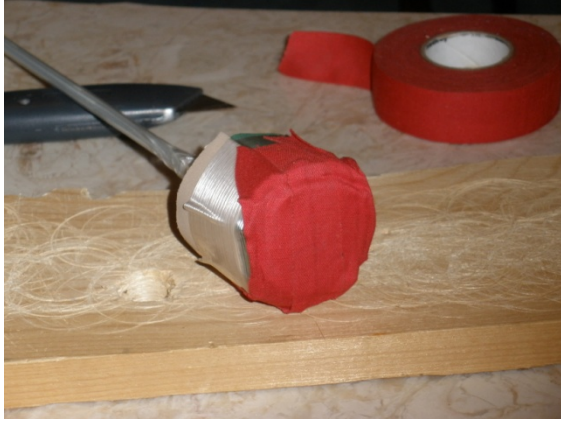
Secure the side wrap foam by placing a circular wrap of strapping tape over it.



Place a layer of strapping tape covering the entirety of the exposed region of the shaft (from the base of the APD to where the strapping tape already covers it by the head.) We use a 1" wide piece, cut to the length of the exposed shaft (~24"), and carefully roll it on. Make sure the entire shaft is covered, as the strapping tape will prevent any splinters from breaking off if the shaft should receive enough of a blow to break it.



Using colored tape, mark the striking surface of the head. Make sure the color extends over the whole flat face. It is ok to have the tape stick off onto the side of the head, as it will be covered in the next step. In fact, if you use a little excess tape, it is preferable. The ends of the tape will then be safely covered by the rest of the head wrap, and will be less susceptible to peeling off.

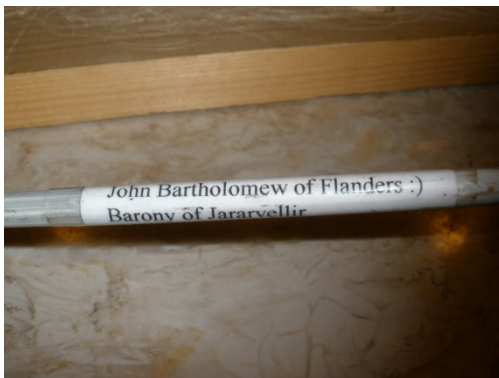


Using a neutral colored tape (black cloth tape or duct tape) cover the rest of the head. Continue this wrap down onto the shaft, placing another layer of tape over the strapping tape which adhered the foam to the blunt and shaft. You can either spiral down with one continuous piece, or cut separate pieces of appropriate lengths. A 2" wide roll of tape is very useful for this step.



Place a label on each arrow, anywhere on the shaft. We use regular ink printer labels, though laser printer labels would probably hold up better with exposure to water and lots of sun.

Place a layer of clear tape (packing tape) over each label. This prevents water damage, smudging, and peeling off over time.



If desired, add additional paint or tape stripes around the shaft, for cresting that will make your arrows easier to quickly identify.

