



TEC Accessories Glow Fob DIY Kit

Project: Self-luminous Tritium Pellet

The glow fob do-it-yourself kit is designed for the TEC Accessories 3 Series Glow Fobs (i.e. TEC-A3). This kit will allow you to create a pellet insert of your own design that will replace the existing pellet that was included with the glow fob. The kit contains two pieces of clear tubing, 2 extra neoprene washers, 2 extra o-rings, and an extra glow fob split ring. The clear tubing has been pre-cut to the precise length required, polished to remove scratches, and cleaned to remove any dirt and extrusion release chemicals.

The Project

This project will consist of making a new glow fob pellet that includes a tritium vial as the source of illumination. This new pellet will replace the standard glow pellet that came with the housing.

Due to the nature of tritium being radioactive, the following sections will be included to help understand exactly what tritium is, its availability, restrictions, use, and health hazards.

What is Tritium?

Tritium is a radioactive isotope of Hydrogen. Tritium light sources are radioluminescent and can be best described as a strong glow. They are self-powered and do not need to be charged via exposure to light, such as our standard glow pellet. Tritium does not in itself emit light but excites phosphors, thereby generating light. It is therefore most often encountered in glass capsules with an internal phosphor coating of various colors. Green is usually the brightest based on the phosphors and the sensitivity of the human eye. The half life of tritium is 12.32 years which means that a tritium based light source will be half as bright after 12.32 years.

Are There Any Restrictions on Tritium?

Tritium capsules are used in gun sights, archery sights, self luminous exit signs, watches, compasses, and other similar products. Due to U.S. regulations regarding radioactive substances, all of the above items can be legally sold in the U.S. The exception is for products that are regarded as having a "frivolous" use such as glow rings. (Note: restrictions are on the sale and not necessarily on the possession). As a result of these restrictions, TEC Accessories does not sell tritium, only a means to mount it into a fob for use as a marker light. Please be aware that tritium use in consumer products might be restricted or banned in some jurisdictions or countries.

DISCLAIMER: TEC Accessories DOES NOT sell tritium vials. It is illegal to resell tritium in the United States without a special license, and we do not have such a license. Please do not ask us to purchase or install tritium for you, we will not do it.

Does Tritium Carry Any Health Hazards?

Tritium electrons are unable to penetrate the human skin and can be stopped without any problems by a sheet of paper. Further physical and chemical characteristics of tritium are almost identical to those of

hydrogen. Like hydrogen, tritium oxidizes when exposed to oxygen. Doing so with tritium, results in tritiated water (HTO). The tritium gas is tasteless, odorless and considerably lighter than air. If tritium enters the body, it spreads evenly in the body water and is then again eliminated with a biological half-life time of 10 days. The quantities of gas used in individual light sources do not represent any danger to the body. If a tritium vial breaks, the tritium escapes and mixes with the ambient air. Thanks to its low density, the gas rises and thins down in the atmosphere. If possible, do not inhale the gas.

Where Can I Purchase Tritium Vials?

There are several countries where tritium is commonly available, however some of these countries will not export tritium to other countries (in the UK for example). However, there are places where it can be obtained fairly easily. One reputable source is in the Marketplace section of the online forum candlepowerforums.com. Candlepower Forums is one of the best online sources of information for the flashlight hobbyist. In the Buy/Sell/Trade section, look for the section titled "WTS: Other Personal". There is a thread titled "For Sale: Tritium Vials" originated by a member named Merkava. Alternatively, you can do an online search for "Merkava tritium vials". Just make sure you find the thread that is selling tritium vials, not glowrings or any other product. In the first post of the thread, you will see instructions on how to purchase the tritium vials. You want to buy the correct size, which is 3mm x 23mm. These will fit perfectly in the clear tubes included in your DIY kit.

What Color Tritium Vials are Available?

The following chart shows the most common available colors and their relative intensity. Any color below the 60% level is dramatically lower in intensity than green and is usually not very desirable.

Color		Yield in %	Remarks
green		100%	Standard color
yellow		80 %	Special color
white		60%	Special color
ice-blue		60 %	Standard color
orange		40 %	Special color
red		20 %	Standard color
blue		15 %	Standard color
UV / IR		--	Special color

Installation of the Tritium Vial

Once you receive your tritium vial, it is a very simple process to mount it into the clear tube. The following types of adhesive can be used, with their pros and cons identified:

Clear Silicone: This is the preferred method of mounting the vial. It not only is clear, but it is flexible when it dries and will not crack. This will also provide a bit of shock cushioning to the vial.

Norland Optical Adhesive: This is a UV curing adhesive that dries perfectly clear and is very easy to use. Apply a dab and place it in the sun, the UV rays of the sun will cure the epoxy and permanently mount the vial in place. The drawback to using this product is the relatively high cost and it is very fluid, almost like water. When applying it, it has a tendency to wick up along the vial and when dry, you can see the slight

outline of the adhesive. It does not look too bad, but if you want a perfectly clear look, you may not want to use this.

Crazy Glue or Crazy Glue Gel: This adhesive is not recommended. It has a tendency to outgas, and if you completely seal the ends of the clear tube with it, the interior will haze up during the drying cycle.

2-Ton Epoxy: If used sparingly, this product can be used with success. You want to avoid completely covering the ends of the vial and sealing the ends of the clear tubing. As it dries, it can create stress on the glass vial and possibly crack it, and some epoxies can also outgas causing the hazy interior.

There are three methods of mounting the vial in the tubing:

1. Seal the ends with an adhesive such as silicone so that the vial sticks to it and cannot move. This also prevents dirt/moisture from getting inside.
2. Glue the vial in place with a thin adhesive such as Norland, then pot the vial in place to eliminate any chance of vial breakage. Potting can be done with additional Norland adhesive or a resin mixture.
3. Glue the vial in place and be done with it.

Method #1 is preferred, as it is the easiest to accomplish and seals the vial in place. Method #2 can be difficult because potting the vial can result in bubbles forming in the vial and giving it a not-so-nice appearance. Method #3 can be done but moisture and dirt can possibly get in the tubing and also give a bad appearance. Although this method is possible, we do not recommend it.

Mounting the Tritium Vial with Silicone:

The clear tubing has an inside diameter of 1/8" (.125"). The tritium vial has an outside diameter of 3mm (.118"). The tritium vial will therefore slide into the clear tubing with a very slight gap. Push the vial into the center of the tube so it is perfectly centered. Make sure the LIGHT from the vial is centered, not the vial itself. Some vials can have a thicker end on one side, making the light a bit off-center.

Once you have the vial in place, use a toothpick or other small item to push small amounts of silicone into one end of the tubing. Don't worry about the mess at the end of the tubing, this can be trimmed after it is dry. But make sure you don't get silicone on the outside diameter of the tubing if possible. If you do get some on the outer diameter, wipe it off completely. Make sure you have enough silicone in the end of the tube to completely seal it, and also make sure you have a small amount surrounding the end of the vial as well..

Perform the same process at the other end, being careful not get silicone on the outside diameter of the tubing. Once it is dry, make sure there is no excessive silicone at the ends of the tubing. If there is, simply trim it with an exacto knife. Note that the area where the silicone is placed is not visible once the pellet is installed in the housing, only the tritium vial will be visible.

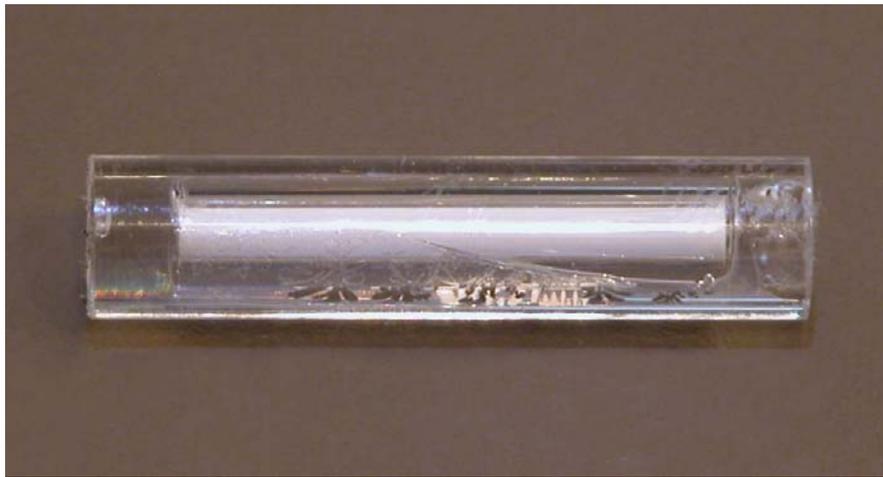


Tritium vial mounted with clear silicone

Mounting the Tritium Vial with Adhesive and Potting the Vial in Place:

As outlined in the previous method, center the vial and then use whatever adhesive you have selected to glue it in place. Only a small amount is necessary, just enough to hold it centered before you pot it. Once it is dry, place the tubing on its end and prepare whatever medium you have chosen to pot the vial. Be very careful when preparing the potting medium, any excessive mixing or any air in the applicator will have a tendency to create bubbles. It will take very little medium to fill the tubing, as the gap between the vial and the tubing is very small. You only need enough to fill the gap and the ends of the tubing. Once you have filled the vial, let it dry completely and inspect it to see if there are any bubbles or cracks.

If the finished product looks good, congratulations! More times than not however, you will see some minor cracks or bubbles. If they are small enough, you can simply ignore them as they will not effect the intensity of the tritium. If they are large enough that you find it looks bad and you just cannot live with it, one alternative is to lightly sand the outside of the tubing with 600 grit sandpaper. This will give a nice matte finish and will only slightly effect the overall output intensity of the tritium pellet. It may not hide all the cracks and/or bubbles, but it will look MUCH nicer.



Tritium vial mounted and potted in Norland UV adhesive

Installing the completed tube into your glow fob housing:

The TEC glow fobs are sold with a glow-in-the-dark pellet installed in the housing. This pellet is held in place with an o-ring which sits in a small groove in the inside wall of the housing (at the bottom). Remove the o-ring using an exacto knife, a pin, or even an opened paper clip being careful not to scratch the housing. Don't worry about damaging the o-ring, it is very durable and we have included extras in case you need them. Once the o-ring is removed, the pellet simply slides out. There is a neoprene washer located at the top end of the pellet, this needs to be re-used when installing the tritium pellet. It may be stuck inside the end of the bore, if so, you can simply leave it there. Just make sure it is lying flat at the bottom. We have included extra washers in your DIY kit in case you need them.

Install the new pellet with the tritium vial, and push the o-ring behind it until it falls into the groove. Once the o-ring is in place, the installation is complete!

If you have any questions about this procedure or any other issue regarding our glow fobs, please feel free to contact us anytime:

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