Gooseneck Light Wiring Simplified

Our N2018 .018" diameter stainless tubing is ideal for fabricating different styled lighting fixtures in several different scales. We offer two versions (N scale and HO) of gooseneck style building light kits' using this tube, and its small size helps these lights to look very prototypical. That's the good news... The not-so-good news is that once this tubing is formed into the gooseneck shape, threading two of our tiny #38 wires through the tube can be very challenging,

We recommend reading through this complete procedure before actually beginning the process.

"You can't push a rope"

Electricians have a tool called a fish tape, which is simply a long steel wire or narrow strip that has a curved shaped loop on one end, and is rolled-up in a small case for easy carrying. They use this tool for pulling electrical wires through sections of metal conduit or tubing (usually located inside walls of buildings). They unroll the fish tape and push it through the conduit until it exits the other end, then attach electrical wires to the loop on the end and pull the wires back through the conduit.

One of our customers experimented with a variation of the "fish tape" method by pushing just a single piece of our #38 wire through a segment of our .018" diameter tube that had been formed in the gooseneck shape and found that it was quite easy compared to trying to push two wires through the tube. He then tinned the end and attached two wires to it and pulled them back through the curved tube without difficulty. ***Voila!*** He emailed us with these findings and we put it to the test. After making a few minor adjustments, we are excited to say that it is a very repeatable procedure that works well and is much, much easier than trying to push wire pairs though this tube after it has been formed into the curved shape.

Requirements for success

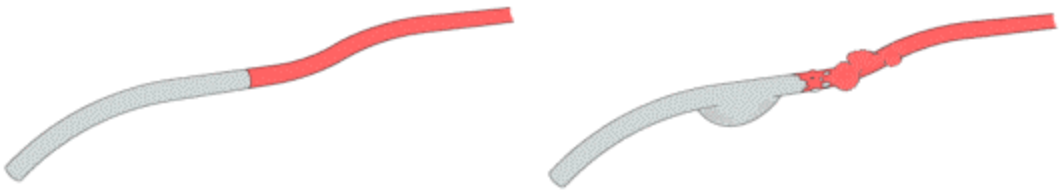
Tubing preparation

Whether N scale of HO, when forming the double-curve of the gooseneck shape with our N2018 tubing, it is essential that good interior support be provided when forming the tubing. We offer two different bending fixtures that have a series of steel pin located in precise positions for forming the shape and allowing for the tubing clearance between the pins. We sell .012" diameter straightened stainless steel wire that fits inside this tubing to provide support for the tube as it is formed around the fixture's pins. After forming the wire is pulled out of the tubing. This method ensures the thin wall (0.002") of the tube stays round and does not collapse when formed.

Our Gooseneck Building Light Kits cover the all of the steps needed to prepare this tubing including flaring, forming, cutting and deburring. It is essential that after these procedures the inside diameter of the tubing is free of end burrs and not narrowed due to partial collapse during bending, for our "fish tape" method to work successfully.

Wire preparation

The "fish tape" wire segment can of course be either the #38 red or green wire. We recommend a length of at least 6-8 inches so there is sufficient to hold onto when pulling the other wires through the tube. The important thing is that the wire is free of any kinks or nicks and the tinned end be a nice smooth tinned area, free of bubbles or blobs of melted insulation. The graphic bellow shows nice smooth tinning on the left, and incorrectly tinned wire on the right. Excess solder or lumpy insulation will cause the wire to resist being pushed and pulled through the tube.

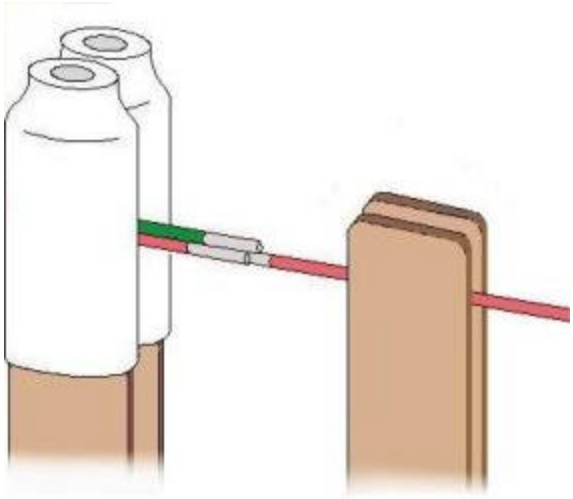


Next, the two wires to be pulled through the tube need to be prepared. If you have already wired up an LED that is intended to be installed in the gooseneck tubing, make sure both wires are free of nicks and kinks, and carefully tin their ends so they resemble the tinning quality of the "fish tape" wire. If an LED has not been wired yet, just cut a length of each color and perform the tinning on one end of each.

Wire joining

This step is the most crucial. The two loose wires will be joined with the "fish tape" wire to form a continuous length that will, once the "fish tape" wire is fed through the tube, be pulled through the curves of the tube and out of the other end. Just like electricians would do, but on a very much smaller scale!

If you have one of our NT301 LED/wire Holding Tools it can be used for this procedure. If not, you will need two smooth surfaces, fixed about ¼" to ½" apart and two small pieces of tape to hold the wires while they're being connected. The graphic to the right shows our NT301 Tool being used. You can see from the picture how the wires need to be held and taped if no NT301 Tool is available.



The wires being held in the padded clip on the left are the two loose wires that will connect to the LED. Align them together so they are straight and parallel next to each other as shown. The idea here is to make the pair as small in combined thickness as possible with their tinned portions together as shown. The tinned portion for each of these two wires should be trimmed so that it is 1/16" or less in length. The objective here is to make the soldered junction of the three wires as short as possible, so they can go "comfortably" around the curves in the tubing. If the soldered group is too long, it will have to be "bent" to curve through the tube and may cause the "fish tape" wire to break when trying to pull them through the tube.

Next, insert the "fish tape" wire through the clip on the right and align it so the end area of its tinned portion is parallel and touching the other two wires. If necessary, use a sharpened toothpick or pointed tweezers to adjust the wires so they are aligned properly.

Now, dab a **very tiny** amount of soldering flux on the tinned area of the three wires. Liquid flux that is thin in viscosity works best (rather than paste type flux) because it won't distort the aligned wires during application.

Using (any) small soldering iron that is hot enough to melt the solder, bring the hot tip up **carefully** beneath the tinned area of the three wires so the tip **just** begins to contact the wire lowest in the group. This will provide sufficient heat to cause the flux to activate and join the three wires together. This iron should be freshly tinned but does not need any additional solder applied to the tip. Just tin it and wipe it on a damp sponge just prior to this step and it is ready to go. The tip only needs to be in position for less that a second to cause the bond. Move the iron away as soon as possible so it doesn't cause heat damage to the padded clip on the left or overheat the wire junction. You will know the process has worked as soon as you see and hear the "zzzzztt" sizzle of the flux. It happens almost instantaneously.

Note: **Do not** use the soldering iron that was used to tin the wires (temperature of 400°C+). This iron is **too** hot and **will** cause heat damage to the wires and the pads on the left holding clip. A lower temperature iron like our N40m2 or a temperature-controlled iron at 260°C that would be used for soldering the LEDs is what to use for this operation.

Open the clips and remove the joined wires being careful not to cause any kinks that could make the threading process difficult.

Fishing and pulling wires

Which end of the formed gooseneck tube you feed the "fish tape" wire into depends on whether an LED had already been soldered to the "loose" wires. If the wires you just joined to the "fish tape" wire are not soldered to an LED yet, the "fish tape" wire can be threaded through the tube from either the flared end at the curve (lampshade end), or the straight end that would go through the building wall. However, if an LED has already been attached, then you **must** start at the flared, or lampshade end, because this is where you want the LED to be after pulling the wires through the tube. I know…DUH.

For the fishing process the gooseneck tube will need to be held in a fixed position and angled so that whichever end is going to be the starting end is easily visible and aligned for comfort when pushing the “fish tape” wire into the tube. We’ve found (if you are right handed) that turning our NT301 tool around backwards so the padded clip is on the right and using it to hold the tube, works very well. The spring loading of the clip is strong enough with the cushioning of the pads to keep the formed tube in position without scratching or deforming it.
Using good bright lighting and magnification, insert the end of the “fish tape” wire into the tube. Using tweezers (plastic tweezers are preferable, if you have them).

VERY IMPORTANT!

Push the wire into the tube **a very small bit** at a time. About **one to two** tube diameters (**maximum**) of wire length each time. Attempting to push a longer amount will very likely cause the wire to kink as it is snaking around the curves in the tube, and kinks are quite hard to straighten out. It takes a bit longer pushing less wire, but that is much faster than have to stop and try to straighten out (or cut off) wire and start over. Been there… done that… Too many times…

Sooner than you might imagine, the end of the “fish tape” wire will poke out of the other end of the tube. Grasp the end and begin slowing pulling while watching the soldered junction of the three wires approach the opening of the tube. Carefully guide the soldered junction into the tube end and continue to pull with a steady force. You will notice resistance as the soldered junction negotiates its way around the curves in the tube. Don’t jerk the wire or it will break. A steady pull is best. Although this wire is only 0.0045” in diameter (with insulation) it is surprisingly strong and hand withstand a substantial pull before it breaks. If all has gone well, amount of force needed to pull the wires through will get easier and the two wires will exit the tube end.

If an LED was attached to the wires you just pulled through the tubing, leave at least 1-2” of excess wire at the flared tube end. You will want the LED well out of the way when you epoxy the shade into position and let it cure. Once this epoxy joint is fully cured, the LED can be pulled into position up under the lampshade.

If the wires had no LED attached, leave at least 4 or 5 inches exposed for easy tinning and LED soldering.

That’s all there is to it! As of this writing, we’ve done more than 30 goosenecks using this procedure and after a false start and slight process tweaking on the first one, they have all gone perfectly.

We hope this helps you as much as it has us here at Ngineering.

Happy “Goosenecking”…