

# **COPPER KNIGHT**

## **Installation instructions**

Each installation will be unique due to job site differences in space factors, the configuration of the piping system and ambient temperature considerations. A basic familiarity with plumbing principals and the safe usage of hand and power tools is important if a satisfactory result from this installation is expected.

- 1.) Choose a place that will be free of Temperature extremes.. Freezing or High Ambient Temperatures.**
- 2.) Select a place where vandalism or mischievous hands will not be a problem.**
- 3.) Allow 18 Inches of clear space above the installation site for ease in anode replacement when needed.**
- 4.) Do not install unit where it can not be seen, like under a stair case or in a closet lest it be forgotten about.**
- 5.) The installation of a “Three Valve By-Pass” with unions is recommended for obvious easier maintenance or service reasons.**
- 6.) Use only well established plumbing practices use only quality pipe and fittings that may be required to complete the installation.**
- 7.) If a Water Softener is in use at the job site, install the COPPER KNIGHT on the outlet side of it in order to obtain maximum corrosion effectiveness for pin hole leak problems with the piping system.**
- 8.) Install the heavy copper wire supplied at the installation site before cutting the piping, this will protect you from electrocution if the house wiring has a faulty primary ground.**

Your installation kit includes mounting straps that are provided for the sole purpose of securing the unit from unwanted movements and to hold it firmly when the anode must be unscrewed from the housing.....use them.

There are 4 pipe grounding clamps included in the kit, these are used to assure electrical continuity in the piping system...put a jumper wire across hot and cold water lines at a water heater and the plastic by-pass water valve found behind most water softeners.

Do not under any circumstances solder fittings that have been screwed into the Copper Knight housing; heat will soften the PVC housing and cause the joint to leak and void the warranty.

Be very careful when screwing metal fittings into PVC fittings; be sure that they do not become cross threaded due to misalignment, this too will void the warranty.

As with all things worth doing, it is important to take the time needed to do a good job; one that will last for years; use only quality pipe and fitting that may be required to complete your particular installation.

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## HOW TO GET LEAK FREE JOINTS WITH TEFLON TAPE

Excellent results can be obtained with Teflon tape when used as the sole means of sealing Metal Threads to Plastic Threads, Metal to Metal or Plastic to Plastic Pipe or Fittings. The key to success is the application of the tape to the male threads. 12 to 15 wraps of 1/2" wide light weight tape seems to work far better than fewer wraps with a wide heavier tape.

Apply the tape to only the first 4 or 5 starting threads as shown below.

Apply the tape in a direction that will allow the tape to tighten as the male thread is tightened into the female thread... this is very important!

Do not over tighten the joint, it can cause plastic fittings to split or deform causing leaks to develop suddenly, or even long after the job is done.

The COPPER KNIGHT is constructed with schedule 80 PVC fittings in order to minimize the possibility of splitting. Great care must be exercised when engaging the lead threads of the male fitting into the female thread, or cross threading can easily result...start the threads in by hand making sure that it is perfectly aligned before continuing to tighten. If pipe dope is used, it MUST BE SUITABLE FOR USE WITH PLASTICS Pipe dope can be really messy and unsatisfactory at times.



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# Notice to installer:

**DUE TO THE EPA'S CURRENT ENFORCEMENT OF LEGISLATION IN VERMONT AND CALIFORNIA TO BAN ALL BRASS, BRONZE AND OTHER MATERIALS THAT CONTAIN EVEN MINISCULE AMOUNTS OF LEAD, WE WILL NO LONGER BE ABLE TO SUPPLY FITTINGS FOR THOSE ON SITE INSTALLATION NEEDS OF OUR COPPER KNIGHT PRODUCTS. Local purchase of these items will be required. California's Regulatory Fantasyland: Brass and Lead Edition by Chuck DeVore**

Last night was one of those nights when I was mad as hell at the California State government and their foolish, micro-managing, Big-Nanny ways. (Caution, dear reader, such rage at the machine has been known to cause the temporary insanity of running for public office.)

## States turn on lead-free pipe rule

Concerns over lead content in drinking water led two states, California and Vermont, to enact regulations that prohibit any lead-containing pipes, plumbing fixtures and fittings that come into contact with potable water. The new laws went into effect on Jan. 1, 2010.

In California, the ban applies to kitchen and bathroom faucets (tub and shower faucets are exempt); pipes, fittings and supply lines; select brass fittings; shut-off valves; angle stops; and solder. The law applies to anyone who sells, installs or repairs plumbing parts that carry drinking water supplies. Fines go as high as \$6,000 per violation. All pipe, plumbing fixtures, solder or flux must be certified by an independent American National Standards Institute (ANSI) accredited third party.

Vermont does not require testing and certification, but like California, there was no grandfathering. The plumbing inventory with lead content had to be replaced by Jan. 1. The law was signed in June 2008, giving retailers less than two years to comply. (California dealers had a three-year grace period.)

Tags: [brass alloy plumbing](#), [brass fixtures](#), [brushed nickel fixtures](#), [California legislature](#), [California regulations](#), [chrome fixtures](#), [Forbes Magazine](#), [lead exposure](#), [lead-free plumbing](#), [plumbing fixtures](#)  
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## **THE CAUSES AND CURES FOR PIN HOLE LEAKS IN COPPER PIPING.**

The current "Pin Hole Leak" phenomenon was unheard of prior to WW2.

For some unknown reason the plague of pin hole leaks has risen sharply over the past 50 or 60 years. I am a retired Plumbing Contractor; and the son of a Plumbing Contractor. I worked with my Dad 65 years ago, we never heard of copper piping leaks aside from an occasional sweat fitting failure ( in those days there were no copper sweat fittings; all fittings were made from cast brass, and occasionally would have tiny sand hole imperfections from the Foundry)

It has been said that "Opinions are like noses; everyone has one" I will very briefly offer my humble opinion as to what causes this nagging, common, costly and perplexing problem.

Pin hole leaks start from corrosion cells on the inner walls of the copper pipe or tubing. This cell is powered by DC electricity that is generated within the piping system. The DC energy that is generated is very small and can be measured by a Volt/Ohm meter that has a mA function (a mA is 1-1/1000<sup>th</sup> of 1 Ampere).

Although this electrical energy level is very small, it works 24/7 year in and year out disassembling the copper atoms that form the wall of the copper tube. It does its dirty work by borrowing electrons from the outer orbits of the Copper Atom. When enough electrons have been stolen from the Copper Atom under attack, it simply collapses and goes into solution. The green stains or those pretty aqua blue stains that you occasionally see on plumbing fixtures is all that remains of the destroyed copper atom. The Greens Stain is Copper Chloride, a copper salt from the union of Copper in the presence of Chlorine. Blue Stains are Copper Sulfate from Copper joining forces with Free Sulfur present in the water. This Copper Atom destruction continues unabated until finally the corrosion cell breaks through the tubing wall to form a pin hole leak.

As we all know from High-School Science 101; If two dissimilar metals are immersed in a suitable electrolyte (in this case that electrolyte is the water in the piping system). An electrolyte can be any liquid that has the capacity to conduct an electrical charge. We also learned that Mother Nature abhors a vacuum; Mother Nature also abhors a disparity in electrical energy levels within a given circuit.

So.. It is Mother Nature who is really to blame for Pin Hole leaks; she steals electrons at an active corrosion site in a vain attempt to correct a deficit of electrons in another less positively charged part of the piping system.

The Copper Knight utilizes a Sacrificial Magnesium to provide an abundance of ions to any areas that are deficient and under attack my good old Mother Nature. As long as the Magnesium Anode pumps out the needed ions, all is well on the Copper scene.

Water conditions can and do vary wildly through-out the world. In places near toxic Alkaline water is all that is available; in other places Acidic water on pH scale of 4 is all there is. It is entirely possible to have a perfect 7 on the pH scale and still have serious corrosion problems due to entrapped or dissolved gasses and minerals.

TDS (Total Dissolved Solids (minerals) can make the water very corrosive, High amounts of dissolved gasses like Oxygen, Chlorine, Hydrogen, Carbon Di Oxide, Sulfur Di Oxide can team up to turn the water into a super electrolyte and exacerbate corrosion problems. Free Chlorine can hook up with Hydrogen to form Hydrochloric acid, Carbon Di oxide can morph into Carbonic Acid and on and on.

The COPPER KNIGHT is not a hero; it simply throws the baby to the wolves. In this case the Baby is the Sacrificial Anode, and the Wolves are the active corrosion cells in the piping system. This is not heroism at its most gallant, but it is very effective in protecting Copper water piping.

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## POWER SUPPLY FOR M-1 COPPER KNIGHT

This is a typical DC power supply for the M-1 series Copper Knight corrosion control unit. It is set at 6 volts at our factory; and may need to be adjusted up or down depending on water quality or conditions in your particular geographic location. This is done by simply moving the voltage dial indicator in the desired direction; see particulars below in the Powering Up section.



Care must be taken not to short circuit the red and black leads from the power supply; (it will burn out the windings in the power supply.) This power supply is intended for indoor usage only..

Once the Copper Knight has been connected to the piping system and checked for possible leaks, "POWERING UP THE COPPER KNIGHT" is next. Connect the RED WIRE from the power supply to the RED CAP of the Anode Assembly wing nut binding post. Connect the BLACK WIRE from the power supply to the copper grounding strap on the piping to be protected from pin hole leaks (corrosion)...Plug the power supply in. ..Set the Volt Ohm Meter(VOM) supplied to the 200mA (Milliamp)function and turn it on...Disconnect the red wire that you had connected to the wing nut binding post on the anode...now take the black lead from the VOM and touch it to the large stainless steel washer on the red cap of the anode assembly...and simultaneously touch the RED LEAD of the VOM to the RED Wire end and observe the reading on the VOM. The ideal reading is between 3 and 10 mA. If the reading on the VOM was less than 3mA , increase the voltage setting on the power supply until the reading comes up to 5 or 6 mA. Reconnect the red wire to the anode cap. This mA reading will taper off to a self regulating maintenance level as the interior surfaces of the piping becomes pacified by the abundant ions and Magnesium Oxide liberated from the Sacrificial Magnesium Anode.

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## **.....Our Mission Statement.....**

The COPPER KNIGHT was the brain child of the owner of a long established Plumbing Contractor in Florida. After years of dealing with distraught customers trying to cope with an endless succession of pin-hole leak problems, He set about finding a workable solution to the ever growing number of pipe failures.

Much of this Plumbing Contractors work involved High Rise Condos, Home Owner Associations, Hospitals, Professional Office Buildings, Residential, Commercial and Industrial structures.

High Rise Condos were the most troublesome of all in that if a pipe sprung a leak on the 15<sup>th</sup> Floor, generally by the Time a plumbing repairman could get to the job and isolate the leak and get the water leak stopped, the 14<sup>th</sup>, 13<sup>th</sup>, 12<sup>th</sup> Floor might also have sustained serious water damage to walls, ceilings, carpeting and personal possessions of many tenants below the actual leak site.

Florida Condo Law at that time held that any water or structural damage as the result of a leak from any apartment down through the floor to apartments below was not covered by insurance by the owner of the leaking apartment above. That left every one effected on lower floors to deal with Painters, Dry wall, Carpeting and Water extraction issues by themselves.

Many people think that Plumbers can do magic. If the Plumber is called to fix a pin hole-leak in a pipe, and 6months or a year later they have another pin-hole leak in the same general (area 6 inches or 6 feet away from the previous repair), should some how some feel that it should be a freebie.

A Plumbing Contractor loses credibility with the Condo Management Company or Building Superintendent or Home owner after the pin-hole leaks become a routine on going occurrence.

It was this Customer Relationship issue that provided the impetus to find some workable solution to the Pin-Hole Nightmare. With the help of a NASA Metallurgist and a Technical Operation Manual Writer from Cape Canaveral (during a temporary lay-off due to a lapse in Federal funding) that really got the Copper Knight corrosion control off the ground.

The Metallurgist and the Writer were hired as laborers; part of their work was with plumbers doing re-pipe jobs , and helping plumbers with pin-hole repair jobs. It was the Metallurgist's knowledge of metals and corrosion problems that was the key to success. He worked with the owner of that Plumbing Company in devising the basic ground work for the very first successful Copper Knight ...the rest is history.

Copper piping when properly installed can and should last at least one Human Lifetime or two, sometimes it takes a little help from friends.

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## Watts Regulator HAV Automatic Air Vent



Series HAV Automatic Vent Valves are used in commercial, residential, and industrial applications to provide automatic or manual air venting in baseboards, convectors, radiators, and high points in piping systems. It consists of a 2-piece, chromed body construction, stainless steel check valve, brass disc bearing cover, copper thermostat assembly, neoprene O-ring, cellulose fiber disc, replaceable cartridge, and ABS heat-resistant knob. Cartridge can be easily maintained or replaced without system shutdown. Series HAV is ideal for use with hot water and low pressure steam systems. Maximum Pressure: 125psi

### Setting the Automatic Air Relief Valve

**Open the valve by very SLOWLY turning the little knob on top of the valve to the left (counter clockwise) until a steady stream of water is evident..... then turn the knob very SLOWLY to the right (clockwise) until water no longer flows.....then turn that little knob another 1/4 turn (clockwise); this should be the correct setting for the Air Relief Valve.**