

## *Water Quality and your resin, What's going on???*

Lets talk about water quality and facts you probably don't know and your current edm supplier "forgot" to tell you.

Water quality has to do with the chemical purity of your dielectric fluid (IE: water). Conductivity is the control and removal of minerals from the water. After the water is treated we should end up with pure water. Pure water is non-conductive, it is the dissolved elements (minerals / compounds) within the water that are conductive. It is important to note that "tap" water is far from pure as it contains everything from calcium, sodium, chloride, phosphates, various ferrous compounds and more. These materials are dissolved solids and cannot be filtered out by any mechanical method. Water filters remove suspended solids but cannot remove dissolved solids. Like sugar in a glass of water, these dissolved solids cannot be seen.

How are these dissolved solids removed and controlled?, by your resin system. The resin system is controlled by a conductivity sensor tied into the machine controller. Each material to be cut has a specific conductivity level that is most efficient. The conductivity sensor open and closes the water path through your resin bed.

Resin are small, very porous plastic beads. These beads are treated with a strong acid (40% cation resin) and a base (60% anion resin) making for mixed bed resin used in water edm machines. NOTE: RESIN IS HIGHLY TOXIC TO THE ENVIROMENT BEFORE IT IS EVEN PUT INTO THE EDM MACHINE. The beads are extremely porous, filled with small capillaries. In fact most of the ion exchange occurs within the beads. This is where using a larger micron filter, above 5 micron, or a poor quality filter will clog the capillaries with suspended material making the resin useless. Since resin has a higher cost and is supposed to have a longer life than your water filters, the small amount you saved in larger micron or cheaper filters is lost in the unnecessary destruction of your resin. You saved a dollar but cost yourself tens of dollars.

The physical process of making resin remains the same no matter the grade. What does matter is the number of organics, bead integrity and size. "Nuclear" grade is the most widely recommended as it is held to a higher standard. This resin is designed for cooling water in nuclear power plants where impurities and organics are not acceptable. Of note is the organics from lower quality resins is what creates that "pond" smell in your machine. It is the growth of bacteria that will coat your resin beads and filters, reducing the life of both.

The process of ion exchange is based on the fact that all dissolved solids are either positively charged (cations) or negatively charged (anions). When these pass through the resin bed they are changed. The cations are changed to hydrogen and anions changed to hydroxide. This process generated pure water. Allowing for the control of water conductivity.

Of special note, we stated above that mixed bed resin is highly toxic to the environment. Once it is in the machine and becomes contaminated with elements like nickel, vanadium, chromium and there are many more identified by EPA including zinc and copper, the elements of your brass wire. So it was toxic before you used, it is really toxic afterwards. Dumping this "out back" or in your scrap / garbage dumpsters could get you a visit from guys in yellow suits with an invoice. Make sure you are disposing of spent resin correctly according to local, state and federal requirements.

Have a question?? Give us a call (440)918-3770 North American EDM Supplies Inc.