D/F MACHINE SPECIALTIES, INC.

MIG & TIG Welding Products and Consumables
for Automated Welding Systems

American Made Welding Equipment, Family Owned and Operated Since 1966

Torch Maintenance

Cleaning Torches, Gas Nozzles, & Contact Tips

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One of the most important and simplest ways to create strong welds is to properly maintain your welding equipment. Taking care of your torch does not require a great deal of effort, and it can save you significant time and money in the long run with equipment longevity, weld quality, and performance. Proper short term torch maintenance will help you prevent some common welding errors, avoiding costly repairs on improperly maintained or neglected equipment. Depending on the type of welding equipment you're using, the maintenance required will be different. Stick (SMAW) welding equipment requires very little maintenance, while MIG (GMAW) and TIG (GTAW) welders need a bit more care and attention to stay in proper shape. The torch, contact tip, gas nozzle, and spatter disc work together to facilitate the necessary electrical conductivity and gas dispersion for the MIG process to occur, and proper care is important to maintain trouble-free welding performance. You won't be able to weld properly if these elements of your system aren't kept in top shape.

Contact Tips in MIG Welding

Make sure the gun tip isn't worn out or that weld spatter is not on the tip near the exit hole. The contact tip in the gun should be perfectly round and just a few thousandths larger than the wire itself. Worn tips are typically oval and can cause an erratic arc from the random electrical connection and physical movement of the wire inside the worn tip. Genuine D/F Machine Specialties contact tips are precisely made from a wear-resistant copper alloy for superior welding performance. If the contact tip enters the molten weld pool, it should be immediately replaced. For most casual welders, a good rule of thumb to assure high quality welding is to change the tip after every 100 lbs. of wire. For production welding with extreme conditions and duty cycles such as 4-hour arc time, it is recommended that you change a tip every time you finish a part. D/F is famous for a constant and stable arc. It is very safe to assume that if you have any change in weld quality or any change in the arc that the contact tip should already have been changed. Because of the superior performance and reliability of D/F torches, contact tips, and nozzles, it is very easy to perform a brief study to determine the contact tip and nozzle life for a particular job. The result of this study can be used to put measures in place so that the tip can be changed at regular appropriate intervals that will prevent any reduction in weld quality. Another point to remember about contact tips is that they should always be threaded completely into the adapter or torch body and tightened prior to welding to give a smooth flow of welding current and to prevent resistance heating.

Regular Inspection of MIG Equipment

Wire welders (MIG and/or flux-cored welding) include many peripheral items—the gun liner, gun contact tips, gas nozzles, the water/out & power cable, water-in hose & gas hose, gas diffuser/spatter disc, insulation tubes, etc.—and therefore require regular care and attention. It should be noted to always unplug the machine before performing any maintenance tasks. A MIG gun has to be inspected and cleaned during every shift change, and during every change of a contact tip, gas nozzle, spatter disc, or liner. The tips, nozzles, spatter discs, and liners themselves should be checked, changed, and cleaned regularly to prevent spatter buildup which leads to lower quality welds, and will even decrease torch life.

Resistance Heating – Torch Damage, Reduces Consumable Life

Copper starts to break down once its temperature exceeds 200 degrees. Keeping the gas nozzle clean is an important measure for several reasons. A gas nozzle with threads dirty from spatter buildup or oxidization will allow for significantly decreased metal to metal (copper to copper) contact when the gas nozzle is threaded back into the torch. This reduced contact with the copper front of the water-cooled nozzle will decrease the amount of cooling on the gas nozzle. More importantly, however, is the fact that the lack of contact will cause resistance heating. Without a clean connection, the electrical current that passes through the gap between the threads of the gas nozzle and water-cooled nozzle will turn into heat, causing the front of the torch to be preheated. Further, a torch can be overheated by not threading a copper gas nozzle all the way up so that the copper gas nozzle is not seated on the water-cooled nozzle's copper front; resistance heating will also occur if the gas nozzle is not seated and snug tight. Resistance heating is a great threat to the life of the torch, causing consumables to be used up prematurely, and even causing damage to the torch itself.

Preventing Spatter Buildup in Gas Nozzles

The gas nozzle, which helps to shield the weld, often becomes filled with spatter while welding. It is important to keep the nozzle clean in order to avoid inhibiting the flow of gas and preventing your ability to weld. Using a nozzle dip or anti-spatter will help keep the nozzle clean. Similar to the consistency of jelly, a product referred to as nozzle dip can help prevent spatter from sticking to the nozzle. Simply dip the nozzle in the product every once in a while welding to reduce the buildup of spatter. However, don't fully submerge the entire nozzle, you don't want to clog the torch or cut off the gas, just dip the tip. Also, store the nozzle in the manufacturer's packaging to prevent damage; if you toss it in a bin or other container, it may get dented or scratched, creating defect areas that can collect spatter or damage threads.

The following links feature various products for nozzle cleaning, maintenance, and prevention of spatter buildup:

- All Products: http://www.weldaid.com/
- Nozzle Dip Gel: http://www.weldaid.com/nozzle-dip-hd-gel/
- Nozzle Cleaning Tool: http://www.weldaid.com/nozzle-kleen-tool/

Cleaning Spatter and Reconditioning Nozzles

There are various methods for cleaning gas nozzles when spatter does end up collecting in them. Remove the gas nozzle to inspect it. A spatter-full or damaged nozzle has to be wire brushed with a hand drill or lathe with a wire wheel brush. Thorough cleaning would include brushing the outside and inside flat surfaces, brushing the edges, and brushing out the threads. Once cleaned, a gas nozzle should be free of surface inconsistencies, and the threads should be clean enough to allow the copper nozzle to be threaded back onto the chrome water-cooled nozzle by hand. It is important to remember that after cleaning out the nozzle, blow it out with air to remove any metallic or foreign particles that might prevent a clean thread connection.

Removing a Seized Gas Nozzle Properly

If the gas nozzle is not properly cleaned, the operator will most likely use a large wrench on it to force it up onto the chrome water-cooled nozzle (front of the torch). This will seize up the gas nozzle in the torch, and will not come out without damaging the torch. In an attempt to remove a seized nozzle, a large wrench will again have to be used to remove the gas nozzle, and will end up tearing the front end off of the torch. If a gas nozzle cannot be threaded up by hand, it should not be put on the torch.

In case a gas nozzle does seize up in the front of the chrome water-cooled nozzle assembly, it is necessary to remove the assembly so that it can be held properly to avoid damaging it when removing the gas nozzle. On the top of the water-cooled nozzle assembly there are two spigots. The water passages run through these spigots and straight down the sides of the water-cooled nozzle. These passages cannot be seen from the outside of the water-cooled nozzle. If these water passages are squeezed with a wrench or vise they will cave in and cut off the water supply through the torch and to the torch's water out & power cable. This will cause the torch to overheat; it will possibly cause severe damage to the torch and burn up the water out & power cable because cooling fluid will no longer be flowing through it.

When it is required that a wrench be used to grab the water-cooled nozzle, it is important to make sure that the jaws of the wrench are grabbing the water-cooled nozzle perpendicular to the water channels on sides of the water-cooled nozzle that are 90 degrees to the channels. This will avoid any pressure on the water passages and prevent them from caving in and restricting water flow.

In the factory, the water-cooled nozzles are placed in "soft jaws" in a vise that grab the water-cooled nozzle on the two sides 90 degrees to the water passages. This guarantees that the water-cooled nozzle will be grabbed correctly without damaging it, enabling the use of a wrench to remove the gas nozzle.

If the first two options are not available, the water-cooled nozzle can be placed in a lathe where the back collar is secured tightly with a chuck. The machine can be used to back out the gas cup.

Whenever a gas nozzle is removed to be cleaned or replaced, the threads of the chrome water-cooled nozzle should be inspected and cleaned as well, and chased with a nozzle thread chaser tap if necessary. Forcing the gas nozzle back onto the water-cooled nozzle will cause the threads to gall. If this does happen, or if the threads become damaged in any other way, they can be re-tapped with the nozzle thread chaser tap, and a new gas nozzle should be applied.

D/F Nozzle Thread Chaser Taps
In general it is important to keep the weldment and welding equipment clean to produce consistent quality welds. Chasing and re-tapping the nozzle threads is an excellent way to help keep the torch clean in particular. Chasing the threads will clean out things like dirt, metal shavings, or spatter built up in and around the threads of the nozzle. In turn, there will be less chance of contaminants entering the weld pool, as well as a cleaner contact between the gas cup and the nozzle. A quick re-tapping will also straighten damaged threads.

D/F has a complete line of nozzle thread chaser taps available for MIG (GMAW) & TIG (GTAW) torches for robotic and welding automation equipment. These nozzle thread chaser taps will clean threads and re-tap and repair any damaged threads for all of the different water-cooled & air-cooled torches, semi-automatic, handheld, automatic & robotic torches, tandem, open-arc, gasless & submerged arc (sub arc) nozzles and nozzle bodies that D/F manufactures.

Proper use of a D/F nozzle thread chaser tap: **CAUTION:** Incorrect use of a Nozzle Thread Chaser Tap can cause severe damage to a Nozzle. Do not cross-thread the water-cooled Nozzle. Also, do not tap past the last threads in the W/C Nozzle. Always make sure the threads are clean.

All D/F W/C Nozzles are hand checked for fit before & after plating, and checked again before shipping. If a nozzle has been installed on a new complete torch, they have also been hand checked while being assembled.

The only reason to ever take a gas cup out a nozzle is to clean it. The nozzle and the gas cup must be blown out, and all of the threads have to be wire brushed and blown out again before hand-tightening the gas cup back into the nozzle. If you can’t thread it in by hand then something is wrong. Never force a gas cup into a nozzle.

When using the D/F Machine Specialties nozzle thread chaser taps, be sure to always follow the steps below:

1. Make sure that the nozzle is properly supported when tapping so that it does not twist in the front of the torch body and cause damage.
   - Improper support can cause the spigots to twist off the top of the rear nozzle collar, or damage the torch internal body parts.
   - Note where the water ports go down the sides of the water-cooled nozzle (following down in line with the spigots). Too much direct pressure on these water ports could cause them to cave in and block of the flow of water.
   - Over-tightening of the vice can cause damage in general.
2. Remove the tip from the front of the torch before tapping.
3. Lightly lubricate the nozzle and nozzle thread chaser tap before tapping.
4. Be sure to start the tap very carefully. Do not cross thread the nozzle.
5. Be very careful to start threads correctly. Only tap 1/2 turn at a time, always backing up and removing chips 1/2 cycle at a time before moving forward. Do not try to tap further into the water-cooled nozzle than needed or past the factory thread depth.
6. Blow out the nozzle after tapping.
7. Wire brush and blow off the gas cup before threading it back into the nozzle.
8. If nozzle is badly deformed or damaged please return to the factory for a repair estimate before disposing of product (damaged parts can often be repaired).

Gas Diffuser/Spatter Disc Cleaning and Maintenance

As on a gas nozzle, the buildup of spatter on the gas diffuser/spatter disc will also inhibit the flow of gas. The gas diffuser/spatter disc is held into the front of the torch by the by the support tube which is held in place by the collet nut (if you are using a slip-in tip) or by the threaded contact tip. This gas diffuser/spatter disc disperses the shielding gas required for MIG or gas-shielded flux-cored welding. On a regular basis, remove the gas cup, tip (collet), and support tube and check the diffuser to ensure that it's not clogged. If there is spatter in the diffuser, use a razor blade to clean, a small wire to clean holes or a rag to just wipe it clean.

Torch Position & Other Precautions

The position of the torch is another important factor to consider within the idea of torch maintenance. To ensure that your gun contact tip stays in the best shape, try not to touch the tip to the work piece. Every time you make unwanted electrical connection between the tip and the work piece, the tip is damaged. It is often possible to burn the tip enough to modify the path of the wire through the tip, thus affecting weld quality. Also, for best performance be sure that your torch is above the work piece at the correct height with the correct gas coverage. Ensure that the tip is clean and seated in the torch all the way down so you have copper touching copper. If the tip is not bottomed out and snugged tight, you will also get resistance heating similar to that occurring with improperly seated gas nozzles. Make sure the tip is hand tight or snug tight. These precautions will improve torch life and weld quality, but despite a welder's best efforts, gun contact tips do eventually need to be replaced. After significant use, the hole diameter in the tip will elongate or become oval in shape due to the friction from constant wire feed, affecting wire placement in the joint.