



Instruction Manual  
162WP NC-21-E/HT-21-E  
Revised 10/2015

# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

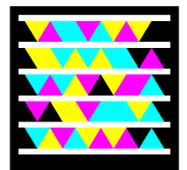
1750 Howard Drive, North Mankato, MN 56003

Phone: (507) 625-6200 Fax: (507) 625-6203

Email: [sales@dfmachinespecialties.com](mailto:sales@dfmachinespecialties.com)

[www.dfmachinespecialties.com](http://www.dfmachinespecialties.com)

## WATER-COOLED PISTOL GUN with EURO CONNECTOR



**INSTRUCTION, PARTS & SPECIFICATIONS MANUAL**

**D/F MACHINE SPECIALTIES** is a world leader in the design, development, and manufacture of “MIG” (GMAW) & “TIG” (GTAW) welding products, consumables and accessories. D/F offers several types of manual Air or Water-Cooled “MIG” welding tools, and with the increased use of automated and robotic welding systems, a demand has been created for welding tools of the highest quality, durability and interchangeability. For over forty years, D/F welding products have been used extensively on “MIG” and “TIG” welding applications. This experience, coupled with patented design features, unavailable on any other competitive equipment, has made D/F welding tools the most advanced “MIG” and “TIG” welding guns and barrels for semi-automatic, automatic or robotic welding applications.

This Catalog is a guide to helping you select the proper tool for a given semi-automatic, automatic or robotic welding application. The following is only a partial listing of available semi-automatic, automatic and robotic guns. For further information on special “MIG” and “TIG” requirements, please consult the factory.

#### **Customer satisfaction and customer benefits are the center points of all strategic contents**

The spirit of the D/F Machine Specialties personnel is to listen to and to integrate the customer throughout the process, to develop and design marketable products, to present prototypes, to carry out pilot tests and to prepare for and be open to new technology and tasks. We attract and carefully select talented individuals who share our values. Together we will nurture and sustain a work environment with two-way communication, training, mentoring, and rewarding career opportunities.

#### **Innovation and quality**

Innovation and quality come from being receptive and willing to learn from others. We encourage our people to be creative and take risks in the pursuit of excellence. Innovative practices are deeply rooted in every one of our employees, a philosophy that leads to continuous product development and industry firsts.

#### **Progress**

By remaining confident, focused, and persistent in challenging times, we will discover opportunity. Commitment to quality and the pursuit on innovation ensure that D/F Machine Specialties will remain an industry leader for years to come.

#### **Commitment to excellence**

At D/F Machine Specialties we commit to design, build and deliver premium products and superior customer support to quality driven welding professionals. Customers still to this day choose D/F over competitors because of our responsiveness and flexibility. Customers will continue to choose D/F tomorrow for our superior hand-made products and service. To ensure this, we need creative and competent personnel in all business divisions, an intensive exchange of thoughts and ideas with all users, participation in working and study groups within the field of welding technology and intensive cooperation with institutes and universities.

#### **Teamwork**

Striving for excellence is a commitment that is an integral component of the D/F Culture. Our team of skilled and dedicated employees takes pride in the excellence products they produce. Each of us willingly accepts personal responsibility for meeting our commitments and we hold each other to a high standard of accountability.

#### **Responsibility**

We will continually strive to be environmentally responsible and to support the health and safety of our employees, customers, and neighbors. We continue to support the communities in which we operate and the industries in which we participate.

*Thank You for Choosing D/F Machine Specialties*



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## SAFETY MEASURES - **\*\*PLEASE READ!\*\***

Welding is not particularly hazardous when certain safety practices are followed. Anyone using this equipment should be thoroughly trained in safe welding practices. Failure to observe safe practices may cause serious injury. Handling welding torches presents no danger if the appropriate safety regulations are strictly adhered to. For example:

- Starting-up procedures must be reserved for those fully conversant with processes relating to arc welding equipment.
- Arc welding can prove damaging to eyes, skin, and hearing! It is therefore imperative that the Accident Prevention Regulations UVV 26.0 and VGB 15 are fully observed and that all protective clothing, eye and ear protectors specified are worn.
- The load data given are maximum limit figures. Overloading will inevitably damage the torch!
- Before changing wear parts, disconnect for the power supply.
- The operating instructions for the individual welding components - e.g. power source, wire feed and cooling unit must be followed.
- Never pull the cable assembly across sharp edges or set down close to weld spatter or on a hot workpiece.
- Those not involved in the welding process should be protected by curtains or partitions from radiation and the danger of being dazzled.
- When handling gas cylinders, consult the instructions issued by the manufacturers and the suppliers of the pressurized gas.
- Workpieces which have been degreased using chlorinated solvents must be sprayed down with clean water before welding starts to avoid the risk of phosgene forming. For the same reason, no degreasing baths containing chlorine must be placed close to the welding point.
- All vapors given off by metals can cause harm and a special warning is attached to lead, cadmium, copper, zinc, and beryllium. If necessary, take appropriate precautions (by providing adequate ventilation or an extraction system) to ensure that the legal maximum levels of toxic concentrations are not exceeded.

**For more information**, refer to the following standards in their latest revisions and comply as applicable.

- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
- ANSI Standard Z88.2, "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY, 10018.
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402.
- American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.

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### IMPORTANT

The D/F torch is famous for the fact that if it is chilled properly, the welder can grab the front of the torch with their bare hand and it will be cold to the touch seconds after welding. With the proper chiller, this can be done even after a 4 hour arc time.

Make certain the cooling water supply is **Deionized water (DI Water)** and at least the minimum flow rate of 3 quarts per minute (for each inner body), at 40 psi (80 psi maximum) with a 5 gallon reservoir and 15,000 BTU/hr cooling capacity. Gun ratings are affected by shielding gas used, arc time, cooling time and inlet water temperature. Water outlet temperature should not exceed 27°C (80°F). The torch's water out & power cable is not cooled until the coolant has gone through the torch and out the water out & power cable. If water is not flowing through the D/F torch for at least 1 minute prior to striking an arc, when you apply the power and water hits the "hot" water/out & power cable, you will generate steam. Steam can damage the torches internals in seconds causing a leak. It can also blow out the torches water/out & power cable. A flow switch can be installed after the return line ensuring that coolant is present at the return line prior to striking an arc.

When High-Deposition GMAW or extended periods of arc time are used, it is recommended that a liquid chiller be considered with a larger reservoir and a minimum of 30,000 BTU/hr cooling capacity. Precise temperature control maintains the cooling at a constant 13°C (55°F) temperature, thus prolonging the life of the welding equipment and more specifically extending the service life of the gas nozzle and current tip.

A refrigerated liquid chiller for GMAW may be obtained from: For single torch chillers: Dynaflux - 800-334-4420 - [www.dynaflux.com](http://www.dynaflux.com)

**\*\*For extreme duty cycles or multiple torch cooling systems: MTA Refrigerated Chillers - 716-693-8651 - <https://www.mta-it.com/eng/>**

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## INTRODUCTION

This manual provides general information covering various models of the D/F Water-Cooled Pistol Gun with EURO quick-disconnect, along with parts information. All models are equipped with the EURO quick-disconnect which accepts wire in, shielding gas and trigger circuit contacts. The water hoses are provided with quick-disconnect fittings that may be directly connected to 1/4" hoses extended from the cooling source.

A unique feature of these Water-Cooled Pistol Guns is that the nozzle assembly water chamber and inner body water chamber are serially connected to each other with sliding removable connectors making it a relatively simple matter to detach the nozzle assembly, thus completely eliminating the need for gaskets or O-rings in the water passage system.

**MODEL NC-21-E - For Soft Aluminum Wire 3/64"-3/32" Diameter (Slip-In Tips):**

The Model NC Water-Cooled Pistol Gun has a current capacity of 500 amperes. It accommodates a slip-in tip fastened by a collet action nut. The aluminum wire diameter range is 3/64"-3/32" diameter.

**MODEL NC-21-E - For Hard & Cored Wire .030"-1/8" (Slip-In Tips):**

The Model NC-21-E Water-Cooled Pistol Gun has a current capacity of 600 amperes in CO<sub>2</sub> shielding and 500 amperes in Argon mixtures. Tips are of the slip-in type fastened by a collet action nut. Current tips are accepted by the gun inner body by the change of an inner body adapter. The length of the Model NC-21-E Water-Cooled Pistol Gun may be extended by applying any of three (3) different length Water-Cooled Nozzle assemblies.

**MODEL HT-21-E - For Hard & Cored Wire .035"-1/8" (Threaded Tips):**

The Model HT-21-E Water-Cooled Pistol Gun has a current capacity of 600 amperes in CO<sub>2</sub> shielding and 500 amperes in argon mixtures. Tips are of the threaded type. Diameters of the tips are 7/16" threaded. Current tips are accepted by the gun inner body by the change of an inner body adapter. The length of the Model HT-21-E Water-Cooled Pistol Gun may be extended by applying either of three (3) different length Water-Cooled Nozzle assemblies. When the gun is applied to applications which require an upper current level, it is recommended that the 7/16" diameter threaded tips be employed.

Several types of wire casings are available for specific wire diameters. All guns are furnished with single piece wire casings for wire diameters of 5/64"-1/8". For smaller diameter wires the casings will be of the type which accepts a replaceable liner.

For further information or help with D/F Machine Specialties products, please visit our web site at [www.dfmachinespecialties.com](http://www.dfmachinespecialties.com), or consult the factory at 1-507-625-6200.

## TABLE 1 - SPARE PARTS

ITEM	CODE NO.	MIN QTY.
Gas Nozzle	To Be Selected	2
Current Tip	To Be Selected	25
Collet Nut	To Be Selected	1
Spatter Disc	10405	2
Body Liner	To Be Selected	2
Insulation Tube	To Be Selected	1

**TABLE 2 - SPECIFICATIONS**

Model	Current Capacity	Length 3" Nozzle	Length 4" Nozzle	Length 5" Nozzle	Diameter of Body Housing	Weight (approx.)	Cooling Required	Recommended Wire Diameter Range
NC-21-E	500 amp	9.250"	10.250"	11.250"	1.625"	2.5 lbs. (3" Nozzle)	5 pints/min.	.030"-1/16" Hard 3/64"-3/32" AL
HT-21-E	600 amp	9.250"	10.250"	11.250"	1.625"	2.5 lbs. (3" Nozzle)	5 pints/min.	.030"-1/16" Hard .035"-1/8" Cored

**TABLE 3 - ORDERING INFORMATION**

**MODEL NC-21-E - For Aluminum Wire (Slip-In Tips - 1/4" & 5/16")**

Code No.	Description	With Nozzle Assembly	Current Tips		Wire Range	Argon (Amps)	CO <sub>2</sub> (Amps)	Model No.
			Length	Fastening Method				
18857	10 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	3/64"-3/32"	500	-	NC-21-57-E
18858	12 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	3/64"-3/32"	500	-	NC-21-58-E
18859	15 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	3/64"-3/32"	500	-	NC-21-59-E

**MODEL NC-21-E - For Hard & Cored Wire (Slip-In Tips - 1/4" & 5/16")**

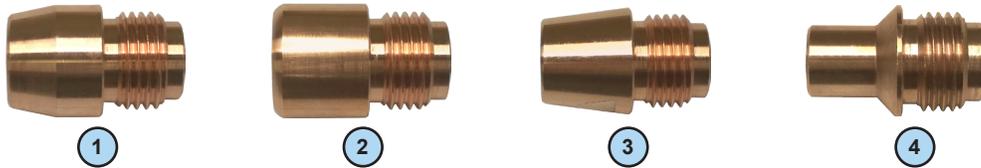
Code No.	Description	With Nozzle Assembly	Current Tips		Wire Range	Argon (Amps)	CO <sub>2</sub> (Amps)	Model No.
			Length	Fastening Method				
18860	10 Ft. Assembly	11117 (Short.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-60-E
18861	10 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-61-E
18862	10 Ft. Assembly	11119 (Long.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-62-E
18863	12 Ft. Assembly	11117 (Short.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-63-E
18864	12 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-64-E
18865	12 Ft. Assembly	11119 (Long.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-65-E
18866	15 Ft. Assembly	11117 (Short.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-66-E
18867	15 Ft. Assembly	11118 (Inter.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-67-E
18868	15 Ft. Assembly	11119 (Long.)	4" & 3.5"	Collet Nut	.035"-1/8"	500	600	NC-21-68-E

**MODEL HT-21-E - For Hard & Cored Wire (Threaded Tips - 7/16")**

Code No.	Description	With Nozzle Assembly	Current Tips		Wire Range	Argon (Amps)	CO <sub>2</sub> (Amps)	Model No.
			Length	Fastening Method				
18869	10 Ft. Assembly	11117 (Short.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-69-E
18870	10 Ft. Assembly	11118 (Inter.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-70-E
18871	10 Ft. Assembly	11119 (Long.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-71-E
18872	12 Ft. Assembly	11117 (Short.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-72-E
18873	12 Ft. Assembly	11118 (Inter.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-73-E
18874	12 Ft. Assembly	11119 (Long.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-74-E
18875	15 Ft. Assembly	11117 (Short.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-75-E
18876	15 Ft. Assembly	11118 (Inter.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-76-E
18877	15 Ft. Assembly	11119 (Long.)	Variable	Threaded	.035"-1/8"	500	600	HT-21-77-E

## TABLE 4 - GAS NOZZLES

GUN MODEL	REF.	NOZZLE TYPE	O.D.	I.D.	CODE NO.
NC/HT	1	Copper Tapered	63/64"	5/8"	10362
	2	Copper Straight	1"	3/4"	10340
	3	Copper Full Taper	63/64"	5/8"	10359
	4	Copper Straight	5/8"	7/16"	10374



## DISASSEMBLY

1. All repairs and adjustments to gun assemblies are made with the power source and feeder turned off.
2. Remove the forward gas nozzle, current tip and spatter disc.
3. Unscrew the cone nut which permits the water-cooled nozzle assembly to be pulled forward approximately 3/4". This will expose the water connection fittings. With a 5/16" open end wrench, disconnect the fittings and remove the water-cooled nozzle assembly from the body. The barrel housing can now be pulled from the inner body with a slight twisting motion.
4. Remove the flat head inner body holding screw (12610), after which the inner body with service hoses connected may be pulled from the rear end of the barrel body.
5. The alignment tube, used for centering the liner, can be removed by pushing the tube with a 4" current tip toward the service connections at the rear of the inner body.
6. If the adapter is worn or damaged proceed as follows. Two (2) 1/2" open end wrenches are needed to remove the adapter/jam nut assembly from the inner body. Break the jam nut loose first, and then remove the assembly.

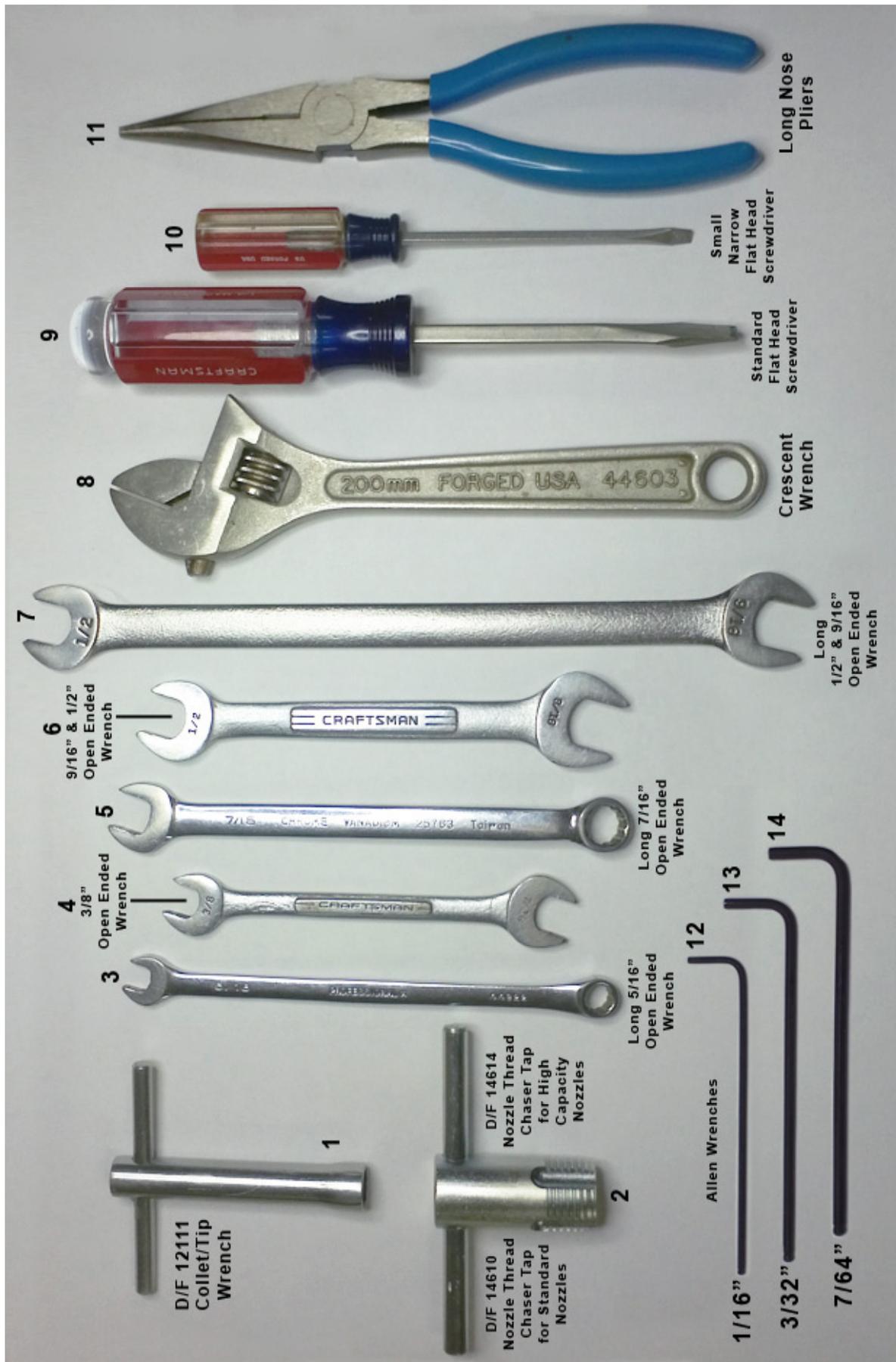
## ASSEMBLY

1. To assemble the water-cooled gun, connect all service lines to the inner body, including the interconnection hose assembly which attaches to the water-cooled nozzle. Care must be exercised when reassembling the hoses to the fittings on the inner body. Do not over tighten them. Before connecting a replacement interconnection hose (10974) note position of spring liner within hose assembly. It is mandatory to connect the end of the hose to the inner body water fitting using the end that indicates the spring liner closest to it. If the spring is in the middle of the interconnection hose assembly you must gently tap the spring all the way down towards one of the fittings of the interconnection hose assembly prior to bending it. The fitting with the spring touching it is the one that should be connected to the inner body. In other words the hose end that indicates the open space within the hose should be the end that is fastened to the Water-Cooled Nozzle. The interconnection hose assembly may be bent into a U-shape manually before applying it to the rear of the inner body.
2. The interconnection hose assembly is placed in the upper right hand concave while pushing inner body assembly in from the rear of the body housing until the flat head screw may be started into the body (Note: it may be necessary to temporarily tape the hose to the front end of the inner body). Place the water-in hose assembly in thru the left hand concave until it extends out the front. You must insert the two (2) nylon insulating tubes (10723) over the hose fittings. If you do not, the torch may short itself out.
3. The nylon collar should be in place on the rear of the Water-Cooled Nozzle assembly. It is important that the small indicator hole in the nylon collar be on the lower right hand side as Water-Cooled Nozzle is connected to the hose fittings. After fastening the hoses the Water-Cooled Nozzle may be pushed back until it contacts the body housing, after which the cone nut may be applied. Replace the Water-Cooled Nozzle insulation tube.
4. Place the spatter disc with counter-bored end facing inner body into nozzle, apply current tip, collet nut and gas nozzle. Always wire brush the gas nozzle threads and blow out the water-cooled nozzle threads before reapplying the gas nozzle.
5. CAUTION: Never mount over the "HOT" flat head inner body holding screw (12610).

# REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY

1. **D/F 12111 Collet/Tip Wrench** - This is the only tool that should ever be used to tighten the collet nut or the tip. Pressure should be 30 lbs., or as snug as hand tightened. Never use another wrench to apply more torque to this wrench.
2. **D/F Nozzle Thread Chaser Tap** - This is used to re-tap damaged threads that have been improperly cleaned or cross threaded. Always blow out the nozzle and gas nozzle after changing gas cup or re-tapping. For more information on how to use the nozzle thread chaser tap, use the following link: [www.dfmachine.com/taps](http://www.dfmachine.com/taps)
3. **Long 5/16" Open Ended Wrench**
  - A. A short wrench will work, however we prefer the feel and comfort of the long 5/16" open ended wrench. This is used to loosen or tighten interconnection hose (10974) to the 7mm fitting on the inner body, and to connect the pipe assembly (10957) to the water in hose.
  - B. Also use this wrench to connect the torch's water-cooled nozzle assembly to the interconnection hoses.
4. **3/8" Open Ended Wrench** - This is used on the inner body's gas hose fitting to secure the gas hose to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. You never want to use excessive force by using too large of a wrench. You will use the Long 7/16" Open Ended Wrench for the fitting on the gas hose itself while using the 3/8" wrench to steady the inner body at the fitting. (see #5)
5. **Long 7/16" Open Ended Wrench** - This is used to secure the gas hose to the torch's inner body. (see #4)
6. **9/16" & 1/2" Open Ended Wrench**
  - A. This is used on the inner body's water out & power cable fitting to secure the water out and power cable to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. You will use the #7 (Long 9/16" Open Ended Wrench) for the fitting on the water out & power cable hose. (see #7 A)
  - B. This wrench is also used to secure the adapter and jam nut that hold the current tip to the inner body. In your left hand hold the inner body, and with your right hand thread up the adapter using the 1/2" Open Ended Wrench until it is tight. Now place the same wrench on the jam nut and snug it up against the inner body. Keeping that wrench on the jam nut and placing it on the table for force, take #7 (Long 1/2" Open Ended Wrench), place it on the adapter and push it down (counter-clockwise) securing the adapter to the inner body. (see #7 B)
7. **Long 1/2" & 9/16" Open Ended Wrench**
  - A. This is used to secure the water out & power cable to the torch's inner body. A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. (see #6 A)
  - B. This wrench is also used to secure the adapter and jam nut to the inner body. (see #6 B)
8. **Adjustable Crescent Wrench** - A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. **CAUTION:** Never use excessive force with large wrenches, for you could twist or break parts.
9. **Standard Flat Head Screwdriver** - This is used to tighten or secure the torch's body screw. Also, the screwdriver can be used to straighten the contact tip if it is not aligned in the center of the gas cup or water-cooled nozzle **CAUTION:** This cannot be done unless the spatter disc has been removed from the torch.
10. **Small Narrow Flat Head Screwdriver** - This is required to insert into the small body housing hole so you can access the casing/conduit set screw.
11. **Long Nose Pliers** - These are used to grab the small white insulation tubes (10723) and get them into the correct position when working on the interconnection hose fittings inside the torch. Also they are very handy when changing a slip-in contact tip.
12. **1/16" Allen Wrench** - This is used for secure the button switch set screw in the aluminum pistol handle.
13. **3/32" Allen Wrench** - This is used to secure the socket cap screws in the handle bracket to the 3 t-bolts required to secure the handle bracket (10338) to the body housing (12130).
14. **7/64" Allen Wrench** - This is used to secure the 4 socket cap screws in the sides of the aluminum pistol handle to the handle bracket and body housing.
15. **Propane Torch** - Required for applying new heat shrink to interconnection hose assemblies & water in hoses.

# REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY



## HOW DO I CUT, FIT, AND INSTALL A NEW LINER?

1. Be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing or removing a wire liner.
2. Remove the old liner by first removing the MIG gun's contact tip.
3. Pull the old wire liner out of the conduit/casing assembly from the feeder connector or feeder adapter plug end. If you are using a feeder adapter that has an inlet, the inlet must be removed first. If you have any problems removing the liner you may un-thread the feeder adapter first this will also back the liner out of the conduit/casing.
4. If you know that the old liner is the correct length or is still the original liner that was cut at the factory you may hold the new liner up against the old liner and cut off the new liner to the same size as the old liner.
5. Make sure you have a good sharp cut off with no material sticking out!
6. To get the correct length of the new liner, insert the liner into the feeder adapter and feed it through the conduit/casing.
7. Once again be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing a new wire liner.
8. Sometimes on longer conduits/casings and liners it may take 2 people together; one on each end to rotate and twist the conduit/casing to get the liner through the torch.
9. If you have any troubles getting a liner through a torch make sure you have a good sharp cut off, and if you have to you can gently sand the end of the liner on a belt sander. You can remove the cast in the aluminum liner by pre-bending and straightening the liner before loading.
10. After the new liner comes out the end of the torch you want to cut the new liner off flush with the end of the copper gas nozzle or Cu gas cup.
11. Now you have the overall length of the liner, you still have to take out the length of the contact tip.
12. Carefully remove the liner one more time.
13. After removing the liner hold the gun end of the liner up against the tip.
14. Cut off the length off the tip plus the set back of the tip (1/8" or 3/8" tip setbacks)
15. Now that you have cut off the length of the tip plus the setback you may install the new liner and it will back up into the back of the tip chamfer.
16. We always recommend checking the condition of the insulation tube in the front of the torch and collet nut that holds the slip-in tip.
17. We always recommend replacing the spatter disc/gas diffuser, contact tip, and nozzle, after installing a new liner.
18. Tighten the flat head set screw in the inner body, or the Allen set screw in the docking spool onto the conduit/casing to prevent backward movement or an unwanted pumping action.

# WHAT IS THE PROPER USE OF THE NOZZLE THREAD CHASER TAP?

All D/F Nozzles are hand checked for fit before and 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 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.
  - Best practice is to hold the water-cooled nozzle in a vice with soft jaws, perpendicular to the spigots.
  - 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. Wire brush and blow off the gas cup before threading it back into the nozzle.
7. 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).

## ORDERING INFORMATION - NOZZLE THREAD CHASER TAPS

CODE NO.	DESCRIPTION	USED WITH NOZZLE ASSEMBLY	USED FOR GAS NOZZLE
14610	Nozzle Thread Chaser Tap for Standard A/C & W/C Nozzle Assembly Front	13197 16184 11117, 45101 11118, 45102 11119, 45103 45114 45107 NCC-N/HTC-N NCC-LRN, HTC-LRN	10340 10359 10362 10374
14611	Nozzle Thread Chaser Tap for BIG MIG & BIG TIG Nozzle Assembly Front	11123	10382 10387 10389 10390 10392
14612	Nozzle Thread Chaser Tap for Nozzle Body Assembly Rear	13196 13197 13198 16184	
14614	Nozzle Thread Chaser Tap for Series A High-Capacity Nozzle Assembly Front	11142, 45120 11138, 45121 45127 11132, 45129 45125	16748 16749 16750 16751 18030 18031 18032
14615	Nozzle Thread Chaser Tap for Nozzle Body Assembly Front	13198	10379
14617	Nozzle Thread Chaser Tap for Tandem Nozzle Assembly Front	41641	41667 41668

# TABLE 5 - CURRENT TIPS



## CURRENT TIPS - 1/4" DIAMETER SLIP-IN

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (Tip provides 1/8" set back)	.030"	Hard	10787
	.035"	Hard	10788
	.045"	Hard	10789
	.052"	Hard	10830
	1/16"	Hard	10790
All NC, NCC, NCM (Tip provides 1/8" set back)	5/64"	Hard	10792
	3/64"	Aluminum	10781
	1/16"	Aluminum	10782
	5/64"	Aluminum	10823
All NC, NCC, NCM (Bent Tip) (Tip provides 1/8" set back)	3/32"	Aluminum	10783
	.045"	Hard	10562
	.035"	Hard	10565
	3/64"	Aluminum	10572
	1/16"	Aluminum	10573



## CURRENT TIPS - 5/16" DIAMETER SLIP-IN

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (Tip provides 1/8" set back)	.030"	Hard	10883
	.035"	Hard	10884
	.045"	Hard	10885
	.052"	Hard	10886
	1/16"	Hard	10887
	5/64"	Hard	10888
	3/32"	Hard	10889
	7/64"	Hard	10904
All NC, NCC, NCM (Tip provides 3/8" set back)	1/8"	Hard	10933
	.035"	Cored	10893
	.045"	Cored	10894
	.052"	Cored	10895
	1/16"	Cored	10896
	5/64"	Cored	10897
	3/32"	Cored	10898
All NC, NCC, NCM (Tip provides 1/8" set back)	7/64"	Cored	10899
	1/8"	Cored	10900
	3/64"	Soft	10902
	1/16"	Soft	10935
	5/64"	Soft	10888
	3/32"	Soft	10936

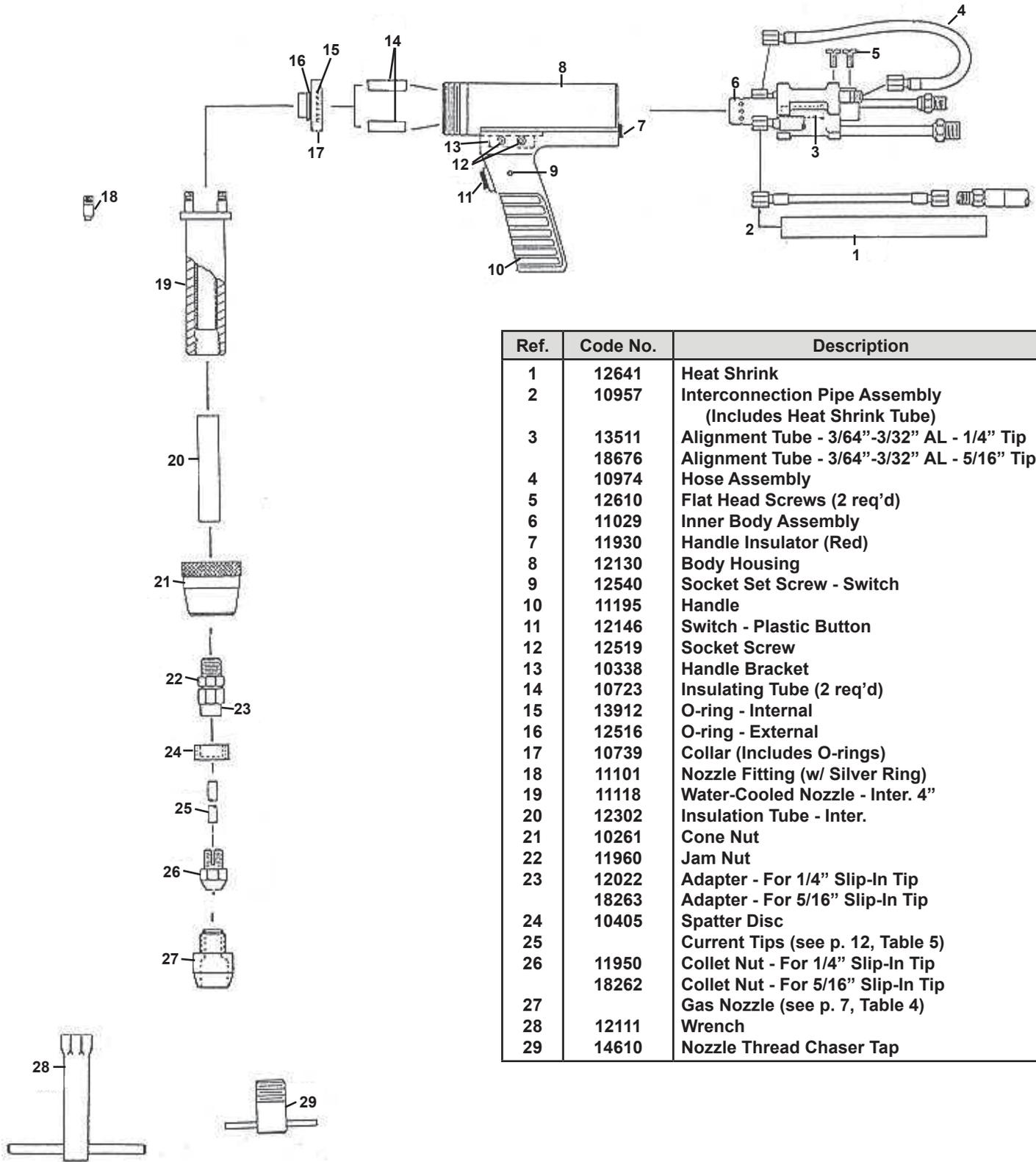


## CURRENT TIPS - 7/16" DIAMETER THREADED

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 1/8" set back)	.035"	Hard	15116
	.045"	Hard	15117
	.052"	Hard	15121
	1/16"	Hard	15118
	5/64"	Hard	15119
	3/32"	Hard	15120
	7/64"	Hard	15122
	1/8"	Hard	15105
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 3/8" set back)	.035"	Cored	15101
	.045"	Cored	15106
	.052"	Cored	15112
	1/16"	Cored	15107
	5/64"	Cored	15108
	3/32"	Cored	15109
	7/64"	Cored	15110
All HT, HTC, HTM, CTW, CW-T, MTW (Tip provides 1/8" set back)	1/8"	Cored	15111
	3/64"	Aluminum	15126
	1/16"	Aluminum	15125
	5/64"	Aluminum	15087
	3/32"	Aluminum	15148
	1/8"	Aluminum	15123

# WATER-COOLED PISTOL GUN FOR EURO CONNECTOR

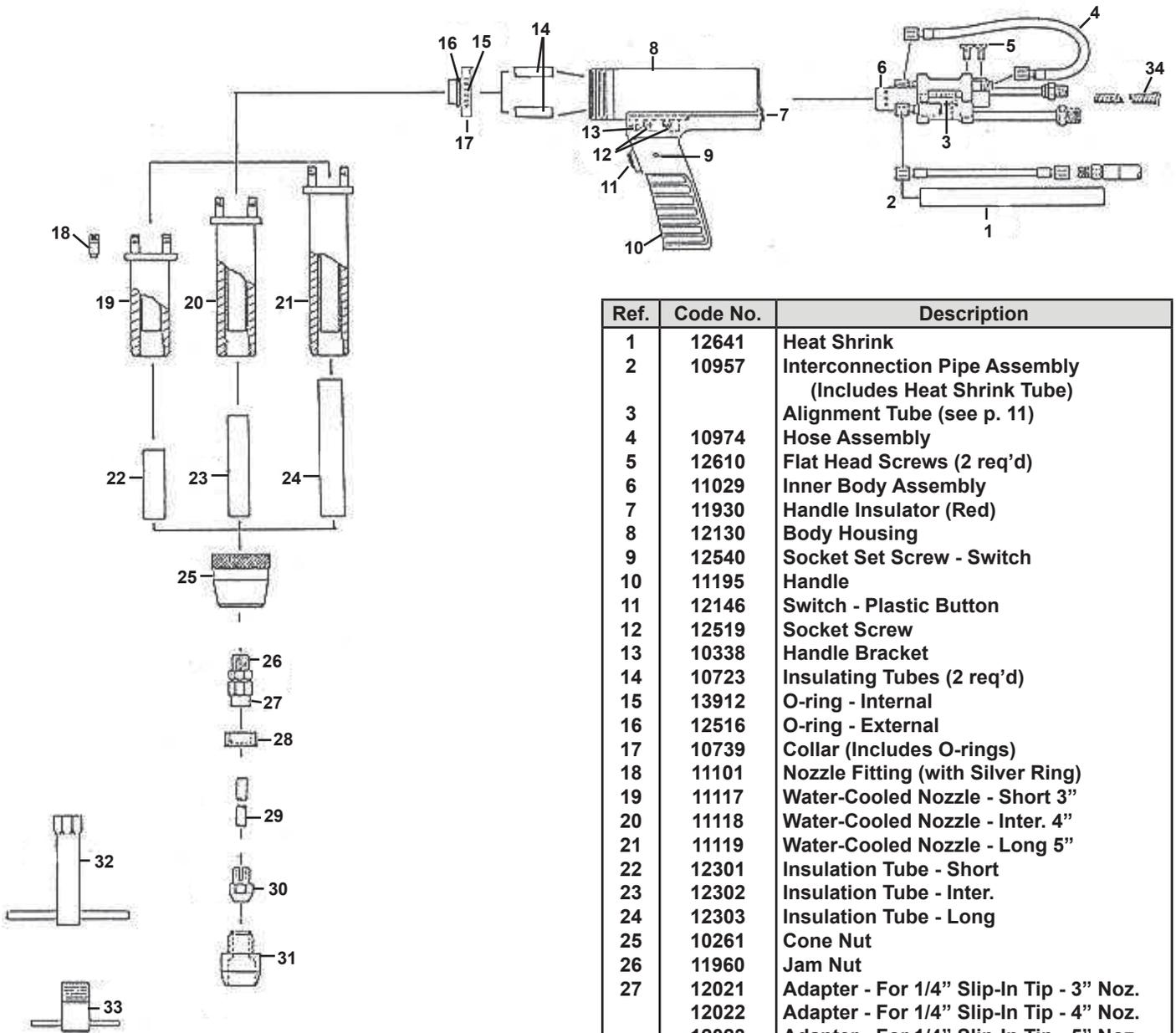
## MODEL NC-21-E (AL Wire, Slip-In Tip)



Ref.	Code No.	Description
1	12641	Heat Shrink
2	10957	Interconnection Pipe Assembly (Includes Heat Shrink Tube)
3	13511	Alignment Tube - 3/64"-3/32" AL - 1/4" Tip
	18676	Alignment Tube - 3/64"-3/32" AL - 5/16" Tip
4	10974	Hose Assembly
5	12610	Flat Head Screws (2 req'd)
6	11029	Inner Body Assembly
7	11930	Handle Insulator (Red)
8	12130	Body Housing
9	12540	Socket Set Screw - Switch
10	11195	Handle
11	12146	Switch - Plastic Button
12	12519	Socket Screw
13	10338	Handle Bracket
14	10723	Insulating Tube (2 req'd)
15	13912	O-ring - Internal
16	12516	O-ring - External
17	10739	Collar (Includes O-rings)
18	11101	Nozzle Fitting (w/ Silver Ring)
19	11118	Water-Cooled Nozzle - Inter. 4"
20	12302	Insulation Tube - Inter.
21	10261	Cone Nut
22	11960	Jam Nut
23	12022	Adapter - For 1/4" Slip-In Tip
	18263	Adapter - For 5/16" Slip-In Tip
24	10405	Spatter Disc
25		Current Tips (see p. 12, Table 5)
26	11950	Collet Nut - For 1/4" Slip-In Tip
	18262	Collet Nut - For 5/16" Slip-In Tip
27		Gas Nozzle (see p. 7, Table 4)
28	12111	Wrench
29	14610	Nozzle Thread Chaser Tap

# WATER-COOLED PISTOL GUN FOR EURO CONNECTOR

## MODEL NC-21-E Hard/Cored Wire, Slip-In Tip



Ref.	Code No.	Description
1	12641	Heat Shrink
2	10957	Interconnection Pipe Assembly (Includes Heat Shrink Tube)
3		Alignment Tube (see p. 11)
4	10974	Hose Assembly
5	12610	Flat Head Screws (2 req'd)
6	11029	Inner Body Assembly
7	11930	Handle Insulator (Red)
8	12130	Body Housing
9	12540	Socket Set Screw - Switch
10	11195	Handle
11	12146	Switch - Plastic Button
12	12519	Socket Screw
13	10338	Handle Bracket
14	10723	Insulating Tubes (2 req'd)
15	13912	O-ring - Internal
16	12516	O-ring - External
17	10739	Collar (Includes O-rings)
18	11101	Nozzle Fitting (with Silver Ring)
19	11117	Water-Cooled Nozzle - Short 3"
20	11118	Water-Cooled Nozzle - Inter. 4"
21	11119	Water-Cooled Nozzle - Long 5"
22	12301	Insulation Tube - Short
23	12302	Insulation Tube - Inter.
24	12303	Insulation Tube - Long
25	10261	Cone Nut
26	11960	Jam Nut
27	12021	Adapter - For 1/4" Slip-In Tip - 3" Noz.
	12022	Adapter - For 1/4" Slip-In Tip - 4" Noz.
	12023	Adapter - For 1/4" Slip-In Tip - 5" Noz.
	18312	Adapter - For 5/16" Slip-In Tip - 3" Noz.
	18263	Adapter - For 5/16" Slip-In Tip - 4" Noz.
	18313	Adapter - For 5/16" Slip-In Tip - 5" Noz.
28	10405	Spatter Disc
29		Current Tips (see p. 8, Table 5)
30	11950	Collet Nut - For 1/4" Slip-In Tip
	18262	Collet Nut - For 5/16" Slip-In Tip
31		Gas Nozzle (see p. 7, Table 4)
32	12111	Wrench
33	14610	Nozzle Thread Chaser Tap
34		Inner Body Liners (see p. 11) Right (req'd with Single Piece Casing)

# WATER-COOLED PISTOL GUN FOR EURO CONNECTOR

## MODEL NC-21-E Hard/Cored Wire, Slip-In Tip)

### Alignment Tubes

Description	Liner Wire Size	Code No.
Req'd with single piece casing 5/16" Slip-In Tip		
Model NC-21-E Short Noz.	.030"-.035"	18679
Model NC-21-E Inter. Noz.	.030"-.035"	18680
Model NC-21-E Long Noz.	.030"-.035"	18681
Model NC-21-E Short Noz.	.035"-1/16"	18675
Model NC-21-E Inter. Noz.	.035"-1/16"	18676
Model NC-21-E Long Noz.	.035"-1/16"	18677

Description	Liner Wire Size	Code No.
Req'd with single piece casing 1/4" Slip-In Tip		
Model NC-21-E Short Noz.	.030"-.035"	13501
Model NC-21-E Inter. Noz.	.030"-.035"	13502
Model NC-21-E Long Noz.	.030"-.035"	13503
Model NC-21-E Short Noz.	.035"-1/16"	13510
Model NC-21-E Inter. Noz.	.035"-1/16"	13511
Model NC-21-E Long Noz.	.035"-1/16"	13512

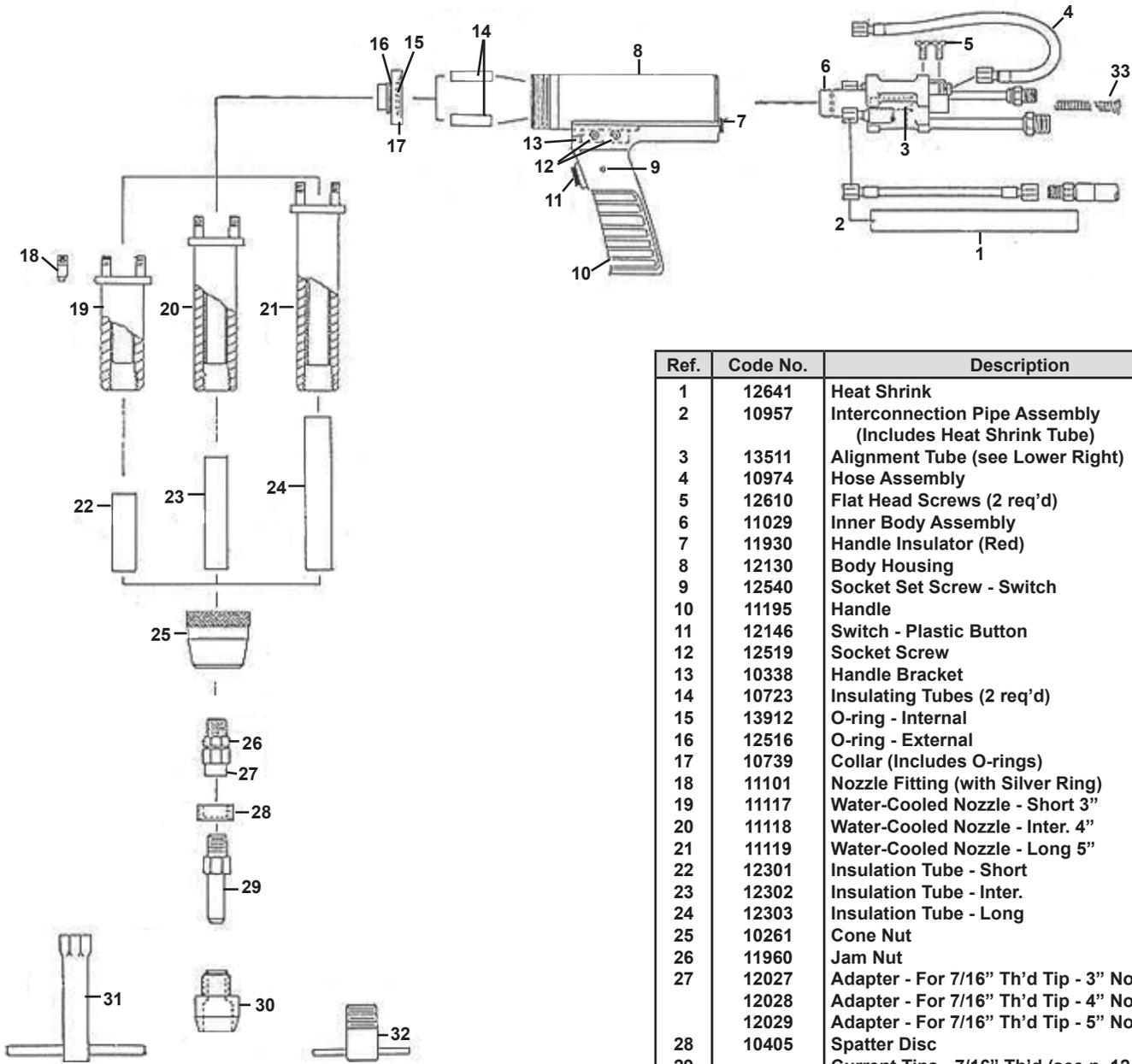
### Body Liners

Description	Liner Wire Size	Code No.
Req'd with single piece casing 5/16" Slip-In Tip		
Model NC-21-E Short Noz.	.035"-.045"	18703
Model NC-21-E Inter. Noz.	.035"-.045"	18704
Model NC-21-E Long Noz.	.035"-.045"	18705
Model NC-21-E Short Noz.	.045"-1/16"	18685
Model NC-21-E Inter. Noz.	.045"-1/16"	18686
Model NC-21-E Long Noz.	.045"-1/16"	18687
Model NC-21-E Short Noz.	5/64"-1/8"	18688
Model NC-21-E Inter. Noz.	5/64"-1/8"	18689
Model NC-21-E Long Noz.	5/64"-1/8"	18690

Description	Liner Wire Size	Code No.
Req'd with single piece casing 1/4" Slip-In Tip		
Model NC-21-E Short Noz.	.035"-.045"	14656
Model NC-21-E Inter. Noz.	.035"-.045"	14657
Model NC-21-E Long Noz.	.035"-.045"	14658
Model NC-21-E Short Noz.	.045"-1/16"	14661
Model NC-21-E Inter. Noz.	.045"-1/16"	14662
Model NC-21-E Long Noz.	.045"-1/16"	14663
Model NC-21-E Short Noz.	5/64"-1/8"	14676
Model NC-21-E Inter. Noz.	5/64"-1/8"	14677
Model NC-21-E Long Noz.	5/64"-1/8"	14678

# WATER-COOLED PISTOL GUN FOR EURO CONNECTOR

## MODEL HT-21-E Hard/Cored Wire, Threaded Tip)



Ref.	Code No.	Description
1	12641	Heat Shrink
2	10957	Interconnection Pipe Assembly (Includes Heat Shrink Tube)
3	13511	Alignment Tube (see Lower Right)
4	10974	Hose Assembly
5	12610	Flat Head Screws (2 req'd)
6	11029	Inner Body Assembly
7	11930	Handle Insulator (Red)
8	12130	Body Housing
9	12540	Socket Set Screw - Switch
10	11195	Handle
11	12146	Switch - Plastic Button
12	12519	Socket Screw
13	10338	Handle Bracket
14	10723	Insulating Tubes (2 req'd)
15	13912	O-ring - Internal
16	12516	O-ring - External
17	10739	Collar (Includes O-rings)
18	11101	Nozzle Fitting (with Silver Ring)
19	11117	Water-Cooled Nozzle - Short 3"
20	11118	Water-Cooled Nozzle - Inter. 4"
21	11119	Water-Cooled Nozzle - Long 5"
22	12301	Insulation Tube - Short
23	12302	Insulation Tube - Inter.
24	12303	Insulation Tube - Long
25	10261	Cone Nut
26	11960	Jam Nut
27	12027	Adapter - For 7/16" Th'd Tip - 3" Noz.
	12028	Adapter - For 7/16" Th'd Tip - 4" Noz.
	12029	Adapter - For 7/16" Th'd Tip - 5" Noz.
28	10405	Spatter Disc
29		Current Tips - 7/16" Th'd (see p. 12, Table 5)
30		Gas Nozzle (see p. 7, Table 4)
31	12111	Wrench
32	14610	Nozzle Thread Chaser Tap
33		Inner Body Liners (see Lower Left) Right (req'd with Single Piece Casing)

### Body Liners

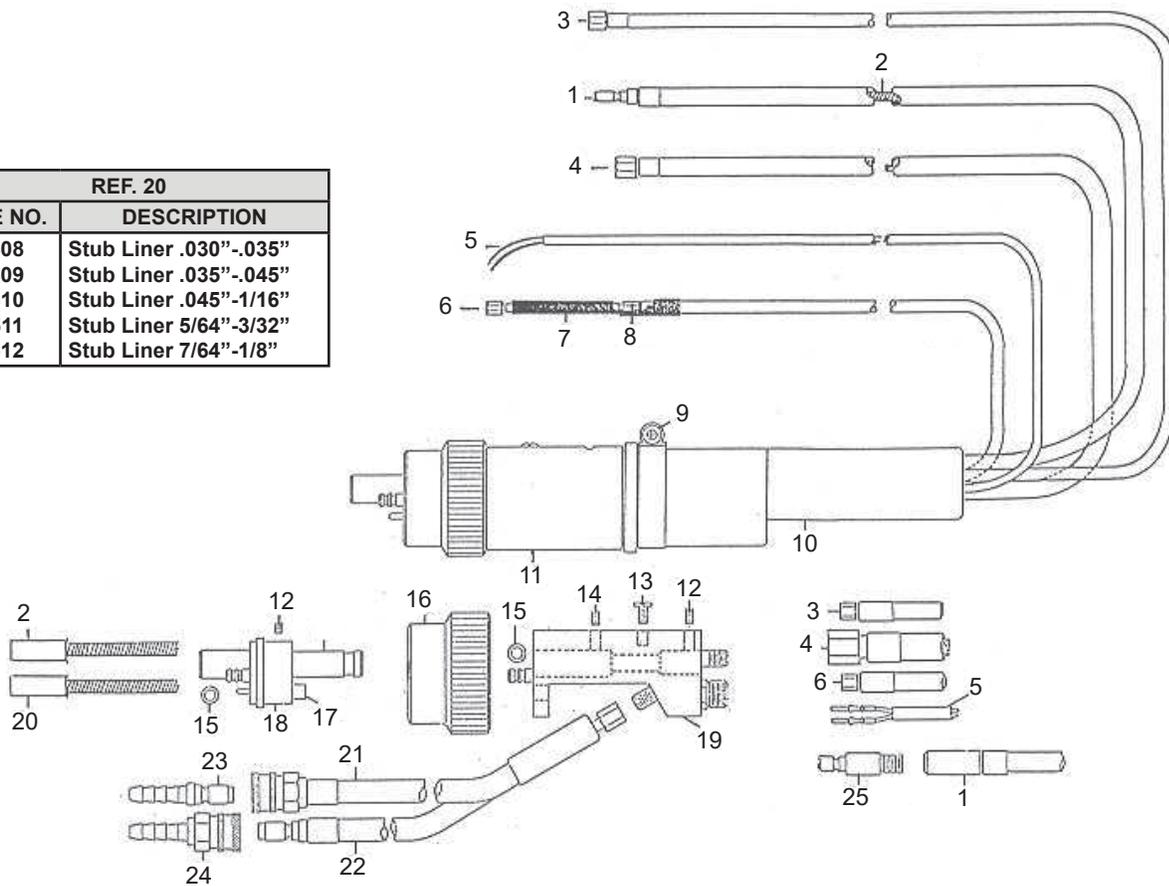
Description	Liner Wire Size	Code No.
Req'd with single piece casing 5/16" 3-1/2" Slip-In Tip		
Model HT-21-E Short Noz.	.035"-.045"	18703
Model HT-21-E Inter. Noz.	.035"-.045"	18704
Model HT-21-E Long Noz.	.035"-.045"	18705
Model HT-21-E Short Noz.	.045"-1/16"	18685
Model HT-21-E Inter. Noz.	.045"-1/16"	18686
Model HT-21-E Long Noz.	.045"-1/16"	18687
Model HT-21-E Short Noz.	5/64"-3/32"	14670
Model HT-21-E Inter. Noz.	5/64"-3/32"	14671
Model HT-21-E Long Noz.	5/64"-3/32"	14672
Model HT-21-E Short Noz.	7/64"-1/8"	14673
Model HT-21-E Inter. Noz.	7/64"-1/8"	14674
Model HT-21-E Long Noz.	7/64"-1/8"	14675

### Alignment Tubes

Description	Liner Wire Size	Code No.
Req'd with single piece casing 7/16" Threaded Tip		
Model HT-21-E Short Noz.	.035"-1/16"	13544
Model HT-21-E Inter. Noz.	.035"-1/16"	13545
Model HT-21-E Long Noz.	.035"-1/16"	13546

# EURO CONNECTOR ASSEMBLY

REF. 20	
CODE NO.	DESCRIPTION
18508	Stub Liner .030"-.035"
18509	Stub Liner .035"-.045"
18510	Stub Liner .045"-1/16"
18511	Stub Liner 5/64"-3/32"
18512	Stub Liner 7/64"-1/8"

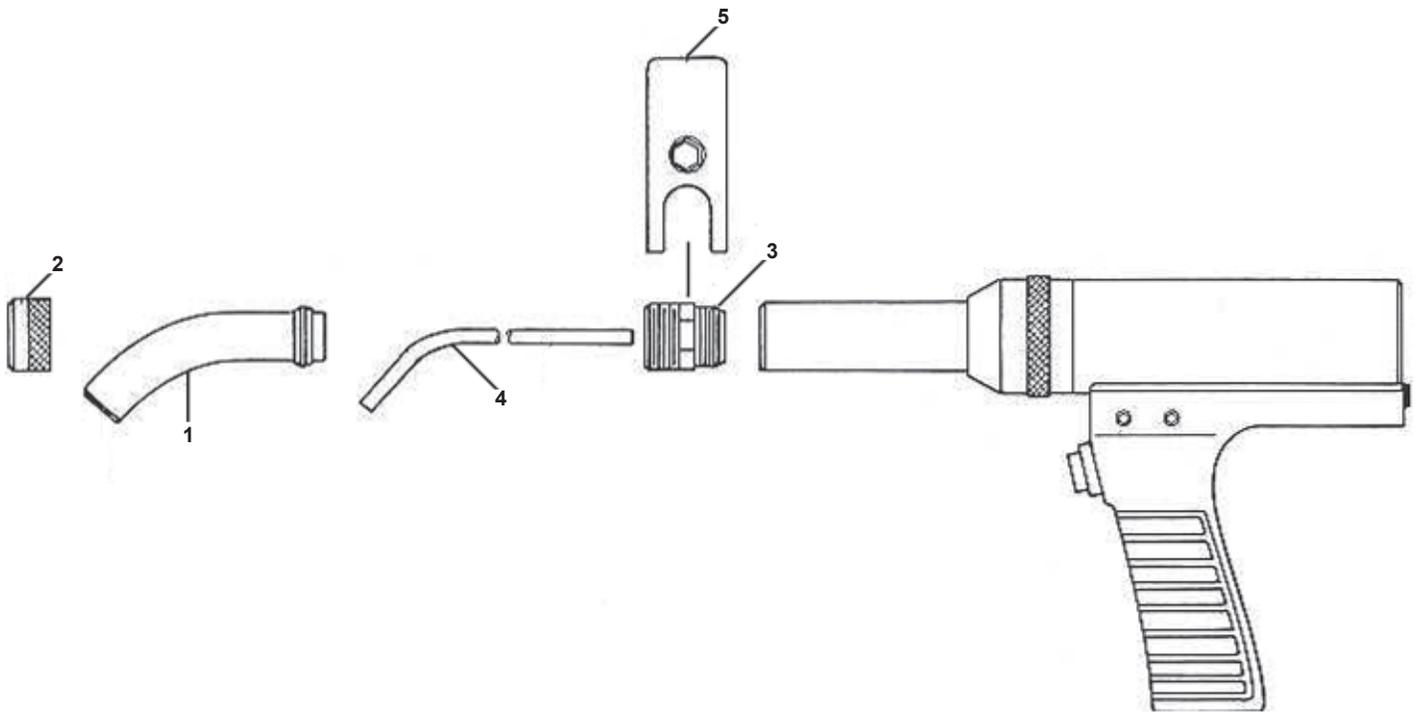


REF.	CODE NO.	DESCRIPTION
1	46350-X	Casing .030"-.035" (Requires Liner)
	46370-X	Casing .035"-1/16" (Requires Liner)
	46420-X	Casing .035"-.045" Single Piece
	46440-X	Casing .045"-1/16" Single Piece
	46460-X	Casing 5/64"-3/32" Single Piece
	46480-X	Casing 7/64"-1/8" Single Piece
2	47020-X	Liner .030"-.035" Hard/Cored
	47021-X	Liner .035"-.045" Hard/Cored
	47022-X	Liner .045"-1/16" Hard/Cored
	47023-X	Liner 3/64" Soft
	47024-X	Liner 1/16" Soft
	47025-X	Liner 3/32" Soft
3	16128	Gas Hose Assembly 10Ft.
	16129	Gas Hose Assembly 12Ft.
	16130	Gas Hose Assembly 15Ft.
4	15934	Water Out & Power Cable 10Ft.
	15935	Water Out & Power Cable 12Ft.
	15936	Water Out & Power Cable 15Ft.
5	18477	Switch and Cable Assembly 10Ft.
	18478	Switch and Cable Assembly 12Ft.
	18479	Switch and Cable Assembly 15Ft.
6	16131	Water In Hose 10 Ft.
	16132	Water In Hose 12 Ft.
	16133	Water In Hose 15 Ft.

REF.	CODE NO.	DESCRIPTION
7	12641	Heat Shrink Tube
8	10957	Interconnection Pipe Assembly
9	14803	Clamp
10	14051	Boot
11	18471	Body Housing
12	14714	Socket Set Screw
13	12610	Machine Screw (Steel)
14	14263	Socket Set Screw
15	13922	O-ring (4 req'd)
16	18473	Nut - Connector
17	18474	Sleeve - Contact Pin
18	18492	Rear Spool Assembly
19	18472	Connector Body Assembly
20		Stub Liner (see upper left) - Required with Single Piece Casings
21	18468	Q.D. Water In Hose Assembly
22	18469	Q.D. Water Out Hose Assembly
23	13295	Plug - Water In Hose from Cooler
24	13301	Socket - Water Out
25	18466	Casing Adapter .030"-1/16"
	18467	Casing Adapter 5/64"-1/8"
26	18493	EURO Connector Complete Consists of: 11-18, 20-23

**NOTE: FOR WIRE CASINGS & LINERS ONLY**  
 Add Footage to Code Number for Length Desired  
 Example: 5 Ft. Casing .035"-1/16" - 46370-5

# CURVED NOZZLE KIT



## ORDERING INFORMATION

Code No.	Description	
13925	Curved Nozzle Kit (w/ included parts)	
<b>INCLUDED PARTS IN CURVED NOZZLE KIT:</b>		
Ref.	Code No.	Description
1	10365	Curved Gas Nozzle
2	13926	Lock Nut
3	13927	Adapter
4	10572	Bent Current Tip 3/64" AL (5 ea.) or
	10573	Bent Current Tip 1/16" AL (5 ea.)
5	12116	Wrench

## INSTALLATION

To adapt the Curved Nozzle, proceed as follows:

1. Remove the existing Gas Nozzle, Current Tip and Collet Nut from the Water-Cooled Nozzle.
2. Fasten the Adapter (13927) using the Wrench (12116) into the forward end of the Water-Cooled Nozzle.
3. Place the Collet Nut on the Bent Current Tip (10572/10573) and tighten to provide access to welding condition desired.
4. Slide the Curved Nozzle (10365) over the Bent Current Tip until it engages in the Adapter. Fasten the curved end of the Curved Gas Nozzle by tightening the Lock Nut (13926). Observe the latter carefully so that the curved nozzle remains concentric to the Bent Current Tip.

# TROUBLESHOOTING: POROSITY (SUMMARY)

NOTE: Most POROSITY is caused by gas problems, followed by base metal contamination.

## Causes of Porosity

### BASE METAL CONTAMINATION

Impurities on base metal

### FILLER METAL CONTAMINATION

Impurities on filler metal (wire)

### ATMOSPHERIC CONTAMINATION

Drafts, wind, fans, etc.

### GAS MIXING APPARATUS

1. Too high a gas flow, causing turbulence, and/or sucking air at hose connections; creating the venturi effect at end of gas nozzle
2. Too low a gas flow, causing insufficient gas coverage
3. Damaged or kinked gas lines
4. Too high an oxygen content
5. Leaks in gas distribution system
6. Other impurities in gas - moisture, etc.
7. Inconsistent gas flow (cfh) at the torch connection

### GAS TURBULENCE

1. Excessive spatter build-up in gas nozzle and on current tip
2. Nozzle damage, causing uneven gas coverage
3. Torch gas ports clogged or deformed
4. Super-heated nozzle, causing shielding gas to expand rapidly and create return effect at end of nozzle
5. Gas diffuser/nozzle insulator missing
6. Too high a gas flow causing the venturi effect

### WELDING PARAMETERS, ETC.

1. Too long a wire stick-out; gas nozzle too far from weld puddle
2. Bad torch position - too sharp a torch incline causing the venturi effect at the end of the nozzle leading to atmospheric contamination
3. Excessively wide weld pool for nozzle I.D.
4. Arc voltage too high
5. Too high a travel speed

## Possible Solutions

- a. Remove contamination; clean surfaces
  - b. Use of specific wire/gas mix for specific types of impurities
- 
- a. Replace wire
  - b. Install wire-cleaning system
  - c. Prevent industrial dust/dirt/grit from contaminating wire during storage or use
  - d. Prevent build-up of aluminum oxide on exposed aluminum wire surface by using up quickly
  - e. Remove wire from wire drive unit and store in a sealed plastic bag when not in use for long periods
- 
- a. Protect weld from drafts (curtains/screens)
  - b. Use tapered or bottleneck gas nozzles when drafts cannot be avoided
- 
- 1a. Reduce gas flow
  - 1b. Tighten all hose connection points
  2. Increase gas flow
  3. Repair or replace
  4. Adjust mixer
  5. Repair leaks
  6. Overhaul system; fit filters and/or dryers
  7. Regulate pressure into flow meter for consistent cfh delivery of gas
- 
1. Clean nozzle and tip regularly; spray with anti-spatter fluid
  2. Replace nozzle
  3. Clean or replace
  4. Check duty cycle rating of torch
  5. Replace
  6. Reduce gas flow
- 
1. Use longer nozzle or adjust stick-out (3/8" minimum or 15 times wire diameter)
  2. Correct torch angle
  3. Width of the weld pool should be 1.3 times the nozzle I.D.; use suitable wider gas nozzle
  4. Reduce voltage
  5. Reduce speed

# TROUBLESHOOTING: SPATTER

## Problems/Causes

### SPATTER

Too fast or too slow wire feed for the arc voltage

Too long an arc

Damaged current tip

Inclination of welding gun too great

Faulty power source

Incorrect start

Incorrect pulse parameters

Uneven wire feed

Impurities on the base metal

Poor ground contact

Too long stick-out (short-arc welding)

Incorrect polarity

## Possible Solutions

Set the wire feed rate and voltage in accordance with good welding practices as recommended by a qualified welding engineer.

Adjust the wire feed and voltage so that the arc is in accordance with good welding practice for the joint to be welded. The distance from the current tip to the workpiece should be 15 times the welding wire diameter. If the arc is too long there will be spatter, usually in the direction of the weld.

If the current tip becomes worn the welding wire will not be in constant contact with the tip and the arc will become unstable. A current tip contaminated with spatter will cause uneven wire feed resulting in further spatter.

The angle of the gas nozzle relative to the workpiece should be between 45 and 90 degrees. If the angle is too small, the wire runs parallel to the weld pool, resulting in spatter in the direction of the welding.

Have the power source checked for faulty conditions such as broken wires and faulty contacts.

A great deal of spatter occurs if the stick-out is too great and if the welding gun is held too far from the workpiece when striking the arc. Try to start with as short a stick-out as possible and with the welding gun as close to the starting point as possible. If a large ball end is formed on the end of the welding wire, remove it by cutting the wire with sharp wire cutters. It is helpful if the wire is cut to a point. Always remove the ball end before striking an aluminum arc. Check the welding ground connection.

Check the user manual for your power supply or consult a qualified welding engineer.

Uneven wire feed gives rise to heavy spatter. Find the cause of the disturbance and correct the condition before proceeding.

Paint, mill scale, rust and other contamination on the base metal form an insulating layer causing an unstable arc that results in heavy spatter. Clean the surfaces to be welded.

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found and attach the ground cable directly to the workpiece after having cleaned the contact surface first. **POOR GROUND CONTACT IS THE MOST COMMON CAUSE OF UNSTABLE MIG WELDING CONDITIONS.**

The stick-out should be 15 times the diameter of the wire electrode being used. With increasing stick-out, the current is reduced and the arc voltage rises, giving a longer unstable arc and increased spatter.

Check for correct polarity. Follow the electrode manufacturer's recommendations.

# TROUBLESHOOTING: GENERAL GUIDE

## Problems/Causes

## Possible Solutions

### ERRATIC WIRE FEED

Slipping feed rolls

Check that the feed roll size is correct for the wire size being used. Increase the drive roll pressure until the wire feed is even. Do not apply excessive pressure as this can damage the wire surface, causing copper coating to loosen from steel wires or metal shavings to be formed from soft wires like aluminum. These metal fragments or shavings can be drawn into the wire feed conduit and will rapidly clog the liner. When welding with flux-cored wires, excessive drive roll pressure may open the wire seam and allow flux or metal powders to escape.

Clogged or worn gun liner

a. Dust, particles of copper, drawing lubricants, metal or flux and other forms of contamination can all clog the liner so that the wire feed is slowed or impeded. A liner that has been in use for an extended period of time becomes worn and filled with dirt and must be replaced.

b. When changing the welding wire, remove the tip from the front end of the gun and blow out the body liner with clean, dry compressed air from the back of the gun. Repeat with the casing and liner assembly. Note: Wear safety goggles when using compressed air to clean the liners. Make sure proper safety procedures are followed in order to avoid possible serious eye injury.

Liners too long or too short

Check the lengths of the liners and trim or replace if too long or too short. The efficient feeding of the welding wire is dependent on the liners fitting correctly.

Spatter on the wire

An unprotected coil of wire quickly collects dust and other airborne contamination. If grinding is being performed in the vicinity, particles can become attached to the wire, severely interfering with the wire feed. Replace with clean wire and keep it protected with a cover. Make sure spare wire rolls are stored in a clean, dry place.

Coil brake incorrectly adjusted

Set the brake so that the coil immediately stops rotating as soon as welding is interrupted. If the brake is applied too hard it will cause the feed rolls to slip, resulting in uneven wire feed. If it is too loose, overrun of the wire will occur, causing wire tangles, inconsistent tension on the feed mechanism and irregular arc characteristics.

### UNSTABLE ARC

Incorrect setting of voltage and/or current

Set the wire feed in relation to the arc voltage in such a way that the arc is stable and burns evenly. In spray arc welding, set the wire feed so that there are no short circuits and the filler metal is transferred in a spray across the arc. Find the cause of the interference and correct it. (See ERRATIC WIRE FEED above)

Problems in wire feeding: worn current tip

When the internal diameter of the current tip becomes worn from the passage of wire through it, the wire may no longer stay in continuous electrical contact with the tip. This results in an unstable arc and an increase in spatter. Paint, mill scale, silicon scale, rust or flux deposits from previous weld runs may form an insulating layer causing an unstable arc. Clean the surfaces to be welded.

Impurities on the base metal

Securely attach the ground cable as close to the point of welding as possible on the workpiece. Clean the surfaces thoroughly to ensure good contact.

Poor contact between ground cable and workpiece or loose power connection

Check to insure the welding power connection on the power source is tight, the and workpiece. Connection on the wire feeder is tight, the connection to the adaptor block is tight, Loose power connection and the connection of the gun to the adaptor block is tight.

Stick-out too long

Adjust the current tip to work distance to a minimum of 3/8" for short arc welding. A more precise distance is 15 times the wire diameter.

# TROUBLESHOOTING: GENERAL GUIDE

## Problems/Causes

## Possible Solutions

### AIR-COOLED GUN RUNNING TOO HOT

Poor ground

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found. Clean clamping area to insure good contact. Securely attach the ground cable to the workpiece, as close as possible to the point of welding. Make sure there is a good connection to the welding power source.

Loose power connection

Check to make sure the power connection on the power source is tight, the connection on the wire feeder is tight, the connection to the adaptor block is tight, and the connection of the gun to the adaptor block is tight.

Consumable items loose or worn

Remove nozzle from gun and inspect current tip, collet nut (tip holder) and spatter disc (gas diffuser) for wear and tightness; replace or tighten as necessary.

Capacity of gun being exceeded

Note complete weld parameters, including welding current (Amps), welding voltage, wire feed speed, type and size of wire, type of gas and flow rate of gas and consult your local Authorized D/F Machine Specialties Distributor or contact the factory.

Dirty connection

Remove torch and inspect parts for dirt build-up. Periodic cleaning is necessary.



# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

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## WARRANTY

This Equipment is sold by D/F MACHINE SPECIALTIES, Incorporated, under the warranty set forth in the following paragraph. Such warranty is extended only to the buyer who purchases the equipment directly from D/F or its authorized distributor as new merchandise.

The barrel and cable assemblies are warranted by D/F to be free from manufacturing defects for 90 days after delivery by D/F, provided that the equipment is properly operated under conditions of normal use and that regular periodic maintenance and service is performed. Expendable parts are not warranted for any specific time. Expendable parts referred to herein would be the nozzles, current tips, spatter discs, insulators, casing liners, and wire inlets. D/F's sole obligation under this warranty is limited to making replacement at its manufacturing facility for barrel assemblies which are returned to it with transportation charges prepaid, and upon D/F's examination have been found to be so defective.

Genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, and Consumables must be used for safety and performance reasons. The use of anything other than genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, or Consumables will void this Warranty. All units returned for warranty repair are subject to Warranty Inspection. Warranty and repair work shall not apply to goods that have been altered or repaired, have been subject to misuse or used while any parts are loose, broken, or damaged, or used with other than original D/F® parts, consumables, or accessories which may affect performance and safety.

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**D/F MACHINE SPECIALTIES, INC.**

1750 Howard Drive

North Mankato, MN 56003

Phone: (507) 625-6200

Fax: (507) 625-6203

[www.dfmachinespecialties.com](http://www.dfmachinespecialties.com)