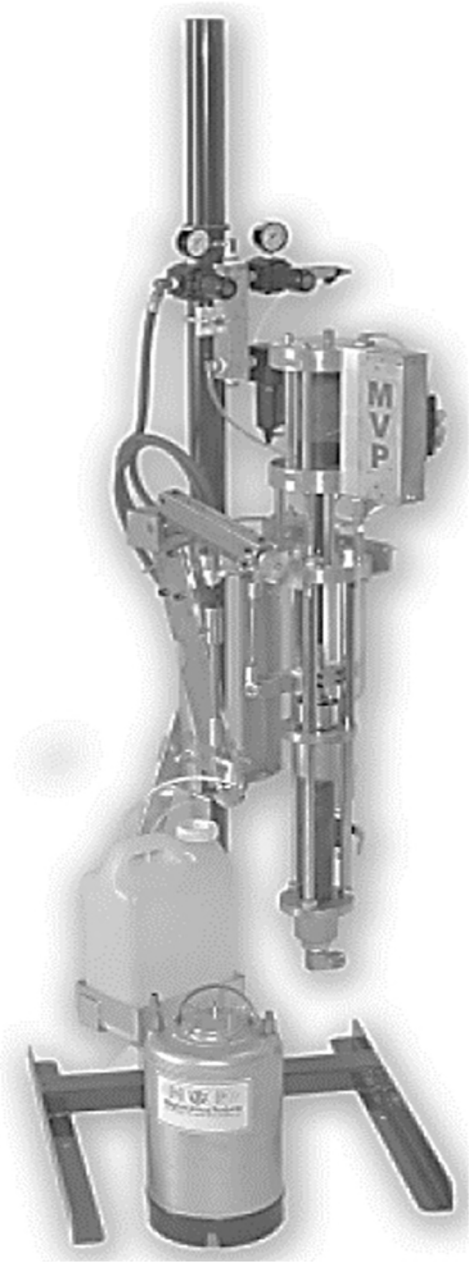
# APS Chop System

## Operations Manual

This manual is applicable to the following models:

- FIT-C-APS
- FIT-F-APS
- FIT-W-APS
- MCS-APS
- SF-FIT-C-APS
- SF-FIT-F-APS
- SF-FIT-W-APS
- MWS-APS

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Rev. December 2018


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# Safety & Warning Information

## Warnings

Due to the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. MVP assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

The end user is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used and that all documentation is adhered to.

### Recommended Occupational Safety & Health Act (OSHA) Documentation:

- 1910.94 Pertaining to ventilation
- 1910.106 Pertaining to flammable liquids
- 1910.107 Pertaining to spray finishing operations, particularly paragraph (m), Organic Peroxides and Dual Component Coatings

For Additional information, contact the Occupational Safety and Health Administration (OSHA) at https://www.osha.gov/about.html.

### Recommended National Fire Protection Association (NFPA) Documentation:

- NFPA No.33 Chapter 14 Organic Peroxides and Dual Component Materials
- NFPA No. 63 Dust Explosion Prevention
- NFPA No. 70 National Electrical Code
- NFPA No. 77 Static Electricity
- NFPA No. 91 Blower and Exhaust System
- NFPA No. 654 Plastics Industry Dust Hazards

**Fire Extinguisher** – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

The following general warnings and guidelines are for the setup, use, grounding, maintenance, and repair of equipment. Additional product-specific warnings may be found throughout this manual as applicable. Please contact your nearest MVP Technical Service Representative if additional information is needed.

| Safety Precautions |
| --- |
| • Avoid skin contact and inhalation of all chemicals. |
| • Review Material Safety Data Sheet (MSDS) to promote the safe handling of chemicals in use. |
| • Restrict the use of all chemicals to designated areas with good ventilation. |
| • Chemicals are flammable and reactive. |
| • Noxious fumes released when combusted. |
| • Operate equipment in a ventilated environment only. |
| • Uncured liquid resins are highly flammable unless specifically labeled otherwise. |
| • Cured laminate, accumulations of overspray, and laminate sandings are highly combustible. |
| • Do not operate or move electrical equipment when flammable fumes are present. |
| • Ground all equipment. |
| • If a spark is seen or felt, immediately halt operation. Do not operate the equipment until the issue has been identified and repaired. |
| • Contaminated catalyst may cause fire or explosion. |
| • Containers may explode if exposed to fire / heat. |
| • Use and store chemicals away from heat, flames, and sparks. |
| • Do not smoke in work areas or near stored chemicals. |
| • Do not mix Methyl Ethyl Ketone Peroxide (MEKP) with materials other than polyethylene. |
| • Do not dilute MEKP. |
| • Keep food and drink away from work area. |
|  |

| Physical Hazards |
| --- |
| • Never look directly into the spray gun fluid tip. Serious injury or death can result. |
| • Never aim the spray gun at or near another person. Serious injury or death can result. |
| • Chemical compounds can be severely irritating to the eyes and skin. |
| • Inhalation, ingestion, or injection may damage internal organs and lead to pulmonary disorders, cancers, lymphomas, and other diseases or health conditions. |
| • Other potential health effects include: irritation of the eyes and upper respiratory tract, headache, light-headedness, dizziness, confusion, drowsiness, nausea, vomiting, and occasionally abdominal pain. |
| • Eye contact: Immediately flush with water for at least 15 minutes and seek immediate medical attention. |
| • Skin Contact: Immediately wash with soap and water and seek immediate medical attention. |
| • Inhalation: Move the person to fresh air and seek immediate medical attention. |
| • Do not remove shields, covers, or safety features on equipment that is in use. |
| • Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can shoot liquid through the skin. |
| • Keep hands and body parts away from any moving equipment or components. |
| • Do not stand under plunger |
| • An improperly loaded drum may lead to an imbalance, causing a unit to tip over |
|  |

| Personal Protective Equipment (PPE) |
| --- |
| • MVP recommends the use of personal safety equipment with all products in our catalog. |
| • Wear safety goggles, hearing protection, a respirator, and chemical resistant gloves. |
| • Wear long sleeve shirts or jackets and pants to minimize skin exposure. |
| • PPE should be worn by operators and service technicians to reduce the risk of injury. |
|  |

For Additional information, contact the Occupational Safety and Health Administration (OSHA). https://www.osha.gov/about.html

# Symbol Definitions


Indicates the risk of contact with chemicals that are hazardous, which may lead to injury or death.


Indicates the risk of contact with voltage / amperage that may lead to serious injury or death


Indicates that the materials being used are susceptible to combustion


Indicates the risk of contact with moving components that may lead to serious injury or death.


Indicates that the system or component should be grounded before proceeding with use or repair.


Indicates the use of lit cigarettes or cigars is prohibited, because the materials being used are susceptible to combustion.


Indicates that the materials and/or the process being performed can lead to ignition and explosion.


A recommendation for the use of Personal Protective Equipment (PPE) before using or repairing the product.

# Polymer Matrix Materials: Advanced Composites

Potential health hazards associated with the use of advanced composites can be controlled through the implementation of an effective industrial hygiene and safety program.

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_1.html#t iii:1_1

| **Resins** | | |
|---|---|---|
| **Composite Component** | **Organ System Target (Possible Target)** | **Known (Possible) Health Effect** |
| Epoxy resins | Skin, lungs, eyes | Contact and allergic dermatitis, conjunctivitis |
| Polyurethane resins | Lungs, skin, eyes | Respiratory sensitization, contact dermatitis, conjunctivitis |
| Phenol formaldehyde | Skin, lungs, eyes | As above (potential carcinogen) |
| Bismaleimides (BMI) | Skin, lungs, eyes | As above (potential carcinogen) |
| Polyamides | Skin, lungs, eyes | As above (potential carcinogen) |
| **Reinforcing materials** | | |
| **Composite Component** | **Organ System Target (Possible Target)** | **Known (Possible) Health Effect** |
| Aramid fibers | Skin (lungs) | Skin and respiratory irritation, contact dermatitis (chronic interstitial lung disease) |
| Carbon/graphite fibers | Skin (lungs) | As noted for aramid fibers |
| Glass fibers (continuous filament) | Skin (lungs) | As noted for aramid fibers |
| **Hardeners and curing agents** | | |
| **Composite Component** | **Organ System Target (Possible Target)** | **Known (Possible) Health Effect** |
| Diaminodiphenylsulfone | N/A | No known effects with workplace exposure |
| Methylenedianiline | Liver, skin | Hepatotoxicity, suspect human carcinogen |
| **Other aromatic amines** | | |
| **Composite Component** | **Organ System Target (Possible Target)** | **Known (Possible) Health Effect** |
| Meta-phenylenediamine (MPDA) | Liver, skin (kidney, bladder) | Hepatitis, contact dermatitis (kidney and bladder cancer) |
| Aliphatic andcyclo-aliphatic amines | Eyes, skin | Severe irritation, contact dermatitis |
| Polyaminoamide | Eyes, skin | Irritation (sensitization) |
| Anhydride | Eyes, lungs, skin | Severe eye and skin irritation, respiratory sensitization, contact dermatitis |

# Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

MEKP is among the more hazardous materials found in commercial channels. The safe handling of the "unstable (reactive)" chemicals presents a definite challenge to the plastics industry. The highly reactive property which makes MEKP valuable to the plastics industry in producing the curing reaction of polyester resins also produces the hazards which require great care and caution in its storage, transportation, handling, processing and disposal. MEKP is a single chemical. Various polymeric forms may exist which are more or less hazardous with respect to each other. These differences may arise not only from different molecular structures (all are, nevertheless, called "MEKP") and from possible trace impurities left from the manufacture of the chemicals, but may also arise by contamination of MEKP with other materials in its storage or use. Even a small amount of contamination with acetone, for instance, may produce an extremely shock-sensitive and explosive compound.


**WARNING**

***Contamination with promoters, materials containing promoters (such as laminate sandings), or with any readily oxidizing material (such as brass or iron) will cause exothermic redox reactions which can be explosive in nature. Heat applied to MEKP or heat buildup from contamination reactions can cause the material to reach its Self-Accelerating Decomposition Temperature (SADT).***

Researchers have reported measuring pressure rates-of-rise well over 100,000 psi per second when certain MEKP's reach their SADT. For comparison, the highest-pressure rate-of-rise listed in NFPA Bulletin NO.68, "Explosion Venting", is 12,000 psi per second for an explosion of 12% acetylene and air. The maximum value listed for a hydrogen explosion is 10,000 psi per second. Some forms of MEKP, if allowed to reach their SADT, will burst even an open topped container. This suggests that it is not possible to design a relief valve to vent this order of magnitude of pressure rate-of-rise. The user should be aware that any closed container, be it a pressure vessel, surge chamber, or pressure accumulator, could explode under certain conditions. There is no engineering substitute for care by the user in handling organic peroxide catalysts. If, at any time, the pressure relieve valve on top of the catalyst tank should vent, the area should be evacuated at once and the fire department called. The venting could be the first indication of a heat, and therefore, pressure build-up that could eventually lead to an explosion. Moreover, if a catalyst tank is sufficiently full when the pressure relief valve vents, some catalyst may spray out, which could cause eye injury. For this reason, and many others, anyone whose job puts them in an area where this vented spray might go, should always wear full eye protection even when laminating operations are not taking place.

Safety in handling MEKP depends to a great extent on employee education, proper safety instructions, and safe use of the chemicals and equipment. Workers should be thoroughly informed of the hazards that may result from improper handling of MEKP, especially regarding contamination, heat, friction and impact. They should be thoroughly instructed regarding the proper action to be taken in the storage, use, and disposal of MEKP and other hazardous materials used in the laminating operation. In addition, users should make every effort to:

- Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.
- Keep MEKP away from heat, sparks, and open flames.
- Prevent contamination or MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum, and non-stainless steels.

- Never add MEKP to anything that is hot, since explosive decomposition may result.
- Avoid contact with skin, eyes, and clothing. Protective equipment should be worn at all times. During clean-up of spilled MEKP, personal safety equipment, gloves, and eye protection must be worn. Firefighting equipment should be at hand and ready.
- Avoid spillage, which can heat up to the point of self-ignition.
- Repair any leaks discovered in the catalyst system immediately, and clean-up the leaked catalyst at once in accordance with the catalyst manufacturer's instructions.
- Use only original equipment or equivalent parts from Magnum Venus Products in the catalyst system (i.e.: hoses, fitting, etc.) because a dangerous chemical reaction may result between substituted parts and MEKP.
- Catalyst accumulated from the purging of hoses or the measurement of fluid output deliveries should never be returned to the supply tank, such catalyst should be diluted with copious quantities of clean water and disposed of in accordance with the catalyst manufacturer's instructions.

The extent to which the user is successful in accomplishing these ends and any additional recommendations by the catalyst manufacturer determines largely the safety that will be present in his operation.

## Clean-Up Solvents and Resin Diluents


**WARNING**

***A hazardous situation may be present in your pressurized fluid system! Hydro carbon solvents can cause an explosion when used with aluminum or galvanized components in a closed (pressurized) fluid system (pump, heaters, filters, valves, spray guns, tanks, etc.). An explosion could cause serious injury, death, and/or substantial property damage. Cleaning agents, coatings, paints, etc. may contain Halogenated Hyrdrocarbon solvents. Some Magnum Venus Products spray equipment includes aluminum or galvanized components and will be affected by Halogenated Hydrocarbon solvents.***

There are three key elements to the Halogenated Hyrdocarbon (HHC) solvent hazard.

| | | |
|---|---|---|
| 1. | The presence of HHC solvents. | 1,1,1 – Trichloroethane and Methylene Chloride are the most common of these solvents. However, other HHC solvents are suspect if used; either as part of paint or adhesives formulation, or for clean-up flushing. |
| 2. | Aluminum or Galvanized Parts. | Most handling equipment contains these elements. In contact with these metals, HHC solvents could generate a corrosive reaction of a catalytic nature. |
| 3. | Equipment capable of withstanding pressure. | When HHC solvent contact aluminum or galvanized parts inside a closed container such as a pump, spray gun, or fluid handling system, the chemical reaction can, over time, result in a build-up of heat and pressure, which can reach explosive proportions. When all three elements are present, the result can be an extremely violent explosion. The reaction can be sustained with very little aluminum or galvanized metal; any amount of aluminum is too much. |

- The reaction is unpredictable. Prior use of an HHC solvent without incident (corrosion or explosion) does NOT mean that such use is safe. These solvents can be dangerous alone (as a clean-up or flushing agent) or when used as a component or a coating material. There is no known inhibitor that is effective under all circumstances. Mixing HHC solvents with other materials or solvents such as MEKP, alcohol, or toluene may render the inhibitors ineffective.
- The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. The possible presence of water in reclaimed solvents could also feed the reaction.
- Anodized or other oxide coatings cannot be relied upon to prevent the explosive reaction. Such coatings can be worn, cracked, scratched, or too thin to prevent contact. There is no known way to make oxide coatings or to employ aluminum alloys to safely prevent the chemical reaction under all circumstances.
- Several solvent suppliers have recently begun promoting HHC solvents for use in coating systems. The increasing use of HHC solvents is increasing the risk. Because of their exemption from many state implementation plans as Volatile Organic Compounds (VOCs), their low flammability hazard, and their not being classified as toxic or carcinogenic substances, HHC solvents are very desirable in many respects.


**WARNING**

***Do not use Halogenated Hydrocarbon (HHC) solvents in pressurized fluid systems having aluminum or galvanized wetted parts.***
***Magnum Venus Products is aware of NO stabilizers available to prevent HHC solvents from reaction under all conditions with aluminum components in closed fluid systems. HHC solvents are dangerous when used with aluminum components in a closed fluid system.***

- Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon solvents.
- Magnum Venus Products recommends that you contact your solvent supplier regarding the best non-flammable clean-up solvent with the heat toxicity for your application.
- If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.
- Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.
- You should only allow enough solvent for one day's use in your laminating area.
- NO SMOKING signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.
- Adequate ventilation (as covered in OSHA Section 1910.94 and NFPA No.91) is important wherever solvents are stored or used, to minimize, confine and exhaust the solvent vapors.
- Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

## Catalyst Diluents

Magnum Venus Products spray-up and gel-coat systems currently produced are designed so that catalyst diluents are not required. Magnum Venus Products therefore recommends that diluents not be used to avoid possible contamination which could lead to an explosion due to the handling and mixing of MEKP and diluents. In addition, it eliminates any problems from the diluent being contaminated through rust particles in drums, poor quality control on the part of the diluents suppliers, or any other reason. If diluents are absolutely required, contact your catalyst supplier and follow his instructions explicitly. Preferably the supplier should premix the catalyst to prevent possible "on the job" contamination while mixing.


**WARNING**

***If diluents are not used, remember that catalyst spillage and gun, hose, and packing leaks are potentially more hazardous since each drop contains a higher concentration of catalyst and will therefore react more quickly with overspray and the leak.***

## Cured Laminate, Overspray and Laminate Sandings Accumulation

- Remove all accumulations of overspray, Fiberglass Reinforced Plastic (FRP) sandings, etc. from the building as they occur. If this waste is allowed to build up, spillage of catalyst is more likely to start a fire; in addition, the fire would burn hotter and longer.
- Floor coverings, if used, should be non-combustible.
- Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, over-sprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent spillage and leakage, you should:

| | | |
|---|---|---|
| 1. | Maintain your Magnum Venus Products System. | Check the gun several times daily for catalyst and resin packing or valve leaks. REPAIR ALL LEAKS IMMEDIATELY. |
| 2. | Never leave the gun hanging over or lying inside the mold. | A catalyst leak in this situation would certainly damage the part, possibly the mold, and may cause a fire. |
| 3. | Inspect resin and catalyst hoses daily for wear or stress at the entry and exits of the boom sections and at the hose and fittings. | Replace if wear or weakness is evident or suspected. |
| 4. | Arrange the hoses and fiberglass roving guides so that the fiberglass strands DO NOT rub against any of the hoses at any point. | If allowed to rub, the hose will be cut through, causing a hazardous leakage of material which could increase the danger of fire. Also, the material may spew onto personnel in the area. |

## Toxicity of Chemicals

- Magnum Venus Products recommends that you consult OSHA Sections 1910.94, 1910.106, 1910.107 and NFPA No.33, Chapter 14, and NFPA No.91.
- Contact your chemical supplier(s) and determine the toxicity of the various chemicals used as well as the best methods to prevent injury, irritation and danger to personnel.
- Also determine the best methods of first aid treatment for each chemical used in your plant.

## Equipment Safety

Magnum Venus Products suggest that personal safety equipment such as EYE GOGGLES, GLOVES, EAR PROTECTION, and RESPIRATORS be worn when servicing or operating this equipment. Ear protection should be worn when operating a fiberglass chopper to protect against hearing loss since noise levels can be as high as 116 dB (decibels). This equipment should only be operated or serviced by technically trained personnel!


**CAUTION**

***Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON.***


**DANGER**

***Contaminated catalyst may cause fire or explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free from dirt, grease, or resin. Clean catalyst system components with clean water daily.***


**DANGER**

***Eye, skin, and respiration hazard. The catalyst MEKP may cause blindness, skin irritation, or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.***

## Treatment of Chemical Injuries


**CAUTION**

***Refer to your catalyst manufacturer's safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.***

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury.

***Precautions include:***

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or if swallowed.
2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.
3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

**WARNING**

***Contact your doctor immediately in the event of an injury. If the product's MSDS includes first aid instructions, administer first aid immediately after contacting a doctor.***

Fast treatment of the outer skin and eyes that contact chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment may be incorrect for some chemicals; you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

## Emergency Stop Procedure

In an emergency, follow these steps to stop a UPS System:

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the "OFF" or closed position.

***Note*** ***The "open" or "on" position is when the ball valve handle is parallel (in line) with the ball valve body. The "closed" or "off" position is when the ball valve handle is perpendicular (across) the ball valve body.***

2. Turn all system regulators to the "OFF" position (counter-clockwise) position.
3. Verify / secure the catalyst relief line, located on the catalyst relief valve.
4. Verify / secure the resin return line, located on the resin filter.
5. Place a container under the resin pump ball valve to catch ejected resin.
6. Locate the ball valve on the resin pump.
7. Rotate the ball valve 90 degrees to the "On" or open position.

## Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance.

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases.


**CAUTION**

***Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see National Fire Protection Association (NFPA) 77, titled "Recommended Practice on Static Electrical". Refer especially to section 7-7 titled "Spray Application of Flammable and Combustible Materials".***

# Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP APS Chop System. The following procedures are included:

- Step-by-step assembly and disassembly
- Installation, start-up, and shut-down instructions
- Step-by-step operation instructions

Please read this manual carefully and retain for future reference. Follow the steps in the order given, otherwise you may damage the equipment or injure yourself.

The information in this manual pertains to all APS Chop Systems, both internal and external mix, including the following model numbers:

- FIT-C-APS-X
- FIT-F-APS-X
- FIT-W-APS-X
- MCS-APS-X
- SF-FIT-C-APS-X
- SF-FIT-F-APS-X
- SF-FIT-W-APS-X
- MWS-APS-X

***Note*** ***The X in each model number above is a place holder. Your model number will have a number as the last digit that indicates the pump size for your unit. SF in a model number indicates a solvent-free system.***

## Component Assemblies

The APS Chop System consists of multiple components. Each component has its own detailed manual and drawings. For complete repair and maintenance instructions, refer to the following manuals:

❑ **MPH_VPH-4250 SERIES** - 4.25" POWERHEAD REPAIR MANUAL

# Air Requirements

1. The system requires a supply of air (30 cfm) and at least 100 psi (7 bar).
2. The unit requires a ½ inch (12 - 13 mm) inside diameter air hose minimum (use caution when using quick disconnects; they may restrict air flow).
3. Preferably the air will be clean, dry, and oil free.

## Catalyst Atomizing Air

4. Atomizing air should be balanced generally between 15 and 25 psi. It should be low enough to reduce overspray and high enough to atomize catalyst efficiently.

# Getting Started

1. Fill solvent cup $^1/_3$ full.
2. Check catalyst level.
3. Inspect material and catalyst spray tips and O-ring for damage; replace as needed.
4. Inspect tip pin O-rings on front of gun head and replace as needed.
5. Attach catalyst and material tips to gun.
6. Lubricate retaining ring threads and assemble onto the gun.
7. Inspect hose

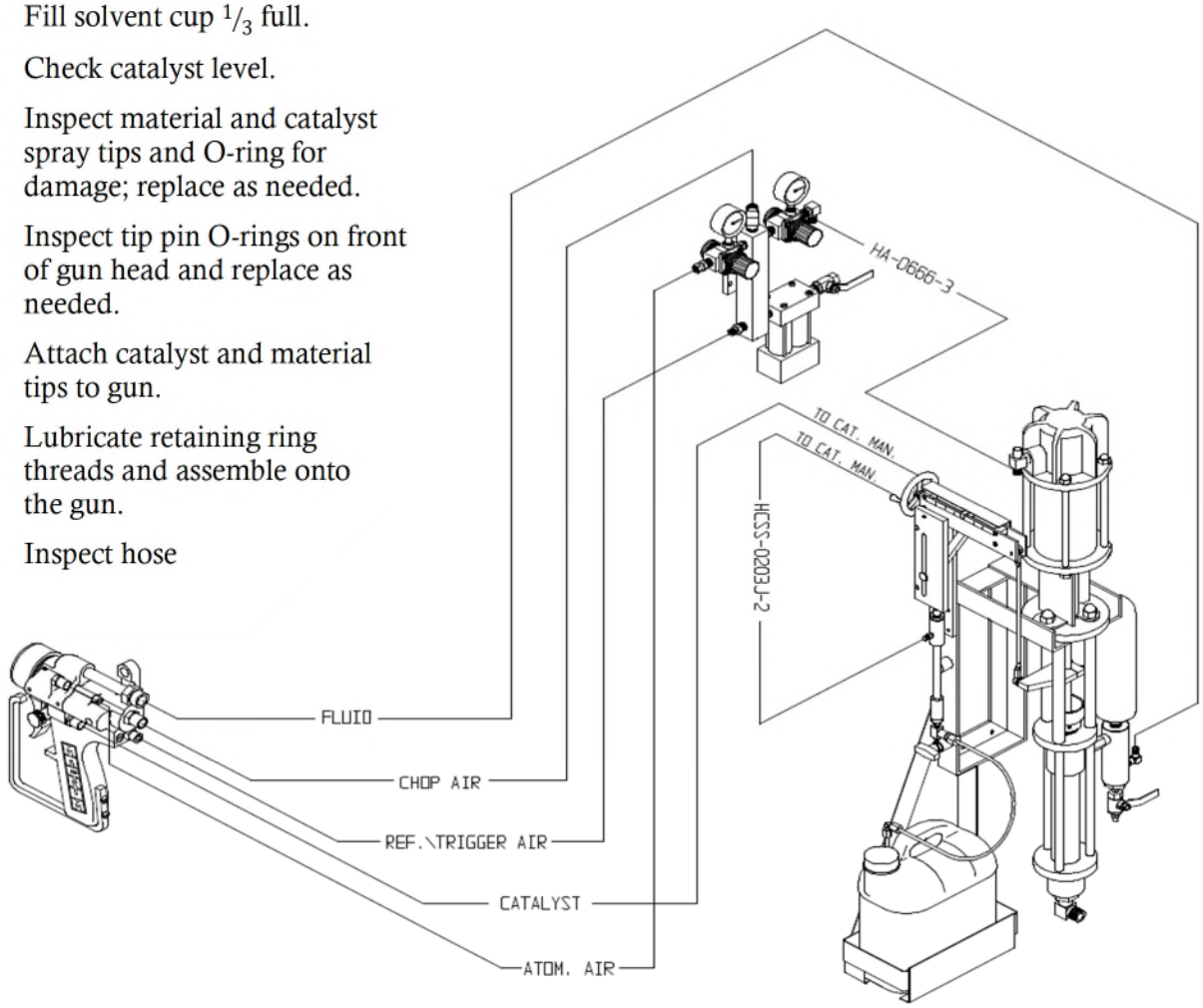



*Figure 1. Hose Connections*

assemblies and connections for leaks or damage; replace as needed.

8. Connect the hoses as shown in Figure 1.

9. Check roving quantity to make sure supply is sufficient to complete the job.
10. Inspect and replace the following parts as needed:
    - Chopper blades
    - Anvil sleeve
    - Cutter head bearing
    - Idler bearing
11. Inspect and adjust the following as needed:
    - Cutter head to anvil sleeve tension
    - Idler bearing to anvil sleeve tension
    - Chopper position for most efficient disbursement of chop into spray pattern
12. Oil the cutter assembly air motor as necessary (normally 2 – 3 drops daily depending on usage).

# Priming the Unit

## First Time Priming

1. Make sure all air regulators are turned completely to the left, shutting off air to the components.
2. Slowly open the main air valve.

### Prime Catalyst

3. Remove the pin to disengage the catalyst pump.
4. Open the ball valve on the catalyst manifold, if applicable.
5. Eliminate air pockets by manually hand pumping the catalyst 5 to 10 short strokes.
6. Continue to hand pump and close the ball valve on the catalyst manifold.
7. Pull and hold the trigger on the gun while hand pumping until there is a solid, steady catalyst flow from the head of the gun, then release the trigger.
8. Continue to hand pump the catalyst until catalyst is fully primed and pressurized, generally within 5 additional strokes.

***Note*** ***Do not engage slave pump until material pump is primed.***

### Prime Material Pump

9. With the catalyst pump still disengaged, place an appropriate waste container under the pump valve to catch material.
10. Open the ball valve located on the bottom of the filter assembly.
11. Bring up the pressure on the material pump gauge just enough that the pump begins to stroke.
12. After a smooth flow of material is coming from the valve, close the valve.

13. Once pump is primed, it will stall (stop stroking). Increase the air to operating pressures (generally 30 – 50 psi, depending on output and transfer efficiency desired).
14. Engage the slave pump.

## Priming Previously Used System

15. Slowly open the main air valve.
16. Disengage the slave pump.

### Prime Material Pump

17. With the catalyst pump still disengaged, place an appropriate waste container under the pump valve to catch material.
18. Open the ball valve located on the bottom of the filter assembly.
19. Bring up the pressure on the material pump gauge just enough that the pump begins to stroke.
20. After a smooth flow of material is coming from the valve, close the valve.
21. Once pump is primed, it will stall (stop stroking). Increase the air to operating pressures (generally 30 – 50 psi, depending on output and transfer efficiency desired).

### Prime Catalyst Pump

22. Open the ball valve on the catalyst manifold (if applicable).
23. Eliminate air pockets by manually hand pumping the catalyst 5 to 10 short strokes.
24. Continue to hand pump and close the ball valve on the catalyst manifold.
25. Continue to hand pump the catalyst until catalyst is fully primed and pressurized, generally within 5 additional strokes.

***Note*** ***You should feel resistance in the pump stroke when the system if properly primed.***

26. Engage the catalyst pump.

# Testing Spray Pattern

1. Lay out a strip of test material such as paper or cardboard.
2. Spray a fan on the test material and check the following:
   - Spray pattern width and output
   - Catalyzation
   - Spray pattern definition (fingers and tails)
   - Glass distribution
3. Adjust the fan as necessary with the MVP Air-Assist adjustment screw.
4. Continue to spray test patterns until you have fine tuned the fan to the best pattern possible by eliminated fingers and tails.

The system is now ready for use.

# Operating the Cutter

The RC-1000 cutter was designed to cut glass roving into short lengths of ½ inch to 4 inches and then dispense it into a resin fan. When properly adjusted, the chopped glass will be spread out evenly from edge to edge of the resin pattern and the glass/resin mixture on the part will need a minimal amount of rolling.

1. Double up the end of the roving and insert into one of the three holes in the feed bar on top of the cutter.
2. Open the motor control knob on the bottom of the manifold assembly about a full turn out.
3. Turn the blower control knob on the side about ½ turn.

***Note*** ***The blower control keeps air moving through the chopper cover to keep it from plugging.***

4. Pull the gun trigger and glass will be dispensed into the resin fan.
5. Use the motor control knob to increase or decrease the glass output as needed.

## Cutter Adjustments

The glass should enter the resin fan as soon as possible without excessive glass fallout. Normally, if the glass enters the resin when the glass pattern and resin pattern are about the same width it will give the best results. To achieve uniform width, do the following:

6. Center the glass pattern by moving the cutter left or right, forward, or backward as needed.

### Idler Bearing

With glass roving in place the idler should hold the glass against the anvil sleeve. Excessive tension may cause the glass to wrap around the idler bearing. If adjustments are needed, follow these steps:

7. Loosen the idler bolt and rotate the eccentric nut to achieve the appropriate tension.
8. Re-tighten the idler bolt.

### Air Motor

The air motor on the cutter is precision built and with proper care and under normal operation will last hundreds of hours of continuous use. At the end of each working shift it is important to lubricate the motor. To properly lubricate, follow these steps:

9. Remove the motor speed control valve and insert 8 drops of lightweight oil.
10. Replace the needle valve and run the cutter for approximately 5 seconds.

***Note*** ***It is not necessary to cut glass curing this time.***

**WARNING**

***The clearances for the air motor are critical. The motor should be sent to an authorized distributor for repair. The warranty is void if this motor is opened by any except factory-authorized repair centers.***

# Disassembly

11. Remove the air motor and manifold assembly by first removing the snap ring and anvil sleeve.
12. Loosen the screw and the motor manifold will slide out of the backplate.

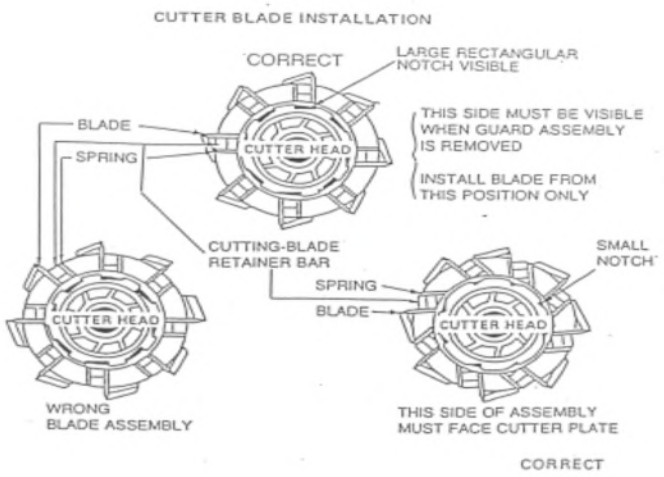
***Note*** ***DO NOT use a hammer to force the motor out. If frozen, a slight pressure with a screwdriver between the motor and backplate will be sufficient to loosen the motor.***

13. The blower and motor control manifold can then drop free from the air motor.
14. Take the cutter head and idler bearing off the backplate by unscrewing their hold down bolts from the corresponding eccentric nuts.

# Replacing Blades

The cutter comes from the factory set to cut 1-inch lengths of glass roving by using four evenly spaced blades inserted into the cutting head assembly. There are slots every ½ inch on the cutting head. By inserting or removing blades you can vary the length of the cut for different applications, however the factory 1-inch length is the standard used. To replace the cutting blades, follow these steps:

15. Pry out the blade retainer and spring using a small screwdriver until the old blade falls free of the slot.
16. Make sure the new blades are on the front side of the slot when inserting, then insert the retaining bar.




17. Insert the retaining spring with a pair of needle-nose pliers.

**WARNING**

***Blades are razor sharp! Use caution when handling to prevent injury.***

# Assembling the Air Motor

1. Remove burrs with a fine file or emery cloth.
2. Take a micrometer reading of the body minus the micrometer reading of the rotor assembly to find the end clearance.
3. Add gaskets to the drive and dead end if needed to achieve the required end clearance.

***Note*** ***Average end clearance is .0015" to .002".***

4. Select the end plate (plate with no threads in hub).
5. Position the bearing on the shaft and with bearing pusher, press the bearing into the end plate hub.
6. Using inner-race tapper, tap the inner-race of the bearing until there is a slight drag between the end plate and rotor assembly.
7. Position the body as follows:
   - The long port is the exhaust, small hole drilled through body
   - Intersecting hole drilled from the top is the intake
   - For clockwise rotation, the small hole is on the right
   - For counterclockwise rotation, the small hole is on the left
8. Assemble the drive gasket by taking approximately ½ of the total gasket needed for proper end clearance, holding in position on the drive end with a few drops of oil, and then punching a hole in the gasket over the air passage.
9. Position the end plate and rotor in the body over the gasket.
10. Screw the end plate onto the top of the body and oil the hole.
11. Place parts in an alignment fixture, resting on hub.
12. Using a .0015" shim, snug the fit between the tightest segment and top of body.
13. Assemble the vanes with the angle on the vane toward the shaft.
14. Take the balance of the gasket from overall clearance and hold in position on the dead end with a few drops of oil.
15. Punch a hole in the gasket over the air passage.
16. Select the dead end plate (plate with threads in hub).
17. Assemble the dead end plate with the kidney ports on the intake side, the plate over the shaft.
18. Snug the screws and then loosen one turn.
19. Place the bearing on the shaft and use the bearing pusher to position the bearing in the end plate.

20. Check the movement of the end plate.
21. The end plate must move back and forth, if it does not, reset top clearance to center.
22. Once the end plate is moving correctly, snug the screws, remove from the fixture and tighten the screws.
23. Adjust the end clearance so the rotor is snug against the drive end plate.
24. Using the inner-race tapper, tap the inner race of bearing very lightly in the dead end plate until the rotor is free.
25. Push and turn, then pull and turn until there is no drag on either end plate.

***Note*** ***For finer adjustment start the air motor and adjust by sound.***

26. Place a small amount of grease on the seal and press it into the end plate.
27. Assemble the end cap into the end plate.
28. Test the air motor for normal operation.

# Shutting Down

1. Trigger gun until the pump shaft is in the fully lowered position at the bottom of the stroke.
2. Engage the gun trigger lock.

## Relieve Pressures

3. Close the main air valve to the system.
4. Purge excess air by relieving air from the bottom of the air filter/water trap.
5. Dump catalyst pressure at the catalyst manifold (if applicable) by opening the catalyst ball valve.
6. Close the ball valve as soon as pressure is relieved to avoid draining catalyst from the line.
7. Place a container under the material ball valve at the bottom of the fluid filter assembly to catch material flow when relieving pressure.
8. **Slowly** open the material ball valve.


**CAUTION**

***Remember, the pump is under extreme pressure. Use the utmost caution when opening the valve to avoid injury or being sprayed with material.***

9. Once material pressure is relieved, close the ball valve.
10. Remove catalyst and material tip assemblies from the head of the gun and clean thoroughly.

***Note*** ***When cleaning gun with solvents, avoid getting solvent in exhaust port of air trigger gun by covering the port with thumb or finger and pointing the gun downward while cleaning.***

11. Thoroughly clean diffuser cavity in front of gun head.

12. Inspect entire gun and equipment for overspray and clean any noted.

System is now shut down and ready for next start up.

# Troubleshooting

## Chopper

| Chopper Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| Cutter is not shutting off | Stuck chopper poppet valve | Lubricate and replace O-ring on the chopper poppet valve in the gun |
| | Worn poppet valve seat | Replace poppet valve seat |
| | Broken poppet valve spring | Replace poppet valve spring |
| Cutter does not come on | Sticking resin needle prohibiting actuation of poppet valve | Replace packings |
| | Bent trigger | Replace trigger |
| | Stuck poppet valve | Clean, lubricate, and replace seals |
| Glass binds up | Obstruction in roving path | Trace roving path from source to chopper for any obstructions and clear as necessary |
| | Improper anvil sleeve to bearing tension | Adjust tension |
| | Improper cutter head to anvil sleeve tension | Adjust tension |
| | Resin on roving | Clean as necessary; keep roving away from resin and overspray |
| | Worn cutter wheel | Replace cutter wheel |
| | Open slots in cutter wheel | Be sure all blade slots are filled with a retainer bar and spacer (whether a blade is inserted or not) |
| | Worn or broken blades | Replace blades |
| Improper chop length | Worn or misadjusted anvil sleeve | Replace or adjust properly |
| | Worn blades | Replace blades |
| Cutter running too slow | Tension on anvil sleeve to bearing or cutter head is too tight | Adjust tension |
| | Low air volume | Inspect hoses for kinks or cuts |
| | | Inspect primary air line to system for proper diameter and volume |
| | Worn air motor | Replace or rebuild |
| | Dry air motor | Oil motor daily with 3 – 5 drops of MVP air motor oil (AMO) |
| | Chopper poppet in gun sticking | Remove, lubricate, and replace O-rings |

| Chopper Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| | | Check for broken poppet spring and replace if necessary |
| Cutter not running | Chopper poppet stuck in closed position | Clean, lubricate, and replace O-rings as necessary |
| | Air motor locked up | Rebuild or replace air motor |

# Slave Pump

| Pump Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| No catalyst coming from gun | Ball valve open on catalyst manifold | Make sure ball valve is fully closed |
| Catalyst spitting from gun | Air is being drawn into the catalyst siphon assembly | Replace the inlet nipple |
| | Cracked or deteriorated (pin holes) inlet nipple at the bottom of the slave pump | |
| | Worn or cut O-ring in inlet nipple | Replace O-ring in inlet nipple |
| | Improper seal around siphon hose | Check seal and make sure hose is inserted all the way into the nipple |
| | Cracked or deteriorated (pin holes) catalyst siphon hose | Replace the catalyst siphon hose |
| | Cracked or deteriorated elbow assembly on catalyst jug assembly | Replace elbow assembly |
| | Worn or cut O-ring on elbow assembly | Replace O-ring |
| | Inverted washer in elbow or inlet nipple | Inspect and be certain that flat side of washer is against the O-ring for proper sealing |
| No catalyst flow on down stroke of catalyst pump | Debris in lower ball and seat assembly | Remove and clean |
| No catalyst flow on down stroke of catalyst pump | Chipped or worn ball and/or seat | Inspect and replace ball and/or seat as necessary |
| No catalyst flow on up stroke of catalyst pump | Debris in ball seat assembly located on bottom of pump shaft (upper ball seat assembly) | Remove and clean |

| Pump Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| | Chipped or worn ball and/or seat assembly | Inspect and replace ball and/or seat as necessary |
| Loss of catalyst pressure | Worn or cut O-ring on ball seat assembly located on bottom of pump shaft (upper ball seat assembly) | Replace O-ring |
| | Sticking catalyst pressure relief valve assembly on the catalyst manifold (if applicable) | Disassemble, inspect, and clean; replace seals as necessary |
| Catalyst leaking from top of catalyst slave pump | Worn or cut O-rings located in top of pump | Replace O-rings |
| | Worn guide bushing located in upper jam nut. A bent pump shaft may cause wearing of guide bushing | Replace guide bushing or whole jam nut assembly as necessary |
| Catalyst leaking from top of catalyst slave pump | Bent catalyst pump shaft | Replace pump shaft |

# Fluid Sections

| Pump Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| Fast downstroke (winking of pattern) | Debris on lower ball seat | Disassemble and clean |
| Fast upstroke (winking of pattern) | Debris on upper ball seat | Disassemble and clean |
| Partial dive on downstroke | Air siphoning | Check for loose fittings, kinks, or cuts from bottom of pump to the end of the siphon assembly and correct as necessary |
| Pump stroke chatter | Plugged material filter | Disassemble and clean filter |
| | Buildup of material around pump upper packings/seals | Disassemble and replace packings/seals |
| Material leakage into solvent cup | Loose packings | Clean solvent cup and tighten as applicable ½ turn at a time<br>***Note Pressure must be off at pump before adjusting*** |
| | Worn packings | Disassemble and replace upper packings |
| | Worn shaft | Disassemble and replace shaft |

| Pump Troubleshooting | | |
|---|---|---|
| **Problem** | **Possible Cause** | **Remedy** |
| Intermittent stopping of pump stroke (can cause resin to continue spraying without catalyst) | Air lock in surge chamber. This can be caused by the pump running when the drum is empty or when moving a siphon hose assembly from one drum to another, allowing air into the system | 1. Reduce pump pressure to zero, disconnect slave and slowly open the ball valve on filter to allow resin and air to escape<br>2. Slowly increase pump pressure until pump begins stroking<br>3. After smooth flow of resin is achieved, close the valve and reconnect slave |
| Decrease in volume of resin delivery | Clogged material filter | Disassemble and clean |
| | Worn cylinder; fluid is bypassing the packings through the worn areas | Disassemble and inspect cylinder for wear when doing any repairs |

# Nozzle Information

## Selecting a Tungsten Carbide Spray Nozzle

It is important to select the proper spray nozzle in order to get the optimum efficiency out of your MVP spray system.

| Nozzle Selection Per Gun | |
|---|---|
| **For this gun** | **Choose a nozzle with this prefix** |
| MG-3000 | M2 |
| LW-2500 | LW |
| ATG-3500 | UCT |
| ATC-4000 | UCT |
| MIX-1000 | ALCEL |
| MIX-6000-C | MIX |
| MIX-5500-G | MIX |

The remainder of the part number for the nozzle denotes the orifice size and pattern width.

### Pattern Width

The type and size of the mold being sprayed will determine the appropriate pattern width. Too wide may produce waste.

### Output

The orifice size and fluid pressure determine the material output of a spray nozzle. The following chart will help in selecting the appropriate spray nozzle for the desired output.

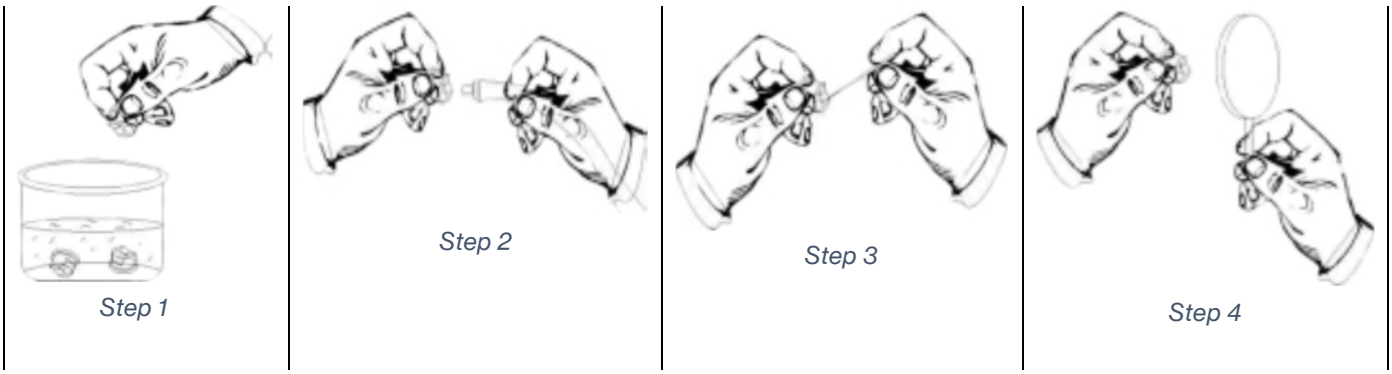
| Orifice Size to Fluid Pressure | | |
|---|---|---|
| **Standard Orifice Size** | **GPM – 500 psi** | **GPM – 1000 psi** |
| 0.015 | 0.12 | 0.16 |
| 0.018 | 0.18 | 0.25 |

| Orifice Size to Fluid Pressure | | |
|---|---|---|
| **Standard Orifice Size** | **GPM – 500 psi** | **GPM – 1000 psi** |
| 0.021 | 0.24 | 0.33 |
| 0.023 | 0.28 | 0.40 |
| 0.026 | 0.35 | 0.50 |
| 0.031 | 0.53 | 0.75 |
| 0.036 | 0.71 | 1.00 |
| 0.043 | 1.10 | 1.50 |
| 0.049 | 1.30 | 1.85 |
| 0.052 | 1.40 | 2.00 |
| 0.058 | 1.60 | 2.50 |
| 0.062 | 2.10 | 3.00 |
| 0.068 | 2.50 | 3.50 |
| 0.072 | 2.80 | 4.00 |
| 0.078 | 3.50 | 5.00 |
| 0.085 | 3.90 | 5.50 |

# Maintenance for Flat Spray Tungsten Carbide Tips

Your carbide tip has a precisely machined orifice and with proper care will give a long and useful life. Remember, the orifice tip is brittle and should never be dropped or probed with a sharp metal object. Follow these steps to keep the tip clean and ready for use:

1. Immediately after spraying, submerge spray tip in solvent until film or coating dissolves completely.
2. Blow out tip with compressed air.
3. Use pointed wooden stick to remove any particles that are left.
4. Inspect the tip carefully using a magnifying glass or microscope.




5. Repeat steps 1 - 3 as necessary.

***Note*** ***All tips have been paint-spray tested. Some orifices are extremely small and barely visible.***