FireHawk® M7 Responder® PAPR

(Powered Air-Purifying Respirator)

PAPR/CBRN (Chemical, Biological, Radiological, and Nuclear) Application

INSTRUCTIONS

⚠ WARNING

THIS MANUAL INCLUDING THE WARNINGS AND CAUTIONS INSIDE, MUST BE READ AND FOLLOWED CAREFULLY BY ALL PERSONS WHO HAVE, OR WILL HAVE, THE RESPONSIBILITY FOR USING OR SERVICING THE PRODUCT. These respirators will perform as designed only if they are used and serviced according to the instructions. OTHERWISE, THEY COULD FAIL TO PERFORM AS DESIGNED, AND PERSONS WHO RELY ON THESE RESPIRATORS COULD SUSTAIN SERIOUS PERSONAL INJURY OR DEATH.

The warranties made by MSA with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. For any additional information relative to use or repair, write or call 1-800-MSA-2222 during regular working hours.

See separate insert for National Institute of Occupation Safety and Health (NIOSH) Approval Information: P/N 10086005 (PAPR/CBRN).

For More Information, call 1-800-MSA-2222 or Visit Our Website at www.MSAnet.com

MSA The Safety Company

MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

TAL 803 (L) Rev. 0

Prnt. Spec. 10000005389(A) Mat. 10086003
Doc. 10086003

INTRODUCTION

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NIOSH APPROVAL INFORMATION
CAUTIONS AND LIMITATIONS

A - Not for use in atmospheres containing less than 19.5 percent oxygen.
B - Not for use in atmospheres immediately dangerous to life or health.
C - Do not exceed maximum use concentrations established by regulatory standards.
F- Do not use powered air-purifying respirators if airflow is less than four cfm (115 lpm) for tight fitting facepieces or six cfm (170 lpm) for hoods and/or helmets.
H - Follow established canister change schedules or observe ESLI to ensure that canisters are replaced before breakthrough occurs.
I – Contains electrical parts that may cause an ignition in flammable or explosive atmospheres.
J - Failure to properly use and maintain this product could result in injury or death.
L - Follow the manufacturer's User's Instructions for changing canisters and/or filters.
M - All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.
N - Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.
O - Refer to User's Instructions, and/or maintenance manuals for information on use and maintenance of these respirators.
P - NIOSH does not evaluate respirators for use as surgical masks.
S – Special or critical User's Instructions and/or specific use limitation may apply. Refer to the User's Instructions before donning.

PAPR/CBRN Application

A - Not for use in atmospheres containing less than 19.5 percent oxygen.
F - Do not use powered air-purifying respirators if air flow is less than four cfm (115 lpm) for tight fitting facepieces or six cfm (170 lpm) for hoods and/or helmets.
H - Follow established cartridge and cartridge change schedules or observe ESLI to ensure cartridges and canisters are replaced before breakthrough occurs.
I - Contains electrical parts that may cause an ignition source in flammable or explosive atmospheres.
J - Failure to properly use and maintain this product could result in injury or death.
L - Follow the manufacturer's User's Instructions for changing canisters.
M - All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA and other applicable regulations.
N - Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.
O - Refer to User's Instructions, and/or maintenance manuals for information on use and maintenance of these respirators.
R - Some CBRN agents may not present immediate effects from exposure, but can result in delayed impairment, illness, and death.
S - Special or critical User's Instructions and/or specific use limitations apply. Refer to User's Instructions before donning.
T - Direct contact with CBRN agents requires proper handling of the respirator after each use and between multiple entries during the same use. Decontamination and disposal procedures must be followed. If contaminated with liquid chemical warfare agents, dispose of the respirator after decontamination.
Y - This respirator provides respiratory protection against inhalation of radiological and nuclear dust particles. Procedures for monitoring radiation exposure and full radiation protection must be followed.
Z - If during use, and unexpected hazard is encountered such as a secondary CBRN device; pockets of entrapped hazard or any unforeseen hazard, immediately leave the area for clean air.

BB - Not for use in entry into atmospheres immediately dangerous to life or health.
CC - For entry, do not exceed maximum use concentrations established by regulatory standards.
GG - Direct contact with CBRN agents requires proper handling of the respirator after use. Correct disposal procedures must be followed.
QQ - Use in conjunction with personal protective ensembles that provide appropriate levels of protection against dermal hazard. Failure to do so may result in personal injury even when the respirator is fitted properly, used, and maintained.
UU - The respirator should not be used beyond eight (8) hours after initial exposure to chemical warfare agents to avoid the possibility of agent permeation. If liquid exposure is encountered, the respirator should not be used for more than two (2) hours.
VV - PAPRS with TC-23C approvals may NOT be used for escape from IDLH atmospheres.

S – SPECIAL OR CRITICAL USER'S INSTRUCTIONS

1. During use of the FireHawk M7 Responder PAPR, the atmosphere must be monitored for the level of contamination and a means of escape must be provided in the event that the contamination level increases to immediately dangerous to life and health (IDLH) levels.
2. The C420 PAPR must be properly inspected before use, properly decontaminated, if necessary, after use, properly cleaned and maintained after use, and properly stored between uses.
3. The C420 PAPR contains a battery and may not be taken into or used in atmospheres containing flammable or explosive gases, vapors, or dusts when the concentration of such contaminants is near or above the lower flammable limit (LFL).
4. Do not use the C420 PAPR for firefighting, in oxygen-deficient atmospheres, or for protection against airborne contaminants from which the canister does not protect.
5. Firehawk® Regulator must always be connected to the inlet adapter when used as a CBRN APR Respirator or CBRN PAPR Respirator.
6. The Firehawk Regulator is a non-functional component as regulator, but is functional as a plug for the front port.

⚠ WARNING

DO NOT attach the regulator to supplied air while using the respirator as a CBRN APR or CBRN PAPR. Failure to follow this warning can result in serious personal injury or death.

⚠ WARNING

This respirator is approved for APR OR PAPR only configurations and is not intended to be combined with other apparatus. Failure to follow this warning can result in serious personal injury or death.

7. The FireHawk M7 Heads-Up-Display (HUD) components are non-functional component while attached to the FireHawk M7 Responder APR when used as a CBRN APR or CBRN PAPR.
8. The FireHawk M7 HUD is an optional component for FireHawk M7 Responder APR or PAPR. The HUD can be removed or attached prior to use.
9. The mouth-bit can be inserted or removed from the nosecup prior to use. Please read the "Preparing the Respirator for Use" section for proper procedure.

⚠ WARNING

Follow instruction in the "Preparing the Respirator for Use" section of the FireHawk M7 Responder APR user instructions before inserting or removing the mouth-bit in the nosecup. Failure to follow this warning can result in serious personal injury or death.

⚠ WARNING

The nosecup must always be installed when using the FireHawk M7 Responder APR or PAPR. Failure to follow this warning can result in serious personal injury or death.

⚠ CAUTION

When using filters in an application that produces sparks, ensure that they are protected by a shield. Contact with sparks can damage filters and reduce protection.

NOTES

INSTRUCTIONS FOR USE AND CARE

CBRN APPLICATION

⚠ DANGER

- **This respirator provides LIMITED protection. It is NIOSH approved for respiratory protection against atmospheres containing CBRN (chemical, biological, radiological, and nuclear) warfare agents; however, it cannot protect against all possible warfare agents.**
- **Some CBRN agents may not present immediate effects from exposure, but can result in delayed impairment, illness, or death.**
- **DO NOT use without a complete understanding of the instructions and limitations for this respirator and proper training. Misuse can prevent the respirator from providing the necessary protection.**
- **CBRN agents may NOT be detectable by smell or sight. Don respirator before entering an area suspected of containing CBRN agent. Follow procedures established by proper authorities.**
- **DO NOT use this respirator beyond eight (8) hours after initial use in an atmosphere containing CBRN agents or beyond two (2) hours after initial use in an atmosphere containing CBRN agents in liquid of mist form; otherwise agent permeation may occur.**
- **DO NOT remove respirator until respirator and clothing are decontaminated; otherwise exposure to CBRN agent may result. Follow decontamination and disposal procedures established by appropriate authorities.**

⚠ WARNING

1. **An adequate respiratory protection program must include knowledge of hazards, hazard assessment, selection of proper respiratory protective equipment, instruction and training in the use of equipment, inspection and maintenance of equipment, and medical surveillance.**
2. **This respirator will perform as designed only if used and maintained according to the manufacturer's instructions. The Program Administrator and the users must read and understand these instructions before using or servicing this product.**
3. **If the respirator does not perform as specified in this manual, it must not be used until it has been checked by authorized personnel.**
4. **DO NOT alter, modify, or substitute any components.**
5. **Inspect the respirator regularly and maintain it according to the instructions. Repairs must only be made by properly trained personnel.**
6. **This respiratory protective device does not supply oxygen. Use only in adequately ventilated areas which conform to the appropriate standard.**
7. **This respirator must be used in conjunction with the proper canisters for protection against specific contaminants. If you cannot determine that the canisters used with this device is designed for the contaminant, or if you do not know the identity of the contaminant, do not use this device.**
8. **DO NOT use when concentrations of contaminants are unknown.**
9. **DO NOT block the canisters.**
10. **DO NOT use when appropriate exposure limit (PEL, REL, TLV, etc.) is not known.**
11. **Leave the contaminated area immediately if:**
    a. **Breathing becomes difficult**
    b. **Dizziness or other distress occurs**
    c. **You taste or smell the contaminant**
    d. **You experience nose or throat irritation**
    e. **Instructed by responsible individuals**
12. **Use strictly in accordance with the instructions, labels, and limitations pertaining to this device. Follow an established canister(s) changeout schedule.**
13. **This respirator may not provide a satisfactory seal with certain facial characteristics, such as beards or large sideburns that prevent direct contact between the skin and the sealing surface of the facepiece. Do not use this facepiece if such conditions exist.**
14. **DO NOT wear eyeglasses under the facepiece. The temples or sidebars on eyeglasses will prevent an air-tight seal. If you must wear glasses, install the spectacle kit.**
15. **The user must perform a respirator fit test (Quantitative Test or Qualitative Test) and follow all warnings and limitations specified.**
16. **Wear impermeable protective clothing to prevent exposure to gases and vapors which can poison by skin absorption.**
17. **DO NOT use this respiratory protective device in explosive atmospheres.**
18. **DO NOT use for urethane paints or other paints containing diisocyanates unless an appropriate canister change-out schedule is developed. Due to their poor warning properties, over exposure can occur without user awareness and result in severe permanent damage to the respiratory system. If unable to develop an appropriate changeout schedule, use an air-supplied respirator or SCBA.**
19. **The C420 PAPR has no user-serviceable parts except as instructed in this manual.**
20. **DO NOT drop the C420 PAPR. If the C420 PAPR is dropped leave the contaminated area immediately and inspect the unit for damage. If the plastic canister or blower housing is cracked it may cause contaminants to get into the system.**

Failure to follow all warnings, instructions, and established protective measures can result in serious personal injury or death.

INSTRUCTIONS FOR USE AND CARE

The C420 PAPR must be properly prepared for use, flow tested, properly donned, and a negative pressure leak test must be conducted in an area known to be free of contaminants before it can be used.

Before entry into a contaminated area, the maximum safe duration of use must be estimated. The maximum safe duration of use depends primarily on:

- The amount and type of contamination in the air and the capacity of the canister to absorb or neutralize that contaminant.
- The amount of airborne particles (dust) in the atmosphere.
- The charge contained in the battery.
- The physiological limits of the respirator user.

The maximum expected canister life shall be predetermined based on a determination of the amount of contaminant in the atmosphere and the capacity of the canisters together with the expected air flow through the canisters. An average airflow of approximately two cubic feet per minute (2 CFM) will flow through each canister during prolonged use.

The single use battery may be used up to eight (8) hours under certain conditions. The rechargeable battery may be used for up to four (4) hours under certain conditions. Air flow must be checked as described in these instructions for maximum protection.

After four (4) hours of use, the user must leave the contaminated area, decontaminate if required, and check the airflow with the Airflow Indicator (Refer to the Flow Test with Canisters Installed section) when using the single use battery. Thereafter, the air flow must be checked at least every two (2) hours of use. (Refer to the In-Use Flow Test section) After four (4) hours of use the user must leave the contaminated area, decontaminate if required, and discontinue using the respirator when using the rechargeable battery.

GENERAL DESCRIPTION

DESCRIPTION

The FireHawk M7 Responder PAPR Respirator is a blower-assisted, air-purifying respirator referred to as a Powered Air-Purifying Respirator or a PAPR.

The filtering system consists of the C420 waist-mounted battery driven motor-blower assembly device and two (2) canister-type filter media. The blower assembly contains an electric motor driving an air blower. A compartment for a non-rechargeable 6 volt (nominal) lithium-sulfur dioxide (LiSO2) battery pack or a rechargeable 4.8 volt (nominal) nickel-metal hydride (NiMH) battery pack is located on the bottom of the blower assembly. There are two (2) threaded inlets on the front of the blower assembly for the attachment of the canisters (sold separately). The user of the respirator breathes ambient air after the air has passed through the canisters. The canisters include a mechanical filter to trap airborne particles and may also include a sorbent bed of impregnated activated carbon to trap and/or neutralize various gases/vapors.

The blower assembly assists breathing by drawing air through the canisters and delivering the purified air through a breathing tube to the facepiece. An airflow indicator used to check for minimum airflow is provided with the C420 PAPR filtering system. To maintain respiratory protection:

- The user must be properly fit tested to the respirator facepiece before use (refer to the appropriate Facepiece User Instructions Manual)
- The blower, with canisters installed, must be tested with the airflow indicator both prior to use and at prescribed intervals during use to monitor battery life and canister efficiency.

The FireHawk M7 Responder PAPR can be used with the FireHawk M7 Responder APR. Refer to the separate NIOSH Approval Label (P/N 10086005) for a complete list of approved part numbers and limitations.

RESPIRATOR USE LIMITATIONS

The respirator must not be worn in atmospheres which exceed any of the following limitations:

1. Maximum use concentrations
   a. Full facepiece: 1000 times the exposure limit for the contaminants present.
   b. 1000 parts per million organic vapors (for organic vapor respirators).
2. The limitations outlined in the applicable NIOSH approval.
3. Any applicable limitation contained in a standard established by a regulatory agency (such as OSHA) with jurisdiction over the wearer.
4. This respirator can be used for protection against a mixture of contaminants that are present simultaneously or alternately against one contaminant then another (using the same canisters or filters) if the mixture meets the following conditions:
   a. The canister/filter must be approved for all contaminants present.
   b. Particulates (dusts, mists, fumes, asbestos, radionuclides) can be mixed with any other particulate or any gas or vapor for which the canister is approved.
   c. Contaminants present simultaneously must be below IDLH levels for the specific contaminants. If any one contaminant in the mixture exceeds the IDLH concentration then the entire mixture must be treated as IDLH and the respirator cannot be used (except for escape from particulates with appropriate filter)."

EXPOSURE LIMITS

A listing of acceptable exposure limits from the following sources is provided in MSA's Response® Respirator Selector:

- American Conference of Governmental Industrial Hygienists (ACGIH)
- Occupational Safety and Health Administration (OSHA)
- National Institute for Occupational Safety and Health (NIOSH)
- American Industrial Hygiene Association (AIHA)

Contact MSA at 1-800-MSA-2222 for information.

Exposure Limits for Mixtures

The American Conference of Governmental Industrial Hygienists (ACGIH) publishes the following information to determine the Threshold Limit Value (TLV) of a mixture.

First determine the total concentration of the chemical mixture ($C_{Mixture}$) from the individual contaminant concentrations (C_1, C_2, C_3, . . .) using the following formula: $C_{Mixture}=C_1+C_2+ C_3+ \ldots$

The TLV of the mixture is found by using the following formula where T_1, T_2, T_3, . . . are the individual contaminant TLVs and C_1, C_2, C_3, . . . are the individual contaminant concentrations:

$$T_{mixture} = \frac{C_{mixture}}{\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3}}$$

Only use these equations if the contaminants present are actually mixed. Some substances do not mix and may be present separately, for example, in pockets or at different levels. In that case, the lowest TLV of the substances present must be used to determine the appropriate respirator category for protection against all contaminants present.

GENERAL DESCRIPTION

See MSA's Response Respirator Selector for additional information.

Technical Information
Airflow: When used with the MSA battery packs, the C420 PAPR provides a constant filtered airflow of a minimum of 115 l/m to the facepiece.
Battery Packs: Non-rechargeable 6 volt (nominal) lithium-sulfur dioxide (LI-SO2) battery pack or a rechargeable 4.8 volt (nominal) nickel-metal hydride (NiMH) battery pack.
Weight: Blower assembly with battery pack and two canisters (approximately 4lbs).

Contents
The C420 PAPR filtering system kit is shipped with the components listed.

Note: Upon receipt of PAPR kit, inspect the contents for shipping damage and ensure all components are present.

- C420 Motor-Blower Assembly
- PAPR Breathing Tube Extension
- Belt Assembly
- Battery Pack
- Airflow Indicator
- User's Instruction Manual (with NIOSH Approval Information)

PREPARING THE C420 PAPR FOR USE

CHECKPOINTS BEFORE USE

1. Check that all parts of the respirator are complete and undamaged. See the Inspection section for inspection procedures.
2. Check that the canister approval is appropriate and effective against the contaminant in the use environment. Always use two MSA canisters of the same type.

⚠ WARNING

DO NOT cross thread any C420 PAPR components during assembly. Cross threading can cause the connection to feel tight, and a sufficient seal would not be achieved. Failure to follow this warning can result in serious personal injury or death.

INSTALLING THE WAISTBELT

1. Note the lacing path of the belt through the male buckle.
2. Remove the male buckle and keeper loop from the end of the belt.
3. Thread the belt through the two belt loops on the back of the blower assembly.
4. Replace the keeper loop and lace the male buckle back onto the belt.

Note: Ensure the belt is properly tightened so that the C420 PAPR blower does not fall off or slide down the body during use.

INSTALLING THE BATTERY PACK

Note: Each battery cap assembly has a retaining lanyard to prevent loss.

Lithium-Sulfur Dioxide (LI-SO2) Battery Pack
When powering the blower assembly with the LI-SO2 Battery Pack, use the black battery cap assembly supplied with the C420 PAPR blower assembly.

Nickel-Metal Hydride Battery Pack

Note: Before initial battery pack use, or if battery pack has not been used for an extended period of time (several months), perform (3) 6-hour charge/4-hour discharge cycles for optimum battery performance. The discharge cycles should be completed with the blower running in a non-hazardous environment, with no breathing tube or canisters attached to the blower.

Note: See the Charging the C420 Rechargeable Battery section for detailed battery charger use instructions.

When powering the blower assembly with the NiMH Battery Pack, use the green battery cap assembly supplied with the NiMH Battery Pack.

⚠ CAUTION

DO NOT completely discharge a rechargeable battery. Rechargeable batteries must not be used for more than four (4) hours at a time. Failure to follow this caution can result in reduced airflow and can cause the battery to be permanently damaged.

Installing the Green Battery Cap Assembly (for NiMH Battery Packs only)

1. Remove the black battery cap assembly by turning it counter-clockwise.
2. Feed the split ring on the retaining lanyard through the securing hole on the C420 PAPR blower housing.
3. Retain the black cap assembly for possible future use with LI-SO2 Battery Packs.
4. Attach the green battery cap assembly by feeding the split ring on the retaining lanyard completely through the securing hole on the C420 PAPR blower housing.

Installing the Battery Pack into the Battery Compartment of the Blower Assembly

⚠ WARNING

DO NOT use any battery which shows signs of damage, such as bulging, swelling, disfigurement, or liquid in the plastic wrap. Failure to follow this warning can result in serious personal injury or death.

1. Ensure the blower switch is in the “OFF” position.

Note: Damage may occur to the battery if the switch is left in the “ON” position when the battery is installed.

2. Remove the battery cap assembly from the C420 PAPR blower by turning it counter-clockwise.
3. Remove the battery from its packaging.
4. Inspect the battery for signs of damage.

⚠ WARNING

The Lithium-Sulfur Dioxide (LI-SO2) Battery Pack used in this equipment contains pressurized Sulfur Dioxide (SO2) gas. The gas is toxic and the battery must not be abused in any way which may cause the battery to rupture. DO NOT handle the battery directly if you detect an odor like that of vinegar or rotten eggs. Such odor indicates exposure to battery gas leakage, which can lead to serious personal injury or death.

5. Install the battery into the battery compartment in the blower assembly, contact end (metal ring) first. An orientation label is located just inside the battery compartment.

6. Replace the battery cap assembly by threading it clockwise onto the blower assembly.

AIRFLOW TEST (LESS CANISTERS)

Testing the Operation of the Blower Assembly with the Airflow Indicator

1. Inspect the airflow indicator to verify that the O-ring is present and in good condition. The red ball must move freely within the column.
2. Remove the green seal plugs from the outlet and canister mounting ports of the blower assembly. Do not discard the plugs. The plugs will be used when storing the C420 PAPR.
3. Insert the airflow indicator into the blower assembly air outlet.
4. Push the airflow indicator into the air outlet until it bottoms out on the shoulder.
5. Position the blower assembly in an upright position so the airflow indicator is vertical on top of the blower assembly.
6. Turn the blower to the “ON” position to verify operation.
7. Support the blower assembly on a horizontal surface so that the airflow indicator is approximately vertical.
8. Observe the reading on the airflow indicator. With the blower assembly running and no canisters installed, the red ball will rise to the top of the airflow indicator.
9. Turn the blower to the “OFF” position.
10. Remove the airflow indicator

INSTALLING/REPLACING THE CANISTER

⚠ WARNING

- **Know the contaminant(s) in the environment before entering. Always check that the filter canisters are appropriate for use in the environment. A filter canister which is not designed for the contaminant present may not provide protection.**
- **Two new MSA canisters of the same type must be installed before each use.**
- **DO NOT reuse canisters. Canisters are intended for one time use only.**

Failure to follow this warning can result in serious personal injury or death.

Note: The C420 PAPR must be used with two MSA canisters of the same type. Refer to the NIOSH Approval Label for approval information.

After verifying that the canister type is appropriate for use in the environment:

1. Verify shelf life expiration date on carton, bag, and canister label has not been exceeded.

⚠ WARNING

- **DO NOT use an expired canister.**
- **DO NOT use the canister if the bag is opened, damaged, or missing. The canister must be in its original packaging prior to use in a contaminated environment. Do not reuse the canister.**

Failure to follow this warning can result in serious personal injury or death.

2. Remove canisters from the packaging.
3. Inspect the canisters to be sure that they are not damaged.
4. Remove the green protective plugs from the blower assembly canister inlets and outlet. Do not discard the plugs. The plugs will be used when storing the C420 PAPR.
5. Inspect the gray gaskets in each of the canister ports. If either gasket is damaged or missing, replace the gasket(s) (P/N B- 60026-002).

Note: When replacing the gasket(s), take proper care to ensure that the canister inlet port threads are not damaged.

⚠ WARNING

DO NOT use a C420 PAPR blower with one or both of the gaskets damaged or missing. Failure to follow this warning can result in serious personal injury or death.

6. Remove both canisters from their packaging.
7. Inspect the canisters to be sure that they are not damaged.

Note: Canisters are considered to be in service when they are removed from their packaging. Canisters are intended for one time use only.

8. Attach both canisters to the blower assembly by threading them snugly into the canister ports, hand-tight.

Replace the canister after each use. Follow the established canister change-out schedules to ensure that canisters are replaced before breakthrough occurs. When used at defined occupational exposure limits, the rated service time cannot be exceeded.

⚠ WARNING

DO NOT over-tighten the canisters. Over-tightening may distort the gasket resulting in leakage that may expose the user to substances resulting in serious personal injury or death.

For CBRN Applications Only

DO NOT use this respirator beyond eight (8) hours after initial use in an atmosphere containing CBRN agents or

beyond two (2) hours after initial use in an atmosphere containing CBRN agents in liquid or mist form; otherwise, agent permeation may occur.

⚠ WARNING

- **DO NOT replace canisters in a contaminated area. Be sure to follow applicable decontamination procedures**
- **If the respirator does not perform as specified, it must not be used until it has been checked by authorized personnel.**
- **Return to a non-contaminated area immediately if you experience unusual sensations (nausea, dizziness, eye irritation, unusual odor or taste, excessive fatigue, or difficulty breathing).**

Failure to follow this warning can result in serious personal injury or death.

AIRFLOW TEST (WITH CANISTERS INSTALLED)

⚠ WARNING

Failure to verify proper airflow from the blower assembly may result in reduced performance of the unit, resulting in serious personal injury or death.

Conducting the Airflow Test

1. Inspect the airflow indicator to verify that the O-ring is present and in good condition. The red ball must move freely within the column.
2. Position the C420 PAPR blower in the upright position so the airflow indicator is vertical on top of the C420 PAPR blower assembly.
3. Insert the airflow indicator into the blower assembly air outlet. Push the airflow indicator into the air outlet until it bottoms out on the shoulder.
4. Turn the blower assembly to the “ON” position.
5. Support the blower assembly on a horizontal surface so that the airflow indicator is approximately vertical.
6. Observe the reading on the airflow indicator. Acceptable performance shall be indicated by the position of the red ball being above the line marked on the outside of the column.

Note: With fresh canisters and a new battery installed, the red ball should rise nearly to the top of the airflow indicator.

INSTALLING THE BREATHING TUBE

The FireHawk M7 Responder PAPR utilizes a 6” PAPR breathing tube extension coupled with either an 18” or 22” APR breathing tube.

Attaching the Breathing Tube assembly to the Blower

1. Remove the green plug from the PAPR breathing tube extension inlet. Do not discard the plug. The plug will be used when storing the breathing tube.
2. Inspect the gray gasket in the breathing tube inlet. If gasket is damaged or missing, replace the gasket (P/N B-10022-001).
3. Attach the breathing tube inlet to the blower outlet connection and snugly hand-tighten.

Attaching the PAPR Breathing Tube extension to the APR Breathing Tube

1. Remove the green plug from the PAPR breathing tube extension outlet. Do not discard the plug. The plug will be used when storing the breathing tube.
2. Inspect the green gasket in the APR breathing tube inlet. If gasket is damaged or missing, replace the gasket (P/N 10078974).
3. Inspect the green gasket seal around the outside of the plunger in the APR breathing tube inlet (if using an APR breathing tube with a plunger). If the gasket is missing or damaged, do not use the APR breathing tube.
4. Attach the PAPR breathing tube extension outlet to the APR breathing tube inlet connection and snugly hand-tighten.

Attaching the Breathing Tube Assembly to the Facepiece

1. If attached, remove the black plastic cap from the facepiece inlet connection.
2. Attach the APR breathing tube outlet to the facepiece inlet connection and snugly hand-tighten using the handwheel.

⚠ WARNING

The handwheel on the breathing tube must rotate easily. If debris has stopped the handwheel from rotating easily, the faceseal could leak if the breathing tube gets moved while on the user’s face. Failure to follow this warning can result in serious personal injury or death.

<u>Optional Accessory:</u>

Attaching the Spark Covers (Recommended for use in spark environments)

1. Remove the canisters and spark covers from the packaging.
2. Attach the canisters to the PAPR.

PREPARING THE C420 PAPR FOR USE

3. Once the canister is attached, align the feet of the spark cover with the inlet hole of the canister.

motion for attaching spark cover

4. Grasp the outside of the canister, twist and push on the spark cover. The spark cover will snap in place.

check for optional spark arresting material

5. To remove the spark cover, gently squeeze the outside of the cover, twist, and pull the spark cover off.
6. Check the spark cover before each use to ensure no sparks have created holes or warped the part. If holes are created or the part is warped, replace the spark cover with a new one.

The FireHawk M7 Responder PAPR is now ready for use. The user must follow the donning procedures before actual use of the respirator.

DONNING AND USE

DONNING

Note: Refer to the FireHawk M7 Responder APR user instructions for facepiece donning instructions.

⚠ WARNING

- **Donning, doffing, and obtaining and checking for a proper facepiece seal must be done in an area known to be free of contaminants. The user must have practiced this procedure before attempting to use the respirator for respiratory protection.**

Failure to follow this warning can result in serious personal injury or death.

Donning the Blower Assembly

1. Examine the breathing tube assembly to verify that it is properly tightened to the facepiece, the APR breathing tube/PAPR breathing tube extension interface, and the blower assembly.
2. Examine the canisters to verify that they are properly installed to the blower assembly.
3. Turn the switch to the “ON” position to confirm that the battery is installed and the blower assembly is working.
4. Turn the switch to the “OFF” position.
5. Don the waistbelt with the blower assembly with the C420 PAPR blower outlet located at the top of the unit.
6. Fasten the buckle and adjust the waistbelt.

Note: Refer to the FireHawk M7 Responder APR user instructions for facepiece donning instructions (P/N 10086002).

The C420 PAPR blower may be worn in multiple locations from either the left hip to the back. When the respirator is donned, ensure:

- That the breathing tube is not excessively tight. During use there should be no movements that can cause the breathing tube to become tight and pull the facepiece away from the face which could break the facepiece seal.
- That the breathing tube is not excessively loose. During use there should not be enough slack in the breathing tube such that it could get caught on something and pull the facepiece away from the face which could break the facepiece seal.

If either one of these conditions is present, one of the following actions must be taken:

- Change the position of the blower on the waist to create or remove slack in the breathing tube.
- Use a different length breathing tube to create or remove slack in the breathing tube.

Note: The C420 PAPR may be used with either a standard 18” (P/N 10082517) or a long 22” (P/N 10082542) APR breathing tube.

Note: Use a buddy, if the situation permits, to ensure that the C420 PAPR is donned correctly (the head harness is in place, the blower is positioned correctly, the waist belt is secure, and all components are properly assembled and tightened).

NEGATIVE PRESSURE SEAL TEST

The Negative Pressure Seal Test must be performed each time the facepiece is donned. A good face-to-facepiece seal must be verified before entering a hazardous area.

Perform the test as follows:

1. Ensure respirator is assembled properly.
2. Close off the inlet side of both canisters by placing palms of the hands over canister inlets and press firmly to seal inlets.
3. Inhale gently and hold breath for 10 seconds. If the seal is good, the facepiece will collapse and remain collapsed against face. Remove hand and breathe normally.
4. If the facepiece did not remain collapsed during the test, or any leakage is noticed, check each canister and breathing tube connection for looseness or cross threading. Perform Negative Pressure Seal Test again.
5. If this does not correct the leak, the facepiece will not provide protection. If the leakage is from the face seal, a different size mask may be tried. If other than face seal leakage is detected, the cause of the leak must be corrected before performing another test.

Note: Protective clothing and headwear, if used, must be arranged so that it does not interfere with the fit of the facepiece or restrict airflow to the canisters.

⚠ WARNING

This device may not seal properly with your face if you have a beard, gross sideburns or similar physical characteristics (see ANSI Z88.2). An improper facial seal may allow contaminants to leak into the facepiece, reducing or eliminating respiratory protection. Do not use this device if such conditions exist. The negative pressure seal test must be conducted and passed before each use. Never remove the facepiece except in a safe, non-hazardous, non-toxic atmosphere. Failure to follow this warning can result in serious personal injury or death.

DONNING AND USE

USING THE C420 PAPR

Once the user has properly donned the respirator the blower should be turned on and the hazardous atmosphere may be entered.

⚠ WARNING

- **Immediately leave the contaminated area if the airborne contaminant is detected by odor, taste, eye irritation, or if any discomfort is felt during use.**
- **If air flow is noticeably decreased or stops completely, leave the contaminated area immediately.**
- **If the battery compartment becomes hot to the touch, leave the contaminated area and turn the switch to the "OFF" position immediately, decontaminate if necessary, and check the respirator.**

Failure to follow this warning can result in serious personal injury or death.

IN-USE FLOW TEST

When to Conduct an In-Use Flow Test

1. If, at any time, the user leaves the contaminated area, perform an in use flow test and negative pressure seal test before reentering the contaminated area.
2. If using a single use LI-SO2 battery, conduct an in-use flow test after four (4) hours of use and again two (2) hours later after six (6) hours of use.

Conducting an In-Use Flow Test

Note: The user must leave the contaminated area and if necessary, be decontaminated.

1. Remove the breathing tube from the blower.
2. Install the airflow indicator (Refer to the Air Flow Test with Canisters Installed section).
3. Turn the blower assembly switch to the "ON" position. Ensure the red ball rises above the line on the air flow indicator.

⚠ WARNING

DO NOT use the respirator if the red ball does not rise completely above the line on the air flow indicator. Failure to follow this warning can result in serious personal injury or death.

a. If the red ball does not rise completely above the line on the air flow indicator:
   - Replace the battery and recheck airflow
   - Reseat the canisters and recheck airflow.

b. If the red ball still DOES NOT rise completely above the line on the air flow indicator remove the respirator from service.

Note: If, after obtaining an acceptable flow test, the user intends to reenter the contaminated area, a successful negative pressure seal test must be performed (Refer to the Donning section).

REMOVING THE RESPIRATOR

DECONTAMINATION

⚠ WARNING

DO NOT remove respirator until respirator and protective clothing are decontaminated; otherwise, exposure to contaminants may result. Follow decontamination and disposal procedures established by appropriate authorities. Failure to follow this warning may result in serious personal injury or death.

Once the protective equipment has been decontaminated, proper disposal of affected equipment must be performed.

Disposal is to be performed as required by federal, state, and/or local laws.

When conditions are safe to remove and handle the respirator, the switch can be moved to the “OFF” position, and accessories/components (belt, canisters etc) can be removed. Refer to the facepiece user’s instruction manual.

⚠ WARNING

DO NOT reuse the canisters. Canisters are considered to be in service when they are removed from their packaging. Canisters are intended for one time use only and must be disposed of upon termination of use.

1. Open the battery compartment by unthreading (counter-clockwise) the battery cap assembly.
2. Remove the battery.
   a. The non-rechargeable LI-SO2 battery must be disposed of on termination of use. Do not reuse the battery.
   b. The rechargeable NiMH battery can be recharged according to the instructions on the battery label and in the Charging the C420 Rechargeable Battery section of this user’s instruction.

⚠ CAUTION

The rechargeable battery can only be charged using the MSA battery charger. Failure to follow this warning can result in serious personal injury or death. DO NOT dispose of batteries as ordinary trash. Follow the instructions included in the Disposal of Canisters and Batteries section.

3. Clean, inspect, and prepare the C420 PAPR for the next use.

NOTES

CLEANING AND INSPECTION

CLEANING AND DISINFECTING

All components (facepiece, breathing tubes, motor-blower, battery pack, and waistbelt) must be thoroughly cleaned after each use. Clean the respirator after each use with Confidence Plus® Cleaner (P/N 10009971) from MSA. Refer to the label for use instructions. A solution as effective as Confidence Plus Cleaning Solution and compatible with MSA respirator components may be substituted.

⚠ WARNING

Be careful that you do not breathe or touch the contaminant in handling the respirator or its parts. Use equipment designed to protect you from the specific contaminant. If necessary, dispose of equipment to protect yourself from the contaminant. Failure to follow this warning can result in serious personal injury or death.

Note: The used canisters and LI-SO2 battery must be removed from the respirator and disposed of as directed in the Disposal of Battery and Canisters section.

1. Preparing the cleaner:
   a. Follow the instructions with the Confidence Plus Cleaning Solution.
   b. If the Confidence Plus Cleaning Solution is not used, prepare in accordance with the instructions provided with cleaning products.
2. Disconnect the breathing tube from the facepiece.
3. Clean and disinfect the facepiece. Refer to the facepiece user's instruction.
4. Separate the motor-blower, breathing tubes, waistbelt, and filter or chemical canisters.
5. Inspect the equipment for worn inlet gaskets, damaged threads, cracked plastic components, rubber parts, worn or frayed belts, or other damaged components. Make note of any damaged components and replace before storage.
6. Use a damp cloth or sponge saturated with Confidence Plus or equivalent cleaning solution to wipe the breathing tube and motor-blower clean.
7. Carefully clean the breathing tube connections and canister ports to remove deposits that could prevent an airtight seal.

⚠ WARNING

DO NOT submerge the blower assembly. If accidental submersion occurs, the blower assembly must be allowed to air dry thoroughly and then tested with the Airflow Indicator to verify that the motor was not damaged. Failure to follow this warning can result in serious personal injury or death.

8. Thoroughly wash and rinse the support belt in the Confidence Plus or equivalent cleaning solution. A soft brush or sponge may be used.
9. Re-assemble the respirator so that it will be ready for use.

INSPECTION

1. Examine all hardware to ensure proper condition of threads, couplings, and adapters.
2. Examine all gaskets and seals and ensure that they are present and in good condition.
3. Examine the blower assembly and breathing tube assembly for damage or cracks. Ensure that there are no loose objects rattling inside the blower assembly.
4. Correct any deficiencies immediately or tag the respirator as in need of repair and remove it from service.
5. Ensure that the unit is working properly before storage.

NOTES

STORAGE

STORAGE

⚠ CAUTION

- **Ensure that the unit is working properly before storage by temporarily installing a battery and check the airflow as instructed in the Before Use section. Remove the battery after testing.**
- **DO NOT store the unit with the battery installed. Always remove the battery from the blower assembly for storage. Store the battery and the blower assembly away from sunlight, heat, or moisture.**

Storing the Respirator

- Install the green seal plugs over the outlet and into the canister mounting ports of the blower assembly.
- Install the green seal plugs over the outlet and into the blower inlet of the PAPR breathing tube extension. The PAPR breathing tube is not stored in any additional packaging.
- Store only undamaged respirators and breathing tubes for further use. When not in use, store the respirator in cool, dry, and clean ambient air.
- Canisters must be stored in original, unopened foil bag and in the original, unopened carton.
- The APR breathing tube must be stored in the provided plastic drawstring bag (p/n 465008). Replace the bag if it becomes damaged.

The facepiece must be stored in the facepiece bag (P/N 805029) with the lens cover label (P/N 10082547) in place and the black plastic cap (P/N 10086013) installed on the facepiece inlet connection. The facepiece bag is provided as a convenient storage container to protect the facepiece. Replace the facepiece bag if it becomes damaged.

Storing the Batteries

- Store the batteries in normal conditions (room temperature/ 50% relative humidity/away from direct sunlight).
- The LI-SO2 battery is designed for extended shelf life when properly stored. The LI-SO2 battery is not rechargeable.
- The NiMH battery is rechargeable. Follow the instructions on the battery label or refer to the Charging the C420 Rechargeable Battery section of this manual.
- Keep this user's instruction manual with the complete respirator.

CHARGING THE C420 RECHARGEABLE BATTERY

Charging the C420 Rechargeable Battery

Note: Before initial battery pack use, or if battery pack has not been used for an extended period of time (several months), perform (3) 6-hour charge/4-hour discharge cycles for optimum battery performance. The discharge cycles should be completed with the blower running in a non-hazardous environment, with no breathing tube or canisters attached to the blower.

1. Place the charger horizontally on a flat surface and in a dust-free area with a temperature range between 32°F and 100°F (0°C and 37.7°C). The ideal temperature is 70°F (21.1°C).
2. Insert the appropriate cord set (120v or 230v) into the IEC receptacle on the charger. Plug the charger AC power cord into the appropriate regulated 120v or 230v outlet. The "ORANGE" LED will illuminate when no battery is plugged in or during battery charging initialization.
3. Align the keyed charger plug with the charging receptacle in the battery pack and fully insert. The "RED" LED will illuminate, indicating that the connected battery pack is being charged in the "Fast Charge Rate" mode.

Note: In a discharged condition (approximately 4 hours of operational use), the battery pack will charge for approximately 6 hours. Charging times will vary for battery packs in a partial charge state.

⚠ WARNING

- **The positive and negative battery terminals of the battery pack are on the opposite end from the charging receptacle. DO NOT ground out the positive terminal (center metal circle) and the negative terminal (outer metal ring). Doing so could short circuit the battery pack, resulting in excessive current flow and could cause battery liquid electrolyte leakage, heat generation, bursting and fire.**
- **Use extreme caution not to ground out the metal charging leads on the battery charger plug, as doing so could result in damage to the battery charger.**

Failure to follow the above warning can result in serious personal injury or death.

4. When the "GREEN/ORANGE" LEDs illuminate, the charger has switched to a "Top-Off Charge" mode, indicating the battery is nearly fully charged.
5. The "GREEN" LED indicates the battery is fully charged and is in the "Trickle Charge" mode. The optimum charging time is 8 hours. Battery packs can be left in a "Trickle Charge" mode indefinitely.

⚠ CAUTION

New batteries, and batteries not used for months, could experience a false indication that can cause the "GREEN" LED indicator to illuminate only a few minutes into the charging cycle. Unplug and then re-plug to continue the charging cycle.

6. If the “Red/Green” LEDs illuminate, there is a fault condition. Remove the battery immediately. If the LED’s illuminate with another battery connected, remove the charger from service.
7. To remove the charging plug from the battery pack, firmly grasp the charging plug housing with the fingers and pull out.

⚠ CAUTION

DO NOT remove by pulling the charging plug cord. This can damage/separate the wire connections to the charging plug housing.

Rapid Charger LED Illumination Sequence

LED Illumination	Charging Status w/AC Power Cord plugged in
Orange	No battery attached or charging cycle is initializing
Red	Fast charge
Green/Orange	Top-off charge, battery is almost fully charged
Green	Battery fully charged and ready to use
Red/Green	Fault condition - remove battery from charge

⚠ CAUTION

DO NOT allow the battery pack to fully discharge. The functional system operational time for the battery pack is approx. 4 hours. Operating the system in excess of 4 hours results in significantly reduced air-flow.

CANISTER AND BATTERY DISPOSAL

CANISTER DISPOSAL

Remove the used canisters and dispose of them properly.

Dispose of the canisters in accordance with federal, state, and local regulations.

⚠ CAUTION

Handle the canisters with care. Canisters may contain the contaminant that was in the atmosphere while the canisters were being used and must be handled as a contaminated or potentially contaminated object.

BATTERY DISPOSAL

⚠ WARNING

DO NOT dispose of the battery in fire. It may explode. Failure to follow this warning can result in serious personal injury or death.

Note: Remove the LI-SO2 battery and discharge it according to the following instructions. Discharge instructions are also printed on the battery.

Discharging and Disposing of the LI-SO2 Battery

1. Remove the warning label from the side of the battery next to the contact end. Attached to the label is a pull tab. The pull tab must be removed with the label.
2. Store the battery with the label removed for five (5) days to completely discharge.
3. Dispose and/or recycle batteries in accordance with federal, state, and local regulations.

⚠ WARNING

DO NOT attempt to the charge the LI-SO2 battery. The battery may ignite resulting in serious personal injury or death.

Disposing of the NiMH Battery

Note: NiMH cells contained in the MSA NiMH battery pack are classified by the federal government as a non-hazardous waste and are safe for disposal as municipal waste.

1. Apply a piece of non-conductive insulating tape across the contact and charging pins ends and dispose the battery pack.
2. NiMH cells contained in the MSA battery pack contain recyclable materials. Dispose of or recycle batteries in accordance with all applicable federal, state, and local regulations.

NOTES

RECERTIFICATION

RECERTIFICATION

MSA recommends the C420 PAPR be recertified by MSA every three years. A recertification consists of blower assembly inspection, main seal and filter gasket replacement, and a system performance verification check.

WARRANTY

Mine Safety Appliances Company
General Express Warranty and Terms of Sale

1. **Express Warranty -** MSA warrants that the product furnished under this order is free from mechanical defects or faulty workmanship for a period of one (1) year from date of shipment, provided it is maintained and used in accordance with MSA's instructions and/or recommendations. This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year such as, but not limited to, non-rechargeable batteries, and canisters. Replacement parts and repairs are warranted for ninety (90) days from the date of repair of the product or sale of the replacement part, whichever occurs first. MSA shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from misuse of the product. No agent, employee or representative of MSA may bind MSA to any affirmation, representation or modification of the warranty concerning the goods sold under this contract. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF: MSA SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.
2. **Exclusive Remedy -** It is expressly agreed that the Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of MSA, or for any other cause of action, shall be the repair and/or replacement, at MSA's option, of any equipment or parts thereof, that after examination by MSA are proven to be defective. Replacement equipment and/or parts will be provided at no cost to the purchaser, F.O.B. MSA's plant. Failure of MSA to successfully repair any non-conforming product shall not cause the remedy established hereby to fail of its essential purpose.
3 **Exclusion of Consequential Damages –** Purchaser specifically understands and agrees that under no circumstances will MSA be liable to Purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of the nonoperation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against MSA.

For More Information, call 1-800-MSA-2222 or Visit Our Website at www.MSAnet.com

MSA
The Safety Company

MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230