Leak Testing

MAINTENANCE AND REPAIR

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MSA The Safety Company

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LEAK TESTING - 1/4 TURN MMR

Leak testing should be performed when the SCBA fails any of the inspection steps; following disassembly; or, as part of a regularly-scheduled maintenance procedure. The SCBA must hold system pressure without leaks to provide adequate protection. The component leak-test procedure is the first step in troubleshooting. Leak testing is a quick means of identifying components which need repair or replacement. Use P/N 600920 leak test solution, or prepare a soapy water solution. Be sure to use enough soap to produce bubbles.

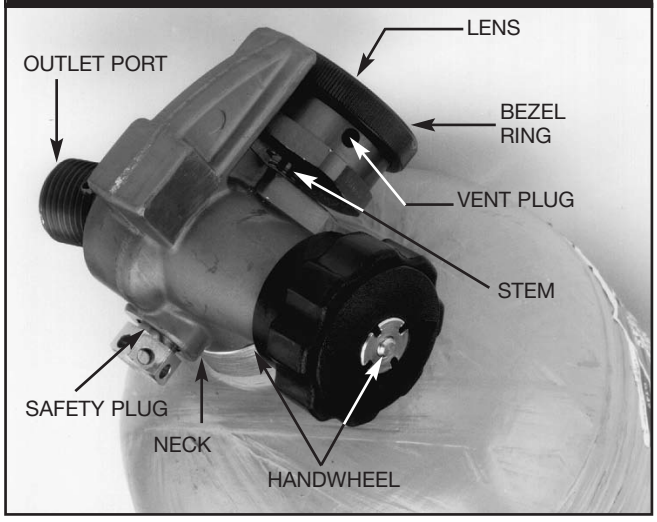
⚠ WARNING

Do not tighten fittings or connectors when the system is pressurized. Close the cylinder valve. Be sure nothing blocks the regulator outlet. Relieve pressure from the system by slowly opening the bypass valve. Failure to follow this precaution may cause fittings or connectors to rupture, resulting in serious personal injury or death.

CYLINDER VALVE

1. Outlet port (coupling nut connection):
   a. Be sure that the cylinder valve handwheel is completely closed.
   b. Draw a bubble of leak test solution across the outlet port and the two bleed holes on the thread(s).
   c. If the bubble expands, there is an air leak through the valve. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.
2. Pressure gauge:
   a. Remove the rubber gauge guard. Apply leak test solution to the pressure gauge stem, cover, and bezel.
   b. If bubbles appear, the pressure gauge must be replaced.

Cylinder Valve



Note: On high pressure gauges, apply leak-test solution to the rubber vent plug or tape. If bubbles appear, there is an air leak through the valve. Remove the cylinder from service. The pressure gauge must be replaced. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.

3. Cylinder neck:
   a. Apply leak test solution to the cylinder neck.
   b. If bubbles appear, the cylinder must be taken out of service. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.
4. Cylinder handwheel and safety plug:
   a. Apply leak test solution to the cylinder handwheel and safety plug.
   b. If bubbles appear at the cylinder handwheel, or safety plug, there is an air leak through the valve. Remove the cylinder from service. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this ginder for procedures to follow.

AUDI-LARM™ AUDIBLE ALARM

Connect the alarm coupling nut to the cylinder and hand-tighten. Check that the bypass valve is completely closed. Open the cylinder valve fully.

1. Coupling nut:
   a. Apply leak test solution to the front and back of the coupling nut.
   b. If bubbles appear, close the cylinder valve. Be sure nothing blocks the regulator outlet. Open the bypass valve to relieve pressure. Hand-tighten the coupling nut further.
   c. Continuation of bubbles indicates a leak at the insert O-ring.
   d. Close the cylinder valve and relieve pressure from the system. Be sure nothing blocks the regulator outlet, then slowly open the bypass valve.
   e. To replace the insert O-ring, see the AUDI-LARM REPAIR section of this binder.
2. Audi-Larm insert:
   Apply leak-test solution to the Insert pipe threads where the Insert enters the alarm. If bubbles appear, see Replacing the Coupling Nut in the AUDI-LARM REPAIR section of this binder.
3. Audi-Larm outlet:
   Apply leak-test solution where the high pressure hose threads into the alarm. If bubbles appear, see the AUDI-LARM REPAIR section of this binder.
4. Audi-Larm adjusting screw:
   Apply leak-test solution to the adjusting screw and the pipe plugs. If bubbles appear, the alarm must be repaired. Refer to the MMR AUDI-LARM REPAIR section of this binder for procedures to follow.

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5. Audi-Larm bell:
   If the bell is loose or missing, see the AUDI-LARM REPAIR section of this binder.

HIGH PRESSURE AUDI-LARM HOSE

1. Apply leak test solution to the Audi-Larm hose connection to the first stage regulator.
2. Apply leak test solution to the Audi-Larm hose connection to the Audi-Larm or URC Assembly.
3. If bubbles appear, the leak must be corrected.

FIRST STAGE REGULATOR

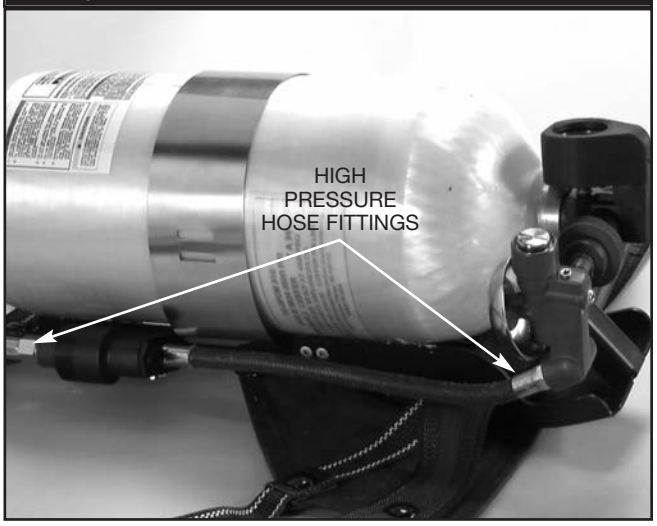
Apply leak test solution to the locations specified below. If bubbles appear, refer to the MMR REGULATOR REPAIR section of this binder for repair procedures to follow.

1. Adjusting nut:
   Apply leak test solution to the adjusting nut.
2. Plug:
   Apply leak test solution to the plug.
3. Regulator Cap:
   Apply leak test solution to the joint between the body and the regulator cap.
4. Joints:
   a. Apply leak test solution to the joints between the relief valve swivel, regulator cap, and retaining ring.
   b. Apply leak test solution to the joints between the relief valve body and the swivel.
5. Relief valve:
   Apply leak-test solution to the relief valve outlet. If bubbles appear, see Removing the Relief Valve Swivel section of the REGULATOR REPAIR in this binder.
6. Vent holes:
   Apply leak test solution across the vent holes in the body.

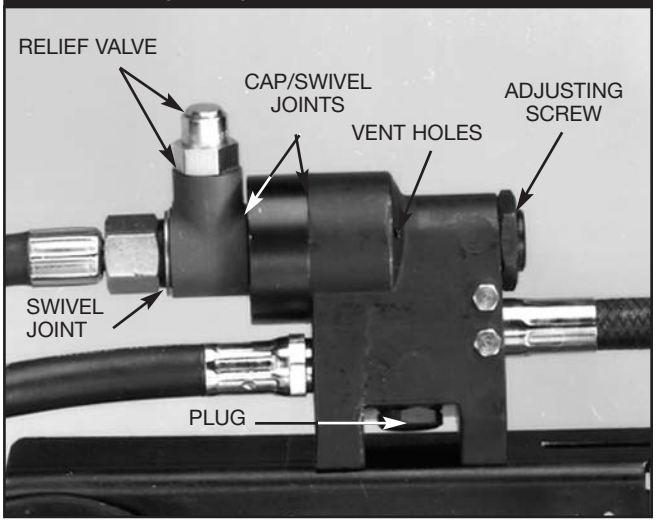
INTERMEDIATE PRESSURE HOSE

1. Apply leak test solution to the connection where the hose joins the first stage regulator.
2. Apply leak test solution to both ends of the swivel, and where the hose ferrule connects to the swivel.
3. If bubbles appear at any of the joints, the leak must be corrected (see the Removing the Intermediate Pressure Hose see the MMR REGULATOR REPAIR section in this binder).

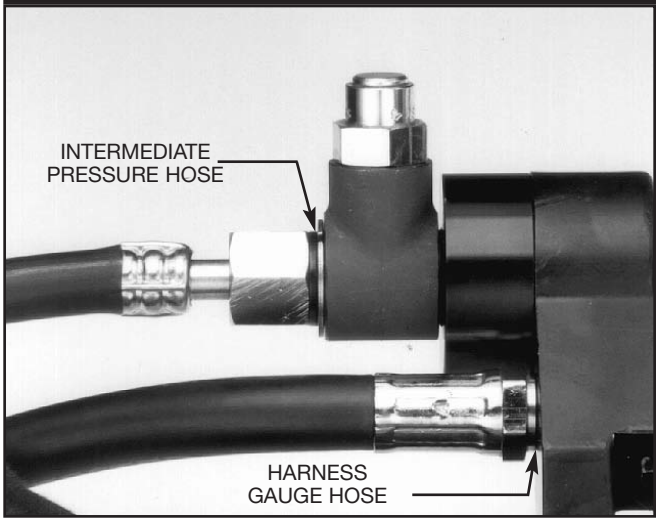
High Pressure Hose



First Stage Regulator



Intermediate Pressure Hose



LEAK TESTING - 1/4 TURN MMR

REDUNDANT ALARM/HARNESS GAUGE HOSE

1. Apply leak test solution to the hose joint where the hose connects to the first stage regulator body.
2. Slide the gauge protective cover back and apply leak test solution to the connections which join the hose, adapter, swivel, and redundant or ICM alarm jam nut.
3. Apply leak test solution around the lens and bezel.
4. If bubbles appear at any of these joints, the leak must be corrected. Refer to the appropriate component section of the MMR REGULATOR REPAIR section in this binder.

QUICK-FILL® SYSTEM

1. Apply leak test solution to the connection between the Quick-Fill coupling and adapter block.
2. Apply leak test solution across the Quick-Fill coupling outlet.
3. For 2216 psig and 3000 psig SCBA only; apply leak test solution to the connection between the pressure relief valve and Audi-Larm assembly.
4. If bubbles appear, the leak must be corrected.

⚠ CAUTION

Do not connect a low pressure air mask to a 4500 psig cylinder. Although the Low Pressure quick-fill block has a relief valve to prevent pressurization, connecting to a 4500 psig cylinder is a dangerous and potentially unsafe condition.

6. Make sure the cylinder is fully pressurized before leak-testing.
7. Remove the dust cover.
8. Open the cylinder valve fully.
9. Apply leak test solution to both sides of the quick-fill block, fitting, and hose end.

⚠ CAUTION

If leaks are found, depressurize the system before performing any maintenance. Close the cylinder valve fully. Be sure that nothing is blocking the regulator outlet. Open the bypass valve to release any trapped air. Close the bypass fully.

10. If leaks are detected, refer to the appropriate component in the MMR AUDI-LARM REPAIR section of this Binder.
11. Be sure that the cylinder valve is fully closed, that all pressure is relieved from the system, and that the bypass valve is closed fully.
12. Install the dust cover on the male quick-fill coupling. The SCBA is now ready for service. Read and be sure that you fully understand the instructions for operating the quick-fill system.

URC ASSEMBLY

Connect the alarm coupling nut to the cylinder and hand-tighten. Check that the bypass valve is completely closed on the MMR, and that the slide button is pushed IN, then fully open the cylinder valve.

1. Check Relief Valve for Damage
   a. Check for missing or loose label.
   b. Check that relief valve ports are not showing or damaged. If damage, remove air mask from service and return to MSA.
2. Relief Valve
   a. Apply leak test solution to top and threads where the relief valve enters the URC Assembly.
   b. If bubbles appear, close cylinder valve and open the bypass valve to relieve pressure. See Replacing Relief Valve.
3. Coupling Nut
   a. Apply leak test solution to the front and back of the coupling nut.
   b. If bubbles appear, close the cylinder valve and open the bypass valve to relieve pressure. Further hand-tighten the coupling nut.
   c. Continuation of bubbles indicates a leak at the insert O-ring.
   d. Close the cylinder valve and relieve pressure from the system. Be sure nothing blocks the regulator outlet, then slowly open the bypass valve.
   e. To replace the insert O-ring, see Alarm Parts Replacement.
4. Alarm Insert
   Apply leak test solution to the alarm. Inspect pipe threads where the insert enters the alarm. If bubbles appear, see Replacing the Coupling Nut.
5. Alarm Outlet
   Apply leak test solution where the high pressure hose threads into the alarm.
6. Alarm Adjusting Screw
   Apply leak test solution to the adjusting screw and the pipe plugs. If bubbles appear, return the alarm to a certified MSA Air Mask Service Center.

DUAL-PURPOSE SYSTEM

1. Apply leak test solution to the hose connections on the Dual-Purpose manifold.
2. Apply leak test solution to the connection between the male airline coupling and Dual-Purpose manifold.
3. Apply leak test solution across the male airline coupling.
4. If bubbles appear, the leak must be corrected.

AFTER ALL COMPONENTS ARE LEAK TESTED

Close the cylinder valve. Be sure that nothing blocks the regulator outlet. Slowly open the bypass valve to relieve pressure from the system. Use a clean, lint-free cloth to wipe the components dry.

FIREHAWK LEAK TESTING

Leak testing should be performed when the SCBA fails any of the inspection steps; following disassembly; or, as part of a regularly-scheduled maintenance procedure. The SCBA must hold system pressure without leaks to provide adequate protection. The component leak-test procedure is the first step in troubleshooting. Leak testing is a quick means of identifying components which need repair or replacement. Use P/N 600920 leak test solution, or prepare a soapy water solution. Be sure to use enough soap to produce bubbles.

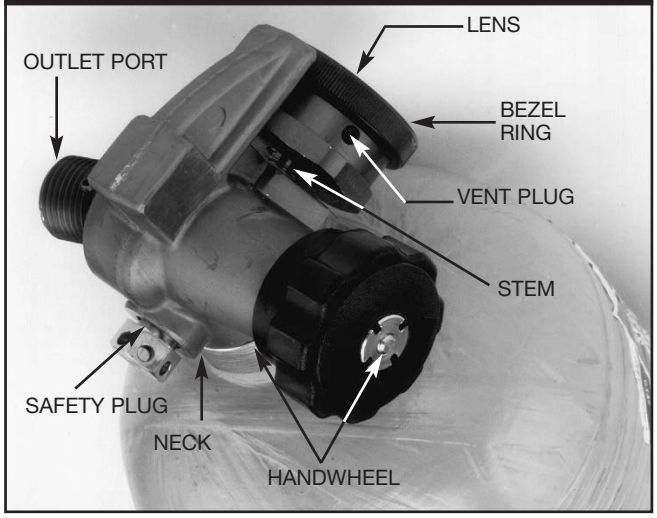
⚠ WARNING

Do not tighten fittings or connectors when the system is pressurized. Close the cylinder valve. Be sure nothing blocks the regulator outlet. Relieve pressure from the system by slowly opening the bypass valve. Failure to follow this warning may cause fittings or connectors to rupture, resulting in serious personal injury or death.

CYLINDER VALVE

1. Outlet Port (Coupling Nut Connection)
   a. Be sure that the cylinder valve hand-wheel is completely closed.
   b. Draw a bubble of leak test solution across the outlet port and the two bleed holes on the thread(s).
   c. If the bubble expands, there is an air leak through the valve. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.
2. Pressure Gauge
   a. Remove the rubber gauge guard. Apply leak test solution to the pressure gauge stem, cover, and bezel.
   b. If bubbles appear, the pressure gauge must be replaced.

Cylinder Valve



Note: On high pressure gauges, apply leak test solution to the rubber vent plug or tape. If bubbles appear, the pressure gauge must be replaced. The pressure gauge must be replaced. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.

3. Cylinder Neck
   a. Apply leak test solution to the cylinder neck.
   b. If bubbles appear, the cylinder must be taken out of service. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this binder for procedures to follow.
4. Cylinder Hand-wheel and Safety Plug
   a. Apply leak test solution to the cylinder hand-wheel and safety plug.
   b. If bubbles appear at the cylinder handwheel, or safety plug, there is an air leak through the valve. Remove the cylinder from service. The valve must be repaired. Refer to the CYLINDER VALVE REPAIR section of this ginder for procedures to follow.

URC ASSEMBLY

Connect the alarm coupling nut to the cylinder and hand-tighten. Check that the bypass valve is completely closed on the MMR, and that the slide button is pushed IN, then fully open the cylinder valve.

1. Check Relief Valve for Damage
   a. Check for missing or loose label.
   b. Check that relief valve ports are not showing or damaged. If damage, remove air mask from service and return to MSA.
2. Relief Valve
   a. Apply leak test solution to top and threads where the relief valve enters the URC Assembly.
   b. If bubbles appear, close cylinder valve and open the bypass valve to relieve pressure. See Replacing Relief Valve.
3. Coupling Nut
   a. Apply leak test solution to the front and back of the coupling nut.
   b. If bubbles appear, close the cylinder valve and open the bypass valve to relieve pressure. Further hand-tighten the coupling nut.
   c. Continuation of bubbles indicates a leak at the insert O-ring.
   d. Close the cylinder valve and relieve pressure from the system. Be sure nothing blocks the regulator outlet, then slowly open the bypass valve.
   e. To replace the insert O-ring, see Alarm Parts Replacement.
4. Alarm Insert
   Apply leak test solution to the alarm. Inspect pipe threads where the insert enters the alarm. If bubbles appear, see Replacing the Coupling Nut.
5. Alarm Outlet
   Apply leak test solution where the high pressure hose threads into the alarm.

FIREHAWK LEAK TESTING

6. Alarm Adjusting Screw
   Apply leak test solution to the adjusting screw and the pipe plugs. If bubbles appear, return the alarm to a certified MSA Air Mask Service Center.

HIGH PRESSURE AUDI-LARM HOSE

1. Apply leak test solution to the Audi-Larm hose connection to the first stage regulator.
2. Apply leak test solution to the Audi-Larm hose connection to the Audi-Larm or URC assembly.
3. If bubbles appear, the leak must be corrected.

FIREHAWK FIRST STAGE REGULATOR

Apply leak test solution to the locations specified below. If bubbles appear, the regulator must be repaired.

1. Adjusting Nut
   a. Apply leak test solution to the adjusting nut.
2. Plug
   a. Apply leak test solution to the plug.
3. Cap
   a. Apply leak test solution to the joint between the body and cap.
4. Vent Holes
   a. Apply leak test solution across the vent hole in the body.
5. Pressure Relief Valve
   a. Apply leak test solution to the pressure relief valve connection to the first stage regulator.
   b. Apply leak test solution to the pressure relief valve seat.

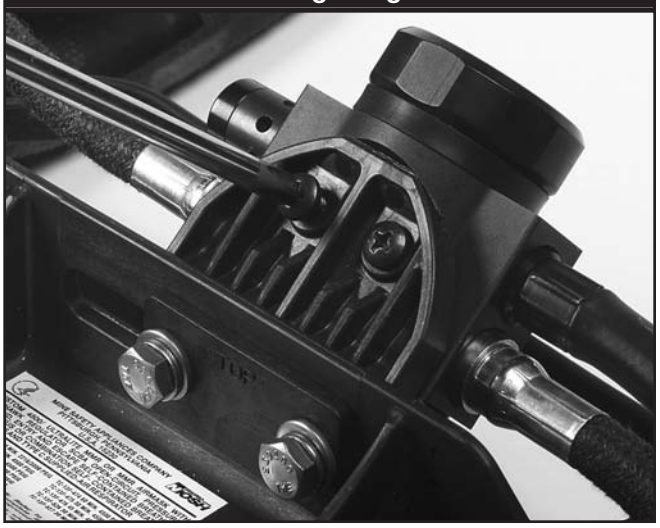
FIREHAWK PR14 FIRST STAGE REGULATOR

Apply leak test solution to the locations specified below. If bubbles appear, the regulator must be repaired.

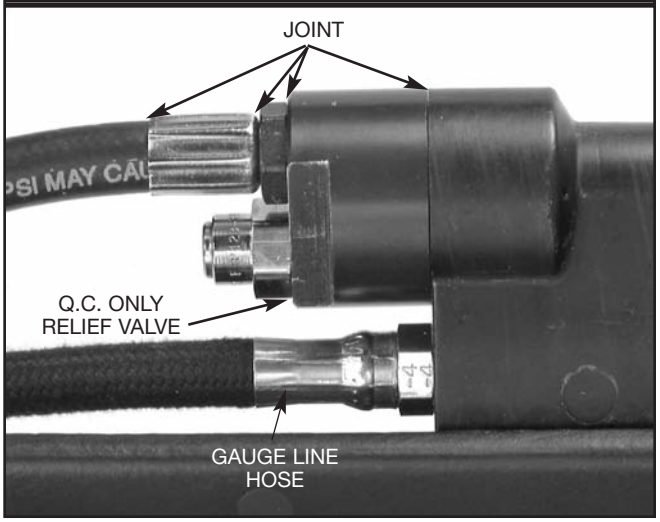
1. Cap and Seal Ring
   a. Apply leak test solution to the cap and seal ring perimeter.
2. Pressure Relief Valve
   a. Apply leak test solution to the pressure relief valve connection to the first stage regulator.
   b. Apply leak test solution across the pressure relief valve vent holes.
3. Seat

Note: The seat is not accessible when the PR14 First Stage Regulator is secured to the mounting bracket. To access the seat, it is necessary to remove the regulator from the mounting bracket and attach the PR14 test bracket (MSA material number 10069386). The u-clips must be installed when using the test bracket.

MMR PR14 First Stage Regulator



Intermediate Pressure Hose



⚠ WARNING

Do not pressurize the PR14 first stage regulator if the regulator is not secured to either the mounting bracket or test bracket. Do not pressurize the PR14 First Stage Regulator until verifying that all high pressure and intermediate pressure connections are properly made and secured with u-clips. Failure to follow this warning can result in serious personal injury or death.

a. Apply leak test solution to the seat perimeter.

INTERMEDIATE PRESSURE HOSE

1. Apply leak test solution to the intermediate pressure hose connection to the first stage regulator.
   a. If bubbles appear, the leak must be corrected.

FIREHAWK LEAK TESTING

HARNESS GAUGE HOSE

1. Apply leak test solution to the gauge hose connection to the first stage regulator.
2. Apply leak test solution to the gauge hose connection to the pressure gauge, ICM, or Nightfighter transmitter.
3. Apply leak test solution to the pressure gauge connection or ICM connection to the Nightfighter transmitter.
4. Apply leak test solution around the pressure gauge lens and bezel.
5. If bubbles appear, the leak must be corrected.

QUICK FILL® SYSTEM

1. Apply leak test solution to the connection between the Quick-Fill coupling and adapter block.
2. Apply leak test solution across the Quick-Fill coupling outlet.
3. If bubbles appear, the leak must be corrected.

DUAL-PURPOSE

1. Apply leak test solution to the hose connections on the Dual-Purpose manifold.
2. Apply leak test solution to the connection between the male airline coupling and Dual-Purpose manifold.
3. Apply leak test solution across the male airline coupling outlet.
4. If bubbles appear, the leak must be corrected.

AFTER ALL COMPONENTS ARE LEAK TESTED

Close the cylinder valve. Be sure that nothing blocks the regulator outlet. Slowly open the bypass valve to relieve pressure from the system. Use a clean, lint-free cloth to wipe the components dry.