Evaporative Emissions Leak Detector
Part No. 8404C

Diagnostic Smoke® Vapor Machine
with UltraTraceUV® Dye Solution

Leak Detection System for the Professional Technician
Caution and Usage Tips

• ALWAYS use Tester with vehicle engine turned <OFF>.
• Use this equipment in the manner specified by the manufacturer.
• Follow common sense safety precautions.
• Connect Tester’s black cable to chassis ground.
• Use 8404-OIL UltraTraceUV® Smoke Solution in Tester. Using a non-approved solution can cause damage to vehicles being tested and may cause personal injury.
• Do not leave Tester’s hose or power cables connected to the vehicle if tests are not being performed.
• Do not perform test near source of spark or ignition.
• Wear appropriate eye protection.
• Wear yellow glasses supplied when using ultraviolet light.
• Air or gas pressure supplied to Tester can be between 3.4 to 10.3 bar (50 ~ 150 PSI).
• Connect Tester to workshop compressed air for general purpose leak detection applications.
• When testing the EVAP system, inert gas such as nitrogen must be used.
• When using alternate source of UV light, use light that includes 405 nanometer (nm) UV light range.
• When operating the Tester in near freezing temperatures, cycle the operation of the Tester 15 seconds <ON> and 15 seconds <OFF> for approximately the first minute or two of operation. This will allow the Tester to reach optimum operating temperature.
• When testing an engine’s intake or exhaust system for leaks, it is best if the engine is cold. Small leaks may be sealed due to thermal expansion.
Thank You and Congratulations! Your Miller 8404C Evaporative Emissions Leak Tester, which incorporates STAR Diagnostic Smoke” Technology inside, is the simplest and quickest way to find many vehicle system leaks. Smoke vapor-generating leak detectors containing this STAR Technology are the only leak detectors in the world approved by automakers (OEMs).

The patented technology inside your 8404C, including the vapor-producing solution (UltraTraceUV®), was designed in collaboration with major OEMs, in order to establish a standard for leak detection. It is designed to be safe for vehicle systems and will not void factory warranties.

It is also the only smoke technology in the world that meets SAE INTERNATIONAL Published Papers’ safety standards recommendation to use a smoke machine designed to function with an inert gas (such as Nitrogen, Argon or CO₂) when testing a vehicle’s fuel evaporative (EVAP) system [SAE: 2007-01-1235 & 2008-01-0554].
Initial Setup

1. Pour entire contents of one 12 oz. UltraTraceUV® solution bottle into the smoke chamber.

2. Check level regularly with dipstick and use second bottle of UltraTraceUV® solution supplied to regularly maintain at or near FULL mark.

3. If not supplied; install correct air fitting onto the 8404C.

NOTE: Your 8404C is now ready for operation.
Quick Start Guide

Do One of the Following:

Connect to workshop air for general Purpose leak testing. (Non-EVAP Testing.)

Connect to Nitrogen, or other inert gas, when testing fuel evaporative system (EVAP.)

Regulate nitrogen from 50 to 150 PSI (3.4 bar ~ 10.3 bar)

Inert Gas Pack
Optional Accessory; Inert Gas Pack Kit When filled with liquid CO₂ will perform approximately 50 EVAP tests.
> Connect the red clip to 12V-DC power.
> Connect black clip to chassis ground.

> Green light will turn <ON>.
> A blinking green light indicates a weak battery.

> Use cone to access intake system. Connect smoke supply hose to cone.
> Position to SMOKE (full flow).

> Press START button.
> Green and red lights are <ON>.
> 5-minute timer.

> Use white light to find the smoke.

> Use UV light and yellow glasses to find the dye.
Other Leak Samples

The 8404C can be used in virtually any vehicle low pressure system suspected of having a leak, such as; intake/induction, intercooler and turbocharger, vacuum, exhaust, EVAP and even wind/water leaks. Can also be used to verify air solenoid functions and test components prior to assembly.

Exhaust

Fluorescent Dye Deposit

The 8404-OIL smoke solution contains a special ultraviolet-activated fluorescent dye that deposits at the exact location of a leak. Use the UV light provided to highlight the dye.

> The longer the smoke is allowed to exit a leak, the more dye will be deposited.

> This technology has been designed so that the dye deposits only if there is pressure-differential. So for instance; the dye will deposit when exiting a leak but will not deposit during a wind and water leak test.
Other Leak Samples (Cont’d)

Wind and Water Leaks

1. Set vehicle’s climate control to ‘Fresh Air’ (not to re-circulate). Set blower on full-speed. This creates positive cabin pressure.

2. Connect supply hose nozzle to Smoke Diffuser.

3. Lay smoke path along seals.

4. Look for smoke disturbance indicating a leak.

No smoke disturbance means ‘No Leak’ >

< Smoke disturbance pinpoints the leak.
**Control Valve Overview**

**TEST:** Delivers non-smoke air and a very accurate flow meter reading. This setting is for determining if a leak exists and how large it is.

**SMOKE:** Delivers maximum smoke volume.

**FLOW CONTROL:** Controls smoke volume. > Locating the leak source is sometimes easier with less smoke volume. First, fill system with smoke then reduce the volume.

*Note:* Flow Control does not affect delivery pressure; it only affects flow volume.
A flow meter ball indicating flow means there is flow going into (or through) the system being leak-tested. This is normal while the system is being filled. If flow meter indicates flow after the system is filled, this indicates a leak. The higher the ball is in the flow meter, the larger the leak size. No flow indicates no flow through the system, or no leak.

**Leak Size Reference Points:**

The Flow Control Valve and the Flow Meter have leak size reference points which makes it easy to determine if a leak in the system being tested is a Pass or Fail.

The .010” and .020” settings on the Flow Control Valve will set the flow through the machine at precisely these settings. Turn the Flow Control Valve to the desired setting and set the red flag on the Flow Meter to where the ball settles. The .040” setting is permanently set on the Flow Meter.

Once the system is filled (either in TEST or SMOKE setting) and the flow meter ball stops descending, compare the level of the ball with the reference points in order to determine a leak size or pass/fail.

> **Above**
> Reference Point = FAIL.

> **Below**
> Reference Point = PASS.

> The flow meter is most accurate in TEST setting.
Do One of the Following:

The flow meter is active in the SMOKE and TEST positions of the Flow Control Valve. However, for the most precise quantifying of a leak size use the TEST position in either of these two methods:

1. Fill system in TEST (no smoke) setting until flow meter ball stops descending. Position the flow meter’s red flag so that it aligns with the flow meter ball position. Compare flow meter ball position with flow meter’s Leak Size Reference Points. If the leak size is unacceptable and leak testing is required; set control valve to SMOKE setting, introduce smoke and look for smoke or dye to find the leak(s).

- OR -

2. To save time; fill system in SMOKE (full open) setting until flow meter ball stops descending. Be sure the 8404C is still <ON> and immediately position control valve to TEST, for a more accurate flow meter reading. Be sure ball has stopped descending and compare flow meter ball position with flow meter’s Leak Size Reference Points.

> Above reference point = FAIL.
> Below reference point = PASS.

If the leak size is unacceptable and leak testing is required, then time will have been saved because you will have already filled the EVAP system with smoke. Now position the control valve again to SMOKE and continue to introduce smoke while looking for smoke or dye at exit points.

NOTE: When testing a closed system, such as the EVAP system, it is best to purge the ‘non-smoke’ air out of the system by leaving an opening in the system being filled (e.g. EVAP vent). Close the system once smoke exits that opening and continue to fill with smoke. This quickly fills the system with smoke.
### Technical Specifications

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>13.5 in. (34 em)</td>
<td>Solution Max. Volume</td>
<td>12 oz. (355 ml)</td>
</tr>
<tr>
<td>Length</td>
<td>13 in. (33 em)</td>
<td>Supply pressure</td>
<td>13.0 in. H2O (0.032 bar)</td>
</tr>
<tr>
<td>Width</td>
<td>9 in. (23 em)</td>
<td>Supply volume</td>
<td>10 liters per minute</td>
</tr>
<tr>
<td>Weight</td>
<td>10.5 lb. (4.8 kg)</td>
<td>Smoke supply line</td>
<td>8 feet (2.4m)</td>
</tr>
<tr>
<td>Shipping weight</td>
<td>13.5 lb. (6.1 kg)</td>
<td>Power supply line</td>
<td>8 feet (2.4m)</td>
</tr>
<tr>
<td>Power supply</td>
<td>12 volts DC</td>
<td>Power consumption</td>
<td>15 amps.</td>
</tr>
</tbody>
</table>

If the leak size is unacceptable and leak testing is required, then time will have been saved because you will have already filled the EVAP system with smoke. Now position the control valve again to SMOKE and continue to introduce smoke while looking for smoke or dye at exit points.
Troubleshooting Guide

Two lights on the control panel double as diagnostic lights.

<table>
<thead>
<tr>
<th>Green</th>
<th>Red</th>
<th>Interval</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td></td>
<td>Blinks: 1 per second</td>
<td>Insufficient battery power</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>Blink simultaneously: 1 per second</td>
<td>Bad ground or power connection at smoke canister or short in circuit</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>Blink simultaneously: 4 times per second</td>
<td>Bad ground at smoke canister or open heating circuit</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>Blink alternately: 1 per second (System shuts down)</td>
<td>Bad ground or circuit board failure *</td>
</tr>
</tbody>
</table>

* If circuit board failure occurs, first disconnect power to your Tester for 10 seconds and reconnect. If failure code occurs a second time, disconnect Tester and contact Miller Special Tools.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Likely Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The green power indicator lamp on the Tester does not turn ON.</td>
<td>1. The power cables are reversed.</td>
<td>1. Correctly position power cables.</td>
</tr>
<tr>
<td></td>
<td>2. Poor power supply cable connection.</td>
<td>2. Secure the connection at the positive terminal and chassis ground.</td>
</tr>
<tr>
<td></td>
<td>3. Battery providing power is too weak.</td>
<td>3. Verify the battery is in good condition and fully charged.</td>
</tr>
<tr>
<td>There is no air or smoke coming out of the supply hose.</td>
<td>1. Flow control valve is closed.</td>
<td>1. Open flow control.</td>
</tr>
<tr>
<td></td>
<td>2. Bad power-supply cable connection.</td>
<td>2. Secure the connection at the positive terminal and chassis ground.</td>
</tr>
<tr>
<td></td>
<td>3. Battery providing power is too weak.</td>
<td>3. Verify the battery is in good condition and fully charged.</td>
</tr>
<tr>
<td></td>
<td>4. Air supply to tester is insufficient.</td>
<td>4. Check for sufficient air supply.</td>
</tr>
<tr>
<td>Very little smoke coming out of the smoke hose or oil dripping from the smoke hose.</td>
<td>1. There is too much smoke condensation inside the smoke supply hose.</td>
<td>1. Position the hose lower than the Tester. Set control valve to TEST and turn Tester &lt;ON&gt; for one cycle, or until oil has drained from hose.</td>
</tr>
<tr>
<td></td>
<td>&gt; This usually does not indicate a failure.</td>
<td></td>
</tr>
</tbody>
</table>
UltraTraceUV®: (8404-OIL) this patented solution is the only Automaker-approved smoke-producing solution in the world. The solution’s chemistry is specially formulated to withstand vaporization temperatures, is designed not to damage vehicle components and contains a special dye that deposits at the exact location of a leak. Will not harm automotive systems and each bottle will perform approximately 300 tests. (12 oz. / 355 ml). (Part No. is for one bottle, two bottles included with Tester).

Combination Light: white light, for easier smoke location and ultraviolet (UV) light, to highlight the fluorescent dye deposited at the exact location of a leak.

Standard Size Service Port Adapter: (504430) connects to factory service port on many OBD-II vehicles.

Schrader Removal/Installation Tool: (504834) fits both sizes of Schrader valves in vehicles with factory OBD-II service port fittings.

Inert Gas Supply Hose: 25 ft. length. Connect threaded end to inert gas supply regulator and the quick-disconnect to the tester.

Cap Plugs Kit: (10368) used for sealing some systems during leak testing.

Smoke Diffuser: (504450) locates leaks around doors, windows, sunroofs and trunk compartment seals.

Adapter Cone (standard): (563514) for introducing smoke into the exhaust system or the induction system. Cone is 1/1 x 3.5” and 6” long (25.4 mm x 89 mm x 152 mm).

Adapter Cone (large): (563515) Cone is 3.5” x 6” and 4.5” long (89 mm x 152 mm x 144 mm).

Air fitting: Two are supplied. The automotive style fitting is already installed on the tester. The spare fitting is an industrial fitting but also a popular one in auto facilities.
LIMITED TWO (2) YEAR WARRANTY
EELD MILLER SPECIAL TOOLS 8404C

Miller Special Tools Warrants To the Original Purchaser; under normal use, care and service, Tester shall be free from defects in material and workmanship for TWO YEARS from the date of original invoice.

Seller’s obligations under this warranty are limited solely to the repair or, at Seller’s option, replacement of or refund of the original purchase price for, equipment or parts which to Seller’s satisfaction are determined to be defective and which are necessary, in Seller’s judgement, to return the equipment to good operating condition.

Repairs or replacements qualifying under this Warranty will be performed or made on regular business days during Seller’s normal working hours within a reasonable time following Buyer’s request. All requests for warranty service must be made during the stated warranty period.

For Technical Support
1-800-801-5420
Mon.-Fri. 8:00am to 6:00pm Eastern Time