HOW FLUORESCENT DYES BENEFIT LEAK DETECTION PROCEDURES IN AIR CONDITIONING AND REFRIGERATION SYSTEMS
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining UV Leak Detection</td>
<td>3</td>
</tr>
<tr>
<td>Advantages Of Leak Detection</td>
<td>4</td>
</tr>
<tr>
<td>Choosing The Right Dye</td>
<td>5</td>
</tr>
<tr>
<td>Choosing The Right Lamp</td>
<td>6-7</td>
</tr>
<tr>
<td>Common Misconceptions</td>
<td>8</td>
</tr>
<tr>
<td>Injection Methods</td>
<td>10-11</td>
</tr>
</tbody>
</table>
Have you searched for a leak in an air conditioning or refrigeration system recently? Most likely you used a bubble solution. What’s this bubble solution? It’s one of the most popular methods of leak detection in the HVAC industry. Just spray a soapy solution over a suspected surface until a bubble appears. This bubble indicates the location of the leak. Sounds great, right? While this method is cost efficient up front, in the long run its inaccuracy ends up costing more by operating a system not running at peak efficiency, high refrigerant replacement costs, food spoilage, and customer callbacks. Furthermore, this time consuming practice keeps technicians on the job for an excessive amount of time. It also makes it extremely difficult to find smaller leaks, especially on an outdoor unit on a windy day.

So, what is UV leak detection? It’s a method in which a small amount of fluorescent dye is injected into and circulated through an operating system. The dye/refrigerant mixture will escape and accumulate at all leak sites. By then scanning the system with a leak detection lamp, all leaks will fluoresce green or yellow, making them easy to spot.

Don’t feel like waiting for the dye to circulate before getting to work? Well, this method is best when used as part of a comprehensive maintenance plan, in which the dye is added to a system before a problem has occurred. A leak detection flashlight or lamp can then be used to quickly scan the system for leaks during regular maintenance or service calls. If a leak is present, a fluorescent glow will appear making even the smallest leaks easy to pinpoint.
Advantages of FLUORESCENT LEAK DETECTION:

- Easily implemented into a comprehensive preventative maintenance program.
- Dye can remain in systems indefinitely. Ideal means of cutting emissions.
- System can easily be rechecked after repairs are complete.
- Very small, multiple, and intermittent leaks are easily found.
- Technicians can search for leaks while system is off or running.
- Leaks are detectable at a distance.
- Quickly finds the exact source of each and every leak.
- Reduces contract service costs. Reduction in callbacks.
- Ideal means of cutting emissions.

4
Nervous about voiding your equipment’s warranty?
Some dyes are approved by manufacturers, and can remain safely in systems for their lifetime. It’s about choosing the right dye for you. Check the dye manufacturer’s specifications for an OEM approval indication.

DYES SHOULD BE:

Co-solvent Free
Co-solvent based dyes can impair the properties of the systems’ lubricant, resulting in diminished viscosity and lubricity. For example, dyes formulated with the co-solvent Aromatic 200 are detrimental to the operating parameters of refrigeration oil due to its low viscosity. Another co-solvent often used by dye manufacturers is NMP or N-menthylpyrrolidone. This co-solvent is known to be harmful to aluminum, light metals, rubbers and plastic. Both Aromatic 200 and NMP are listed in the Pesticide Action Network (PAN) as Bad Actor Pesticides because of their reproductive or development toxicity or carcinogenicity. By choosing a dye that is co-solvent free, any potential compatibility and health issues will be minimized.

Concentrated
Choosing a concentrated dye is cost efficient, as it minimizes the quantity of dye required to inject into a system.

OEM Approved
Choosing a dye that is OEM approved by major compressor, refrigerant, lubricant and AC&R manufacturers will not void any equipment warranties. These dyes can also safely remain in systems. Look for the label before you buy!

NSF Certified
When searching for leaks in refrigeration systems, dyes should be registered to meet food-grade processing requirements for category codes HTX-2 and HX-2.

Lubricant Specific
The dye should match the OEM lubricant type in the system. Another option is to use universal “/E” polyol ester dye. This dye is compatible with all refrigerants and lubricants, including mineral oil, PVE, polyol ester and alkyl benzene, and is recommended for technicians maintaining multiple types of systems.
UV LIGHT
- Works with all AC&R dyes
- Works best with mineral oil dyes
- Most costly

VIOLET LIGHT
- Works only with Universal/POE dyes
- Yellow inspection glasses not needed in most situations

BLUE LIGHT
- Must wear yellow inspection glasses
- Works with all AC&R dyes
- Works best with Universal/POE dyes
Direct sunlight may make it difficult to see the glow of the fluorescent dye.  
**SOLUTION:** Inspect for leaks early or late in the day, or shade the suspected area.

Line of site doesn’t always allow for proper inspection.  
**SOLUTION:** Light can be bounced off an inspection mirror to view difficult areas. Also, flexible shaft UV inspection lamps are available for such circumstances.

Equipment must be operational in order to circulate dye.  
**SOLUTION:** A full charge is not actually required. Slight cooling indicates that the dye is being circulated.

There is a time delay after injecting dye into systems before inspection can be performed.  
**SOLUTION:** Dye can be added on a service call before a problem presents itself. It will then be fully circulated and the system will be ready to quickly inspect when needed.

If another technician is called to service the system, they won’t know I’ve put dye in the system.  
**SOLUTION:** Many leak detection kits come with leak-free stickers, which can be placed on the system to indicate when dye was injected and how any found leaks were handled. Another option is to use tamper-evident straps (shown in photo) to warranty your work and guard against unqualified repairs. Doing this will also safeguard your recovery equipment and reduce comebacks.
TAMPER-EVIDENT STRAP
INJECTION METHODS

Spectroline™ offers four different injection methods, each appropriate for the size of the system being serviced.

EZ-JECT™
Multi-dose dye cartridges are recommended for small to medium systems and can be installed by using an injector like the EZ-Ject™ (shown in Fig. 1). Injection is performed by connecting the hose to the low-side service port. Then turn the EZ-Ject handle to inject the amount of fluorescent dye required into the system.

GLO-STICK®
Single-dose dye capsules (such as the GLO-STICK® shown in Fig. 2) are injected by connecting between the low-pressure gauge of a charged manifold and the service port, using two bleed valves. By opening the valves slowly, dye will gradually be added into the system, along with refrigerant.
**BIG-EZ™**
Larger multi-dose dye cartridges are cost efficient when working on multiple medium or larger systems. A multi-dose injector (like the Big-EZ™ shown in Fig. 3) is connected to the system’s low-side service port. Simply turn the handle to inject the amount of dye required and let it circulate.

**BOTTLEDYE INJECTOR**
For large commercial and industrial systems, bottled dye is suggested and can be injected by pouring it directly into the system or by using any standard, refillable injector (shown in Fig. 4).

AR-GLO® fluorescent dyes are OEM approved by major compressor, AC&R equipment, lubricant and refrigerant manufacturers. They are currently being used in over 50 million AC&R systems worldwide!

For more information on HVAC/R fluorescent leak detection, please visit our website at [Spectroline.com](http://Spectroline.com).

For questions or inquiries contact us [here](http://here).