# New EPA SECTION 608 Regulations

## Rules, recordkeeping challenges may sway more interest toward refrigerant leak sealants.

BY JAMES BOWMAN

*Images courtesy of RectorSeal Corp.*

[*Editor's Note: RSES/*RSES Journal *recognizes the fact that many compressor manufacturers only approve the use of oil and refrigerant in the system. However, there is a time and place for the proper use of leak sealants. This article is not intended to endorse or denounce the use of sealants in the system, but rather to educate industry professionals on the potential for and/or proper considerations when using leak sealants.*]

The EPA's new additions to Section 608 HVACR system leak regulations promise to stir more interest in the refrigeration service industry's refrigerant leak sealants category. Announced last fall, the new EPA regulations began taking effect Jan. 1, and will continue phased implementation through Jan. 1, 2019. The new regulations will help limit ozone depleting substances (ODS) from entering the environment, but they also promise a mountain of recordkeeping paperwork for contractors and equipment owners when systems leak.

Once all the recordkeeping kicks in, the EPA will want to know when systems are leaking, how much refrigerant they are leaking, how long they have been leaking and what is being done to repair or retire them. It is the service technician's and the building owner's responsibility to keep extensive records on leak incidents.

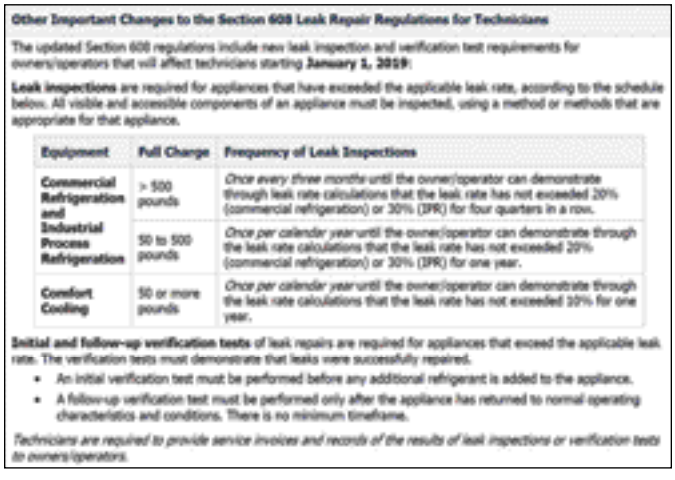
When faced with this expected exponential increase of paperwork, many service technicians may rely more on refrigerant leak sealants. Most leak sealants are used to fix current leaks. However, some leak sealant formulas have a less relied upon ability to circulate within the refrigeration system and automatically fix future leaks as they occur. This could prove invaluable for eliminating leaks and circumventing periodical documentation the EPA will require for continually leaking units.

This will also create an interesting discussion between leak sealant advocates and opponents. Today's refrigeration service industry is divided when it comes to leak sealants. Old school service technicians believe a system should only have refrigerant/oil and that leaks should be repaired conventionally after they occur. Other service technicians use leak sealants when the leak is unfindable, inaccessible or cost-prohibitive to fix conventionally. For leak sealant opponents this usually means the system gets retired, instead of sealed for a longer lifecycle. To date, many systems, such as commercial rooftops, most refrigeration equipment in supermarkets and residential central air conditioning systems have successfully had operation-extending leak sealant treatments.

In an attempt to limit record documentation, conventional leak repairs may take a backseat to repairing with leak sealants, because the latter will continue working when new leaks appear in the future. Typically this scenario is unbeknownst to the service technician or the equipment owner. Thus, there will be less recordkeeping and paperwork.

## Coming EPA regulation changes

Briefly, the service technician can look forward to the following EPA regulation changes:



**Other Important Changes to the Section 608 Leak Repair Regulations for Technicians**

The updated Section 608 regulations include new leak inspection and verification test requirements for owners/operators that will affect technicians starting **January 1, 2019**:

**Leak inspections** are required for appliances that have exceeded the applicable leak rate, according to the schedule below. All visible and accessible components of an appliance must be inspected, using a method or methods that are appropriate for that appliance.

| Equipment | Full Charge | Frequency of Leak Inspections |
|---|---|---|
| **Commercial Refrigeration and Industrial Process Refrigeration** | > 500 pounds | *Once every three months* until the owner/operator can demonstrate through leak rate calculations that the leak rate has not exceeded 20% (commercial refrigeration) or 30% (IPR) for four quarters in a row. |
| | 50 to 500 pounds | *Once per calendar year* until the owner/operator can demonstrate through the leak rate calculations that the leak rate has not exceeded 20% (commercial refrigeration) or 30% (IPR) for one year. |
| **Comfort Cooling** | 50 or more pounds | *Once per calendar year* until the owner/operator can demonstrate through the leak rate calculations that the leak rate has not exceeded 10% for one year. |

**Initial and follow-up verification tests** of leak repairs are required for appliances that exceed the applicable leak rate. The verification tests must demonstrate that leaks were successfully repaired.

- An initial verification test must be performed before any additional refrigerant is added to the appliance.
- A follow-up verification test must be performed only after the appliance has returned to normal operating characteristics and conditions. There is no minimum timeframe.

*Technicians are required to provide service invoices and records of the results of leak inspections or verification tests to owners/operators.*

→Sales restrictions after ODS and substitute refrigerants are recovered and reclaimed that went into effect Jan. 1, 2017, with another phase scheduled for Jan. 1, 2018;

→New service technicians EPA-certified after Jan. 1, 2018, will be trained and tested on substitute refrigerants in addition to ODS. Technicians certified before Jan. 1, 2018, are required to follow the new substitute refrigerant guidelines;

→Additional restrictions on maintenance, servicing, repair and disposal begins Jan. 1, 2018;

→New recordkeeping for the disposal of appliances between 5 lb–50 lb will be effective Jan. 1, 2018; and

→New recordkeeping for equipment disposal will be effective Jan. 1, 2018.

As for leaks, the new EPA regulations divide leak inspection requirements and their required recordkeeping documentation into three categories: 1. Commercial Refrigeration and Industrial Process Refrigeration over 500 lb of refrigerant; 2. Commercial Refrigeration and Industrial Process Refrigeration from 5 lb–50 lb; and 3. Comfort Cooling units over 50 lb (see sidebar). While leak sealants will benefit all the above categories, and are traditionally used in smaller systems, supermarket systems and many commercial refrigeration appliances gain the largest benefits.

New EPA mandates for habitually leaking systems should be of the upmost concern for equipment owners and their service contractors. The EPA states that "owners/operators must create a retrofit or retirement plan within 30 days of an appliance leaking ODS or substitute refrigerant above the applicable leak rate" if:

→The owner/operator intends to retrofit or retire rather than repair the leak;

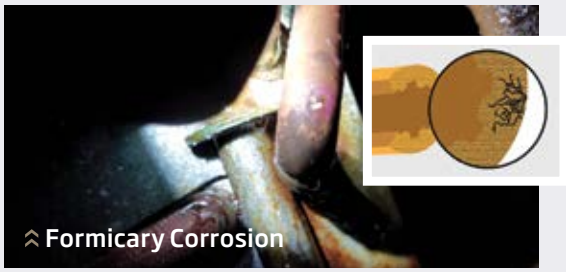
→The owner/operator fails to identify and repair the leak; or

→The appliance continues to leak above the applicable leak rate after required repairs and verification tests.

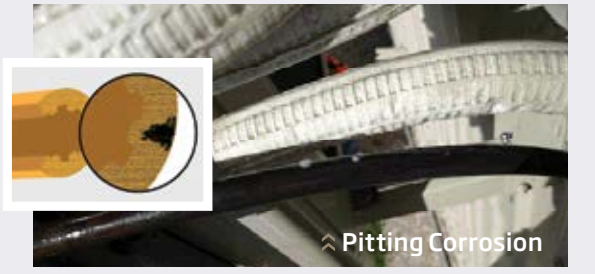
## To braze or use sealant

Contractors who foresee a mountain of profit-cutting paperwork do have an option when fixing leaks. Some refrigerant leak sealant formulas not only fix the leak(s), but the residual in the system will also fix future leaks as they occur. A conventional repair using leak detectors, traditional solder/brazing and post leak pressure only satisfies present leaks, not future leaks.

Copper tubing leaks often result from pitting or formicary corrosion, which penetrates the tubing wall either internally or externally. External pitting corrosion can be caused by airborne volatile household chemicals passing through the air handler, such as chlorides commonly found in aerosol sprays, bleach and dishwasher detergents. External formicary corrosion can result from organic acids used in building materials such as paneling, carpeting, plywood, cleaning solvents and vinegar.



Formicary Corrosion



Pitting Corrosion

Copper tubing leaks can also result from manufacturing process residue or poor quality control. Manufacturing defects cannot be prevented by service techs, but there are proactive alternatives they can employ to help prevent leaks:

- ↳Rinse off indoor coils annually, but keep in mind local water may leave chlorine or other municipal water sanitizer residuals that could corrode copper;
- ↳Dilute indoor air with outdoor air via an energy-recovery ventilator add-on;
- ↳Install low-static, higher MERV filtration (as close to the system as possible);
- ↳Execute total air turnover or ventilate the air out in newly-constructed homes periodically during the first couple of years; and
- ↳Use specialized coatings, which are very effective, but are sometimes cost-prohibitive.

Internal corrosion can be proactively prevented with periodic oil changes and applications of acid neutralizers, especially after a compressor motor burnout on either POE or mineral oil systems. Properly executed evacuations will mostly remove system moisture that can produce sulfuric, hydrochloric and hydrofluoric acids over time. Moisture can lead to acid and leaks, but it also has other detriments, such as higher head pressure, increased discharge temperatures and increased compression ratio, all which will add up to efficiency losses.

Other best practices for preventing leaks include flushing contaminants from line sets during major component placement or repair, and proactively using non-polymer sealants to prevent future leaks before they occur is also helpful.

However, it is a good practice to always fix first-time leaks with conventional methods, but in the real world of HVACR, not all leaks are the same. The following is a list of reasons when a leak sealant may be the better choice:

- →Cannot find the leak with conventional bubble liquids and electronic leak sniffers;
- →Cannot get access to the leak in order to repair it;
- →Suspect there is more than one leak and it would be cost prohibitive for the equipment owner to repair it conventionally;
- →Equipment has a history of leaks that suggest there'll be more occurring in the future, thus a residual of leak sealant in the system may fix future leaks; and
- →To eliminate hot work permits required even on a small repair.

**Figure 2 Zeroing in on leaks with leak locater bubbles. Technically formicary corrosion cannot be seen with the naked eye so technicians should use bubbles to look for leaks.**

## Choosing a leak sealant

Not all leak sealants perform the same, so service techs need to be careful to select a product that does no harm to them or the system. One thing most leak sealants have in common is the hole size they are capable of repairing. This is typically about 300 microns (about the size of a human hair) or smaller.

Leak sealants fall into two categories: non-polymer formulas that create a polymer through a chemical reaction using either moisture or oxygen exposure as the catalyst; and oil-based non-polymers. With any leak sealant, the two most important selection concerns should be personal and system safety. Therefore, it is the service technician's responsibility to do the required due diligence on which sealant type is the safest and most effective.

For example, some polymer-creating formulas typically use chemicals, such as toluene, that are very harmful when exposed to skin or have dangerous flash points under 100°F. Although, they are not considered polymers, when their separate ingredients are in the presence of moisture or oxygen, the chemical reaction creates a hole-bonding polymer. However, when minute amounts of moisture inadvertently enter the system, a premature chemical reaction can formulate particulates and potentially block capillary tubes, metering devices, tools/equipment and lock up moving components, such as compressor discharge valves. Because of their reaction to moisture, polymer-type sealants typically must be used with drying agents.

Two advantages are they might repair holes larger than 300 microns, and they travel with the refrigerant, which might lead to a quicker reaction than other formulas

Non-polymer, oil-based sealants are safe if exposed to skin and do not harm system components. These non-polymer, oil-based sealants have no adverse effect on moving parts or blockage of cap tubes, as illustrated by OEM equipment approvals and successful third-party test data available to the public. Non-polymer, oil-based leak sealants are not all the same either, so it is important to check the product's Safety Data Sheet (SDS) for toxic or dangerous ingredients and emergency guidelines if accidentally exposed.

Non-polymer sealants are oil-based and travel with a system's oil, not the refrigerant. They do not react to moisture or air, but instead coagulate in layers across a leak hole, similar to the way blood reacts to a cut in the human body (see Figures 2 and 3).

The leak sealant industry has made recent strides to simplify and expedite applications with new injection-type applicators that negate the previous requirement of pumping down systems with high pressure refrigerants such as R-410A.

Once again, due diligence is valuable and should include discovery on what products are OEM-approved and have third-party test data for safety and effectiveness.

Whether a service contractor approves of using leak sealants, one thing is for sure, the residual leak sealant repair of future leaks will be invaluable for eliminating EPA-mandated paperwork required when leaks occur.

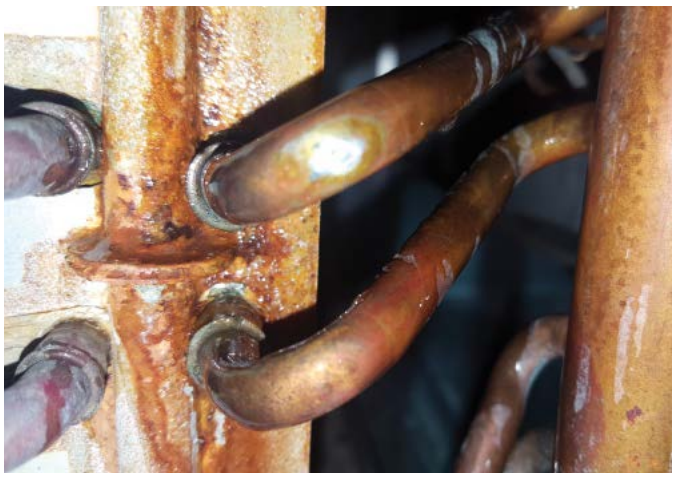


**Figure 3 This photo shows a former leak that has been sealed internally with a non-polymer, oil-based sealant.**

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