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Additional EPA Refrigerant Leak Detection Guidelines to Take Effect Soon

New 608 guidelines include inspection, monitoring and reporting requirements

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Refrigerant leaks have significant economic and environmental impacts. The average supermarket has two to four refrigeration racks charged with approximately 3,500 pounds of refrigerant. According to the Environmental Protection Agency (EPA)'s GreenChill research, about 25 percent, or 875 pounds, of refrigerant is lost each year to leaks.

Even in a more moderate scenario with a lower leak rate of 20 percent, the economic costs are still significant. For an individual store, the loss of 700 pounds of R-404A (among the most common refrigerants in use today) at $7 per pound equates to an annual expense of nearly $5,000.

But that's only one store. The cost swells exponentially when you factor in the multiple stores that a supermarket chain operates. Across a chain of 100 stores, refrigerant leaks can cost retailers nearly $500,000 annually. This doesn't include the associated labor costs, food waste, or the potential loss of business due to service disruptions resulting from a leak.

A supermarket's bottom line isn't the only thing affected by refrigerant leaks. The environment may also suffer a significant impact as well. In the previous 100-store example, nearly 70,000 pounds of refrigerant are leaked into the atmosphere. That's equivalent to 124,500 metric tons of CO_2, the emissions of 24,000 cars or 10,600 homes. This environmental impact doesn't account for the potential additional energy required to power refrigeration equipment experiencing a leak, as this equipment must run harder to compensate for its declining refrigerant levels.

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Changes to EPA's Section 608

The EPA introduced Section 608 as part of the Clean Air Act in the 1990s to address emissions of ozone-depleting substances such as chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) refrigerants used in stationary refrigeration and air conditioning units.

The ruling was designed to ensure proper use, handling and disposal of refrigerants. It prohibited venting, required technician certification, provided for safe disposal, mandated accurate record keeping, and required corrective actions for leak rates greater than 35 percent.

In 2016, the EPA revised Section 608 and its Refrigerant Management Program requirements to include HFC refrigerants. This revision also introduced more stringent requirements for repairing leaks in larger appliances as well as new record keeping, reporting and disposal mandates.

Per the 2016 revision to Section 608, the next iteration of these requirements will take effect on January 1, 2019, and include the following changes:

Lower leak thresholds. The EPA lowered the leak rate thresholds that mandate the repair of industrial process refrigeration (IPR), commercial refrigeration equipment (CRE) and comfort-cooling equipment containing 50 or more pounds of refrigerant. The new thresholds are 30 percent (from 35 percent) for IPR, 20 percent (from 35 percent) for CRE, and 10 percent (from 15 percent) for comfort-cooling equipment.

Required inspection and monitoring. Section 608 now requires quarterly/annual leak inspections or the use of automatic, continuous monitoring devices for refrigeration and air conditioning equipment that have exceeded the threshold leak rate.

New reporting requirements. Owners and operators must maintain hard or electronic copies of reports documenting the full charges of appliances and the type of automatic leak detection systems used, if any. For chronically leaking appliances, owners/operators must also submit reports if their systems contain 50 or more pounds of refrigerant and leak 125 percent or more of their full charge in one calendar year.

Disposal requirements. Technicians must keep a record of refrigerant recovered during system disposal from systems with charge sizes ranging from 5 to 50 pounds.

With all of these revisions on the horizon, it's important to note that the EPA is serious about enforcing these regulations — and the consequence of noncompliance can be significant: the agency is authorized to assess fines of $37,500 per day for violations.

Leak detection strategies

Implementing and maintaining a refrigerant leak detection program is an effective way to minimize refrigerant leaks and also plan how to respond in the event of a leak. An effective program should address detection, notification and monitoring.

A leak program begins with detection. There are several refrigerant leak detection technologies available, but they fall into two primary categories: *direct* and *indirect.*

Direct detection

Direct leak detection technology includes fixed or portable monitors that are installed on-site to detect the concentration of

Leak detection best practices

Incorporate these best practices to help ensure an effective leak detection program.

Adopt a no-tolerance policy. Store managers should stress the importance of detecting and minimizing leaks throughout their organization. Communicate the significance of such a program to all employees and be sure to highlight the operational efficiencies, regulatory mandates and potential savings at stake.

Track leaks. Tracking leaks and capturing crucial information can help determine if specific equipment is more prone to leaks than others, detect trends and choose replacement options.

Follow proper maintenance procedures. Not only should you follow proper maintenance procedures on your refrigerated equipment, but be sure to perform the recommended preventive maintenance on leak detection equipment to ensure it is operating correctly.

Stay informed. Industry guidelines can change often, so it's important to stay informed of the latest technologies, best practices and government requirements to maintain a strong leak detection program.

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refrigerants in the air. Such monitors can be installed close to the anticipated leak airstream, in enclosed spaces such as machine rooms, and in areas near the floor where leaked refrigerants can collect. These systems can also integrate into a store's existing energy management system to enable remote monitoring and notifications.

Direct leak monitoring technologies can further be broken into two subcategories: *active* and *passive* systems. Active systems are centralized units with sniffing technology that utilizes tubing connected to multiple zones. The central unit takes air samples from each zone to determine if refrigerants are present in the air.

Passive systems use infrared technology placed in specific areas where leaks could occur. Employing no moving parts, these systems generally require less maintenance than an active (tubing) system. Depending on the number of zones that need to be monitored, initial costs may be higher for passive systems — although these costs may decrease throughout the lifecycle.

It may be beneficial to perform a side-by-side comparison of installation, maintenance and other lifecycle costs to determine which leak detection system would be the most cost-effective for a given installation.

Indirect detection

Indirect detection technology monitors and interprets the status and operation of an entire refrigeration system to determine if leaks are occurring. This method typically uses existing sensors and hardware, eliminating the need to install dedicated leak detection hardware on-site. Indirect technologies analyze refrigeration system data — such as temperatures, pressures, liquid levels and ambient conditions — against performance algorithms and historical data to evaluate system status.

Notification and continuous monitoring

While detecting a refrigerant leak is a crucial first step in protecting your store, having a formal plan to address notification and continuous monitoring is equally important.

It's vital to alert the correct individuals in the organization when a leak occurs. A best practice is to always combine local notifications (alarms) with remote notifications. Most energy management systems provide the capability to integrate leak detection alarms and can be configured to also provide remote notifications in the case of a refrigeration leak. A leak detection program should identify all of the individuals who should be notified in the event a leak is detected.

Continuous monitoring is one aspect that is often overlooked by operators. By recording and analyzing the data around leak events, retailers can correlate the leaks with different types of equipment or maintenance events. In doing so, it can help identify problem areas, develop more effective leak detection programs, and improve overall operations.

Leak detection makes good business sense

With the renewed regulatory focus on reducing refrigerant leaks, retailers are taking a closer look at developing effective leak detection strategies. With the help of leak detection technologies, retailers can achieve continuous monitoring, satisfy new reporting requirements, and reduce the need to perform manual inspections.

But achieving compliance with current or future regulations is only one benefit. Stores that implement and follow a leak detection program can potentially save costs associated with lost refrigerant, the degradation of refrigerated system performance, and avoid food loss.