In 2011, a range of vehicles with air conditioning systems running on the new R-1234yf gas entered the European market. However, the great majority of vehicles on the road will still be using the older R-134a refrigerant – and these will continue to require servicing for the next 15 years or so.

This means that service bays will need equipment that can handle both the old and new vehicles. As noted before, R-1234yf is slightly flammable. So it is essential to use equipment that is specifically designed for the new refrigerant and that has been properly certified.

## What Your Repair Shop Needs in 2012

- **1.** Avoiding contamination between the two refrigerants is imperative. Accordingly, using two distinct circuits for the recovery and recharging process represents the best solution. In reality, this translates into a dedicated machine for each of the two systems. From a purely technical perspective, a "dual use" unit or a retrofit of an older R-134a service machine is possible. But major auto manufacturers have not endorsed either dual use or retrofit solutions for their networks.
- **2.** In addition, major automotive manufacturers are recommending the use of refrigerant identifiers that will allow the repair shop to monitor the type, quality and purity of a given refrigerant.
- **3.** Finally, the professional repair shop will also require a new leak detector capable of identifying leaks of the new R-1234yf refrigerant in the vehicle's air conditioning system.

### Robinair AC1234 - The New Standard in Air Conditioning Service

AC1234 is the first Robinair air conditioning service station to conduct maintenance and service on mobile air conditioning systems that use the new refrigerant R-1234yf. Developed in conjunction with car manufacturers, this unit meets the highest standards in performance, safety and efficiency. Working with a global engineering team, Robinair has brought all its experience to bear in this unit. This ensures that R-1234yf-based air conditioning systems are serviced in the most efficient and most reliable way possible, giving shop owners and technicians peace of mind.

The unit is designed to be intrinsically safe: it will only operate after having successfully completed a thorough self-check.

# Servicing Hybrid Vehicle With High Voltage Electric Compressors

Hybrid vehicles are becoming more popular these days as the price of gasoline continues to rise. Back in 2001 there were a total of 4 hybrid models available, today in 2011 that number has increased to 41 models available and continues to grow. Looking at the numbers, in 2009, there were more than 1.4 million hybrids in the United States with one million of them using high voltage electric compressors. As the number of hybrid vehicles continues to increase, it presents new challenges to service facilities providing A/C service work to both vehicles with traditional A/C systems, and the high voltage electric compressor systems used on many hybrids.

### What Changes Were Made to the SAEJ2788 Standard?

To address the growing number of hybrid vehicles on the road, and differences in the A/C system on certain hybrids, in June 2010, the SAE published a revised version of the SAE J2788 standard that covers the operation of an A/C Recover, Recycle and Recharge (RRR) machine. The revised requirements state that a machine must:

- 1. Not have on board automatic/manual oil or dye injection
- 2. Must be capable of charging refrigerant into a system with less than 0.1 percent by weight of any residual oil
- **3.** A machine must meet these new requirements to be suitable for servicing both vehicles with a high voltage electric compressor that uses POE oil and traditional PAG oil system.

### Which Hybrid Models Use a High Voltage Electric Compressor?

Some of the more popular hybrid vehicles are: Toyota Prius, Ford Fusion/Mercury Milan, Toyota Camry, Toyota Highlander, Lexus GS 450H, Hyundai Sonata

Chevrolet Silverado/Tahoe/ Suburban (and GMC equivalents), Cadillac Escalade. One additional note, Honda is using kind of a hybrid of its own with a high voltage electric compressor that is also belt driven.

### What's the Difference Between a Standard Compressor and a High Voltage Electric Compressor?

The biggest difference (other than being powered by electricity versus the vehicle's engine) is the type of lubricating oil used by the compressor. High voltage electric compressors use POE oil that has high dielectric properties. This oil helps to pro-vide proper lubrication of the compressor and maintains the integrity of the compressor's electrical windings.

So what happens if the wrong type of oil is used? With just 1% of PAG oil in the system it can lower the insulation resistance of a compressor from over 10 Mega ohms to less than 1 Mega ohm. If PAG oil is used to completely fill an electric compressor system the insulation resistance can essentially be reduced to zero.

The Hyundai Sonota hybrid is using yet another different type of oil for their high voltage electric compressor. They use PVE (Polyvinyl ether) oil. With the different oils available, keeping it all straight can be a challenge for today's A/C technicians.

### How Can You Tell if an A/C RRR Machine is Suitable for Servicing Hybrid Vehicles?

Aside from the obvious—there should be no automatic oil injection anywhere on the A/C RRR machine as mentioned earlier, another way to tell if a machine is certified as suitable for servicing vehicles that use high volt-age electric compressors is to look for the marking (Certified for High Voltage Compressor Service). This certifying statement should appear somewhere on the machine either on a separate decal, or on the decal that indicates SAE J2788 certification. This will tell the user if they are using a machine suitable for servicing hybrid vehicles with electric compressors. And remember always follow the procedures outlined in the operators manual when using the machine.

Due to its environmental impact, R134a, the refrigerant currently used in vehicles around the world, is being phased out. To comply with new European legislation, a new refrigerant, R-1234yf, is being introduced in its place. While it is an efficient refrigerant, R134a is also known to have consequences for global warming. Increasing environmental awareness has led the scientific and industrial community to search for a less harmful alternative.

R-1234yf has now emerged as the best possible replacement. This gas has an environmental impact of 4 gwp (units of global warming potential) – well under the Eu limit of 150 gwp, and a major improvement on R134a, which has a whopping 1430 gwp. What's more, R-1234yf does not have hefty cost implications for industry. The only downside of the new refrigerant, compared to R134a, is that it can be flammable in specific circumstances. However, this can be kept under control with well-

engineered air conditioning servicing machines — like the Robinair units — and some common sense precautions in the workshop.