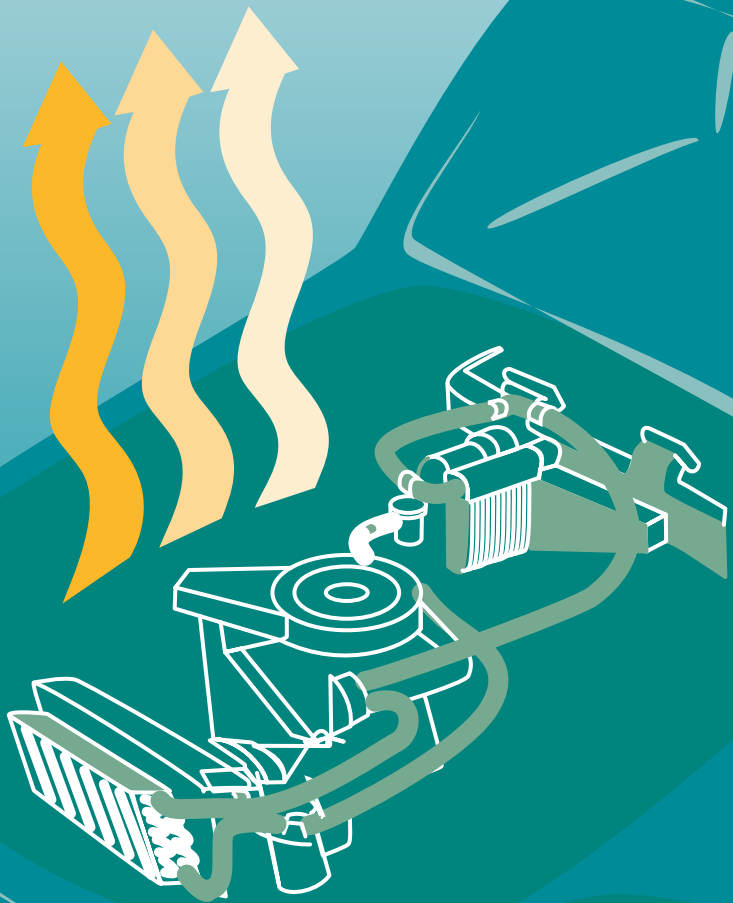
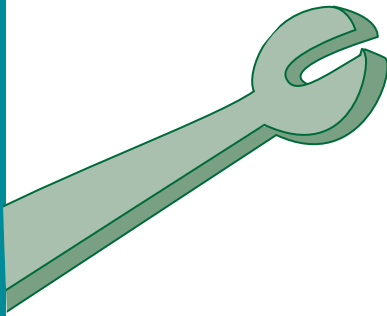




# It's Your Choice Retrofitting Your Car's A/C System



**E**PA is grateful for the participation of representatives of vehicle, chemical, and parts manufacturers, testing laboratories, training organizations, and automobile technicians in developing this brochure.





**D**o you own a motor vehicle with air conditioning manufactured before 1995? If so, your air conditioning system may contain ozone-depleting chlorofluorocarbons (CFCs). Chemical manufacturers are no longer allowed to produce CFCs, and prices will continue to rise as supplies dwindle.

CFC-12 is the refrigerant, often known as Freon-12™, used in most motor vehicle air conditioners made before 1995. If your car uses CFC-12, the next time you need to repair your air conditioning system, you can either:

1. Retrofit the air conditioning system, by having new parts installed that allow it to use a non-CFC based refrigerant;  
or
2. Repair and recharge the air conditioning system with CFC-12, and pay more for CFC-12 since supplies are limited. Remember, the supply of CFC-12 will eventually run out.

Which choice is better? If you retrofit, which refrigerant should you use? Why are CFCs being phased out anyway? All the answers you need to know are in this booklet.



## Motor Vehicle Air Conditioners and the Environment: What's the Connection?

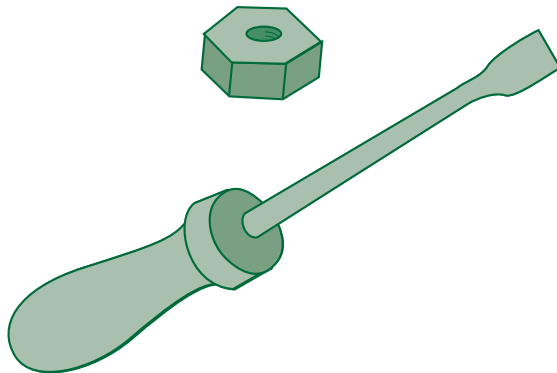
**T**he ozone layer protects the earth from the sun's harmful ultraviolet (UV) rays. You've heard about ozone depletion, but did you know the CFC-based refrigerants used in your car's air conditioning system may be part of the cause? When released into the air, CFCs from your car's air conditioning system damage the ozone layer.

CFCs break down and destroy ozone molecules in the stratosphere. As the ozone layer is destroyed, more and more UV rays reach the earth. Too much UV radiation causes human health problems, such as:

- Skin cancer
- Cataracts
- Weakened immune systems

UV radiation also can damage:

- Crops
- Livestock
- Ecosystems





Chlorine from CFCs attacks ozone molecules. A thinner ozone layer leads to higher levels of harmful ultraviolet radiation reaching the Earth, harming human health and the environment.



## The CFC Phaseout

Over 160 countries, including the United States, have signed an agreement to stop making several ozone-depleting substances, including CFC-12. This agreement, known as the

Montreal Protocol, became a law in the United States under the federal Clean Air Act.

Since the end of 1995, CFC refrigerants have not been manufactured in the United States. Scientists predict that if all countries comply with the Montreal Protocol, the ozone layer will recover by 2050.

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## Does Your Vehicle's Air Conditioning System Use CFC-12?

How can you determine if your vehicle's air conditioning system uses CFC-12?

- If your vehicle was made before 1992, the air conditioning system uses CFC-12.
- If your vehicle was made in 1992, 1993, or 1994, your air conditioning system might use CFC-12. In 1992, a few vehicle manufacturers began using a refrigerant called HFC-134a that does not destroy ozone. The older the car, the more likely that CFC-12 is being used. You can find a refrigerant identification label on the air conditioning compressor or elsewhere inside the engine compartment. You can also ask your service technician or vehicle manufacturer.
- If your vehicle was made in 1995 or later, it does not use CFC-12. By 1995, all vehicle manufacturers were using the new, ozone-safe HFC-134a refrigerant in every vehicle made.

# To Retrofit or to Repair and Recharge with CFC-12?

**W**hat can you do if your CFC-based air conditioning system needs to be repaired? You have two choices:

## **Retrofit:**

Although some cars are not candidates for retrofits, most cars' air conditioning systems can be converted by installing new parts that allow them to use an environmentally acceptable refrigerant. Retrofitting will help protect the ozone layer and may:

- Save you money on future repairs and on the purchase of refrigerant.
- Possibly increase the value of your vehicle.
- Save you the expense and inconvenience of trying to locate CFC-12 as supplies run out.

## **Repair and Recharge with CFC-12:**

You can keep using CFC-12 for repairs until the current supply is depleted. This may be the most economic option if you are not planning to keep your car for very long. There are no laws requiring you to retrofit your air conditioning system.

*You should consider cost and availability of CFC-12 when deciding whether to retrofit your car's air conditioning system.*



# What You Should Know About Retrofitting

There are two types of retrofits available:

1. a. **High-performance retrofit with HFC-134a:** The vehicle manufacturer recommends specific procedures and parts to be used, including HFC-134a as the refrigerant.
- b. **Economy retrofit with HFC-134a:** HFC-134a is still used as the refrigerant, but this retrofit typically does not include all the procedures or parts recommended by the vehicle manufacturer. Vehicle manufacturers do not recommend economy retrofits.
2. **Economy retrofit with blends:** This system uses a blend of refrigerants that contains a mixture of several chemicals. Vehicle manufacturers do not approve of or recommend retrofits using refrigerants other than HFC-134a.

The differences among these retrofits are explained in more detail in the table on page 10.

*The high-performance retrofit might be more expensive than the economy retrofits but could save you money in the long run.*

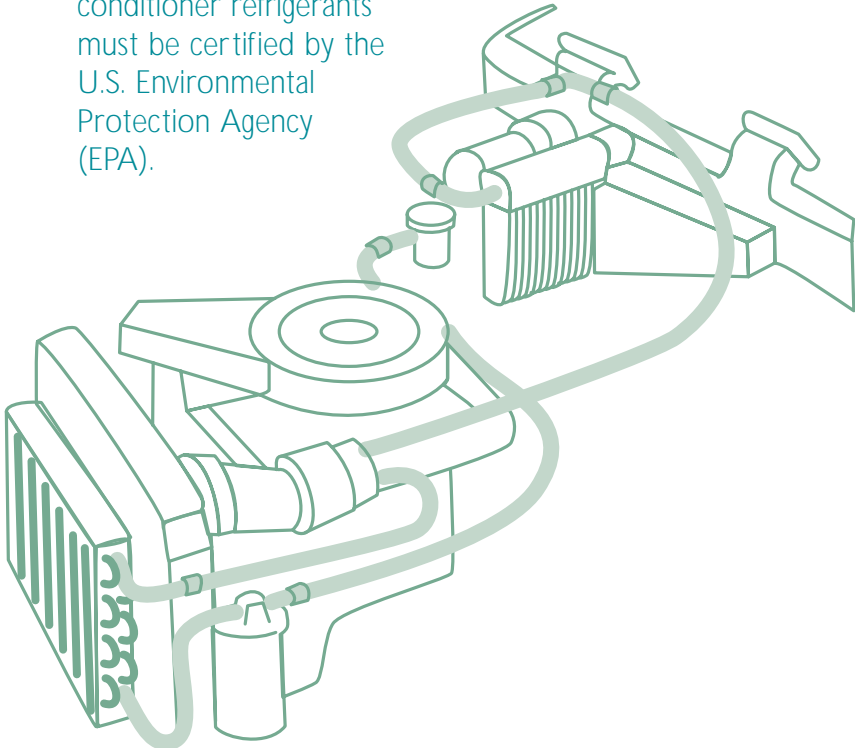


Retrofits entail:

- **Labeling:** All retrofitted systems must include refrigerant labels that specify which refrigerant is used. This helps prevent contamination of air conditioning systems and refrigerant supplies.
- **Replacing service fittings:** All retrofitted systems must use unique fittings that match the refrigerant used.
- **Adding and recycling refrigerant:** During the retrofit procedure, the original refrigerant (CFC-12) is removed and recycled. New refrigerant is then added.

Depending on the retrofit, additional parts may have to be replaced or the system components altered.

Note: Technicians handling air conditioner refrigerants must be certified by the U.S. Environmental Protection Agency (EPA).



## Points to Keep in Mind About Refrigerants

- The new refrigerants listed as acceptable by EPA may not work in every vehicle. Ask your vehicle manufacturer, service technician, or refrigerant manufacturer if you should retrofit or continue to use CFC-12.
- Be sure the refrigerant used in your vehicle is meant to be a substitute for CFC-12, not a substitute for HFC-134a. Do not retrofit your vehicle if it already uses HFC-134a; this would void your warranty and could damage the system.
- Make sure your service facility uses refrigerants listed as acceptable by EPA. A list of acceptable refrigerants is available through EPA's Hotline at 800 296-1996.

EPA reviews refrigerants to ensure they are not flammable and do not pose risks to human health or the environment. EPA does not, however, test or judge how well a refrigerant will work in a particular vehicle.

Refrigerants currently undergoing EPA review may be legally sold but may ultimately be judged unacceptable by EPA. A prudent vehicle owner will insist that the refrigerant used has final EPA acceptance.

- Vehicle manufacturers only recommend using HFC-134a for retrofitting, because (1) it is the only refrigerant that meets manufacturers' performance and durability requirements, (2) it is widely available and inexpensive, and (3) you will be able to obtain service for an air conditioning system using HFC-134a almost anywhere in the United States.
- Use of refrigerants other than HFC-134a may void air conditioning warranties.

A decorative header image featuring various mechanical parts such as bolts, nuts, washers, and a hose, rendered in a light teal color against a darker teal background. The text 'Beware of Flammable Refrigerants' is overlaid in white.

# Beware of Flammable Refrigerants

It is illegal to replace CFCs with refrigerants consisting primarily of pure propane, butane, other hydrocarbons, or other flammable substances. Vehicles presently designed to use CFC-12 should NEVER be retrofitted or repaired with a flammable refrigerant.

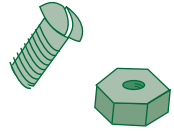
- Fifteen states and the District of Columbia have prohibited the use of flammable refrigerants in vehicle air conditioning systems, whether they are replacing CFC-12 OR any other refrigerant.
- Vehicle manufacturers strongly discourage the use of hydrocarbon or other flammable refrigerants. Use of these refrigerants poses a safety risk and can void the warranties on air conditioner systems or replacement parts.
- Automobile insurance may not protect owners against liability for damages as a result of using illegal flammable refrigerants.

# Your Options

This table presents advantages and disadvantages for each retrofitting option. You should consider cost, performance, and availability when deciding whether to retrofit. (Be aware that the actual cost of your repair or retrofit might vary depending on your location, as well as parts, supplies, and labor required.)

Considerations	High Performance HFC-134a Retrofit
Warranties	<p>Ask about warranties. Vehicle manufacturers may offer a warranty only on new parts installed. Some may also guarantee performance.</p> <p>Some manufacturers of CFC-based air conditioner parts do not warrant them for use with HFC-134a.</p> <p>All vehicles require replacement of refrigerant, new fittings, oil, and a label.</p>
Special Parts and Procedures That Might Be Required	<p>Some vehicles may require replacement of the compressor, drier, condenser, hoses, and/or refrigerant controls, such as the high-pressure cutout switch.</p> <p>The accumulator/drier should usually be replaced on older or high-mileage vehicles (with more than 70,000 miles) and when the air conditioning system is opened to the atmosphere for an extended length of time.</p> <p>May require a high-pressure cutout switch.</p>
Initial Costs (Beyond Necessary Repair Costs)	<p>This retrofit generally costs more, but cost depends on the complexity of the retrofit procedure. In some cases, the cost is comparable to the economy retrofit.</p>
Future Costs	<p>Parts and performance often have warranties, and this retrofit was designed specifically for your car.</p>
Performance	<p>This is the most reliable retrofit. It is custom-designed by vehicle manufacturers specifically for your make and model of car to maintain performance and durability.</p>
Environmental Safety	<p>Does not destroy the ozone layer.</p>
Refrigerant Availability	<p>Available everywhere.</p>





## Economy HFC-134a Retrofit

Repair shops may offer a warranty on new parts installed but may not guarantee performance.

Some manufacturers of CFC-based air conditioner parts do not warrant them for use with HFC-134a.

All vehicles require replacement of refrigerant, new fittings, oil, and a label.

May require a high-pressure cutout switch.

The accumulator/drier should usually be replaced on older or high-mileage vehicles (with more than 70,000 miles) and when the air conditioning system is opened to the atmosphere for an extended length of time.

At least \$80 more than the cost to repair the old system, plus the cost for the accumulator/drier and high-pressure cutout switch, if needed.

May not be designed specifically for your car, and fewer parts may be replaced at the time of retrofit. Future costs may be greater than for high performance HFC-134a retrofit.

Cooling may be reduced in some vehicles, but this may only be noticeable on very hot and humid days or when the vehicle is idling. Durability may be reduced if vehicle manufacturer procedures are not followed.

Does not destroy the ozone layer.

Available everywhere.

## Economy Retrofit with Blends

Use of blends may void remaining warranties from vehicle or parts manufacturers.

Some repair shops may offer a warranty on new parts installed but may not guarantee performance. Insist on a warranty.

All vehicles require replacement of refrigerant, new fittings, oil, and a label.

May require the replacement of hoses, the high-pressure cutout switch, and/or system and refrigerant controls.

The accumulator/drier must be compatible with the chemicals in the blend and should usually be replaced on older or high-mileage vehicles (with more than 70,000 miles) and when the air conditioning system is opened to the atmosphere for an extended length of time. Driers designed for HCFC blends may not be available for your vehicle.

At least \$80 more than the cost to repair the old system, plus the cost for the accumulator/drier, high-pressure cutout switch, system controls, and/or hoses, if needed.

May reduce the durability of certain parts, which could lead to additional repair costs.

Not designed specifically for your car, and fewer parts may be replaced at the time of retrofit. Future costs may be greater than for high performance HFC-134a retrofit.

Cooling and durability may be reduced in some vehicles. Cooling reduction may only be noticeable on very hot and humid days or when the vehicle is idling. Durability may be reduced.

Might contain ozone-depleting ingredients; however, ingredients will have less ozone-depleting potential than the CFC-12 originally used.

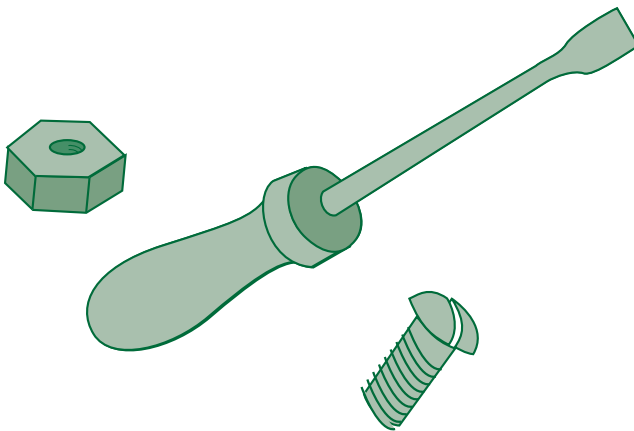
Be sure the refrigerant proposed for your vehicle has been listed as acceptable by EPA.

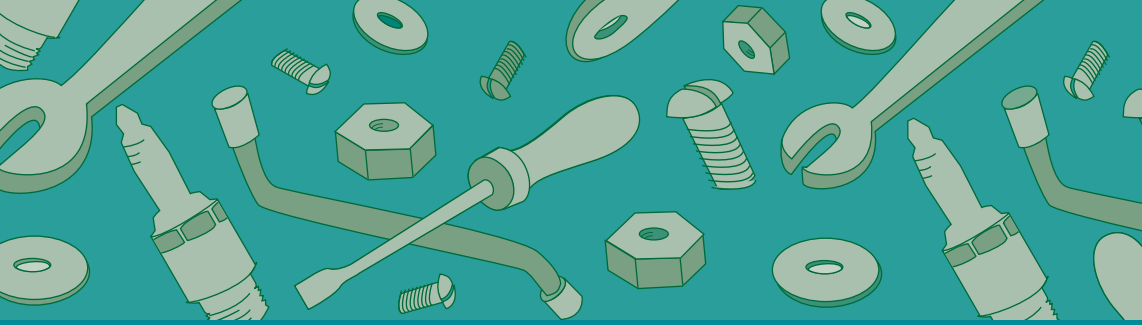
Not as widely available as HFC-134a. At this time, most service facilities are not able to service vehicles retrofitted to blends.

## Make Sure You Know What You're Getting!

If you have your car's air conditioning system retrofitted, ask your service facility about your choices:

- Are the replacement parts covered by a warranty?
- Is the performance of the system covered by a warranty?
- Will performance or durability of the system be reduced?
- Can the substitute refrigerant used be serviced nationwide?
- Is the substitute refrigerant listed by EPA as environmentally acceptable?
- Are unique service fittings specific to the refrigerant installed?
- Is the system clearly labeled to indicate which refrigerant is used?





## For More Information

**F**or more information about motor vehicle air conditioners and the environment, contact EPA's Stratospheric Protection Hotline at 800 296-1996 to request copies of the following publications:

*How to Keep Your Cool and Protect the Ozone Layer*  
(EPA430-F-97-005)

*Underhood Tips to Help You Keep Cool: Servicing Vehicle Air Conditioning Systems During the CFC Phaseout*  
(EPA430-F-95-092)

The Hotline also has the following publications about stationary sources of CFCs:

*Protecting the Ozone Layer: A Checklist for Citizen Action*  
(EPA430-F-94-007)

*Disposing of Appliances With Refrigerants: What You Should Know*  
(EPA430-F-93-003)

Additional information about ozone protection is available at EPA's Stratospheric Protection Division homepage at <http://www.epa.gov/ozone>



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