



Operating Manual

Vortex[®] Dual

Refrigerant Recovery Machine

English · Español · Deutsch · Français · Italiano · 中文 · Svenska ·
Nederlands

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1 Introduction

Thank you for buying the INFICON Vortex Dual Refrigerant Recovery Machine! For optimal Vortex Dual performance, read this manual carefully before use.

For additional questions or assistance, contact INFICON.

USA: +1.800.344.3304 or service.tools@inficon.com

Europe: +49 221 56788-660 or servicetools.europe@inficon.com

Responsibility



CAUTION

A user should not use Vortex Dual unless they are properly trained in the recovery process.

The operation of this machine by unqualified personnel is potentially dangerous.

Liability

The information contained in this manual is believed to be accurate and reliable. However, INFICON assumes no responsibility for its use and shall not be liable for any special, incidental, or consequential damages related to the use of this product.

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EPA Certification

INFICON Vortex Dual (PN 714-202-G1 only) is an EPA Certified machine in accordance with section 608 of the Clean Air Act. It has been independently tested and certified to conform with AHRI standard 740.

2 Safety Precautions

Safety



CAUTION

This symbol is intended to alert the presence of critical items regarding operating, safety, and maintenance (servicing) instructions in this manual.

Product Safety

Vortex Dual is a recovery machine for a broad range of refrigerants. Recovering refrigerants into separate storage tanks involves a process of gas compression, resulting in high pressures within the machine, the connecting hoses, and the storage tank.



CAUTION

High pressure systems can cause an accident or injury if they are not handled properly, and with care.

Refrigerant hoses must have shut-off devices within 30.5 cm (12 in.) of the ends, to reduce the likelihood of refrigerant leakage to the atmosphere when tanks or setups are changed.

Read this manual before using Vortex Dual to become familiar with its specifications and operation. Review the Material Safety Data Sheets (MSDS) and the temperature/vapor pressure information for the proper safety and handling requirements regarding the refrigerants being recovered.



CAUTION

Wear gloves, eye protection and foot protection when working on refrigeration systems.



WARNING

Refrigerant vapor can be hazardous and its byproducts can be lethal.

**⚠ WARNING**

Motors and switches can generate sparks and can be especially dangerous in flammable environments.

Work only in well-ventilated areas, with mechanical ventilation that provides at least four air change rates per hour. Do not work in an enclosed area without appropriate safety equipment. It may be necessary to install a separate circulation fan

**⚠ WARNING**

Never use oxygen for leak detection.

Oxygen can become an explosive mixture in the presence of oil and pressure. Perform leak detection in accordance with recommended practice only. For the best results, use a refrigerant detector, such as INFICON D-TEK® 3, D-TEK Stratus®, or TEK-Mate®.

**⚠ CAUTION**

Never mix refrigerants.

Use separate storage cylinders, hoses, and filters for each type of refrigerant recovered. Store the refrigerants in a cool, dry place.

**⚠ WARNING**

Never overfill a storage container.

Overfilled tanks can rupture and explode. Use a refrigerant scale, such as INFICON Wey-TEK, to prevent overfilling.

**⚠ CAUTION**

When opening service or cylinder valves, do so slowly, to ensure that all of the connections are secure and free of danger.

**⚠ CAUTION**

Disconnect the power before moving or servicing Vortex Dual.

**⚠ WARNING**

The risk of electric shock and exposure to hot compressor parts is possible if the Vortex Dual covers are removed.

Vortex Dual should only be opened by a qualified technician who has been trained in basic electronics and refrigeration.

**⚠ CAUTION**

Use only the power cord supplied by INFICON.

If the cord is lost or damaged, contact INFICON for information about obtaining a replacement.

**⚠ CAUTION**

When connected to Vortex Dual, extension cord wiring can overheat under conditions of high current draw.

If an extension cord is necessary, use the shortest possible length and only size 14 AWG or larger for 115 V (ac) or 1.00 mm² or larger for 230 V (ac).

**⚠ WARNING**

Do not use Vortex Dual near open containers of gasoline or other flammable liquids.

**⚠ WARNING**

This product is designed for use with refrigerants only and is not intended for use with any combustible refrigerants.

Any other uses of this product are not recommended by INFICON and could result in personal injury. Use of this product, other than intended, is done at the user's own risk.

3 Specifications, Features and Warranty

3.1 Vortex Dual Specifications

Refrigerants	R12, R1234yf, R134a, R22, R401a, R401b, R401c, R402a, R402b, R404a, R406a, R407a, R407b, R407c, R407d, R408a, R409a, R410a, R410b, R500, R502, R507, R32, R406a, R407d, R410b, R411a, R411b, R417c, R419b, R422e, R427a, R448a, R449a, R422b, R452a, R452b, R411a, R411b, R417c, R419b, R422e, and R427a
Power	115 V (ac), 60 Hz, 12 A, or 230 V (ac), 50/60 Hz, 10A (depending on version)
Protection	High pressure switch cutoff at 550 psi, 3.8 MPa, 38 bar compressor motor thermally protected
Pressure	Low side design pressure 350 PSI, 2.4 MPa, 24 bar High side design pressure 550 PSI, 3.8 MPa, 38 bar
Temperature	Operating range 10 to 40°C (50 to 104°F)
Pollution degree	2
Ingress protection	IP20
EPA Certification (PN 714-202-G1 only)	Certified for all refrigerants listed under categories III, IV, & V in ARI standard 740-2016

3.2 Warranty

INFICON warrants the Vortex Dual Refrigerant Recovery Machine to be free from defects of materials or workmanship for three years from the date of purchase. INFICON does not warrant any machine that has been subjected to misuse, negligence, or accident, or has been repaired or altered by anyone other than INFICON.

The compressor is warranted for a period of three years by the manufacturer. To keep this warranty in force, a filter (included) must be used on the inlet port or hose at all times to prevent particulates from entering the compressor. Failure to use the included filter will void the compressor warranty.

INFICON liability is limited to repairing or replacing, at its option, a defective machine or part. If a defect arises, a valid claim must be received by INFICON, with transportation prepaid, no later than thirty (30) days after the warranty period expires. INFICON will determine whether the machine has malfunctioned due to defective materials or workmanship.

This warranty is in lieu of all other warranties, expressed or implied, whether of merchantability, fitness for a particular purpose, or otherwise. All such other warranties are expressly disclaimed.

INFICON shall have no liability in excess of the price paid to INFICON for Vortex Dual, plus return transportation charges prepaid. INFICON shall have no liability for any incidental or consequential damages. All such liabilities are excluded.

4 Setup and Operation

4.1 Getting Started

Review the full contents of this manual before operating Vortex Dual.



WARNING

Failure to follow the proper safety precautions can result in personal injury or death.

Do not use Vortex Dual unless you are properly trained in the recovery process.

- 1 Install the included filter dryer on the inlet (V1). Vortex Dual has a female refrigerant flare fitting which connects with male flare fittings.
- 2 Attach the hoses to the filter dryer.



To achieve the fastest recovery rates, remove restrictions by removing valve cores from the system using valve core removal tools.



CAUTION

Do not use an adapter fitting in place of a filter.

The use of an adapter fitting can damage the valves and will void the warranty.

- 3 Attach a hose from the discharge valve (V2) to the recovery tank. Connect the other hoses between the system components according to the figure in Standard Recovery Operation [► 12].
- 4 Connect the AC power cord to a circuit protected by an appropriately sized circuit breaker. If an extension cord is absolutely necessary, make sure it meets the following conditions:
 - ⇒ The length is not excessive.
 - ⇒ The cord contains a safety ground wire.
 - ⇒ The wire size is 14 AWG or larger for 115 V (ac) or 1.0 mm² or larger for 230 V (ac).

**⚠ WARNING****Overfilled tanks can rupture and explode.**

When the system is operating in standard recovery or push-pull mode, it is possible to overfill the tank. Use a refrigerant scale to ensure that the tank does not exceed 80% of its capacity, by weight. Check the tank weight before transporting it.

**⚠ CAUTION****Do not allow Vortex Dual to recover large amounts of liquid too quickly.**

When a significant amount of liquid is present and enters the recovery machine too quickly during the refrigerant recovery process, this is sometimes referred to in the field as a "liquid slug" or "slugging."

A liquid slug can activate the high pressure shutoff and prolong the refrigerant recovery process. If Vortex Dual recovers large amounts of liquid too quickly (or if a liquid slug is present), a loud knocking will sound from the compressor.

**⚠ CAUTION****Compressor damage caused by recovering a large amount of liquid too quickly is not covered by the compressor warranty.**

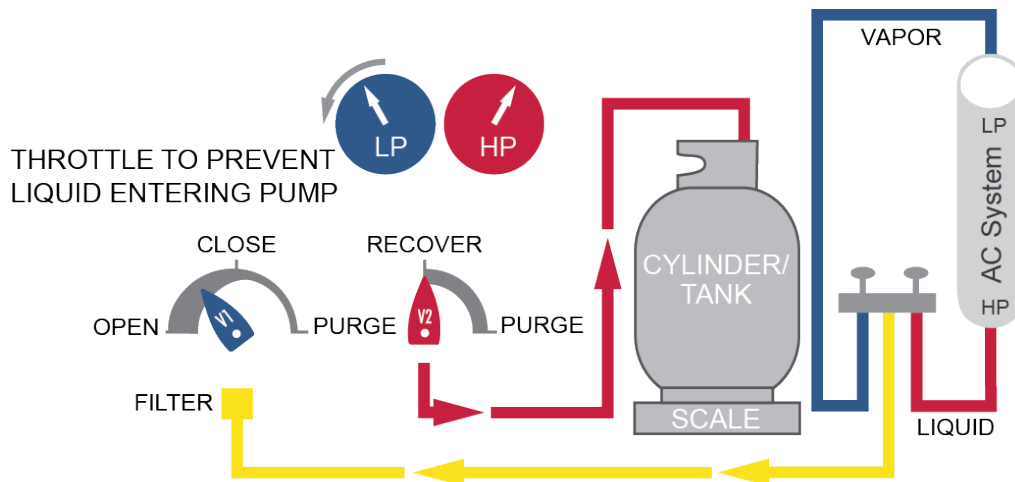
Monitor the recovery process carefully. If the compressor begins to knock:

- Throttle the **INLET** valve clockwise, or
- Adjust the **MANIFOLD** gauge valves until the knocking stops.

4.2 Standard Recovery Operation

1 Connect all the cables and hoses as described in Getting Started [► 10].

⇒ Make sure all of the connections are tight and that the cables and hoses do not interfere with the recovery process. See the figure below.



- 2 Make sure the hose connecting Vortex Dual to the recovery tank is attached to the **VAPOR** port (usually blue).
- 3 **OPEN** the **VAPOR** valve on the tank. Keep the **LIQUID** valve **CLOSED**.
- 4 Rotate the **INLET** valve (V1) to **CLOSE**.
- 5 Rotate the **PURGE/RECOVER** valve (V2) to the **RECOVER** position.
- 6 Slowly rotate the **LIQUID** (high side) valve on the **MANIFOLD** gauge to **OPEN**. Make sure there are no leaks.
- 7 Turn on Vortex Dual.
- 8 Monitor the inlet pressure (**LP**, low pressure gauge) and slowly rotate the **INLET** valve (V1) to **OPEN**.



CAUTION

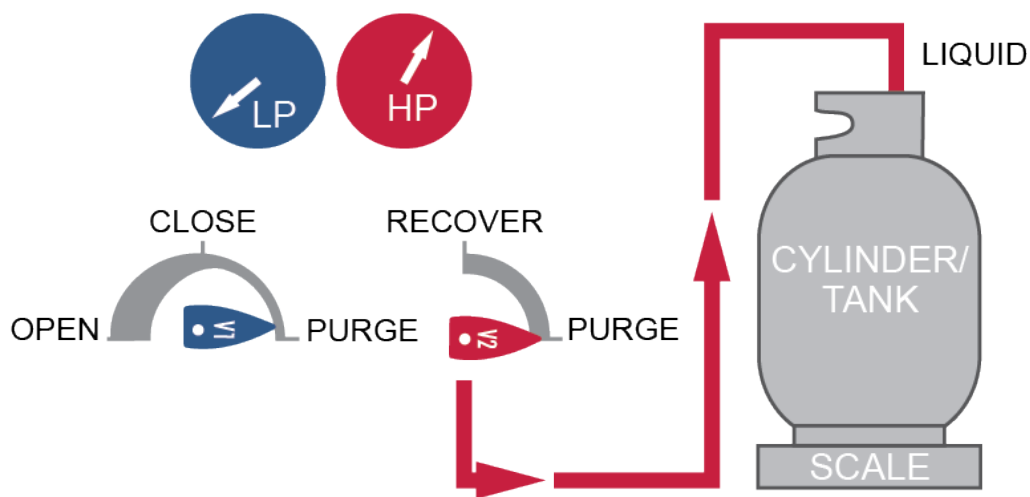
The compressor may emit a knocking sound if Vortex Dual attempts to recover a significant amount of liquid.

To prevent damage to the compressor, throttle the **LIQUID** valve on the **MANIFOLD** gauge set, or the Vortex Dual **INLET** valve (V1).

- 9 Once the liquid has been recovered, transfer the remaining vapor by opening the **VAPOR** (low side) valve on the **MANIFOLD**.
- 10 Continue to operate Vortex Dual until the **LP** gauge indicates that the required vacuum has been obtained.
- 11 Turn off Vortex Dual and close the **INLET** valve (**V1**). Wait five minutes. If the **MANIFOLD** gauge indicates that the pressure has risen above **0 PSIG** (0 bar), refrigerant is still present.
 - ⇒ Open the **INLET** valve (**V1**) and turn on Vortex Dual.
 - ⇒ Run Vortex Dual until the required vacuum is reached again.
 - ⇒ Wait five minutes.
 - ⇒ Repeat this process until all the refrigerant is removed and the pressure is **0 PSIG** (0 bar), or less.
- 12 Immediately purge Vortex Dual. Purging is necessary to remove any residual refrigerant from inside the Vortex Dual internal components as well as the hose from the outlet to the recovery tank. See --- MISSING LINK ---.

4.3 Purging Vortex Dual

- 1 While Vortex Dual is off, rotate the **PURGE/RECOVER** valve (**V2**) to **PURGE**. See the figure below.



- 2 Turn on Vortex Dual and slowly rotate the **INLET** valve (**V1**) to **PURGE**.
- 3 Run Vortex Dual and monitor the **LP** gauge until a vacuum of **20 In/Hg** (0.7 bar) or more is achieved.
- 4 Turn off Vortex Dual and immediately close the valves on the recovery tank. Rotate the **INLET** valve (**V1**) to **CLOSE**.



⚠ CAUTION

The hose and the discharge port will contain a small amount of pressurized refrigerant.

Exercise care when removing this hose.

See also

📄 Push-Pull Operation [▶ 14]

4.4 Push-Pull Operation

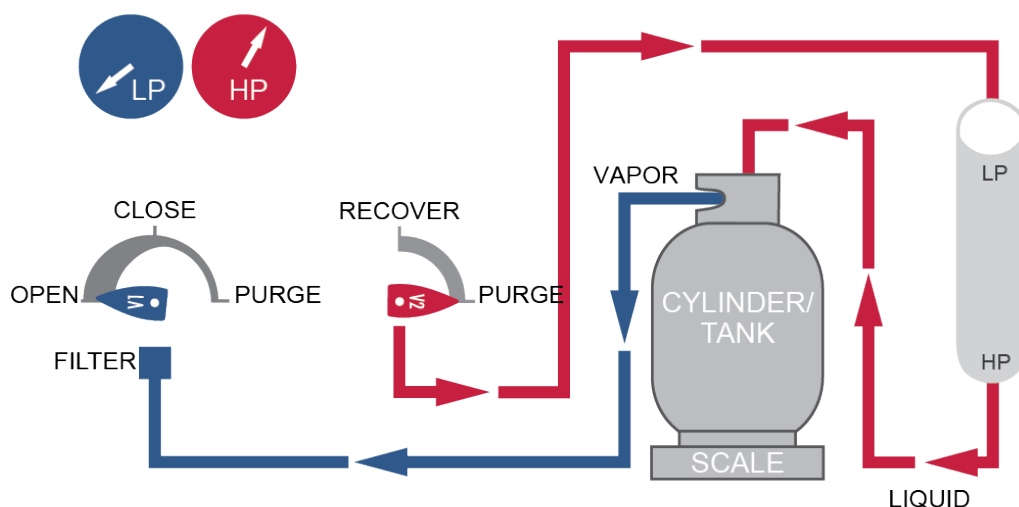
The push-pull recovery method is used to move large amounts of liquid refrigerant. During this process, the recovery unit pulls vapor from the recovery cylinder and produces a high-pressure discharge gas that pushes the liquid out of the HVAC system and back into the recovery cylinder. Recovery rates above 15 pounds per minute can be achieved using this procedure.



Do not attempt the push-pull process unless the system contains at least 15 pounds (7 kg) of liquid that can be easily isolated.

To prevent overfill, use the scale to make sure that the tank does not surpass 80% capacity, by weight. Monitor the tank weight carefully. Eighty percent capacity may be reached quickly during push-pull due to the rapid transfer of refrigerant.

Connect the refrigerant hoses as shown below. A sight glass (not included) can help determine when the liquid has been transferred and vapor remains.



4.5 Cooling The Recovery Tank

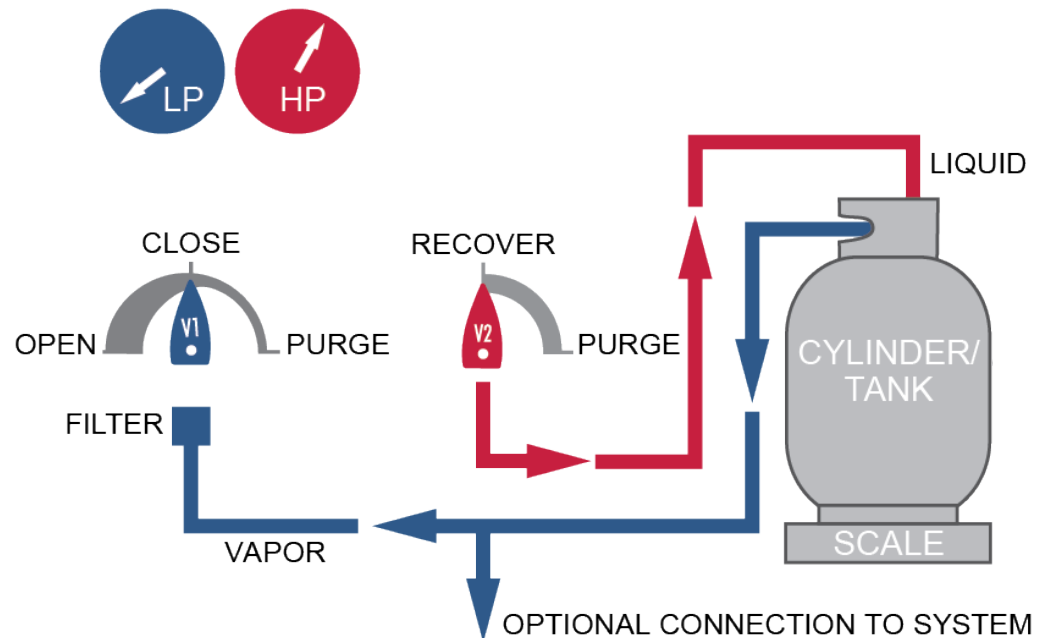
Vortex Dual can be used to pre-cool (or sub-cool) the recovery tank, if the head pressure is too high to complete the recovery process. If the ambient pressure is too high, high head pressure can occur when working with certain refrigerants that have a high vapor pressure.



The recovery tank must contain five pounds or more of liquid, to allow the pressure differential to develop.

Sub-cooling the tank before starting the recovery process may provide little or no benefit.

If the recovery process stalls because of high head pressure, turn off Vortex Dual, close the hose valves, and reconfigure the setup as shown below.



- 1 Rotate **V2** on the Vortex Dual to **RECOVER** and open the **LIQUID** and **VAPOR** valves on the cylinder.
- 2 Turn on Vortex Dual.
- 3 Rotate **V1** on Vortex Dual to **OPEN**.
- 4 On the cylinder, throttle the flow of liquid by slowly closing the **LIQUID** valve to achieve a minimum pressure differential of **100 PSIG** (0.7 MPa, 7 bar) between the **LP** and **HP** gauges.



To prevent the **HP** cutoff switch from actuating, do not allow the **HP** gauge to exceed **550 PSIG** (3.8 MPa, 38 bar).

- 5 Once the recovery tank is cold, turn off Vortex Dual and reconfigure that setup for standard recovery. Repeat as needed.

4.6 Special Operating Notes

During standard operation, the high pressure switch resets when the head pressure drops below approximately 435 PSI (2.9 MPa, 29 bar), and Vortex Dual restarts automatically.

5 Maintenance

With minimal but important maintenance, Vortex Dual can provide many seasons of reliable service. After each use, clean Vortex Dual with a damp cloth to remove dirt and oils.



CAUTION

Do not use gasoline or other hazardous solvents to clean Vortex Dual. It might damage the plastic enclosure.

Standard household detergent or isopropyl alcohol may be used, but do not allow the liquid to penetrate the outer case.

Make sure the inlet and discharge ports are protected during transit and storage. Keep the inner diameter and the outer threads clear and clean.



For the best results, leave the filter connected to the inlet port and change the filter regularly.

6 Troubleshooting

Problem	Cause	Action
Vortex Dual will not turn on. The compressor does not start.	The power cord is not attached.	Attach the power cord.
	There is no voltage at the receptacle.	Verify the voltage at the job site.
	The circuit breaker has opened.	Identify the cause of the break activation, rectify the issue and reset the circuit breaker.
	The discharge pressure is too high. The HP cutoff switch has opened.	Reduce the pressure. Rotate V2 to PURGE , then back to RECOVERY .
	There is an electronics failure in the motor.	Factory service is required.
The compressor starts, but falters within minutes. The pressure indication on the HP gauge is high.	The recovery tank valve is not open.	Open the tank valve.
	The discharge hose is blocked.	Check and clear the hose blockage.
	There is air in the system or the tank.	Bleed the air from the system or the tank.
The compressor stops intermittently.	The vapor pressure of the refrigerant in the tank is close to the HP cutoff switch trip point.	Reduce the tank temperature.
	The thermal overload switch in the compressor is activating.	Reduce the amount of liquid being pumped. Let the machine cool before proceeding.
Vortex Dual overheats.	There is excessive head pressure due to a high ambient temperature.	Reduce the tank temperature.
	There is excessive head pressure due to a restricted discharge hose.	Check and clear the hose restriction.
	There is excessive head pressure due to air in the recovery tank.	Bleed the air from the tank.

Problem	Cause	Action
The recovery process is too slow.	The head pressure is too high.	Reduce the tank temperature or change tanks.
	The system refrigerant is frozen.	Interrupt the process to allow ice to dissipate.
	The compressor seals are worn.	Rebuild the compressor with the service kit. Contact the wholesaler for assistance.

7 Service

Vortex Dual uses electrical components recognized by international safety agencies or components that have been specially designed for this application.



CAUTION

Do not change any of the components, as it could compromise safety.

All service work must be performed at an INFICON-approved facility to maintain the safety rating and the warranty.

If the instrument is defective, do not return Vortex Dual directly to the factory. For technical assistance or service information, contact INFICON or the wholesaler.

8 Replacement Parts and Accessories

The following parts and accessories are available through many distributors. Contact INFICON or a local distributor for availability.

Power cord (115 V)	068-0684
Power cord (230 V)	068-0685
Low pressure gauge	722-406-P1
High pressure gauge	722-407-P1
Carrying strap	722-408-P1
Filter dryer (1/4 in. male-to-male)	722-409-P1

9 EPA Requirements (PN 714-202-G1 only)

Under Section 608 of the Clean Air Act (40 CFR Part 82), the Environmental Protection Agency (EPA) has established regulations that cover all aspects of the refrigerant recovery process.

These regulations have established service practices that maximize the recycling of ozone-depleting compounds during the servicing and disposal of air-conditioning and refrigeration equipment.

Certification requirements for recovery equipment and technicians have also been established. The INFICON Vortex Dual has been EPA Certified for use by an independent laboratory.

The EPA has also established Evacuation Requirements for HVAC/R equipment used for service, to ensure that any release of CFCs or HCFCs to the atmosphere is minimized.

- Technicians repairing small appliances such as household refrigerators, window air conditioners and water coolers, must recover 80% of the refrigerant when the compressor in the appliance is not operating.
- Technicians repairing small appliances must recover 90% of the refrigerant when the compressor in the appliance is operating.



These requirements may also be met by evacuating the small appliance with the recovery machine to four inches of mercury vacuum.

Other requirements are covered in the table below.

Type of Appliance	Required Inches of Hg Vacuum
HCFC-22 appliance, generally containing less than 200 pounds of refrigerant	0
HCFC-22 appliance, generally containing 200 pounds or more of refrigerant	10
Other high-pressure appliance, generally containing less than 200 pounds of refrigerant	10
Other high-pressure appliance, generally containing 200 pounds or more of refrigerant	15
Very high-pressure appliance (CFC-13, -503)	0
Low-pressure appliance (CFC-11, HCFC-123)	25*

*mmHg absolute

The EPA requires that service technicians certify the acquired recovery equipment to the appropriate EPA Regional Office, and that it is in compliance with the applicable laws established by the Clean Air Act. Forms are available from the Regional Office of the EPA.

Questions about the EPA requirements can be answered by contacting the Ozone Protection Hotline, toll-free, at +1.800.296.1996.