

# Certified Product Directory



**Reclaimed Refrigerants: 700**



**Refrigerant Testing Laboratories: 700**



**Refrigerant Recovery/Recycling  
Equipment: 740**

**2016 Edition  
Updated: January 12, 2016**



The latest issue of the directory may be downloaded, at no charge, from [www.ahridirectory.org](http://www.ahridirectory.org).

Other certified products are published in the AHRI directories and on [www.ahridirectory.org](http://www.ahridirectory.org).

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## **NOTICE**

This Program is sponsored and administered by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

At any time there may be some participants added or removed from the Program; also some models may be added, deleted or revised. The latest issue of the directory may be downloaded, at no charge, from [www.ahridirectory.org](http://www.ahridirectory.org). In the event of any question regarding the listing of any model or participant, communicate directly with

**Air-Conditioning, Heating, and Refrigeration Institute**  
**2111 Wilson Boulevard, Suite 500**  
**Arlington, VA 22201**  
**Phone: 703-524-8800**



## To the User of this Directory

This directory lists the following certified products in accordance with the latest editions of the standards cited:

- Recovery, recovery/recycling and recycling equipment (AHRI Standard 740);
- Reclaimed refrigerants (AHRI Standard 700); and
- Refrigerant Testing Laboratories (AHRI Standard 700).

The Air-Conditioning, Heating and Refrigeration Institute sponsors and administers certification programs to help ensure that industry products perform as rated.

### PERSPECTIVE

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) is the trade association representing manufacturers of heating, cooling, and commercial refrigeration equipment. More than 350 members strong, AHRI is an internationally recognized advocate for the industry, and develops standards for and certifies the performance of many of the products manufactured by our members. AHRI's member companies account for more than 90 percent of the residential and commercial air conditioning, space heating, water heating and commercial refrigeration equipment manufactured and sold in North America.

AHRI traces its history back to 1903 when the Ice Machine Builders' Association of the United States started. Since that time, AHRI has emerged as the major voice for the industry. Manufacturers are drawn to AHRI membership in part because of the variety of services and benefits afforded those who participate in AHRI activities. These activities include:

- Establishing standards for testing and rating products.
- Testing products to verify certified performance ratings, and publishing certification rating data.
- Providing representation and technical assistance to government entities in federal/state/local legislative and regulatory matters.
- International trade research and analysis.
- Public relations and promotional programs for the industry.
- Consumer education programs.
- Credit information services.
- Regular statistical reports on product shipments.

### WHAT CERTIFICATION MEANS

Two of AHRI's most important functions are the development of performance rating standards and the administration of performance certification programs for the eligible products. Each product section, with the support of the AHRI engineering staff, may develop certification programs for the eligible products. Participation in the program is voluntary and open to non-members of AHRI on an equal basis. AHRI regularly selects random samples of products to be tested by an independent laboratory under contract to AHRI. The product is tested using procedures stipulated in the corresponding AHRI standard to verify that it meets the manufacturer's certified published performance ratings.

The AHRI certification label appearing on products has been an indication of verified performance for more than 40 years. Once a product is certified it is listed with its performance ratings in the

online AHRI Directory of Certified Products. This directory serves as an authoritative source of specification and performance ratings for manufacturers, wholesalers, retailers, contractors, utilities, architects, engineers, and consumers.

## **RECLAIMED REFRIGERANTS**

This Directory of Certified Reclaimed Refrigerants lists all reclaimers and refrigerants regularly processed by each reclaimer participating in the AHRI certification program.

Listing in the directory means that listed refrigerants have been certified by AHRI and the refrigerants meet the purity levels as described in the latest AHRI Standard 700. Listing does not constitute a recommendation by AHRI regarding safety or reliability of any listed product.

Under the program, participating reclaimers must file certification data with AHRI on all refrigerants reclaimed on a regular basis within the scope of the program. AHRI conducts analysis of each reclaimer's refrigerant(s) each quarter of each year in a verification testing program.

In addition to evaluation of the certified data, and to the AHRI ongoing random testing program, participating reclaimers which question certification of competitors' refrigerants may request that these refrigerants be tested.

The reclaimer of a refrigerant which fails to pass the specified tests must initiate corrective action or cease shipment of the failed reclaimed refrigerant.

If neither of the above solutions is accomplished, the reclaimer's right to use the AHRI certification symbol on *all* of its refrigerants is withdrawn, and the reclaimer's name and listings are deleted from the directory.

The AHRI certification program is designed to assure contractors, manufacturers and other refrigerant users, as well as consumers, that refrigerants reclaimed by a program participant have been accurately tested and thus are eligible for the AHRI certification label.

## **REFRIGERANT TESTING LABORATORIES**

This Directory of Certified Refrigerant Testing Laboratories lists all refrigerant testing laboratories, performing AHRI-700 testing on any new or reclaimed refrigerants as covered by AHRI Standard 700, participating in the AHRI certification program.

Listing in the directory means that the listed laboratories have certified by AHRI and that the laboratories can accurately perform AHRI Standard 700 testing of those refrigerants listed.

Under the program, the participating laboratory must submit requested information on the applicant's laboratory facilities, personnel, equipment and technical capability. A site visit is conducted to verify all data submitted by the certifying laboratory. In addition, the prospective laboratory shall analyze three "doped" samples and accurately determine, for each contaminant, whether it meets or fails to meet AHRI Standard 700 purity and accurately determine the quantity, within acceptable range, of each contaminant in the sample.

In addition to the aforementioned qualification procedure, quarterly random tests are conducted on "doped" refrigerant samples. Laboratories that report incorrect results shall be subject to

retests with more strict analysis and reporting requirements.

A participating laboratory that fails to pass the specified tests shall be terminated from the program. After a specified waiting period, the laboratory must requalify prior to reinstatement to the program.

The AHRI certification program is designed to assure contractors, manufacturers and other refrigerant users, as well as consumers, that refrigerants tested by program participants have been accurately analyzed to AHRI Standard 700.

## **REFRIGERANT RECOVERY/RECYCLING EQUIPMENT**

This Directory of Certified Refrigerant Recovery/Recycling Equipment lists all eligible models of this type of equipment produced by each manufacturer participating in the AHRI certification program.

Listing in the directory means that the models have been certified by AHRI and that the models meet the performance ratings as described in AHRI Standard 740. Listing does not constitute a recommendation by AHRI regarding safety or reliability of any listed product.

Under the program, participating manufacturers must file certification data with AHRI on all models produced within the scope of the program. AHRI conducts standard performance tests of an average of 33% of each manufacturer's basic models each year in a verification-testing program.

In addition to evaluation of the certified data, and to the AHRI ongoing random testing program, participating manufacturers which question certified ratings of competitors' models may request that those models be tested.

The manufacturer of a model which fails to pass the specified tests has two basic alternatives: rerate the model in question to reflect its tested performance, or stop production of that model.

If neither of the above solutions is accomplished, the manufacturer's right to use the AHRI certification symbol on *all* of its models is withdrawn, and the manufacturer's name and listings are deleted from the directory.

The AHRI certification program is designed to assure contractors and other equipment specifiers, as well as consumers, that products manufactured by a program participant have been accurately rated and thus are eligible for the AHRI certification label.

## **AHRI STANDARDS COVERED**

AHRI Standard 740 for *Refrigerant Recovery/Recycling Equipment* was prepared to establish: definitions; requirements for testing and rating; requirements for specifications, literature and advertising; and conformance conditions.

AHRI Standard 700, *Specifications for Refrigerants*, was prepared to establish: definitions; requirements for testing; requirements for specifications, literature and advertising; and conformance conditions.

AHRI provides free access to its standards and guidelines. Download the free standards (AHRI Standard 740 and AHRI Standard 700) from the internet at <http://www.ahrinet.org>.



# SCOPE OF RECLAIMED REFRIGERANTS CERTIFICATION PROGRAM

## A. Standard

The program references the latest AHRI Standard 700, *Specifications for Refrigerants*.

Certification by reclaimers under this standard requires that the reclaimers' refrigerants do not exceed the contaminant level established per the tables in AHRI Standard 700.

## B. Refrigerants Covered

This standard defines and classifies refrigerant contaminants primarily based on standard and generally available test methods and specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon refrigerants hereinafter referred to as refrigerants regardless of source. These refrigerants can be found in ANSI/ASHRAE Standard 34 with addenda, *Designation and Safety Classification of Refrigerants* (American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.).

## C. Basis of Participation

Participation in this Program by contract between participating reclaimers and AHRI consists of:

1. Certification by the reclaimer to AHRI that its reclaimed refrigerants comply with the latest AHRI Standard 700.
2. Participation by the refrigerant reclaimers in the random test program. Refrigerants for test are selected from reclaimers' inventories by representatives of an independent testing laboratory under contract to AHRI.

## D. Evidence of Participation

The qualified participating reclaimer may indicate its participation in the Certification Program in the following ways:

1. Display of the Certification Symbol on all packaging of certified refrigerants by means of a label or by printed application directly on packaging.
2. The Certification Symbol with the statement "Rated in accordance with AHRI Standard 700", shall be displayed on all specification sheets, literature and advertising.
3. Distribution of the Directory carrying the name of each participating reclaimer and a list of its certified refrigerants.

## THE SYMBOL

The Certification Symbol, as required to cover the governing Standard, is illustrated below.



This symbol has been registered with the United States Patent Office. The Symbol may not be reproduced or copied except by permission of AHRI. The Symbol may be displayed on qualified packaging in the form of a label obtained from AHRI, or may be an integral part of the packaging.

## THE DIRECTORY

The Directory lists the names, addresses, and certified refrigerants of the participating reclaimers and location of all reclaim facilities.

### Maximum Contaminant and Rating Definitions

Maximum contaminants are defined in the latest AHRI Standard 700 based on tests as set forth in the Standard.

*High Boiling Residue Method.* High boiling residue shall be determined by measuring the residue from a standard volume of refrigerant after evaporation. Oils and/or organic acids will be captured by this method.

*Conductivity (alternative chloride or acidity tests).* A refrigerant may be tested for conductivity as an indication of the presence of acids, metals, chlorides, and any compound that ionizes in water. This alternative procedure is intended for use with new or reclaimed refrigerants.

*Acidity.* The Acidity Test uses the titration principle to detect any compound that ionizes as an acid. The test requires about a 100 to 120 gram sample and has a lower detection limit of 0.1 ppm by weight.

*Water Content.* The Coulometric Karl Fischer Titration method shall be used for determining the water content of refrigerants. Water is a harmful contaminant in refrigerants because it causes freeze up, corrosion and promotes unfavorable chemical breakdown.

*Chloride Ions.* The refrigerant shall be tested for chlorides as an indication of the presence of hydrochloric or similar acids. The results of the test shall not exhibit any sign of turbidity. Results are reported as “pass” or “fail”.



# SCOPE OF REFRIGERANT TESTING LABORATORIES CERTIFICATION PROGRAM

## A. Standard

The program references the latest AHRI Standard 700, *Specifications for Refrigerants*.

Certification by a refrigerant testing laboratory under this standard requires the laboratory to perform refrigerant analysis to this standard.

## B. Refrigerants Covered

This standard defines and classifies refrigerant contaminants primarily based on standard and generally available test methods and specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon and other refrigerants regardless of source. These refrigerants can be found in the ANSI/ASHRAE Standard 34, *Designation and Safety Classification of Refrigerants* (American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.).

## C. Basis of Participation

Participation in this Program by contract between participating refrigerant testing laboratories and AHRI consists of:

1. Certification by the laboratory to AHRI that all refrigerant analysis is performed to AHRI Standard 700.
2. Participation by the laboratory in the random test program. Random refrigerants samples are “doped” and sent to the participating laboratories by an independent testing laboratory under contract to AHRI.

## D. Evidence of Participation

The qualified participating reclaimer may indicate its participation in the Certification Program in the following ways:

1. Display of the Certification Symbol.
2. Distribution of the Directory carrying the name of each participating refrigerant testing laboratory and a list of its certified refrigerants.

## THE SYMBOL

The Certification Symbol, as required to cover the governing Standard, is illustrated below.



This symbol has been registered with the United States Patent Office. The Symbol may not be reproduced or copied except by permission of AHRI. The Symbol may be displayed on qualified packaging in the form of a label obtained from AHRI, or may be an integral part of the packaging.

## THE DIRECTORY

The Directory lists the names, addresses and telephone numbers of the participating refrigerant testing laboratories and lists all refrigerants that the program participant tests and certifies to AHRI Standard 700.

### Method of Analysis

Methods of Analysis are defined in AHRI Standard 700. Procedures are defined in Appendix C to AHRI Standard 700.

Maximum Contaminants are defined in AHRI Standard 700 based on tests as set forth in the Standard.

*High Boiling Residue Method.* High boiling residue shall be determined by measuring the residue from a standard volume of refrigerant after evaporation. Oils and/or organic acids will be captured by this method.

*Conductivity (alternating to chloride or acidity rosos).* A refrigerant may be tested for conductivity as an indication of the presence of acids, metals, chlorides, and any compound that ionizes in water. This alternative procedure is intended for us with new or reclaimed refrigerants.

*Volatile Impurities including Other Refrigerants.* The amount of volatile impurities including other refrigerants in the subject refrigerant shall be determined by the gas chromatographic method described in Appendix C to AHRI Standard 700 for the appropriate refrigerant.

*Non Condensables.* Non condensable gases consist primarily of air accumulated in the vapor phase of refrigerant-containing tanks. The solubility of air in the refrigerant's liquid phase is extremely low and air is not significant as a liquid phase contaminant.

*Acidity.* The Acidity Test uses the titration principle to detect any compound that ionizes as an acid. The test requires about a 100 to 120 gram sample and has a lower detection limit of 0.1 ppm by weight.

*Water Content.* The Coulometric Karl Fischer Titration method, as described in Appendix C to AHRI 700, shall be used for determining the water content of refrigerants. Water is a harmful contaminant in refrigerants because it causes freeze up, corrosion and promotes unfavorable chemical breakdown.

Results are reported as “pass” or “fail”.

**LISTING OF REFRIGERANT TESTING  
LABORATORIES CERTIFIED TO AHRI**

Laboratory	Qualified Refrigerants
<p><b>A-Gas Americas</b> 1100 Haskins Road Bowling Green, OH 43402, USA Telephone: (419) 867-8990</p>	<p>R-11, R-12, R-22, R-23, R-32, R-113, R-114, R-123, R-125, R-134a, R-227ea, R-236fa, R-404A, R-407A, R-407C, R-409A, R-410A, R-424a, R-500, R-502</p>
<p><b>Hudson Technologies (Headquarters)</b> PO Box 1541, One Blue Hill Plaza Pearl River, New York 10965 Telephone: (845)735-6000</p> <p><b>Hudson Technologies Laboratory</b> 3402 North Mattis Avenue Champaign, Illinois 61821 Telephone: (217) 373-1414</p>	<p>R-11, R-12, R-22, R-32, R-113, R-114, R-123, R-134a, R-500, R-502</p>
<p><b>Lie Ku Pte Ltd (Headquarters)</b> No 61 Kaki Bukit Ave 1 #03-43 Shun Li Industrial Park Singapore 417943 Telephone: (65) 67492788</p> <p><b>Texcarrier Industries Sdn Bhd (Laboratory)</b> <b>Snowice Fluorochemicals Industries Sdn Bhd (Laboratory)</b> No 5 Jalan Wawasan 8, Kawasan Perindustrian Sri Gading 83300 Batu Pahat, Johor, Malaysia Telephone: (607) 4556363</p>	<p>R-22, R-123, R-134a, R-407C, R-410A, R-404A, R-507A</p>
<p><b>National Refrigerants, Inc. Laboratory</b> 661 Kenyon Avenue Rosenhayn, NJ 08352 Telephone: (800) 262-0012 Telephone: (856) 455-2776</p>	<p>R-11, R-12, R-13, R-22, R-23, R-32, R-113, R-114, R-123, R-124, R-125, R-134a, R-143a, R-401A, R-401B, R-402A, R-402B, R-403A, R-403B, R-404A, R-405A, R-406A, R-407A, R-407B, R-407C, R-407D, R-407E, R-408A, R-409A, R-409B, R-410A, R-410B, R-411A, R-411B, R-412A, R-413A, R-414B, R-416A, R-417A, R-422A, R-500, R-502, R-503, R-507A, R-508A, R-508B, R-509A</p>

# SCOPE OF REFRIGERANT RECOVERY/RECYCLING EQUIPMENT CERTIFICATION PROGRAM

## A. Standard

The program references AHRI Standard 740-1998 for *Refrigerant Recovery/Recycling Equipment*.

Certification by manufacturers under this standard requires that the manufacturers' certified ratings are established per AHRI Standard 740-1998.

## B. Equipment Covered

Factory-made refrigerant recovery/recycling equipment models, certified to AHRI, as defined in AHRI Standard 740-1998, are included in this Program.

*Refrigerant Recovery Equipment* is defined as a device designed for the purpose of removal of refrigerant from a system for the purpose of storage, recycling, reclamation or transportation.

*Refrigerant Recycling Equipment* is defined as a device designed to reduce contaminants in used refrigerant by oil separation and single or multiple passes through devices which reduce moisture, acidity and particulate matter, such as replaceable core filter driers.

*Refrigerant Recovery/Recycling Equipment* is defined as a device designed for the purpose of removal of a refrigerant from a system and decontamination of the refrigerant for reintroduction to the system.

## C. Basis of Participation

Participation in this Program by contract between participating manufacturers and AHRI consists of:

1. Certification by the manufacturer to AHRI that its model(s) comply with AHRI Standard 740-1998.
2. Participation by the manufacturer in the random test program, at an independent testing laboratory under contract to AHRI. Representatives of the testing agency select units for test from manufacturers' inventories.
3. Recovery and/or Recycling units shall have "passed" tests for Chlorides, Particulates and Refrigerant Loss due to Non-Condensable Purging, as applicable, as a minimum requirement for listing in the Directory.



## D. Evidence of Participation

The qualified participating manufacturer may indicate its participation in the Certification Program in the following ways:

1. Display of Certification Symbol on all units of certified models.
2. The Certification Symbol with the statement “Rated in accordance with AHRI Standard 740”, shall be displayed on all specification sheets, literature and advertising.
3. Distribution of the Directory carrying the name of each participating manufacturer and a list of its certified models, together with its certified ratings.

## E. Equipment Classification

*Self Contained Equipment.* A refrigerant recovery or recycling system that is capable of refrigerant extraction without the assistance of components contained within an air conditioning or refrigeration system.

*System Dependent Equipment.* Refrigerant recovery equipment that requires, for its operation, the assistance of components contained in an air conditioning or refrigeration system.

## THE SYMBOL

The Certification Symbol, as required to cover the governing Standard, is illustrated below.



This symbol has been registered with the United States Patent Office. The Symbol may not be reproduced or copied except by permission of AHRI. The Symbol may be displayed on qualified units in the form of a label obtained from AHRI, or may be an integral part of the nameplate.

## THE DIRECTORY

The Directory lists the names, addresses, trade names and certified ratings of the participating manufacturers and their certified products.

## STANDARD RATING DEFINITIONS

*Standard Rating.* A *Standard Rating* is a rating based on tests performed at Standard Rating Conditions set forth in AHRI Standard 740.

*Standard Contaminated Refrigerant Sample.* A mixture of new and/or reclaimed refrigerant and specified quantities of identified contaminants defined in Table 1, which are representative of field obtained, used refrigerant samples and which constitute the mixture to be processed by the equipment under test.

## F. Performance Rating Definitions

Performance Ratings are based on tests as set forth in AHRI Standard 740. Performance Ratings shall include the following:

*Liquid Recovery Rate.* The liquid refrigerant recovery rate shall be expressed in kg/min [lbs/min] and measured by weight change at the mixing chamber (see Figure C1 of AHRI Standard 740) divided by elapsed time to an accuracy within 0.008kg/min [0.02 lbs/min] for flow rates up to 0.42 kg/min and 2.0% for flow rates larger than 0.42 kg/min.

*Liquid Recovery Rate (Push/Pull).* The push/pull refrigerant recovery method is defined as the process of transferring liquid refrigerant from a refrigeration system to a receiving vessel by lowering the pressure in the vessel and raising the pressure in the system, and by connecting a separate line between the system liquid port and the receiving vessel.

*Vapor Recovery Rate.* The vapor refrigerant recovery rate shall be expressed in kg/min [lbs/min] and measured by weight change at the mixing chamber (see Figure C1 of AHRI Standard 740) divided by elapsed time to an accuracy within 0.008 kg/min [0.02 lbs/min] for flow rates up to 0.42 kg/min and 2.0% for flow rates larger than 0.42 kg/min.

*Recycle Rate.* The amount of refrigerant processed divided by the time elapsed in the recycling mode, expressed in kg/min [lbs/min]. For equipment that uses a separate recycling sequence, the recycle rate does not include the recovery rate (or elapsed time). For equipment that does not use a separate recycling sequence, the recycle rate is a maximum rate based solely on the higher of the liquid or vapor recovery rate, by which the rated contaminant levels can be achieved. If no separate recycling loop is used, the rate shall be the higher of the vapor refrigerant recovery rate or the liquid refrigerant recovery rate.

*Shut off Vacuum.* The shut off vacuum levels shall be expressed in kiloPascals [inches of mercury vacuum] to an accuracy of 0.33 kPa [0.1 in Hg vac].

System Dependent Equipment shall be rated by shut off vacuum level only.

*Contaminants.* The contaminant levels remaining after testing shall be published as follows:

- Moisture content, PPM (parts per million) by weight.
- Acidity, PPM (parts per million) by weight.
- High boiling residue, percentage by volume.
- Non-condensables, percentage by volume.

## **MAXIMUM CONTAINMENT LEVELS OF RECYCLED REFRIGERANTS IN SAME OWNER'S EQUIPMENT**

The air-conditioning and refrigeration industry has established the **Industry Recycling Guide (IRG-2), *Handling and Reuse of Refrigerants in the United States***, to specify procedures and guidelines to maintain the quality of refrigerants used in refrigeration and air-conditioning equipment. The intent is to protect the end user, the consumer and the refrigeration and air-conditioning products owned by the consumers.

IRG-2 lists maximum levels of contaminants of recycled refrigerants placed in the same owner's equipment. Some recycling equipment models listed in the Directory currently reach those levels given the standard contaminant samples defined in AHRI Standard 740.

### **TOLERANCES**

Any machine tested shall produce contaminant levels not higher than the published ratings. The liquid refrigerant recovery rate, vapor refrigerant recovery rate, vacuum levels and recycle flow rate shall not be less than the published ratings.

### **PRODUCT LABELING**

Type of equipment: Recovery, Recovery/ Recycling, or Recycling.

Designated refrigerants and/or refrigerant categories and the following as applicable for each:

1. Push/Pull liquid refrigerant recovery rate
2. Liquid refrigerant recovery rate
3. Vapor refrigerant recovery rate
4. Shut off vacuum level
5. High temperature vapor recovery rate
6. Residual trapped refrigerant
7. Recycle flow rate
8. Moisture Content
9. Acidity
10. High Boiling Residue
11. Non-condensables
12. Quantity recycled at filter change

**Table 1. Standard Contaminated Refrigerant Samples**

Contaminants	R11	R12	R13	R22	R23	R113	R114	R123	R134a	R500	R502	R503	R507	R508A	R508B	R509
Moisture Content: ppm by Weight of Pure Refrigerant	100	80	30	200	30	100	85	200	200	200	200	30	200	20	20	100
Particulate Content: ppm by Weight of Pure Refrigerant <sup>1</sup>	80	80	N/A	80	N/A	80	80	80	80	80	80	N/A	80	N/A	N/A	80
Acid Content: ppm by Weight of Pure Refrigerant <sup>2</sup>	500	100	N/A	500	N/A	400	200	500	100	100	100	N/A	100	N/A	N/A	100
Oil (HBR) Content: % by Weight of Pure Refrigerant	20	5	N/A	5	N/A	20	20	20	5	5	5	N/A	5	N/A	N/A	5
Viscosity/Type <sup>3</sup>	300/ MO	150/ MO	N/A	300/ MO	N/A	300/ MO	300/ MO	300/ MO	150/ POE	150/ MO	150/ MO	N/A	150/ POE	N/A	N/A	150/ MO
Non-Condensable Gases (Air Content): % by Volume	N/A	3	3	3	3	N/A	3	N/A	3	3	3	3	3	3	3	3

Contaminants	R401A	R401B	R401C	R402A	R402B	R404A	R406A	R407A	R407B	R407C	R407D	R408A	R409A	R410A	R411A	R411B	R412A
Moisture Content: ppm by Weight of Pure Refrigerant	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Particulate Content: ppm by Weight of Pure Refrigerant <sup>1</sup>	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Acid Content: ppm by Weight of Pure Refrigerant <sup>2</sup>	200	200	200	200	200	500	200	500	500	500	500	200	200	500	200	200	200
Oil (HBR) Content: % by Weight of Pure Refrigerant	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Viscosity/Type <sup>3</sup>	150/ AB	150/ AB	150/ AB	150/ AB	150/ AB	150/ POE	150/ AB	150/ POE	150/ POE	150/ POE	150/ POE	150/ MO	150/ MO	150/ POE	150/ MO	150/ MO	150/ AB
Non-Condensable Gases (Air Content): % by Volume	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

## Superscripts:

- 1 Particulate content shall consist of inert materials and shall comply with particulate requirements in Appendix D to AHRI Standard 740-1998.
  - 2 Acid consists of 60% oleic acid and 40% hydrochloric acid on a total number basis.
  - 3 POE = Poluoester, AB = Alkylbenzene, MO = Mineral Oil.
- N/A = Not Applicable.

Certification Directory Listings - Directory listings shall include all of the certified ratings for each refrigerant as follows. If a manufacturer promotes the use of a model for more than one refrigerant, then it is mandatory that contaminant ratings for all specified refrigerants be certified.

Types of Equipment

<u>Certified Item for Each Separate Refrigerant</u>	<u>Recovery</u>	<u>Recovery/Recycling</u>	<u>System Dependent</u>	<u>Recycling</u>
Liquid Refrigerant Recovery Rate	X	X	-	-
Vapor Refrigerant Recovery Rate	X	X	-	-
Shut Off Vacuum Level	X	X	X	-
Recycle Flow Rate	-	X	-	X
Refrigerant Loss due to Non-condensable Purging	*	X	-	X
Moisture Content	*	X	-	X
Chloride Ions	*	X	-	X
Acidity	*	X	-	X
High Boiling Residue	*	X	-	X
Particulates	*	X	-	X
Non-condensables	*	X	-	X

\*Manufacturer may at their option publish any of these. If so, they shall be subject to verification.

**MANUFACTURERS' TRADE OR BRAND NAME INDEX**

	<b>Trade or Brand Name</b>	<b>Recovery</b>	<b>Recovery/ Recycling</b>	<b>Recycling</b>
<b>Bacharach, Inc.</b> <b>724-334-5703</b> 621 Hunt Valley Circle, New Kensington, PA 15068-7074	Bacharach	X		
<b>Carrier Corporation</b> <b>315-432-3461</b> Carrier Parkway, TR5, Syracuse, NY 13221	Carrier Totaline	X X		
<b>Grainger Global Sourcing</b> <b>847-647-4648</b> 100 Grainger Parkway, Lake Forest, IL 69945	Dayton	X		
<b>INFICON, Inc.</b> <b>315-434-1144</b> 2 Technology Place, East Syracuse, NY 13057	Vortex® Dual	X		
<b>RapRec Support Inc.</b> <b>877-372-7732</b> 8932 W Cactus Ave. Peoria, AZ 85381	El Machino La Poderosa	X X		
<b>Redi Controls, Inc.</b> <b>800-626-8640</b> 755 East Main Street, Greenwood, IN 46143	Refrigerant Mizer	X		
<b>REFCO Manufacturing US Inc.</b> <b>716-438-2796</b> 66-B Industry Avenue Springfield MA 01104	ENVIRO ENVIRO-DUO	X X		
<b>RefTec International, Inc.</b> <b>800-214-4883</b> 6950 112th Circle, Largo, FL 33773	CLP EVAC HandiVAC LiteEVAC LOVAC MicroVAC MityVAC SHARK	X X X X X X X		X
<b>Trane</b> <b>608-787-2000</b> 3600 Pammel Creek Road, LaCrosse, WI 54601	EVac Commercial HandiVac LoVac MityVac	X X X X		
<b>York, A Johnson Controls Co.</b> <b>704-598-0000</b> 631 South Richland Avenue, York, PA 17405	York	X		
<b>Zhejiang Value Mechanical &amp; Electrical Products, Co. Ltd.</b> <b>+86-576-86191959</b> Jiulong Road, Western Industrial Zone, Wenling City, Zhejiang Province, China	Thunder Value	X X		

**EQUIPMENT AVAILABLE FOR SPECIFIC REFRIGERANTS**

The manufacturer designates the refrigerants and/or refrigerant categories that each model is capable of processing. The following table lists the manufacturers who offer model(s) that are designated for the particular refrigerant, as defined in AHRI Standard 740.

Refrigerant	Bacharach, Inc.	Carrier Corporation	Grainger Global Sourcing	INFICON, Inc.	RapRec Support Inc.	Redi Controls, Inc.	REFCO Manufacturing US Inc.	RefTec International, Inc.	Trane	York International Corp.	Zhejiang Value Mechanical & Electrical Products, Co. Ltd.
R-11					√			√	√		
R-12										√	
R-13						√					
R-22	√	√	√	√	√		√	√	√	√	√
R-114					√						
R-123					√			√			
R-134a	√	√	√	√	√		√	√		√	√
R-407C		√		√	√			√			
R-410A	√	√	√	√	√		√	√			√
R-500										√	
R-502										√	
R-503						√					
R-1233zd(E)								√			











**AHRI STANDARD 740 RATINGS FOR REFRIGERANT RECOVERY/RECYCLING EQUIPMENT**

Model Number	Refrigerant	Push/Pull Liquid Refrig. Recovery Rate†		Liquid Refrigerant Recovery Rate		Vapor Refrigerant Recovery Rate		Shut Off Vacuum		High Temp Vapor Recovery Rate		Residual Trapped Refrigerant		Recycle Flow Rate		Moisture Content	Acidity	High Boiling Residue	Non Condensables	Quantity Recycled at Filter Change	
		kg/min	lb/min	kg/min	lb/min	kg/min	lb/min	kPa	inHg vac	kg/min	lb/min	kg	lb	kg/min	lb/min	ppm by weight	PPM by weight	% by volume	% by volume	kg	lb
<b>RefTec International, Inc.</b>																					
<b>Trade Name: HandiVAC</b>																					
<b>Type: Recovery</b> RTO-500	R-22	11.34	<b>25.00</b>	3.54	<b>7.80</b>	0.24	<b>0.53</b>	50.53	<b>15.00</b>	0.28	<b>0.62</b>	N/A	<b>N/A</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
<b>Trade Name: LiteEVAC</b>																					
<b>Type: Recovery</b> LRH-500	R-22	36.80	<b>81.13</b>	N/A	<b>N/A</b>	0.84	<b>1.85</b>	60.69	<b>12.00</b>	0.72	<b>1.59</b>	0.68	<b>1.50</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
LRH-500	R-410A	29.48	<b>65.00</b>	N/A	<b>N/A</b>	0.64	<b>1.41</b>	60.69	<b>12.00</b>	N/A	<b>N/A</b>	0.33	<b>0.73</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
<b>Trade Name: LOVAC</b>																					
<b>Type: Recovery</b> CRLV-500	R-11	45.36	<b>100.00</b>	N/A	<b>N/A</b>	0.30	<b>0.66</b>	3.12	<b>29.00</b>	N/A	<b>N/A</b>	N/A	<b>N/A</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
<b>Trade Name: MicroVAC</b>																					
<b>Type: Recovery</b> Diablo-115	R-22	6.17	<b>13.60</b>	1.85	<b>4.08</b>	0.16	<b>0.35</b>	<67.46	<b>&gt;10.0</b>	0.14	<b>0.31</b>	N/A	<b>N/A</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
Diablo-115	R-134a	4.81	<b>10.60</b>	1.72	<b>3.79</b>	0.10	<b>0.22</b>	31.90	<b>20.50</b>	N/A	<b>N/A</b>	<0.05	<b>&lt;0.11</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
Diablo-115	R-407C	6.10	<b>13.45</b>	2.26	<b>4.98</b>	0.12	<b>0.26</b>	47.40	<b>14.00</b>	N/A	<b>N/A</b>	0.05	<b>0.11</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
Diablo-115	R-410A	6.80	<b>15.00</b>	2.26	<b>4.98</b>	0.10	<b>0.22</b>	57.30	<b>16.90</b>	N/A	<b>N/A</b>	<0.05	<b>&lt;0.11</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
<b>Trade Name: MityVAC</b>																					
<b>Type: Recovery</b> MRH-500	R-22	24.95	<b>55.00</b>	N/A	<b>N/A</b>	0.71	<b>1.56</b>	50.53	<b>15.00</b>	0.73	<b>1.60</b>	N/A	<b>N/A</b>	N/A	<b>N/A</b>	N/A	N/A	N/A	N/A	N/A	<b>N/A</b>
<b>Trade Name: SHARK</b>																					
<b>Type: Recovery/Recycle</b> SHARK-230	R-134a	N/A	<b>N/A</b>	2.42	<b>5.34</b>	0.75	<b>1.65</b>	67.46	<b>10.0</b>	1.31	<b>2.89</b>	0.48	<b>1.06</b>	0.92	<b>2.03</b>	10	0.1	0.01	1.40	90.7	<b>199.96</b>



**AHRI STANDARD 740 RATINGS FOR REFRIGERANT RECOVERY/RECYCLING EQUIPMENT**

Model Number	Refrigerant	Push/Pull Liquid Refrig. Recovery Rate†		Liquid Refrigerant Recovery Rate		Vapor Refrigerant Recovery Rate		Shut Off Vacuum		High Temp Vapor Recovery Rate		Residual Trapped Refrigerant		Recycle Flow Rate		Moisture Content	Acidity	High Boiling Residue	Non Condensables	Quantity Recycled at Filter Change	
		kg/min	lb/min	kg/min	lb/min	kg/min	lb/min	kPa	inHg vac	kg/min	lb/min	kg	lb	kg/min	lb/min	ppm by weight	PPM by weight	% by volume	% by volume	kg	lb
<b>York, A Johnson Controls Company</b>																					
<b>Trade Name: York</b>																					
<b>Type: Recovery</b>																					
RP-2200	R-12	56.40	<b>124.34</b>	N/A	<i>N/A</i>	1.23	<b>2.71</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-2200	R-134a	52.07	<b>114.79</b>	N/A	<i>N/A</i>	1.15	<b>2.54</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-2200	R-22	63.50	<b>140.00</b>	N/A	<i>N/A</i>	1.30	<b>2.86</b>	<43.08	<b>&gt;17.2</b>	0.58	<b>1.28</b>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-2200	R-500	59.87	<b>132.00</b>	N/A	<i>N/A</i>	1.17	<b>2.58</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-2200	R-502	68.04	<b>150.00</b>	N/A	<i>N/A</i>	1.49	<b>3.28</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RSR-2222	R-12	56.40	<b>124.34</b>	N/A	<i>N/A</i>	1.23	<b>2.71</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RSR-2222	R-134a	52.07	<b>114.79</b>	N/A	<i>N/A</i>	1.15	<b>2.54</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RSR-2222	R-22	63.50	<b>140.00</b>	N/A	<i>N/A</i>	1.30	<b>2.86</b>	<43.08	<b>&gt;17.2</b>	0.58	<b>1.28</b>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RSR-2222	R-500	59.87	<b>132.00</b>	N/A	<i>N/A</i>	1.17	<b>2.58</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RSR-2222	R-502	68.04	<b>150.00</b>	N/A	<i>N/A</i>	1.49	<b>3.28</b>	<43.08	<b>&gt;17.2</b>	N/A	<i>N/A</i>	<0.50	<b>&lt;1.10</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-3000	R-12	108.64	<b>239.55</b>	N/A	<i>N/A</i>	1.85	<b>4.08</b>	39.63	<b>18.20</b>	N/A	<i>N/A</i>	1.77	<b>3.90</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-3000	R-134a	111.36	<b>245.55</b>	N/A	<i>N/A</i>	1.49	<b>3.29</b>	47.81	<b>15.80</b>	N/A	<i>N/A</i>	1.77	<b>3.90</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-3000	R-22	112.50	<b>248.06</b>	N/A	<i>N/A</i>	2.24	<b>4.94</b>	39.63	<b>18.20</b>	N/A	<i>N/A</i>	1.77	<b>3.90</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
RP-3000	R-500	109.04	<b>240.43</b>	N/A	<i>N/A</i>	1.70	<b>3.75</b>	42.60	<b>17.30</b>	N/A	<i>N/A</i>	1.42	<b>3.13</b>	N/A	<i>N/A</i>	N/A	N/A	N/A	N/A	N/A	<i>N/A</i>
<b>Type: Recovery</b>																					
RP-4400	R-12	215.91	<b>476.00</b>	N/A	<i>N/A</i>	5.78	<b>12.74</b>	18.02	<b>24.60</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.61	<b>3.55</b>	8	<0.1	0.01	1.50	272.2	<b>600.1</b>
RP-4400	R-134a	217.72	<b>479.99</b>	N/A	<i>N/A</i>	5.22	<b>11.51</b>	21.74	<b>23.60</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.63	<b>3.59</b>	20	0.23	0.01	1.50	272.2	<b>600.1</b>
RP-4400	R-22	219.50	<b>483.91</b>	N/A	<i>N/A</i>	6.84	<b>15.08</b>	25.13	<b>22.50</b>	9.00	<b>19.84</b>	0.50	<b>1.10</b>	1.67	<b>3.68</b>	36	2.00	0.01	1.75	272.2	<b>600.1</b>
RP-4400	R-500	217.72	<b>479.99</b>	N/A	<i>N/A</i>	5.73	<b>12.63</b>	19.37	<b>24.20</b>	N/A	<i>N/A</i>	0.40	<b>0.88</b>	1.64	<b>3.62</b>	16	<0.1	0.01	1.50	272.2	<b>600.1</b>
RP-4400	R-502	221.35	<b>487.99</b>	N/A	<i>N/A</i>	9.89	<b>21.80</b>	25.47	<b>22.40</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.69	<b>3.73</b>	24	1.00	0.01	1.75	272.2	<b>600.1</b>
RSR-4445	R-12	215.91	<b>476.00</b>	N/A	<i>N/A</i>	5.78	<b>12.74</b>	18.02	<b>24.60</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.61	<b>3.55</b>	8	<0.1	0.01	1.50	272.2	<b>600.1</b>
RSR-4445	R-134a	217.72	<b>479.99</b>	N/A	<i>N/A</i>	5.22	<b>11.51</b>	21.74	<b>23.60</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.63	<b>3.59</b>	20	0.23	0.01	1.50	272.2	<b>600.1</b>
RSR-4445	R-22	219.50	<b>483.91</b>	N/A	<i>N/A</i>	6.84	<b>15.08</b>	25.13	<b>22.50</b>	9.00	<b>19.84</b>	0.50	<b>1.10</b>	1.67	<b>3.68</b>	36	2.00	0.01	1.75	272.2	<b>600.1</b>
RSR-4445	R-500	217.72	<b>479.99</b>	N/A	<i>N/A</i>	5.73	<b>12.63</b>	19.37	<b>24.20</b>	N/A	<i>N/A</i>	0.40	<b>0.88</b>	1.64	<b>3.62</b>	16	<0.1	0.01	1.50	272.2	<b>600.1</b>
RSR-4445	R-502	221.35	<b>487.99</b>	N/A	<i>N/A</i>	9.89	<b>21.80</b>	25.47	<b>22.40</b>	N/A	<i>N/A</i>	0.50	<b>1.10</b>	1.69	<b>3.73</b>	24	1.00	0.01	1.75	272.2	<b>600.1</b>

