REFRIGERATION NEWS & NOTES

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UL's Web Site is: www.ul.com or www.ul.com/hvacr

UL's Web Site provides access to the following topics:

- The UL Marks
- Global Resources
- UL product testing and certification, facility registration, and related services
- Commercial Inspection and Testing Services
- Seminars
- Technical information resources, such as Standards (including access to the Standards Electronic Bulletin Board System), Directories and UL's Data Services
- UL news and activities, including the latest news releases
- Information for regulatory authorities
- Management System Registration
- Consumer information
- CB Scheme and Market Access Solutions

TABLE OF CONTENTS **PAGE**

Alternative Refrigerants 3
Other UL Services 7
Environmental and Public Health Service 7
Electromagnetic Compatibility Testing 8
Efficiency and Performance Testing 8
UL IQ™ for Plastics 9
Verification Services 9
Market Access Solutions 9
CB Scheme Certification 11
Flammable Refrigerants 12
UL Classified Lubricant for use With Compressor Motor Insulating Materials and Refrigerants 13
UL's Field Evaluation Service 14
Rebuilt Commercial Refrigerators, Beverage Coolers, and Beverage Cooler Dispensers 14
Remanufactured Program for Refrigerant Motor Compressors 15
Pressure Strength Requirements for High Side Refrigerant Containing Parts 16
Restricted Substances Compliance Solutions 16
UL Standards 16
UL Recognized Hermetic Refrigerant Motor Compressors to Hazardous Locations 17
UL Listed Automotive Refrigerant Extraction Equipment 17
UL Listed Automotive Refrigerant Recovery/Recycling Equipment 19
UL Listed and Design Certified Commercial Refrigerant Recovery/Recycling Equipment 22
Performance Certified Commercial Refrigerant Recovery/Recycling Equipment 25

REFRIGERATION NEWS & NOTES

UNDERWRITERS LABORATORIES INC.

Alternative Refrigerants

- The EPA Ozone Protection Hotline is 800-296-1996 and has information on alternate refrigerants under the Significant New Alternatives Program (SNAP).

  INTERNET: EPA's main web site is www.epa.gov
  EPA's SNAP web site is www.epa.gov/ozone/snap/index.html

- A list of refrigerants and their ASHRAE Classifications are tabulated below: Previously, refrigerants were Recognized by UL; they are now Classified to provide identification to the user of the refrigerant and to an authority having jurisdiction that the refrigerant has complied with the UL requirements. Note some refrigerants, including some blends, may be produced by more than one manufacturer.

- Refrigerants submitted to UL are investigated in accordance with requirements in UL's Standard for Refrigerants, UL 2182.

- See also page 12 for information on flammable refrigerants and Carbon dioxide as a refrigerant.

- Effective January 1, 1998, all production and packaged containers of Classified refrigerants must be marked with the Classified company name, product designation and the Classification Marking. Applicable Caution information may also be required. Also see the information on UL Packaging Program for Refrigerants and Refrigerant Oils.

- It is important to check the specific refrigerant supplier's name when you are identifying Classified refrigerants. Make sure to use refrigerant from a supplier who has UL Classification as indicated in UL's Electrical Appliance & Utilization Equipment Directory under the category Refrigerants (SLGV). To find refrigerants that have been Classified by UL, go to the Online Certifications Directory and search by company name or UL Category Code (SLGV).

Refrigerants				Minimum Design Pressures lb-in.² Gauge (KPa)					
UL Classified	Refrigerant Number	ASHRAE 34 Group	Refrigerant Composition/Name (Weight %)(++) (Trade Name)	Low Side		High Side Water or Evaporatively Cooled		High Side Air-Cooled	
Yes	R11	A1	Trichlorofluoromethane	15	(103)	15	(103)	21	(145)
Yes	R12	A1	Dichlorodifluoromethane	85	(586)	127	(876)	169	(1165)
No	R21	B1	Dichlorofluoromethane	15	(103)	29	(200)	46	(317)
Yes	R22	A1	Chlorodifluoromethane	144	(993)	211	(1455)	278	(1917)
Yes	R23	A1	Trifluoromethane	See Note 2					
No	R30	B2	Methylene Chloride	15	(103)	15	(103)	15	(103)
No	R32	A2	Difluoromethane	243	(1673)	403	(2776)	463	(3189)
No	R40	B2	Methyl Chloride	72	(496)	112	(772)	151	(1041)

Refrigerants				Minimum Design Pressures lb-in.^{2} Gauge (KPa)					
UL Classified	Refrigerant Number	ASHRAE 34 Group	Refrigerant Composition/Name (Weight %)(++) (Trade Name)	Low Side		High Side Water or Evaporatively Cooled		High Side Air-Cooled	
Yes	R113	A1	Trichlorotrifluoroethane	15	(103)	15	(103)	15	(103)
Yes	R114	A1	Dichlorotetrafluoroethane	18	(124)	35	(241)	53	(365)
No	R115	A1	Chloropentafluoroethane	152	(1048)	194	(1338)	252	(1738)
Yes	R123	B1	Dichlorotrifluoroethane	15	(103)	15	(103)	18	(124)
Yes	R125	A1	Pentafluoroethane	194	(1333)	281	(1930)	368	(2528)
Yes	R134a	A1	Tetrafluoroethane	88	(606)	135	(930)	186	(1282)
No	R152a	A2	Difluoroethane	76	(523)	119	(820)	164	(1130)
No	R170	A3	Ethane	616	(4247)	709	(4888)	709	(4888)
Yes	R245fa+	B1	HFC-245fa (Genetron® 245fa)	See Notes 1 and 2					
Yes	R290	A3	Propane	129	(889)	188	(1296)	244	(1682)
No	RC318	--	Octafluorocyclobutane	34	(234)	59	(407)	85	(586)
Yes	R401A	A1/A1	R22/152a/124(53%/13%/34%) (SUVA® MP-39)	85	(586)	133	(917)	182	(1255)
Yes	R401B	A1/A1	R22/152a/124(61%/11%/28%) (SUVA® MP-66, Genetron® MP-66)	93	(641)	143	(986)	195	(1344)
No	-	A1/A1	R22/152a/124(40%/17%/43%) (SUVA® MP-33)	See Note 2					
No	R401C	A1/A1	R22/152a/124(33%/15%/52%)	See Note 2					
Yes	R402A	A1/A1	R22/125/290(38%/60%/2%) (SUVA® HP-80)	183	(1262)	265	(1828)	347	(2394)
Yes	R402B	A1/A1	R22/125/290(60%/38%/2%) (SUVA® HP-81)	170	(1172)	247	(1730)	324	(2234)
No	403A	A1/A1	R290/22/218(5%/75%/20%)	See Note 2					
No	403B	A1/A1	R290/22/218(5%/56%/39%)	See Note 2					
Yes	R404A	A1/A1	R125/143a/134a(44%/52%/4%) (Forane® 404A, SUVA® HP-62, Genetron® 404A)	174	(1200)	253	(1745)	331	(2281)
No	R405A	A1/A1	R22/152a/142b/C318 (45%/7%/5.5%/42.5%)G2015	See Note 2					
No	R406A	A1/A2	R22/600a/142b(55%/4%/41%)(GHG12)	See Note 2					
No	-	-	R22/600a/142b(65%/4%/31%)(GHGHP)	See Note 2					
Yes	R407A	A1/A1	R32/125/134a(20%/40%/40%) (KLEA® 407A)	177	(1220)	257	(1771)	335	(2308)
Yes	R407B	A1/A1	R32/125/134a(10%/70%/20%) (KLEA® 407B)	186	(1282)	273	(1881)	355	(2446)
Yes	R407C	A1/A1	R32/125/134a(23%/25%/52%) (KLEA® 407C, SUVA® 9000, Forane® 407C, Genetron® 407C)	167	(1151)	243	(1674)	320	(2205)

Refrigerants				Minimum Design Pressures lb-in.^{2} Gauge (KPa)					
UL Classified	Refrigerant Number	ASHRAE 34 Group	Refrigerant Composition/Name (Weight %)(++) (Trade Name)	Low Side		High Side Water or Evaporatively Cooled		High Side Air-Cooled	
Yes	R407D	A1/A1	R32/125/134a(15%/15%/70%) (KLEA® 407D)	116	(797)	180	(1237)	245	(1683)
Yes	R407E	A1/A1	R32/125/134a(25%/15%/60%) (KLEA® 407E)	See Note 2					
Yes	R408A	A1/A1	R22/143a/125(47%/46%/7%) (Forane® 408A, SUVA® 408A Genetron®408A)	159	(1096)	233	(1606)	307	(2116)
Yes	R409A	A1/A1	R22/124/142b(60%/25%/15%) (Forane® 409A Genetron® 409A, SUVA® 409A)	107	(738)	159	(1096)	212	(1462)
No	R409B	A1/A1	R22/124/142b(65%/25%/10%)	113	(776)	168	(1154)	223	(1532)
Yes	R410A	A1/A1	R32/125(50%/50%) (Genetron® AZ-20, SUVA® 9100, Forane® 410^A)	238	(1641)	344	(2372)	449	(3096)
No	R410B	A1/A1	R32/125(45%/55%)	See Note 2					
No	R411A	A1/A2	R1270/22/152a (1.5%/87.5%/11%)(G2018A)	See Note 2					
No	R411B	A1/A2	R1270/22/152a(3%/94%/3%) (G2018B)	See Note 2					
Yes	R411C+	A1/A1	R1270/22/152a(3%/95.5%/1.5%) (GREENCOOL G2018C)	143	(982)	210	(1443)	277	(1900)
No	R412A	A1/A2	R22/218/142b(70%/5%/25%) (Arcton TP5R)	See Note 2					
No	R413A	A1/A2	R218/134a/600a(9%/88%/3%) (Isceon 49)	See Note 2					
No	-	-	R125/134a/600(46.5%/50%/3.5%) (Isceon 59)	See Note 2					
Yes	R414A+	A1/A1	R22/124/142b/600a (51%/28.5%/16.5%/4%)(GHG-X4)	See Note 2					
Yes	R414B	A1/A1	R22/124/142b/600a (50%/39%/9.5%/1.5%)(Hot Shot)	101	(694)	151	(1037)	201	(1380)
No	R415A	A2	R22/152a(82%/18%)	See Notes 1 and 2					
Yes	R416A	A1/A1	R134a/124/600(59%/39.5%/1.5%) (FRIGC® FR-12)	See Notes 1 and 2					
No	R417A	A1	R125/134a/600 (46.6%/50%/3.4%)	See Notes 1 and 2					
No	R418A	A2	R290/22/152a (1.5%/96%/2.5%)	See Notes 1 and 2					
No	R500	A1	R12/152a (73.8%/26.2%)	102	(703)	152	(1048)	203	(1399)
Yes	R502	A1	R22/115(48.8%/51.2%)	162	(1117)	232	(1599)	302	(2082)
No	R503		R23/13(40.1%/59.9%)(Freon® 503)	See Note 2					

Refrigerants				Minimum Design Pressures lb-in.^{2} Gauge (KPa)					
UL Classified	Refrigerant Number	ASHRAE 34 Group	Refrigerant Composition/Name (Weight %)(++) (Trade Name)	Low Side		High Side Water or Evaporatively Cooled		High Side Air-Cooled	
Yes	R507 or R507A	A1	R125/143a(50%/50%) (Genetron® AZ-50), S UVA® 507, Forane® 507)	180	(1242)	262	(1808)	344	(2374)
Yes	R508 or R508A	A1	R23/116(39%/61%) (KLEA® 508, KLEA® 5R3)	See Note 2					
Yes	R508B	A1/A1	R23/116(46%/54%)(SUVA® 95)	See Note 2					
No	R509 or R509A	A1	R22/218(44%/56%) (Arcton TP5R2)	See Note 2					
No	-	-	R134a/142b(79%/19%/2% Lubricant) (Freezone)	See Note 2					
No	-	-	R134a/142b(80%/20%) (Freez-12)	See Notes 1 and 2					
No	-	A2	R32/134a(30%/70%)	See Notes 1 and 2					
No	-	-	R23/22/152a(5%/90%/5%) (Moncton)	See Notes 1 and 2					
No	R600	A3	N-Butane	23	(159)	42	(290)	61	(421)
Yes	R600a	A3	Isobutane (Chevron Phillips Chemical Co. L P)	39	(269)	63	(434)	88	(607)
No	R611	B2	Methyl Formate	15	(103)	15	(103)	15	(103)
No	R717	B2	Ammonia	139	(958)	215	(1482)	293	(2020)
No	R744	A1	Carbon Dioxide	955	(6685)	1058	(7295)	1058	(7295)
No	R764	B1	Sulfur Dioxide	45	(310)	78	(538)	115	(793)
No	R1150	A3	Ethylene	732	(5047)	732	(5047)	732	(5047)

Note 1: For other refrigerants, the minimum design pressure shall be no less than the saturation vapor pressure of the refrigerant at the following temperatures:

26.5°C (80°F) for low-sides.
51.7°C (125°F) for high-sides.
40.6°C (105°F) for water or evaporatively cooled high-sides.

Note 2: The design pressure need not be greater than the critical pressure of the refrigerant unless the critical temperature is exceeded under operating, standby or shipping conditions (DOT shipping conditions are 130°F). In which case the design pressure will be determined by the pressure at the operating conditions, standby conditions or 130°F whichever is highest. (Reference ASHRAE 15, Clause 9.2.2)

Note 3: For other refrigerants not listed, see the related standards Safety Standard for Refrigeration Systems, ASHRAE 15, and the Mechanical Refrigeration Code, CAN/CSA-B52.

+ Not yet Classified by ASHRAE 34, preliminary number.
++ For composition tolerances refer to ASHRAE-34.

- ASHRAE Classification – ASHRAE's Classification cannot be used until it is officially adopted by ASHRAE. See latest addendum for ASHRAE 34 for current status.

- ASHRAE 15 specifies that in evaluating the installation requirements of a product containing a refrigerant, the classification after the "/" under the ASHRAE 34 Group governs the application (i.e. a refrigerant rated A1/A2 is governed by the rules for A2 rated refrigerants). UL has developed safety requirements for products that use these refrigerants considering the fractionation potential in the application. Refer to the Subject: Flammable Refrigerants for more on fractionation.

Other UL Services

UL provides a full range of conformity and quality assessment services. UL also assists jurisdictional and provincial authorities, distributes educational materials, and works to enhance safety systems worldwide.

Environmental and Public Health Service

UL evaluates products and materials such as food service equipment, drinking water additives, drinking water system components and plumbing products in accordance with environmental and public health-effects standards. UL's certification programs for food service equipment and drinking water related products are accredited by the American National Standards Institute (ANSI). Products Classified for Environmental and Public effects are shown in the following UL Directories: *Drinking Water System Components, Component Materials and Treatment Additives; Classified Food Service Equipment; and Plumbing and Associated Products*.

For more information concerning the certification of specific products covered in these directories, contact the following Staff or visit UL's related web site at www.ul.com/eph.

Drinking Water System Components, Component Materials and Treatment Additives: Tom Bowman	847-664-3796
Classified Food Service Equipment:	
Refrigeration: Andy Haulotte	847-664-2428
Commercial Cooking: Duane Johnson	847-664-2435

Electromagnetic Compatibility Testing

UL conducts a wide range of electromagnetic compatibility (EMC) tests on many electrical products. These tests include electromagnetic emissions and susceptibility evaluations.

For further information on EMC testing, visit www.ul.com/emc or contact customer service at 877-UL-HELPS (877-854-3577).

Efficiency and Performance Testing

Some products are required to conform to certain requirements or specifications related to their function, such as those designed for purposes of lighting, heating, cooling, communications or other functions. UL can investigate these products for compliance to applicable performance requirements or specifications.

Subject: Efficiency Performance Testing for the California Energy Commission

In our continuing effort to offer our customers "one-stop shopping," UL is accredited to perform energy efficiency testing according to the California Code of Regulations Title 20, Chapter 2 Subchapter 4: Energy Conservation Article 4: Appliance Efficiency Regulations. The accreditation allows UL to test and submit data to the California Energy Commission (CEC) for manufacturers intending to supply self-contained commercial refrigerators and freezers and refrigerated vending machines for use in the state of California. Contact: Contact Mike Shows at 972-509-1281 or Todd Oliphant at 972-509-1285.

Subject: Energy Efficiency of Electrical Appliances sold in Canada

UL's Energy Verification program is accredited by Natural Resources Canada. Commercial Refrigerators, Freezers, Ice Makers, Dehumidifiers, and Vending Machines may be evaluated to the appropriate standards and regulations, resulting in a UL Energy Verification Mark. The Mark is accepted throughout Canada. Testing may be conducted at UL or at the manufacturer's facilities under UL's Data Acceptance Program. Contact Mike Shows at 972-509-1281 or Todd Oliphant at 972-509-1285.

UL IQ™ for Plastics

UL IQ™ for Plastics brings UL's Plastics Recognized Component Directory to a searchable online database that will allow you to verify UL Recognition for plastics or to search for UL Recognized plastics by:

- product specifications
- company name
- file number
- generic family name
- grade and
- description.

Updated regularly, the information in UL IQ™ for Plastics is available online 24 hours a day at www.ul.com/plastics.

Verification Services

UL Verification Services offers commercial testing, commercial inspections, commercial auditing/assessment and supply chain services geared to customer requirements.

As part of its services, UL Verification Services inspects products at the supplier's location, during the manufacturing process and prior to shipment. It tests products to a manufacturer's specific criteria test for safety, performance, verification, reliability and design validation, or to a national or international standard. It performs supplier assessment to client's quality requirements, as well as for social accountability and environmental practices. In addition to these services, UL Verification Services also offers supply chain services, such as identification of product requirements, inspection and testing to those requirements, assistance in the development and maintenance of the supply chain, and Internet-based data reporting and tracking. For the solutions you need, please contact the UL Verification Services Staff at 847-272-8800.

International Certification and Market Access Solutions

- UL offers a CE Marking Assistance Program which includes:
    - identification of applicable directives, critical elements, and their effective date,
    - description of the methods of conformity assessment available under each directive
    - identification of applicable documentation requirements
    - identification of published European Norm (EN) standards that can be used to verify compliance
- UL can facilitate testing and/or product certification and obtain appropriate documentation as required by the directives through UL's relationships with various European organizations.
- EU Directive Self-Declaration Testing Assistance

  For products covered under Directives which allow for manufacturer's self-declaration, UL can perform tests to the appropriate European standards, provide test results, assist in the preparation of the required technical file and assist in the preparation of the "Declaration of Conformity."

- If you need more specific information about your product and how UL can help you with your European or International conformity assessment needs, contact your UL engineer or the following engineers from Conformity Assessment Services for assistance:

  Commercial Cooking Equipment
  Duane Johnson (Commercial Cooking)
  Telephone: 847-664-2435; Fax: 847-313-2435
  E-mail: Duane.T.Johnson@us.ul.com

  Hearth Products
  Bob Zimmerman Jr. (Hearth Products)
  Telephone: 847-664-3129; Fax: 847-509-6225
  E-mail: Robert.J.Zimmerman.Jr.@us.ul.com

  Air Conditioning Equipment and Electrical Controls
  Paul Jackson (Controls)
  Telephone: 847-664-1774
  E-mail: Paul.K.Jackson@us.ul.com

  Fred Salzman (AC Equipment)
  Telephone: 847-664-3002; Fax: 847-509-6225
  E-mail: Frederic.A.Salzman@us.ul.com

  Refrigeration Equipment, Room Air Conditioners, and Motor-Compressors
  Andy Haulotte (Refrigeration Equipment)
  Telephone: 847-664-2428; Fax: 847-509-6225
  E-mail: Andrew.H.Haulotte@us.ul.com

  Mike Romano (Motor Compressors)
  Telephone: 847-664-2167; Fax: 847-509-6225
  E-mail: Michael.A.Romano@us.ul.com

  Joe Freeman (Room Air Conditioners)
  Telephone: 847-664-2937; Fax: 847-509-6225
  E-mail: Joseph.P.Freeman@us.ul.com

  Laundry Equipment and Household Cooking Appliances
  Duane Johnson
  Telephone: 847-664-2435; Fax: 847-509-2435
  E-mail: Duane.T.Johnson@us.ul.com

You can get additional information at www.ul.com/international.

CB Scheme Certification Helps Facilitate International Trade

UL participates in the International Electrotechnical Committee for Conformity Testing to Standards for Electrical Equipment (IECEE) Certification Body (CB) Scheme for many categories, including the following:

- Household Refrigerators, IEC 60335-2-24
- Motor-Compressors, IEC 60335-2-34
- Air Conditioning Equipment, IEC 60335-2-40
- Dispensing Appliances and Vending Machines, IEC 60335-2-75
- Commercial Refrigerators, IEC 60335-2-89
- Switches for Appliances, IEC 61058
- Controls, IEC 60730
- Process Control Equipment, IEC 61010
- Thermal Links (Thermal Cutoffs), IEC 60691

The CB Scheme, established by the IECEE, provides a means for the mutual acceptance of CB Test Certificates and Reports among participating safety certification organizations in certain product categories. It is an international network made up of product certification organizations in 38 countries throughout North America, Latin America, Europe, Africa, Australia and Asia. National Certification Bodies (NCBs) worldwide expedite this certification process.

UL's Northbrook engineers can prepare CB Test Reports and have CB Test Certificates issued for the equipment categories noted above.

Software and IEC 61508 – UL also provides assistance to manufacturers with the generation of informative test reports for demonstrating compliance with IEC 61508, Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems, pending participation into the CB Scheme.

For more information on the CB Scheme certification for these categories please contact the following staff at the Northbrook Office:

Refrigeration and Air Conditioning Equipment – Andy Haulotte at 847-664 2428 or email at Andrew.H.Haulotte@us.ul.com

Compressors –Mike Romano at 847-664-2167 or e-mail at Michael.A.Romano@us.ul.com

Switches – Judy Duresa at 847-664-2592 or e-mail at Judy.A.Duresa@us.ul.com

Controls – Leo Yermakov at 847-664-1580 or e-mail at Leonid.Yermakov@us.ul.com

Process Control Equipment – Leo Yermakov at 847-664-1580 or e-mail at Leonid.Yermakov@us.ul.com

Thermal Links – Thomas DeGrande at 847-664-2684 or e-mail at Thomas.A.Degrande@us.ul.com

Software and IEC 61508 – Anura S. Fernando at 847-664-1730 or e-mail at Anura.S.Fernando@us.ul.com

Flammable Refrigerants

- UL has worked with the Household Refrigerator and Freezer Industry and the IEC (SC61C) in a continuing effort to develop requirements for Household Refrigerators and Freezers employing flammable refrigerants or refrigerants that can fractionate to a flammable gas (e.g. A1/A2). The requirements were adopted in August 2000 as a supplement to the UL Standard for Household Refrigerators and Freezers, UL 250. The UL requirements are similar to the IEC requirements for 60335-2-24 which were adopted in June 1997.

- UL worked with the Commercial Refrigerator and Freezer Industry to develop requirements for Commercial Refrigerators and Freezers employing flammable refrigerants. These requirements have been published, and UL has Listed several commercial refrigerators and freezers that employs propane as the refrigerant. The UL requirements are similar to the requirements in IEC 60335-2-89.

- Fractionation: Refrigerant blends that employ a flammable component have been analyzed for fractionation in accordance with UL 2182. It is commonly believed that operating conditions related to the pressure and temperature of the blend in an end-use application will not result in a "worse" fractionation scenario. Equipment that includes receivers and accumulators may require a check test to confirm that if a leak occurs in that area (i.e., if a joint is present or damage can occur), a flammable gas will not be leaked.

- UL has determined for 410A and 407C that there will not be fractionation within the equipment that is more than what was evaluated during the investigation of the refrigerant per UL 2182.

- For further information contact Randy Haseman 847-664-3076

Carbon Dioxide (R744) as a Refrigerant

- A Joint Task Group (JTG) was formed for the purpose of drafting requirements for large-scale refrigeration equipment using R744 (CO2) as the refrigerant. The JTG was comprised of representatives from equipment manufacturers, UL, and other safety organizations. Requirements have been published in several of the affected UL standards, including UL 471, the Standard for Commercial Refrigerators and Freezers and UL 1995, the Standard for Heating and Cooling Equipment. The requirements are based on a revision to clause 9.2.6 of ASHRAE 15. Current designs of such equipment use the refrigerant in a sub-critical manner, so the proposed requirements are **not** intended to cover the use of CO2 in transcritical applications.

- For further information contact Randy Haseman 847-664-3076.

UL Classified Lubricant For Use With Compressor Motor Insulating Materials and Refrigerants

- UL has developed specifications to Classify lubricant used in sealed motor compressors of air conditioning and refrigeration equipment. The new lubricants are synthetic with varied chemical additives and viscosities to enhance their performance.

- The lubricants are evaluated according to the requirements in Subject 984A, Outline of Investigation for Compatibility of Insulating Materials and Refrigerant/Oil for Use in Hermetic Refrigerant Motor-Compressors. Additional details can be found in UL's November 18, 1997 Bulletin under Subject 984A.

- This UL program covers the Classified lubricants along with the indicated refrigerants for all insulating materials used in Recognized Hermetic Refrigerant Motor-Compressors. Classified Refrigerant Oils are shown in the current Electrical Appliance & Utilization Equipment Directory under the category Refrigerant Oils (SOLI). For further information please contact Mike Romano (Ext. 42167).

- UL's Classification Marking (shown below) on the product is the means to identify products which have been evaluated under this program.

Refrigerant Oil

As to compatibility with Classified Refrigerants
specified on the shipping container and motor
electrical insulating materials used in
Recognized Hermetic Refrigerant
Motor-Compressors

The following oils are presently Classified under UL's Program:

Classified Company	UL File No.	Lubricant Designation	Lubricant Type	Refrigerant
CPI Engineering	SA11535	Solest 31-HE, Solest 370, Solest 22-BC, Solest LT-32, Solest 32-BC, Solest 46, Solest 68, Solest 68FA, Solest 120, Solest 170, Solest 180, Solest 220, Solest 72, Solest 320; CP, -2915AS, -2922LE, -2921, -2931, EXP-1828	POE	R22, R134a, R404A, R407A, R407B, R407C, R410A, R507 and R507A
		Type 32MAPOE-DA.	POE	R22, R134a, R404A, R407A, R407B, R407C and R410A
		CP-2910, -2910A, -2922E	POE	R134A
		RL68H, RL68S	POE	R22, R134a, R404A, R407A, R407B, R407C, R410A, R507 and R507A
		DE 10028, DE 10029, RL7H, RL10H, RL15EB, RL15H, RL22H, RL22N, RL32H, RL32HB, RL32S, RL46H, RL46HB, RL46S, RL68HB, RL100, RL100S, RL150S, RL170H, RL220H		R134a, R404A, R407A, R407B, R407C, R410A, R507 and R507A
Lubrizol	SA9881	Lubrikuhl Lubrizol 2916S	POE	R134a, R404A
Hatco	SA11574	EAL Artic 22, 32, 32ST, 46, 68, 100, 150 and 220	POE	R134a, R404A, R407A, R407B, R407C, R410A, R507, and R507A
		EAL Artic 15	POE	R134a
Shrieve Chemical Co.	SA32640	Zerol 150T	Alkyl-Benzene Synthetic	R22
Japan Energy	SA11855	Freol Alpha 10, 10E, 10L, 10LL, 10SZT, 10W and 22E	POE	R134a
Idemitsu Kosan Co. Ltd.	SA11970	Daphne Hermetic FV10 through FV120	PVE	R134a, R404A, R407A, R407B, R407C, R410A, R507 and R507A
Idemitsu Lubricants America Corp.	SA32168	Daphne Hermetic FV10-FV120	PVE	R134a, R404A, R407A, R407B, R407C, R410A, R507 and R507A

UL's Field Evaluation Service

- Regulatory authorities occasionally find products in the field that haven't been investigated by a third-party certification organization. It can be difficult for regulatory authorities to determine the acceptability of these products without safety certification markings. UL has established a program to evaluate installed products in the field to assist regulatory authorities in determining their acceptability. Under this program, UL technical staff conducts on-site safety evaluations including testing, examination and installation review of products that have already been installed. If the product complies with UL's safety requirements, a Field Evaluated Product Mark is applied to the product on the spot. Contact UL at 877-UL-HELPS (877-854-3577).

Rebuilt Commercial Refrigerators, Beverage Coolers, and Beverage Cooler Dispensers

- UL has a program for Listing reconditioned or "rebuilt" commercial refrigerators, beverage coolers, and beverage cooler dispensers. These rebuilt products are factory reconditioned by being disassembled, then reassembled and tested using new or reconditioned components to provide a product equivalent to a new or original product. Manufacturers interested in using this service are encouraged to contact UL's Customer Service Department.

Remanufactured Program for Refrigerant Motor Compressors

- UL has evaluated remanufactured refrigerant motor-compressors and remanufactured refrigerant open type compressors. These remanufactured products comply with the same requirements as new compressors. Remanufactured compressors used in the field should be checked for the Recognition Mark or the UL Listing Mark. Remanufactured compressors without the appropriate marking may not meet requirements of local electrical codes.

- Remanufactured compressors might be used in air conditioning and refrigeration condensing units, compressor units, commercial refrigerators and freezers, ice makers, ice cream makers, etc.

- The following remanufactured compressors are presently covered by UL's Program:

Recognized Remanufactured Hermetic Refrigerant Motor Compressors (SLLG2)		Listed Remanufactured Open Type Refrigerant Compressors (SLRG)	
Company Name	UL File No.	Company Name	UL File No.
Aircondex Inc.	SA11585	York Refrigeration	SA2792
Emerson Climate Technologies.	SA2337	*	
*			
		Trane Co.	SA11512
*			
Trane Co.	SA11511		
York International Corp.	SA9732		
Carlyle Stone Mountain	SA12668		
York Refrigeration	SA12484		

Pressure Strength Requirements For High Side Refrigerant Containing Parts

- Some new refrigerants entering the marketplace operate at higher pressures than their predecessors. Therefore, it is necessary to either revise the refrigerant containing end product standards to conduct tests at these higher pressures or to conduct fatigue analysis on these refrigerant containing products. UL worked with an ARI task force to develop the requirements for the Fatigue Test Analysis to provide an alternate means of evaluating the strength of parts subjected to refrigerant pressure. The requirements are published in UL's Standards for Refrigerant-Containing Components and Accessories, UL 207, Heating and Cooling Equipment, UL 1995, and Commercial Refrigerators and Freezers, UL 471.

UL's Restricted Substances Compliance Solutions

- If you manufacture electrical products or components, you are probably aware of the increasing concerns about the use of hazardous substances in your products. Many regions are adopting or considering regulations on hazardous substances. UL's Verification Services can assist you with training or third party testing for restricted substances. For further information, contact UL's Customer Service Department at 877-UL-HELPS (877-854-3577) or cec@us.ul.com.

UL Standards:

- UL Certification customers can access UL and ULC Standards on our web site at no charge. Sales of UL Standards are available at www.comm-2000.com. For additional information, visit www.ul.com/standards.

UL Recognized Hermetic Refrigerant Motor Compressors For Hazardous (Classified Locations)

- To assist manufacturers, users and local authorities having jurisdiction, UL created the product category “Hermetic Refrigerant Motor-Compressors For Use In Hazardous (Classified) Locations” (MPAH2) under the Component Recognition Program.

Products covered in this category are intended to be used in hazardous locations refrigeration and air conditioning equipment such as refrigerators, freezers, air conditioners, water coolers and the like. UL 1203, the Standard for “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” along with UL 984, the Standard for “Hermetic Refrigerant Motor-Compressors,” are used to investigate products in this category.

Contact Francis Mah at 847-664-2842 for more details. Presently, equipment of this type is Recognized for:

Company	UL File No.
Andover Protection Systems	E185636

UL Listed Automotive Refrigerant Extraction Equipment

- These Listings cover automotive refrigerant extraction equipment intended to remove refrigerant from automotive refrigerant systems.

- This equipment has been evaluated to determine that it meets the extraction specifications for R-12 recovery to assure that venting of refrigerant will not occur. The refrigerant removed by this equipment is intended to be returned to a refrigerant reclamation facility for processing. Such equipment is provided with the auxiliary marking “Design Certified by Underwriters Laboratories Inc. to meet SAE J2209 (date) for use with R-12. The refrigerant from this equipment must be processed to ARI Standard 700-88 before reuse in a mobile air conditioning system.” This marking indicates that the equipment has been investigated for compliance with the applicable SAE requirements.

- The basic standard used to investigate products in this category is UL 1963, “Refrigerant Recovery/Recycling Equipment.”

- The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word “Listed,” a control number, and the following product name: “Automotive Refrigerant Extraction Equipment.”

THE FOLLOWING TABULATES AUTOMOTIVE REFRIGERANT EXTRACTION EQUIPMENT (SCHL). FOR MOBILE AUTOMOTIVE AIR CONDITIONING SYSTEMS. EQUIPMENT INTENDED TO RECOVER R12 IS MARKED: "DESIGN CERTIFIED BY UNDERWRITERS LABORATORIES INC. TO MEET SAE-J2209 (DATE) FOR USE WITH R-12. THE REFRIGERANT FROM THIS EQUIPMENT MUST BE PROCESSED TO ARI STANDARD 700-88 BEFORE REUSE IN A MOBILE AIR CONDITIONING SYSTEM". EQUIPMENT INTENDED TO RECOVER R134a IS MARKED: "DESIGN CERTIFIED BY UNDERWRITERS LABORATORIES INC. TO MEET SAE-J1732 FOR USE ONLY WITH R134a. THE REFRIGERANT FROM THIS EQUIPMENT MUST BE PROCESSED TO ARI 700-93 SPECIFICATIONS OR TO SAE-J2210 SPECIFICATIONS BY USING DESIGN CERTIFIED EQUIPMENT OF THE SAME OWNERSHIP."

R-12 Manufacturers	R-12 Models
SPX Corporation, Robinair Division	17625A

R-134a Manufacturers	R-134a Models
SPX Corporation, Robinair Div.	34650
Van Steenburg Engineering Laboratories Inc.	JV90R-R134a

THE FOLLOWING TABULATES
AUTOMOTIVE REFRIGERANT RECOVERY/RECYCLING EQUIPMENT (SCMA) EMPLOYING A COMMON REFRIGERANT SYSTEM FOR CFC-12 OR HFC-134a IN MOBILE AUTOMOTIVE AIR CONDITIONING SYSTEMS "DESIGN CERTIFIED BY UNDERWRITERS LABORATORIES INC. TO MEET SAE-J1770 (DATE) FOR RECYCLING R-12 AND R134a USING COMMON REFRIGERANT CIRCUITS."

Manufacturer	Model
SPX Corporation	17800B,

UL Listed Automotive Refrigerant Recovery/Recycling Equipment

- This equipment has been evaluated to determine the minimum purity specifications for recycled CFC-12 or HFC-134a for use in mobile automotive air conditioning systems. Such equipment is provided with the following auxiliary marking "Design Certified by Underwriters Laboratories for Compliance with 'SAE-J1991' for CFC-12 or 'SAE-J2210' for HFC-134a (date)" to indicate that the equipment has been investigated for compliance with the applicable SAE requirements.

- These Listings cover refrigerant recovery/recycling equipment used to service automobiles, light trucks, and other vehicles with air conditioning systems that employ CFC-12 or HFC-134a as a refrigerant. This equipment is intended to be used mainly in automotive service stations and repair facilities.

- The use of this equipment to service mobile vehicles for refrigerated cargo that have hermetically sealed, rigid-pipe air conditioning systems has not been investigated.

- The equipment has not been investigated for operation in hazardous locations. This equipment is to be marked for use either (1) in rooms with mechanical ventilation that provides at least four air changes per hour, or (2) located at least 18 in. (457 mm) above the floor.

- The basic standard used to investigate products in this category is UL 1963, "Refrigerant Recovery/Recycling Equipment."

- Equipment intended only for testing or charging air conditioning systems of mobile vehicles is covered under the category of Garage Equipment (JGWV).

- The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word “Listed,” a control number, and the following product name: “CFC-12 Recycling Equipment” or “HFC-134a Recycling Equipment.”

THE FOLLOWING TABULATES REFRIGERANT RECOVERY/RECYCLING EQUIPMENT, AUTOMOTIVE (SCMA) FOR MOBILE AUTOMOTIVE AIR CONDITIONING SYSTEMS USING CFC-12 “DESIGN CERTIFIED BY UNDERWRITERS LABORATORIES INC. FOR COMPLIANCE WITH SAE-J1991 (DATE).”

Manufacturer	Model
SPX Corporation	17700Z
Van Steenburgh Engineering Lab Inc. *	JV90-4, -3, -2, -1, LV30-4, -3, -2, -1, CV15-4, -3, -2, -1

THE FOLLOWING TABULATES
REFRIGERANT RECOVERY/RECYCLING EQUIPMENT, AUTOMOTIVE (SCMA) FOR MOBILE AUTOMOTIVE AIR CONDITIONING SYSTEMS USING HFC-134a "DESIGN CERTIFIED BY UNDERWRITERS LABORATORIES INC. FOR COMPLIANCE WITH SAE-J2210 (DATE) or SAE-J2788."

Manufacturer	Model
SPX Corporation	34288(+),34788(+), 543160(+), 545160(+), AC34288(+), AC34788(+), H234288(+), H234788(+), J-48943(+), RA-C34788(+), RA-C324288(+), ROB134APF(+), 48920, GE-48800 34988(+), 48710(+)

*

(+)- Tested in accordance with SAEJ2788.

MULTIPLE LISTINGS

Company	Model
*	
Snap-On Tools	EEAC324A (+), EEAC325A(+)

UL LISTED AND DESIGN CERTIFIED COMMERCIAL REFRIGERANT RECOVERY/RECYCLING EQUIPMENT

These Listings cover refrigerant recovery/recycling equipment intended to remove and recycle refrigerant from residential and commercial refrigerant systems. This equipment has been evaluated for the tabulated performance characteristics. Equipment manufactured prior to November 15, 1993 is provided with an auxiliary marking "Design Certified by Underwriters Laboratories Inc. In Accordance With ARI 740 (date) For The Tabulated Characteristics" to indicate that the equipment has been investigated for compliance with the applicable ARI requirements.

This equipment has been evaluated for safety when removing and recycling refrigerant in any condition from a system or storing it in an external container without necessarily testing or processing the refrigerant. The use of this equipment to reduce contaminants, such as moisture, oil, noncondensable gas, acidity, particulate matter and the like has been evaluated.

This equipment has been evaluated to meet EPA's minimum requirements in accordance with Section 608 of the Clean Air Act. Equipment manufactured after November 15, 1993 is provided with the auxiliary marking: "This Equipment Has Been Certified by Underwriters Laboratories To Meet EPA's Minimum Requirements for Recovery/Recycling Equipment Intended For Use With _#_."

- Indicates type(s) of refrigerant and type of appliance.

The basic standard used to investigate products in this category is UL 1963, "Refrigerant Recovery/Recycling Equipment." (SCKG)

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed," a control number, and the following product name: "Commercial Refrigerant Recovery/Recycling Equipment."

VAN STEENBURGH ENGINEERING LABORATORIES, INC.

Type: Recovery/Recycling Dual Pass

Model Designation	Refrigerant	Liquid Refrigerant Recovery Rate (lbs/min)	Vapor Refrigerant Recovery Rate (lbs/min)	Final Recovery Vacuum Level, in. Hg	Recycle Flow Rate (lbs/min)	Moisture Content (ppm by Weight)	Chloride Ions (ppm by Weight)	Acidity (ppm by Weight)	High Boiling Residue (% by Volume)	Particulates/ Solids (Visual)	Non-Condensable (% by Volume)	Non-Condensable Purge Loss (≤ 5% by Weight)
BV300A-1	R12	5.0	1.5	15	2.50	4.8	Pass	< 0.1	0.009	Pass	0.1	Pass
,-2	R22	4.0	2.0	15	2.50	8.0	Pass	< 0.1	0.007	Pass	0.1	Pass
,-3	R500	5.0	1.5	15	2.50	4.8	Pass	< 0.1	0.01	Pass	0.63	Pass
,-4	R502	5.0	2.46	15	2.50	6.8	Pass	< 0.1	0.01	Pass	0.41	Pass
JV 90A –1	R12	5.0	1.47	15	2.08	8.3	Pass	< 0.1	0.005	Pass	0.81	Pass
,-2	R22	4.8	1.8	15	2.08	6.5	Pass	< 0.1	0.007	Pass	1.02	Pass
,-3	R500	4.8	1.5	15	2.08	3.1	Pass	< 0.1	0.007	Pass	0.24	Pass
,-4	R502	5.0	2.4	15	2.08	3.6	Pass	< 0.1	0.005	Pass	0.40	Pass

Note: Tested in accordance with Appendix B in Sec. 608 of the Clean Air Act dated May 14, 1993.

VAN STEENBURGH ENGINEERING LABORATORIES, INC.

Type: Recovery/Recycling Dual Pass

Model Designation	Refrigerant	Liquid Refrigerant Recovery Rate (lbs/min)	Vapor Refrigerant Recovery Rate (lbs/min)	Final Recovery Vacuum Level, in. Hg	Recycle Flow Rate (lbs/min)	Moisture Content (ppm by Weight)	Chloride Ions (ppm by Weight)	Acidity (ppm by Weight)	High Boiling Residue (% by Volume)	Particulates/ Solids (Visual)	Non-Condensable (% by Volume)	Non-Condensable Purge Loss (≤ 5% by Weight)
LV30A-1	R12	2.2	1.6	15	1.20	7.2	Pass	< 0.1	0.01	Pass	0.44	Pass
,-2	R22	1.6	1.5	15	1.20	8.8	Pass	< 0.1	0.007	Pass	0.28	Pass
,-3	R500	1.8	1.8	15	1.20	3.6	Pass	< 0.1	0.005	Pass	0.9	Pass
,-4	R502	2.2	2.0	15	1.20	3.6	Pass	< 0.1	0.005	Pass	0.45	Pass
CV15A-1	R12	2.3	1.0	15	0.95	3.6	Pass	< 0.1	0.005	Pass	0.1	Pass
,-2	R22	1.7	1.0	15	0.95	13.1	Pass	0.3	0.008	Pass	0.29	Pass
,-3	R500	1.4	1.2	15	0.95	3.6	Pass	< 0.1	0.005	Pass	0.28	Pass
,-4	R502	1.9	1.4	15	0.95	6.5	Pass	< 0.1	0.005	Pass	0.18	Pass

NOTE: 1. For recovery-only units. “N/A” indicates not applicable.
2. For a recovery or recycle unit, a mass flow rate must be specified for liquid or vapor refrigerant or for both.

+ - Denotes manufacturer selected push/pull method of liquid recovery rating which may not be applicable in all fluid situations. Consult operating manual for applications.

++ - Denotes manufacturer selected rapid liquid recovery method. Consult operating manual for applications.

Note: Tested in accordance with Appendix B in Sec. 608 of the Clean Air Act dated May 14, 1993

Commercial Refrigerant Recovery/Recycling Equipment Certified For Performance Characteristics In Accordance With Section 608 Of The United States Clean Air Act

This category covers commercial refrigerant recovery/recycling equipment that has been evaluated to meet the United States EPA's minimum performance requirements outlined in Sec. 608 of the Clean Air Act. These are covered under UL Category QVBC.

These products may also bear a UL Listing Mark as appropriate for the product type. For additional information of products that bear such Marks see UL's Electrical Appliance and Utilization Equipment Directory.

LOOK FOR THE CERTIFIED PERFORMANCE STATEMENT ON THE PRODUCT

The Certified Performance Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Certified Performance and Follow-up Service.

For those products which are also Listed, the Certified Performance Statement includes the appropriate Listing Mark and the statement: "This Equipment Has Been Certified by Underwriters Laboratories Inc. to Meet EPA's Minimum Requirements for (+) Equipment Intended for Use With (++)."

For those products which are not Listed, the Certified Performance Statement consists of: "This Equipment Has Been Certified by Underwriters Laboratories Inc. to Meet EPA's Minimum Requirements for (+) Equipment Intended for Use With (++)" and a control number. The symbol UL in a circle is not used as part of the marking.

(+) – Recovery or Recovery/Recycling.
(++) – Indicates type(s) of refrigerant and type of appliance.

PUBLISHED PERFORMANCE RATINGS
RITCHIE ENGINEERING CO.

Type: Refrigerant Recovery Only Equipment

Model Des -ignation	Refri-gerant	Push/ Pull Recovery Rate (kg/min.)	Liquid Re-frigerant Recovery Rate (kg/min)	Vapor Re-frigerant Recovery Rate (kg/min)	High Temperature (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level, kPa	Moisture Content (ppm by Weight)	Chloride Ions (ppm by Weight)	Acidity (ppm by Weight)	High Boiling Residue (% by Volume)	Non-Conden-sable Purge Loss (≤ 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
R30,	R12	4.73	N/A	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R30a	R134a	4.23	N/A	0.09	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R31	R22	3.98	N/A	0.13	0.12	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
9570X	R500	4.38	N/A	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	3.45	N/A	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R50,	R12	4.15	0.79	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R50a,	R134a	4.15	0.79	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R53a,	R22	4.15	0.79	0.11	0.15	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
9575X	R500	4.15	0.79	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	4.17	1.05	0.19	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R60,	R12	5.95	0.76	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R60A,	R134a	5.95	0.76	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R62,	R22	5.95	0.76	0.15	0.14	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R62a,	R500	5.95	0.76	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
95740	R502	5.95	1.04	0.25	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R11	2.07	0.038	0.07	N/A	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
	R123	2.07	0.038	0.07	N/A	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
,	R114	2.07	0.038	0.07	0.14	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
,	R407C	5.39	0.75	0.43	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R63	R12	6.20	1.0	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R63A,	R134a	6.20	1.0	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R73,	R22	6.20	1.0	0.10	0.13	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R73A	R500	6.20	1.0	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	6.23	1.38	0.18	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R65 , 65a,	R12	4.98	0.9	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R68, R68a,	R134a	4.98	0.9	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
95765,	R22	4.98	0.9	0.15	0.10	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
95768	R500	4.98	0.9	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	5.0	1.24	0.25	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05

PUBLISHED PERFORMANCE RATINGS

RITCHIE ENGINEERING CO.

Type: Refrigerant Recovery Only Equipment

Model Des -ignation	Refri-gerant	Push/ Pull Recovery Rate (kg/min.)	Liquid Re-frigerant Recovery Rate (kg/min)	Vapor Re-frigerant Recovery Rate (kg/min)	High Temperature (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level, kPa	Moisture Content (ppm by Weight)	Chloride Ions (ppm by Weight)	Acidity (ppm by Weight)	High Boiling Residue (% by Volume)	Non-Conden-sable Purge Loss (≤ 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
R69,	R12	3.85	0.71	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
95769	R134a	3.85	0.71	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R22	3.85	0.71	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R500	3.85	0.71	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	3.88	0.98	0.25	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R11	1.34	0.04	0.07	N/A	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
	R123	1.34	0.04	0.07	N/A	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
	R114	1.34	0.04	0.07	N/A	>85.0	N/A	N/A	N/A	N/A	N/A	3	0.05
	R407C	3.49	0.70	0.19	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R70,	R12	6.12	0.9	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R70a,	R134a	6.12	0.9	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R72,	R22	6.12	0.9	0.15	0.15	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R72a,	R500	6.12	0.9	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R82A	R502	6.16	1.2	0.27	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R80a,9576X, 9577X.	R410A	5.54	0.76	0.22	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R100,	R12	6.39	1.68	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
9510X	R134a	6.82	1.59	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R22	7.65	1.68	0.24	0.23	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R500	6.77	1.67	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	7.60	2.34	0.27	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
R100	R12	2.75	1.68	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
(European	R134a	2.93	1.59	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
Version)	R22	3.29	1.68	0.20	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R500	2.91	1.67	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05
	R502	3.27	2.34	0.27	N/A	50.53	N/A	N/A	N/A	N/A	N/A	3	0.05

Note: Tested in accordance with Appendix B in Sec. 608 of the Clean Air Act (proposed) dated February 29, 1996.

PUBLISHED PERFORMANCE RATINGS
PUMP WORKS, INC.

Type: Refrigerant Recovery Unit

		PERCENT REFRIGERANT RECOVERED (≥ 90%)		PERCENT REFRIGERANT RECOVERED (≥ 80%)	
		Operational	Operational	Nonoperational	Nonoperational
Model Designation	Refrigerant	Reciprocating Compressor	Rotary Compressor	Reciprocating Compressor	Rotary Compressor
Mongoose	R134a	Pass	Pass	Pass	Pass

Note: Tested in accordance with Appendix C in Sec. 608 of the Clean Air Act dated May 14, 1993.

PUBLISHED PERFORMANCE RATINGS
APPION INC.

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level KPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
G5 TWIN	R134A	5.03	1.97	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	7.54	2.82	0.28	0.19	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	7.99	3.18	0.23	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	4.63	1.58	0.18	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
G1 SINGLE	R134A	4.28	2.36	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	4.90	3.88	0.12	0.14	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	5.14	2.65	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	5.52	1.96	0.12	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05

PUBLISHED PERFORMANCE RATINGS
CPS PRODUCTS, INC.

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level KPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by Weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
CR300	R12	4.72	0.33	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.25
AR2700	R134A	4.34	0.33	0.09	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.25
	R22	4.12	0.20	0.10	0.10	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.25
	R500	3.99	0.25	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.25
	R502	3.75	0.23	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.25
CR400	R12	4.72	0.33	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
AR2700M	R134A	4.34	0.33	0.09	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	4.12	0.20	0.10	0.10	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R500	3.99	0.25	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R502	3.75	0.23	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
CR500	R12	4.49	0.91	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R134A	4.67	0.92	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	5.03	1.24	0.13	0.13	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R500	5.17	1.01	0.12	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R502	5.53	1.37	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
CR600	R12	4.30	1.18	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R134A	4.89	1.00	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	5.30	0.87	0.14	0.13	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R500	4.57	1.09	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R502	4.57	0.75	0.16	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
CR700	R134A	6.3	2.15	0.15	N/A	31.39	N/A	N/A	N/A	N/A	N/A	N/A	<0.0071
	R22	7.17	3.11	0.22	0.242	31.05	N/A	N/A	N/A	N/A	N/A	N/A	<0.0071
	R407C	7.0	2.74	0.21	N/A	29.67	N/A	N/A	N/A	N/A	N/A	N/A	<0.0071
	R410A	6.97	2.95	0.23	N/A	31.05	N/A	N/A	N/A	N/A	N/A	N/A	<0.0071

PUBLISHED PERFORMANCE RATINGS
VAN STEENBURGH ENGINEERING LABORATORIES, INC.

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level kPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
RV-10	R22	N/A	0.34	0.17	0.14	67.73	N/A	N/A	N/A	N/A	N/A	N/A	0.050
	R134a	N/A	0.52	0.13	N/A	71.11	N/A	N/A	N/A	N/A	N/A	N/A	0.045
	R407C	N/A	0.29	0.16	N/A	67.73	N/A	N/A	N/A	N/A	N/A	N/A	0.054

PUBLISHED PERFORMANCE RATINGS
INFICON INC.

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level kPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
Vortex AC	R22	5.37	1.35	0.13	0.13	50.53	N/A	N/A	N/A	N/A	N/A	N/A	0.0
	R134a	3.44	1.13	0.10	-	50.53	N/A	N/A	N/A	N/A	N/A	N/A	0.0
	R407C	5.13	1.85	0.11	-	50.53	N/A	N/A	N/A	N/A	N/A	N/A	0.0
	R410A	5.15	1.57	0.13	-	50.53	N/A	N/A	N/A	N/A	N/A	N/A	0.0

PUBLISHED PERFORMANCE RATINGS
SPX CORP

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level kPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by Weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
RG5410A and	R134A	3.63	1.57	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
RG5410A-KT	R22	4.32	1.81	0.15	0.15	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	4.32	1.81	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	4.91	1.85	0.16	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
RG5410HP	R134A	4.05	1.46	0.12	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	4.64	1.28	0.14	0.15	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	4.64	1.28	0.14	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	4.90	1.7	0.17	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
MINIMAX and	R134A	4.53	1.03	0.11	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
MINIMAX-KT	R22	5.67	1.22	0.13	0.15	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	5.67	1.22	0.13	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	5.90	1.50	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
25150B (Robinair)	R134A	5.13	1.01	-	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	5.87	1.22	-	0.15	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	5.87	1.22	-	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05

PUBLISHED PERFORMANCE RATINGS
SPX CORP

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	High Temp. (40ºC) Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level Kpa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by Weight)	High Boiling Residue (% by volume)	Non-Condensable Purge Loss (< 3% by Weight)	Refrigerant Loss, Weight %	Residual Trapped Refrigerant kg
25175B	R134A	3.55	1.55	0.10	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	4.21	1.75	0.13	0.17	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	4.21	1.75	0.13	N/A	50.5 3	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	4.74	1.75	0.15	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
25200B	R134A	-	0.73	0.06	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	-	0.68	0.06	0.06	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	-	0.68	0.06	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	-	0.30	0.06	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
Pro Vax	R134A	3.63	1.57	0.11	N/A	53.53	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R22	4.32	1.81	0.15	0.15	53.53	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R407C	4.32	1.81	0.15	N/A	53.53	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R410A	4.91	1.85	0.16	N/A	53.53	N/A	N/A	N/A	N/A	N/A	<3	<0.05
RG5410EX	R134A	5.32	1.10	0.144	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R22	6.60	1.90	0.185	0.141	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R407C	5.20	1.20	0.155	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
	R410A	6.41	2.33	0.201	N/A	50.53	N/A	N/A	N/A	N/A	N/A	N/A	<0.05
RG6000	R134a	5.05	2.29	0.18	N/A	50.48	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R22	7.13	3.53	0.25	0.21	50.29	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R407C	7.26	3.15	0.24	N/A	50.45	N/A	N/A	N/A	N/A	N/A	<3	<0.05
	R410A	7.60	2.74	0.16	N/A	50.25	N/A	N/A	N/A	N/A	N/A	<3	<0.05

PUBLISHED PERFORMANCE RATINGS
NATIONAL REFRIGERATION PRODUCTS

Model Dsg	Refrigerant	Push/Pull Recovery Rate (kg/min)	Liquid Recovery Rate (kg/min)	Vapor Recovery Rate (kg/min)	Final Recovery Vacuum Level kPa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by weight)
GS3700	R22(+)	7.17	3.11	0.22	31.05	N/A	N/A	N/A
	R410A(+)	6.97	2.95	0.23	31.05	N/A	N/A	N/A
	R407C(+)	7.0	2.74	0.21	29.67	N/A	N/A	N/A
	R134A(+)	6.3	2.15	0.15	21.39	N/A	N/A	N/A

Note: (High temperature vapor flow rate kg/min=0.242, Residual trapped refrigerant kg=0.0071).

* - Product identification, construction variations, ratings and performance data.

+ - Represents refrigerants in Categories III, IV, V ARI-740 – 1998.

PUBLISHED PERFORMANCE RATINGS
THERMAFLO, DIV. OF REFCO MFG. (US) INC.

Type: Refrigerant Recovery Equipment Only

Model Designation	Refrigerant	Push/Pull Recovery Rate kg/min.	Liquid Recovery Rate kg/min.	Vapor Recovery Rate kg/min.	High Temp. (40ºC) Vapor Recovery Rate kg/min.	Final Recovery Vacuum Level Kpa	Moisture Content (ppm by weight)	Chloride Ions (ppm by weight)	Acidity (ppm by weight)	High Boiling Residue (% by volume)	Residual Trapped Refrigerant kg
Powermax 600	R12	4.64	1.70	0.19	N/A	>50.53	N/A	N/A	N/A	N/A	<0.11
	R22	5.36	2.04	0.23	N/A	>50.53	N/A	N/A	N/A	N/A	N/A
	R134a	5.46	1.92	0.23	N/A	>50.53	N/A	N/A	N/A	N/A	N/A
	R410a	7.96	2.26	0.24	N/A	>50.53	N/A	N/A	N/A	N/A	N/A
	R500	5.32	1.80	0.19	N/A	>50.53	N/A	N/A	N/A	N/A	<0.11
	R502	5.76	2.36	0.28	N/A	>50.53	N/A	N/A	N/A	N/A	<0.11