e-CFR Data is current as of March 6, 2009

Title 40: Protection of Environment

PART 82—PROTECTION OF STRATOSPHERIC OZONE

Browse Previous | Browse Next

Subpart F—Recycling and Emissions Reduction

Source: 58 FR 28712, May 14, 1993, unless otherwise noted.

§ 82.150 Purpose and scope.

(a) The purpose of this subpart is to reduce emissions of class I and class II refrigerants and their substitutes to the lowest achievable level by maximizing the recapture and recycling of such refrigerants during the service, maintenance, repair, and disposal of appliances and restricting the sale of refrigerants consisting in whole or in part of a class I and class II ODS in accordance with Title VI of the Clean Air Act.

(b) This subpart applies to any person servicing, maintaining, or repairing appliances. This subpart also applies to persons disposing of appliances, including small appliances and motor vehicle air conditioners. In addition, this subpart applies to refrigerant reclaimers, technician certifying programs, appliance owners and operators, manufacturers of appliances, manufacturers of recycling and recovery equipment, approved recycling and recovery equipment testing organizations, persons selling class I or class II refrigerants or offering class I or class II refrigerants for sale, and persons purchasing class I or class II refrigerants.

[69 FR 11978, Mar. 12, 2004]

§ 82.152 Definitions.

Appliance means any device which contains and uses a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer.

Apprentice means any person who is currently registered as an apprentice in service, maintenance, repair, or disposal of appliances with the U.S. Department of Labor's Bureau of Apprenticeship and Training (or a State Apprenticeship Council recognized by the Bureau of Apprenticeship and Training). If more than two years have elapsed since the person first registered as an apprentice with the Bureau of Apprenticeship and Training (or a State Apprenticeship Council recognized by the Bureau of Apprenticeship and Training), the person shall not be considered an apprentice.

Approved equipment testing organization means any organization which has applied for and received approval from the Administrator pursuant to §82.160.

Certified refrigerant recovery or recycling equipment means equipment manufactured before November 15, 1993, that meets the standards in §82.158(c), (e), or (g); equipment certified by an approved equipment testing organization to meet the standards in §82.158(b), (d), or (f); or equipment certified pursuant to §82.36(a).

Commercial refrigeration means, for the purposes of §82.156(i), the refrigeration appliances utilized in the

retail food and cold storage warehouse sectors. Retail food includes the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the equipment used to store meat, produce, dairy products, and other perishable goods. All of the equipment contains large refrigerant charges, typically over 75 pounds.

Critical component means, for the purposes of §82.156(i), a component without which industrial process refrigeration equipment will not function, will be unsafe in its intended environment, and/or will be subject to failures that would cause the industrial process served by the refrigeration appliance to be unsafe.

Custom-built means, for the purposes of §82.156(i), that the equipment or any of its critical components cannot be purchased and/or installed without being uniquely designed, fabricated and/or assembled to satisfy a specific set of industrial process conditions.

Disposal means the process leading to and including:

(1) The discharge, deposit, dumping or placing of any discarded appliance into or on any land or water;

(2) The disassembly of any appliance for discharge, deposit, dumping or placing of its discarded component parts into or on any land or water; or

(3) The disassembly of any appliance for reuse of its component parts.

Follow-up verification test means, for the purposes of §82.156(i), those tests that involve checking the repairs within 30 days of the appliance's returning to normal operating characteristics and conditions. Follow-up verification tests for appliances from which the refrigerant charge has been evacuated means a test conducted after the appliance or portion of the appliance has resumed operation at normal operating characteristics and conditions of temperature and pressure, except in cases where sound professional judgment dictates that these tests will be more meaningful if performed prior to the return to normal operating characteristics and conditions. A follow-up verification test with respect to repairs conducted without evacuation of the refrigerant charge means a reverification test conducted after the initial verification test and usually within 30 days of normal operating conditions. Where an appliance is not evacuated, it is only necessary to conclude any required changes in pressure, temperature or other conditions to return the appliance to normal operating characteristics and conditions.

Full charge means the amount of refrigerant required for normal operating characteristics and conditions of the appliance as determined by using one or a combination of the following four methods:

(1) Use the equipment manufacturer's determination of the correct full charge for the equipment;

(2) Determine the full charge by making appropriate calculations based on component sizes, density of refrigerant, volume of piping, and other relevant considerations;

(3) Use actual measurements of the amount of refrigerant added or evacuated from the appliance; and/or

(4) Use an established range based on the best available data regarding the normal operating characteristics and conditions for the appliance, where the midpoint of the range will serve as the full charge, and where records are maintained in accordance with §82.166(q).

High-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure between 170 psia and 355 psia at 104 °F. This definition includes but is not limited to appliances using R–401A, R–409A, R–401B, R–411A, R–22, R–411B, R–502, R–402B, R–408A, and R–402A.

Industrial process refrigeration means, for the purposes of §82.156(i), complex customized appliances used in the chemical, pharmaceutical, petrochemical and manufacturing industries. These appliances are directly linked to the industrial process. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.

Industrial process shutdown means, for the purposes of §82.156(i), that an industrial process or facility temporarily ceases to operate or manufacture whatever is being produced at that facility.

Initial verification test means, for the purposes of §82.156(i), those leak tests that are conducted as soon as practicable after the repair is completed. An initial verification test, with regard to the leak repairs that require the evacuation of the appliance or portion of the appliance, means a test conducted prior to the replacement of the full refrigerant charge and before the appliance or portion of the appliance has reached operation at normal operating characteristics and conditions of temperature and pressure. An initial verification test with regard to repairs conducted without the evacuation of the refrigerant charge means a test conducted as soon as practicable after the conclusion of the repair work.

Leak rate means the rate at which an appliance is losing refrigerant, measured between refrigerant charges. The leak rate is expressed in terms of the percentage of the appliance's full charge that would be lost over a 12-month period if the current rate of loss were to continue over that period. The rate is calculated using only one of the following methods for all appliances located at an operating facility.

(1) Method 1. (i) Step 1. Take the number of pounds of refrigerant added to the appliance to return it to a full charge and divide it by the number of pounds of refrigerant the appliance normally contains at full charge;

(ii) Step 2. Take the shorter of the number of days that have passed since the last day refrigerant was added or 365 days and divide that number by 365 days;

(iii) Step 3. Take the number calculated in Step 1. and divide it by the number calculated in Step 2.; and

(iv) Step 4. Multiply the number calculated in Step 3. by 100 to calculate a percentage. This method is summarized in the following formula:

$$\underset{(\%\text{ per year})}{\text{Leak rate}} = \frac{\text{pounds of refrigerant added}}{\text{pounds of refrigerant in full charge}} \times \frac{365\ \textit{days/year}}{\textit{shorter of: \# days since refrigerant last added or 365 days}} \times 100\%$$

(2) Method 2. (i) Step 1. Take the sum of the quantity of refrigerant added to the appliance over the previous 365-day period (or over the period that has passed since leaks in the appliance were last repaired, if that period is less than one year),

(ii) Step 2. Divide the result of Step 1. by the quantity (*e.g.,* pounds) of refrigerant the appliance normally contains at full charge, and

(iii) Step 3. Multiply the result of Step 2. by 100 to obtain a percentage. This method is summarized in the following formula:

$$\text{Leak rate (\% per year)} = \frac{\text{pounds of refrigerant added over past 365 days (or since leaks were last repaired, if that period is less than one year)}}{\text{pounds of refrigerant in full charge}} \times 100\%$$

Low-loss fitting means any device that is intended to establish a connection between hoses, appliances, or recovery or recycling machines and that is designed to close automatically or to be closed manually when disconnected, minimizing the release of refrigerant from hoses, appliances, and recovery or recycling machines.

Low-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure below 45 psia at 104 °F. This definition includes but is not limited to appliances using R–11, R–123, and R–113.

Major maintenance, service, or repair means any maintenance, service, or repair that involves the removal of any or all of the following appliance components: compressor, condenser, evaporator, or auxiliary heat exchange coil; or any maintenance, service, or repair that involves uncovering an opening of more than four (4) square inches of "flow area" for more than 15 minutes.

Medium-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure between 45 psia and 170 psia at 104 °F. This definition includes but is not limited to appliances using R–114, R–124, R–12, R–401C, R–406A, and R–500.

Motor vehicle air conditioner (MVAC) means any appliance that is a motor vehicle air conditioner as defined in 40 CFR part 82, subpart B.

MVAC-like appliance means mechanical vapor compression, open-drive compressor appliances with a normal charge of 20 pounds or less of refrigerant used to cool the driver's or passenger's compartment of an off-road motor vehicle. This includes the air-conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using R–22 refrigerant.

Normal operating characteristics or conditions means, for the purposes of §82.156(i), temperatures, pressures, fluid flows, speeds and other characteristics that would normally be expected for a given process load and ambient condition during operation. Normal operating characteristics and conditions are marked by the absence of atypical conditions affecting the operation of the refrigeration appliance.

Normally containing a quantity of refrigerant means containing the quantity of refrigerant within the appliance or appliance component when the appliance is operating with a full charge of refrigerant.

One-time expansion device means an appliance that relies on the one-time release of its refrigerant charge to the environment in order to provide a cooling effect.

Opening an appliance means any service, maintenance, repair, or disposal of an appliance that would release refrigerant from the appliance to the atmosphere unless the refrigerant was recovered previously from the appliance. Connecting and disconnecting hoses and gauges to and from the appliance to measure pressures within the appliance and to add refrigerant to or recover refrigerant from the appliance shall not be considered "opening."

Parent company means an individual, corporation, partnership, association, joint-stock company, or an unincorporated organization that can direct or cause the direction of management and policies of another entity, through the ownership of shares or otherwise.

Person means any individual or legal entity, including an individual, corporation, partnership, association, state, municipality, political subdivision of a state, Indian tribe, and any agency, department, or instrumentality of the United States, and any officer, agent, or employee thereof.

Process stub means a length of tubing that provides access to the refrigerant inside a small appliance or room air conditioner and that can be resealed at the conclusion of repair or service.

Reclaim refrigerant means to reprocess refrigerant to all of the specifications in appendix A to 40 CFR part 82, subpart F (based on ARI Standard 700–1995, Specification for Fluorocarbons and Other Refrigerants) that are applicable to that refrigerant and to verify that the refrigerant meets these specifications using the analytical methodology prescribed in section 5 of appendix A of 40 CFR part 82, subpart F.

Recover refrigerant means to remove refrigerant in any condition from an appliance and to store it in an external container without necessarily testing or processing it in any way.

Recovery efficiency means the percentage of refrigerant in an appliance that is recovered by a piece of recycling or recovery equipment.

Recycle refrigerant means to extract refrigerant from an appliance and clean refrigerant for reuse without meeting all of the requirements for reclamation. In general, recycled refrigerant is refrigerant that is cleaned using oil separation and single or multiple passes through devices, such as replaceable core filter-driers, which reduce moisture, acidity, and particulate matter. These procedures are usually implemented at the field job site.

Refrigerant means, for purposes of this subpart, any substance consisting in part or whole of a class I or class II ozone-depleting substance that is used for heat transfer purposes and provides a cooling effect.

Refrigerant circuit means the parts of an appliance that are normally connected to each other (or are separated only by internal valves) and are designed to contain refrigerant.

Self-contained recovery equipment means refrigerant recovery or recycling equipment that is capable of removing the refrigerant from an appliance without the assistance of components contained in the appliance.

Small appliance means any appliance that is fully manufactured, charged, and hermetically sealed in a factory with five (5) pounds or less of a class I or class II substance used as a refrigerant, including, but not limited to, refrigerators and freezers (designed for home, commercial, or consumer use), medical or industrial research refrigeration equipment, room air conditioners (including window air conditioners and packaged terminal air heat pumps), dehumidifiers, under-the-counter ice makers, vending machines, and drinking water coolers.

Substitute means any chemical or product, whether existing or new, that is used by any person as an EPA approved replacement for a class I or II ozone-depleting substance in a given refrigeration or air-conditioning end-use.

Suitable replacement refrigerant means, for the purposes of §82.156(i)(7)(i), a refrigerant that is acceptable under section 612(c) of the Clean Air Act Amendments of 1990 and all regulations promulgated under that section, compatible with other materials with which it may come into contact, and able to achieve the temperatures required for the affected industrial process in a technically feasible manner.

System-dependent recovery equipment means refrigerant recovery equipment that requires the assistance of components contained in an appliance to remove the refrigerant from the appliance.

System mothballing means the intentional shutting down of a refrigeration appliance undertaken for an extended period of time by the owners or operators of that facility, where the refrigerant has been evacuated from the appliance or the affected isolated section of the appliance, at least to atmospheric pressure.

Technician means any person who performs maintenance, service, or repair, that could be reasonably expected to release refrigerants from appliances, except for MVACs, into the atmosphere. Technician also means any person who performs disposal of appliances, except for small appliances, MVACs, and MVAC-like appliances, that could be reasonably expected to release refrigerants from the appliances into the atmosphere. Performing maintenance, service, repair, or disposal could be reasonably expected to release refrigerants only if the activity is reasonably expected to violate the integrity of the refrigerant circuit. Activities reasonably expected to violate the integrity of the refrigerant circuit include activities such as attaching and detaching hoses and gauges to and from the appliance to add or remove refrigerant or to measure pressure and adding refrigerant to and removing refrigerant from the appliance. Activities such as painting the appliance, rewiring an external electrical circuit, replacing insulation on a length of pipe, or tightening nuts and bolts on the appliance are not reasonably expected to violate the integrity of the refrigerant circuit. Performing maintenance, service, repair, or disposal of appliances that have been evacuated pursuant to §82.156 could not be reasonably expected to release refrigerants from the appliance unless the maintenance, service, or repair consists of adding refrigerant to the appliance. Technician includes but is not limited to installers, contractor employees, in-house service personnel, and in some cases owners and/or operators.

Very high-pressure appliance means an appliance that uses a refrigerant with a critical temperature below 104 °F or with a liquid phase saturation pressure above 355 psia at 104 °F. This definition includes but is not limited to appliances using R–13 or R–503.

Voluntary certification program means a technician testing program operated by a person before that person obtained approval of a technician certification program pursuant to §82.161(c).

[58 FR 28712, May 14, 1993, as amended at 59 FR 42956, Aug. 19, 1994; 59 FR 55925, Nov. 9, 1994; 60 FR 40439, Aug. 8, 1995; 68 FR 43806, July 24, 2003; 69 FR 11978, Mar. 12, 2004; 70 FR 1991, Jan. 11, 2005; 70 FR 19278, Apr. 13, 2005]

§ 82.154 Prohibitions.

(a)(1) Effective June 13, 2005, no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any refrigerant or substitute from such appliances, with the exception of the following substitutes in the following end-uses:

(i) Ammonia in commercial or industrial process refrigeration or in absorption units;

(ii) Hydrocarbons in industrial process refrigeration (processing of hydrocarbons);

(iii) Chlorine in industrial process refrigeration (processing of chlorine and chlorine compounds);

(iv) Carbon dioxide in any application;

(v) Nitrogen in any application; or

(vi) Water in any application.

(2) The knowing release of a refrigerant or non-exempt substitute subsequent to its recovery from an

appliance shall be considered a violation of this prohibition. De minimis releases associated with good faith attempts to recycle or recover refrigerants or non-exempt substitutes are not subject to this prohibition. Refrigerant releases shall be considered de minimis only if they occur when:

(i) The required practices set forth in §82.156 are observed, recovery or recycling machines that meet the requirements set forth in §82.158 are used, and the technician certification provisions set forth in §82.161 are observed; or

(ii) The requirements set forth in subpart B of this part are observed.

(b) No person may open appliances except MVACs and MVAC-like appliances for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances:

(1) Without observing the required practices set forth in §82.156; and

(2) Without using equipment that is certified for that type of appliance pursuant to §82.158.

(c) No person may manufacture or import recycling or recovery equipment for use during the maintenance, service, or repair of appliances except MVACs and MVAC-like appliances, and no person may manufacture or import recycling or recovery equipment for use during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, unless the equipment is certified pursuant to §82.158 (b) or (d), as applicable.

(d) Effective June 14, 1993, no person shall alter the design of certified refrigerant recycling or recovery equipment in a way that would affect the equipment's ability to meet the certification standards set forth in §82.158 without resubmitting the altered design for certification testing. Until it is tested and shown to meet the certification standards set forth in §82.158, equipment so altered will be considered uncertified for the purposes of §82.158.

(e) Effective August 12, 1993, no person may open appliances except MVACs for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances, unless such person has certified to the Administrator pursuant to §82.162 that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart.

(f) Effective August 12, 1993, no person may recover refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances unless such person has certified to the Administrator pursuant to §82.162 that such person has acquired recovery equipment that meets the standards set forth in §82.158 (l) and/or (m), as applicable, and that such person is complying with the applicable requirements of this subpart.

(g) No person may sell, distribute, or offer for sale or distribution for use as a refrigerant any class I or class II substance consisting wholly or in part of used refrigerant unless:

(1) The class I or class II substance has been reclaimed as defined in §82.152 by a person who has been certified as a reclaimer pursuant to §82.164;

(2) The class I or class II substance was used only in an MVAC or MVAC-like appliance and is to be used only in an MVAC or MVAC-like appliance and recycled in accordance with §82.34(d);

(3) The class I or class II substance is contained in an appliance that is sold or offered for sale together with

the class I or class II substance;

(4) The class I or class II substance is being transferred between or among a parent company and one or more of its subsidiaries, or between or among subsidiaries having the same parent company; or

(5) The class I or class II substance is being transferred between or among a Federal agency or department and a facility or facilities owned by the same Federal agency or department.

(h) [Reserved]

(i) Effective August 12, 1993, no person reclaiming refrigerant may release more than 1.5% of the refrigerant received by them.

(j) Effective November 15, 1993, no person may sell or distribute, or offer for sale or distribution, any appliances, except small appliances, unless such equipment is equipped with a servicing aperture to facilitate the removal of refrigerant at servicing and disposal.

(k) Effective November 15, 1993, no person may sell or distribute, or offer for sale or distribution any small appliance unless such equipment is equipped with a process stub to facilitate the removal of refrigerant at servicing and disposal.

(l) No technician training or testing program may issue certificates pursuant to §82.161 unless the program complies with all of the standards of §82.161 and appendix D, and has been granted approval.

(m) No person may sell or distribute, or offer for sale or distribution, any substance that consists in whole or in part of a class I or class II substance for use as a refrigerant to any person unless:

(1) The buyer has been certified as a Type I, Type II, Type III, or Universal technician pursuant to §82.161;

(2) The buyer complies with §82.166(b) and employs at least one technician who is certified as a Type I, Type II, Type III, or Universal technician in accordance with §82.161;

(3) The buyer has been certified in accordance with 40 CFR part 82, subpart B and the refrigerant is either R–12 or an approved substitute consisting wholly or in part of a class I or class II substance for use in motor vehicle air conditioners in accordance with 40 CFR part 82, subpart G;

(4) The buyer complies with §82.166 (b) and employs at least one technician who is certified in accordance with 40 CFR part 82, subpart B, and the refrigerant is either R–12 or an approved substitute consisting wholly or in part of a class I or class II substance for use in motor vehicle air conditioners pursuant to 40 CFR part 82, subpart G. Nothing in this provision shall be construed to relieve persons of the requirements of §82.34(b) or §82.42 (b);

(5) The refrigerant is sold only for eventual resale to certified technicians or to appliance manufacturers (*e.g.,* sold by a manufacturer to a wholesaler, sold by a technician to a reclaimer);

(6) The refrigerant is sold to an appliance manufacturer;

(7) The refrigerant is contained in an appliance with a fully assembled refrigerant circuit; or

(8) The refrigerant is charged into an appliance by a certified technician or an apprentice during maintenance, service, or repair of the appliance.

(n) It is a violation of this subpart to accept a signed statement pursuant to §82.156(f)(2) if the person knew

or had reason to know that such a signed statement is false.

(o) Rules stayed for consideration. Not withstanding any other provisions of this subpart, the effectiveness of 40 CFR 82.154(m), only as it applies to refrigerant contained in appliances without fully assembled refrigerant circuits, is stayed from April 27, 1995, until EPA takes final action on its reconsideration of these provisions. EPA will publish any such final action in theFederal Register.

(p) No person may manufacture or import one-time expansion devices that contain other than exempted refrigerants.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42956, Aug. 19, 1994; 59 FR 55926, Nov. 9, 1994; 60 FR 14610, Mar. 17, 1995; 60 FR 24680, May 9, 1995; 61 FR 7726, Feb. 29, 1996; 61 FR 68508, Dec. 27, 1996; 68 FR 43806, July 24, 2003; 69 FR 11979, Mar. 12, 2004; 70 FR 19278, Apr. 13, 2005]

§ 82.156 Required practices.

(a) All persons disposing of appliances, except for small appliances, MVACs, and MVAC-like appliances must evacuate the refrigerant, including all the liquid refrigerant, in the entire unit to a recovery or recycling machine certified pursuant to §82.158. All persons opening appliances except for MVACs and MVAC-like appliances for maintenance, service, or repair must evacuate the refrigerant, including all the liquid refrigerant (except as provided in paragraph (a)(2)(i)(B) of this section), in either the entire unit or the part to be serviced (if the latter can be isolated) to a system receiver (*e.g.,* the remaining portions of the appliance, or a specific vessel within the appliance) or a recovery or recycling machine certified pursuant to §82.158. A technician must verify that the applicable level of evacuation has been reached in the appliance or the part before it is opened.

(1) Persons opening appliances except for small appliances, MVACs, and MVAC-like appliances for maintenance, service, or repair must evacuate to the levels in table 1 before opening the appliance, unless

(i) Evacuation of the appliance to the atmosphere is not to be performed after completion of the maintenance, service, or repair, and the maintenance, service, or repair is not major as defined at §82.152; or

(ii) Due to leaks in the appliance, evacuation to the levels in table 1 is not attainable, or would substantially contaminate the refrigerant being recovered; or

(iii) The recycling or recovery equipment was certified pursuant to §82.158(b)(2). In any of these cases, the requirements of §82.156(a)(2) must be followed.

(2)(i) If evacuation of the appliance to the atmosphere is not to be performed after completion of the maintenance, service, or repair, and if the maintenance, service, or repair is not major as defined at §82.152, the appliance must:

(A) Be evacuated to a pressure no higher than 0 psig before it is opened if it is a high- or very high-pressure appliance;

(B) Be pressurized to a pressure no higher than 0 psig before it is opened if it is a low-pressure appliance. Persons must cover openings when isolation is not possible. Persons pressurizing low-pressure appliances that use refrigerants with boiling points at or below 85 degrees Fahrenheit at 29.9 inches of mercury (standard atmospheric pressure), (*e.g.* R–11 and R–123), must not use methods such as nitrogen, that require subsequent purging. Persons pressurizing low-pressure appliances that use refrigerants with boiling

points above 85 degrees Fahrenheit at 29.9 inches of mercury, *e.g.,* R–113, must use heat to raise the internal pressure of the appliance as much as possible, but may use nitrogen to raise the internal pressure of the appliance from the level attainable through use of heat to atmospheric pressure; or

(C) For the purposes of oil changes, be evacuated or pressurized to a pressure no higher than 5 psig, before it is opened; or drain the oil into a system receiver to be evacuated or pressurized to a pressure no higher than 5 psig.

(ii) If, due to leaks in the appliance, evacuation to the levels in table 1 is not attainable, or would substantially contaminate the refrigerant being recovered, persons opening the appliance must:

(A) Isolate leaking from non-leaking components wherever possible;

(B) Evacuate non-leaking components to be opened to the levels specified in table 1; and

(C) Evacuate leaking components to be opened to the lowest level that can be attained without substantially contaminating the refrigerant. In no case shall this level exceed 0 psig.

(iii) If the recycling or recovery equipment was certified pursuant to §82.158(b)(2), technicians must follow the manufacturer's directions for achieving the required recovery efficiency.

(3) Persons disposing of appliances except for small appliances, MVACs, and MVAC-like appliances, must evacuate to the levels in table 1 unless, due to leaks in the appliance, evacuation to the levels in table 1 is not attainable, or would substantially contaminate the refrigerant being recovered. If, due to leaks in the appliance, evacuation to the levels in table 1 is not attainable, or would substantially contaminate the refrigerant being recovered, persons disposing of the appliance must:

(i) Isolate leaking from non-leaking components wherever possible;

(ii) Evacuate non-leaking components to the levels specified in table 1; and

(iii) Evacuate leaking components to the lowest level that can be attained without substantially contaminating the refrigerant. In no case shall this level exceed 0 psig.

Table 1—Required Levels of Evacuation for Appliances

[Except for small appliances, MVACs, and MVAC-like appliances]

Type of appliance	Inches of Hg vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)	
	Using recovery or recycling equipment manufactured or imported before November 15, 1993	Using recovery or recycling equipment manufactured or imported on or after November 15, 1993
Very high-pressure appliance	0	0
High-pressure appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant	0	0

High-pressure appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant	4	10
Medium-pressure appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant	4	10
Medium-pressure appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant	4	15
Low-pressure appliance	25	25 mm Hg absolute

(4) Persons opening small appliances for maintenance, service, or repair must:

(i) When using recycling and recovery equipment manufactured before November 15, 1993, recover 80% of the refrigerant in the small appliance; or

(ii) When using recycling or recovery equipment manufactured on or after November 15, 1993, recover 90% of the refrigerant in the appliance when the compressor in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(iii) Evacuate the small appliance to four inches of mercury vacuum.

(5) Persons opening MVAC-like appliances for maintenance, service, or repair may do so only while properly using, as defined at §82.32(e), recycling or recovery equipment certified pursuant to §82.158 (f) or (g), as applicable.

(b) All persons opening appliances except for small appliances, MVACs, and MVAC-like appliances for maintenance, service, or repair and all persons disposing of appliances except small appliances, MVACs, and MVAC-like appliances must have at least one piece of certified, self-contained recovery or recycling equipment available at their place of business. Persons who maintain, service, repair, or dispose of only appliances that they own and that contain pump-out units are exempt from this requirement. This exemption does not relieve such persons from other applicable requirements of this section.

(c) System-dependent equipment shall not be used with appliances normally containing more than 15 pounds of refrigerant, unless the system-dependent equipment is permanently attached to the appliance as a pump-out unit.

(d) All recovery or recycling equipment shall be used in accordance with the manufacturer's directions unless such directions conflict with the requirements of this subpart.

(e) Refrigerant may be returned to the appliance from which it is recovered or to another appliance owned by the same person without being recycled or reclaimed, unless the appliance is an MVAC or MVAC-like appliance.

(f) Effective July 13, 1993, persons who take the final step in the disposal process (including but not limited to scrap recyclers and landfill operators) of a small appliance, room air conditioning, MVACs, or MVAC-like appliances must either:

(1) Recover any remaining refrigerant from the appliance in accordance with paragraph (g) or (h) of this section, as applicable; or

(2) Verify that the refrigerant has been evacuated from the appliance or shipment of appliances previously. Such verification must include a signed statement from the person from whom the appliance or shipment of appliances is obtained that all refrigerant that had not leaked previously has been recovered from the appliance or shipment of appliances in accordance with paragraph (g) or (h) of this section, as applicable. This statement must include the name and address of the person who recovered the refrigerant and the date the refrigerant was recovered or a contract that refrigerant will be removed prior to delivery.

(3) Persons complying with paragraph (f)(2) of this section must notify suppliers of appliances that refrigerant must be properly removed before delivery of the items to the facility. The form of this notification may be warning signs, letters to suppliers, or other equivalent means.

(g) All persons recovering refrigerant from MVACs and MVAC-like appliances for purposes of disposal of these appliances must reduce the system pressure to or below 102 mm of mercury vacuum, using equipment that meets the standards set forth in §82.158(l).

(h) All persons recovering the refrigerant from small appliances for purposes of disposal of these appliances must either:

(1) Recover 90% of the refrigerant in the appliance when the compressor in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(2) Evacuate the small appliance to four inches of mercury vacuum.

(i)(1) Owners or operators of commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired in accordance with paragraph (i)(9) of this section, if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period, except as described in paragraphs (i)(6), (i)(8), and (i)(10) of this section and paragraphs (i)(1)(i), (i)(1)(ii), and (i)(1)(iii) of this section. Repairs must bring the annual leak rate to below 35 percent.

(i) If the owners or operators of the federally-owned commercial refrigerant appliances determine that the leaks cannot be repaired in accordance with paragraph (i)(9) of this section and that an extension in accordance with the requirements discussed in this paragraph (i)(1)(i) of this section apply, they must document all repair efforts, and notify EPA of their inability to comply within the 30-day repair requirement, and the reason for the inability must be submitted to EPA in accordance with §82.166(n). Such notification must be made within 30 days of discovering the leaks. EPA will determine if the extension requested in accordance with the requirements discussed in paragraph (i)(1)(i) of this section is justified. If the extension is not justified, EPA will notify the owner/operator within 30 days of receipt of the notification.

(ii) Owners or operators of federally-owned commercial refrigeration equipment may have more than 30 days to repair leaks if the refrigeration appliance is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination. Only the additional time needed to conduct and complete repairs in a safe working environment will be permitted.

(iii) Owners or operators of federally-owned commercial refrigeration equipment requesting or who are granted time extensions under this paragraph must comply with paragraphs (i)(3) and (i)(4) of this section.

(2) The owners or operators of industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period in accordance with paragraph (i)(9) of this section, except as described in paragraphs (i)(6), (i)(7) and (i)(10) of this section, and

paragraphs (i)(2)(i) and (i)(2)(ii) of this section. Repairs must bring annual leak rates to below 35 percent during a 12-month period. If the owners or operators of the industrial process refrigeration equipment determine that the leak rate cannot be brought to below 35 percent during a 12-month period within 30 days (or 120 days, where an industrial process shutdown in accordance with paragraph (i)(2)(ii) of this section is required,) and in accordance with paragraph (i)(9) of this section, and that an extension in accordance with the requirements discussed in this paragraph apply, the owners or operators of the appliance must document all repair efforts, and notify EPA of the reason for the inability in accordance with §82.166(n) within 30 days of making this determination. Owners or operators who obtain an extension pursuant to this section or elect to utilize the additional time provided in paragraph (i)(2)(i) of this section, must conduct all necessary leak repairs, if any, that do not require any additional time beyond the initial 30 or 120 days.

(i) The owners or operators of industrial process refrigeration equipment are permitted more than 30 days (or 120 days where an industrial process shutdown in accordance with paragraph (i)(2)(ii) of this section is required) to repair leaks, if the necessary parts are unavailable or if requirements of other applicable federal, state, or local regulations make a repair within 30 or 120 days impossible. Only the additional time needed to receive delivery of the necessary parts or to comply with the pertinent regulations will be permitted.

(ii) Owners or operators of industrial process refrigeration equipment will have a 120-day repair period, rather than a 30-day repair period, to repair leaks in instances where an industrial process shutdown is needed to repair a leak or leaks from industrial process refrigeration equipment.

(3) Owners or operators of industrial process refrigeration equipment and owners or operators of federally-owned commercial refrigeration equipment or of federally-owned comfort cooling appliances who are granted additional time under paragraphs (i)(1) or (i)(5) of this section, must have repairs performed in a manner that sound professional judgment indicates will bring the leak rate below the applicable allowable leak rate. When an industrial process shutdown has occurred or when repairs have been made while an appliance is mothballed, the owners or operators shall conduct an initial verification test at the conclusion of the repairs and a follow-up verification test. The follow-up verification test shall be conducted within 30 days of completing the repairs or within 30 days of bringing the appliance back on-line, if taken off-line, but no sooner than when the appliance has achieved normal operating characteristics and conditions. When repairs have been conducted without an industrial process shutdown or system mothballing, an initial verification test shall be conducted at the conclusion of the repairs, and a follow-up verification test shall be conducted within 30 days of the initial verification test. In all cases, the follow-up verification test shall be conducted at normal operating characteristics and conditions, unless sound professional judgment indicates that tests performed at normal operating characteristics and conditions will produce less reliable results, in which case the follow-up verification test shall be conducted at or near the normal operating pressure where practicable, and at or near the normal operating temperature where practicable.

(i) If the owners or operators of industrial process refrigeration equipment takes the appliance off-line, or if the owners or operators of federally-owned commercial refrigeration or of federally-owned comfort cooling appliances who are granted additional time under paragraphs (i)(1) or (i)(5) of this section take the appliance off-line, they cannot bring the appliance back on-line until an initial verification test indicates that the repairs undertaken in accordance with paragraphs (i)(1)(i), (ii), (iii), or (i)(2)(i) and (ii), or (5)(i), (ii), and (iii) of this section have been successfully completed, demonstrating the leak or leaks are repaired. The owners or operators of the industrial process refrigeration equipment, federally-owned commercial refrigeration appliances, or federally-owned comfort cooling appliances are exempted from this requirement only where the owners or operators will retrofit or retire the industrial process refrigeration equipment, federally-owned commercial refrigeration appliance, or federally-owned comfort cooling appliance in accordance with paragraph (i)(6) of this section. Under this exemption, the owner or operators may bring the industrial process refrigeration equipment, federally-owned commercial refrigeration appliance, or federally-owned comfort cooling appliance back on-line without successful completion of an initial verification test.

(ii) If the follow-up verification test indicates that the repairs to industrial process refrigeration equipment, federally-owned commercial refrigeration equipment, or federally-owned comfort cooling appliances have not been successful, the owner or operator must retrofit or retire the equipment in accordance with paragraph (i)(6) and any such longer time period as may apply under paragraphs (i)(7)(i), (ii) and (iii) or (i)(8)(i) and (ii) of this section. The owners and operators of the industrial process refrigeration equipment, federally-owned commercial refrigeration equipment, or federally-owned comfort cooling appliances are relieved of this requirement if the conditions of paragraphs (i)(3)(iv) and/or (i)(3)(v) of this section are met.

(iii) The owner or operator of industrial process refrigeration equipment that fails a follow-up verification test must notify EPA within 30 days of the failed follow-up verification test in accordance with §82.166(n).

(iv) The owner or operator is relieved of the obligation to retrofit or replace the industrial process refrigeration equipment as discussed in paragraph (i)(6) of this section if second repair efforts to fix the same leaks that were the subject of the first repair efforts are successfully completed within 30 days or 120 days where an industrial process shutdown is required, after the initial failed follow-up verification test. The second repair efforts are subject to the same verification requirements of paragraphs (i)(3), (i)(3) (i) and (ii) of this section. The owner or operator is required to notify EPA within 30 days of the successful follow-up verification test in accordance with §82.166(n) and the owner or operator is no longer subject to the obligation to retrofit or replace the appliance that arose as a consequence of the initial failure to verify that the leak repair efforts were successful.

(v) The owner or operator of industrial process refrigeration equipment is relieved of the obligation to retrofit or replace the equipment in accordance with paragraph (i)(6) of this section if within 180 days of the initial failed follow-up verification test, the owner or operator establishes that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate, in accordance with paragraph (i)(4) of this section. If the appliance's owner or operator establishes that the appliance's annual leak rate does not exceed the applicable allowable annual leak rate, the owner or operator is required to notify EPA within 30 days of that determination in accordance with §82.166(n) and the owner or operator would no longer be subject to the obligation to retrofit or replace the equipment that arose as a consequence of the initial failure to verify that the leak repair efforts were successful.

(4) In the case of a failed follow-up verification test subject to paragraph (i)(3)(v) of this section, the determination of whether industrial process refrigeration equipment has an annual leak rate that exceeds the applicable allowable annual leak rate will be made in accordance with parameters identified by the owner or operator in its notice to EPA regarding the failure of the initial follow-up verification test, if those parameters are acceptable to EPA; otherwise by parameters selected by EPA. The determination must be based on the full charge for the affected industrial process refrigeration equipment. The leak rate determination parameters in the owner's or operator's notice will be considered acceptable unless EPA notifies the owners or operators within 30 days of receipt of the notice. Where EPA does not accept the parameters identified by the owner or operator in its notice, EPA will not provide additional time beyond the additional time permitted in paragraph (i)(3)(v) of this section unless specifically stated in the parameters selected by EPA.

(5) Owners or operators of comfort cooling appliances normally containing more than 50 pounds of refrigerant and not covered by paragraph (i)(1) or (i)(2) of this section must have leaks repaired in accordance with paragraph (i)(9) of this section if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period, except as described in paragraphs (i)(6), (i)(8) and (i)(10) of this section and paragraphs (i)(5)(i), (i)(5)(ii) and (i)(5)(iii) of this section. Repairs must bring the annual leak rate to below 15 percent.

(i) If the owners or operators of federally-owned comfort-cooling appliances determine that the leaks cannot be repaired in accordance with paragraph (i)(9) of this section and that an extension in accordance with the requirements discussed in paragraph (i)(5) of this section apply, they must document all repair efforts, and notify EPA of their inability to comply within the 30-day repair requirement, and the reason for the inability must be submitted to EPA in accordance with §82.166(n). Such notification must be made within 30 days of discovering that leak repair efforts cannot be completed within 30 days.

(ii) Owners or operators of federally-owned comfort-cooling appliances may have more than 30 days to repair leaks where the refrigeration appliance is located in an area subject to radiological contamination or where the shutting down of the appliance will directly lead to radiological contamination. Only the additional time needed to conduct and complete work in a safe environment will be permitted.

(iii) Owners or operators of federally-owned comfort-cooling appliances requesting, or who are granted, time extensions under this paragraph must comply with paragraphs (i)(3) and (i)(4) of this section.

(6) Owners or operators are not required to repair leaks as provided in paragraphs (i)(1), (i)(2), and (i)(5) of this section if, within 30 days of discovering a leak greater than the applicable allowable leak rate, or within 30 days of a failed follow-up verification test, or after making good faith efforts to repair the leaks as described in paragraph (i)(6)(i) of this section, they develop a one-year retrofit or retirement plan for the leaking appliance. Owners or operators who decide to retrofit the appliance must use a refrigerant or substitute with a lower or equivalent ozone-depleting potential than the previous refrigerant and must include such a change in the retrofit plan. Owners or operators who retire and replace the appliance must replace the appliance with an appliance that uses a refrigerant or substitute with a lower or equivalent ozone-depleting potential and must include such a change in the retirement plan. The retrofit or retirement plan (or a legible copy) must be kept at the site of the appliance. The original plan must be made available for EPA inspection upon request. The plan must be dated, and all work performed in accordance with the plan must be completed within one year of the plan's date, except as described in paragraphs (i)(6)(i), (i)(7), and (i)(8) of this section. Owners or operators are temporarily relieved of this obligation if the appliance has undergone system mothballing as defined in §82.152.

(i) If the owner or operator has made good faith efforts to repair leaks from the appliance in accordance with paragraphs (i)(1), (i)(2), or (i)(5) of this section and has decided prior to completing a follow-up verification test, to retrofit or retire the appliance in accordance with paragraph (i)(6) of this section, the owner or operator must develop a retrofit or retirement plan within 30 days of the decision to retrofit or retire the appliance. The owner or operator must complete the retrofit or retirement of the appliance within one year and 30 days of when the owner or operator discovered that the leak rate exceeded the applicable allowable leak rate, except as provided in paragraphs (i)(7) and (i)(8) of this section.

(ii) In all cases, subject to paragraph (i)(6)(i) of this section, the written plan shall be prepared no later than 30 days after the owner or operator has determined to proceed with retrofitting or retiring the appliance. All reports required under §82.166(o) shall be due at the time specified in the paragraph imposing the specific reporting requirement, or no later than 30 days after the decision to retrofit or retire the appliance, whichever is later.

(iii) In cases where the owner or operator of industrial process refrigeration equipment has made good faith efforts to retrofit or retire industrial process refrigeration equipment prior to August 8, 1995, and where these efforts are not complete, the owner or operator must develop a retrofit or retirement plan that will complete the retrofit or retirement of the affected appliance by August 8, 1996. This plan (or a legible copy) must be kept at the site of the appliance. The original must be made available for EPA inspection upon request. Where the conditions of paragraphs (i)(7) and (i)(8) of this section apply, and where the length of

time necessary to complete the work is beyond August 8, 1996, all records must be submitted to EPA in accordance with §82.166(o), as well as maintained on-site.

(7) The owners or operators of industrial process refrigeration equipment will be allowed additional time to complete the retrofit or retirement of industrial process refrigeration equipment if the conditions described in paragraphs (i)(7)(i) or (i)(7)(ii) of this section are met. The owners or operators of industrial process refrigeration equipment will be allowed additional time beyond the additional time provided in paragraph (i)(7)(ii) of this section if the conditions described in paragraph (i)(7)(iii) of this section are met.

(i) Additional time, to the extent reasonably necessary will be allowed for retrofitting or retiring industrial process refrigeration equipment due to delays occasioned by the requirements of other applicable federal, state, or local laws or regulations, or due to the unavailability of a suitable replacement refrigerant with a lower ozone depletion potential. If these circumstances apply, the owner or operator of the facility must notify EPA within six months after the 30-day period following the discovery of an exceedance of the 35 percent leak rate. Records necessary to allow EPA to determine that these provisions apply and the length of time necessary to complete the work must be submitted to EPA in accordance with §82.166(o), as well as maintained on-site. EPA will notify the owner or operator of its determination within 60 days of receipt the submittal.

(ii) An additional one-year period beyond the initial one-year retrofit period is allowed for industrial process refrigeration equipment where the following criteria are met:

(A) The new or the retrofitted industrial process refrigerant equipment is custom-built;

(B) The supplier of the appliance or one or more of its critical components has quoted a delivery time of more than 30 weeks from when the order is placed;

(C) The owner or operator notifies EPA within six months of the expiration of the 30-day period following the discovery of an exceedance of the 35 percent leak rate to identify the owner or operator, describe the appliance involved, explain why more than one year is needed, and demonstrate that the first two criteria are met in accordance with §82.166(o); and

(D) The owner or operator maintains records that are adequate to allow a determination that the criteria are met.

(iii) The owners or operators of industrial process refrigeration equipment may request additional time to complete retrofitting or retiring industrial process refrigeration equipment beyond the additional one-year period if needed and where the initial additional one year was granted in accordance with paragraph (i)(7)(ii) of this section. The request shall be submitted to EPA before the end of the ninth month of the first additional year and shall include revisions of information required under §82.166(o). Unless EPA objects to this request submitted in accordance with §82.166(o) within 30 days of receipt, it shall be deemed approved.

(8) Owners or operators of federally-owned commercial or comfort-cooling appliances will be allowed an additional year to complete the retrofit or retirement of the appliances if the conditions described in paragraph (i)(8)(i) of this section are met, and will be allowed one year beyond the additional year if the conditions in paragraph (i)(8)(ii) of this section are met.

(i) Up to one additional one-year period beyond the initial one-year retrofit period is allowed for such equipment where the following criteria are met:

(A) Due to complications presented by the federal agency appropriations and/or procurement process, a delivery time of more than 30 weeks from the beginning of the official procurement process is quoted, or

where the appliance is located in an area subject to radiological contamination and creating a safe working environment will require more than 30 weeks;

(B) The operator notifies EPA within six months of the expiration of the 30-day period following the discovery of an exceedance of the applicable allowable annual leak rate to identify the operator, describe the appliance involved, explain why more than one year is needed, and demonstrate that the first criterion is met in accordance with §82.166(o); and

(C) The operator maintains records adequate to allow a determination that the criteria are met.

(ii) The owners or operators of federally-owned commercial or comfort-cooling appliances may request additional time to complete retrofitting, replacement or retiring such appliances beyond the additional one-year period if needed and where the initial additional one year was granted in accordance with paragraph (i)(8)(i) of this section. The request shall be submitted to EPA before the end of the ninth month of the first additional year and shall include revisions of information earlier submitted as required under §82.166(o). Unless EPA objects to this request submitted in accordance with §82.166(o) within 30 days of receipt, it shall be deemed approved.

(9) Owners or operators must repair leaks pursuant to paragraphs (i)(1), (i)(2) and (i)(5) of this section within 30 days after discovery, or within 30 days after when the leaks should have been discovered if the owners intentionally shielded themselves from information which would have revealed a leak, unless granted additional time pursuant to §82.156(i).

(10) The amount of time for owners and operators to complete repairs, retrofit plans or retrofits/replacements/ retirements under paragraphs (i)(1), (i)(2), (i)(5), (i)(6), (i)(7), (i)(8), and (i)(9) of this section is temporarily suspended at the time an appliance is mothballed as defined in §82.152. The time for owners and operators to complete repairs, retrofit plans, or retrofits/replacements will resume on the day the appliance is brought back on-line and is no longer considered mothballed. All initial and follow-up verification tests must be performed in accordance with paragraphs (i)(3), (i)(3)(i), and (i)(3)(ii) of this section.

(11) In calculating annual leak rates, purged refrigerant that is destroyed at a verifiable destruction efficiency of 98 percent or greater will not be counted toward the leak rate. Owners or operators destroying purged refrigerants must maintain information as set forth in §82.166(p)(1) and submit to EPA, within 60 days after the first time such exclusion is used by that facility, information set forth in §82.166(p)(2).

[58 FR 28712, May 14, 1993, as amended at 59 FR 42956, 42962, Aug. 19, 1994; 59 FR 55926, Nov. 9, 1994; 60 FR 40440, Aug. 8, 1995; 68 FR 43807, July 24, 2003; 69 FR 11979, Mar. 12, 2004; 70 FR 1991, Jan. 11, 2005]

§ 82.158 Standards for recycling and recovery equipment.

(a) Effective September 22, 2003, all manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, shall have had such equipment certified by an approved equipment testing organization to meet the applicable requirements in paragraph (b)(1), (b)(2), or (d) of this section. All manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of MVAC-like appliances shall have had such equipment certified pursuant to §82.36(a).

(b) Equipment manufactured or imported on or after November 15, 1993 and before September 22, 2003,

for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must be certified by an approved equipment testing organization to meet the requirements of paragraph (b)(1) of this section and the following requirements below. Equipment manufactured or imported on or after September 22, 2003, for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must be certified by an approved equipment testing organization to meet the requirements of paragraph (b)(2) of this section and the following requirements.

(1) In order to be certified, the equipment must be capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of appendix B1 of this subpart (based upon the ARI Standard 740–1993, Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment):

Table 2—Levels of Evacuation Which Must Be Achieved by Recovery or Recycling Equipment Intended for Use With Appliances[1]

[Manufactured on or after November 15, 1993]

Type of appliance with which recovery or recycling machine is intended to be used	Inches of Hg vacuum
HCFC-22 appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	0
HCFC-22 appliances, or isolated component of such appliances, normally containing 200 pounds or more of refrigerant	10
Very high-pressure appliances	0
Other high-pressure appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	10
Other high-pressure appliances, or isolated component of such appliances, normally containing 200 pounds or more of refrigerant	15
Low-pressure appliances	[2]25

[1]Except for small appliances, MVACs, and MVAC-like appliances.

[2]mm Hg absolute.

The vacuums specified in inches of Hg vacuum must be achieved relative to an atmospheric pressure of 29.9 inches of Hg absolute.

(2) In order to be certified, the equipment must be capable of achieving the level of evacuation specified in Table 2 of paragraph (b)(1) of this section under the conditions of appendix B2 of this subpart (based upon the ARI Standard 740–1995, Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment).

(3) Recovery or recycling equipment whose recovery efficiency cannot be tested according to the procedures in appendix B1 or B2 of this subpart as applicable may be certified if an approved third-party testing organization adopts and performs a test that demonstrates, to the satisfaction of the Administrator, that the recovery efficiency of that equipment is equal to or better than that of equipment that:

(i) Is intended for use with the same type of appliance; and

(ii) Achieves the level of evacuation in Table 2. The manufacturer's instructions must specify how to achieve the required recovery efficiency, and the equipment must be tested when used according to these instructions.

(4) The equipment must meet the minimum requirements for certification under appendix B1 or B2 of this subpart as applicable.

(5) If the equipment is equipped with a noncondensables purge device, the equipment must not release more than three (3) percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of appendix B1 and B2 of this subpart as applicable.

(6) The equipment must be equipped with low-loss fittings on all hoses.

(7) The equipment must have its liquid recovery rate and its vapor recovery rate measured under the conditions of appendix B1 or B2 as applicable, unless the equipment has no inherent liquid or vapor recovery rate.

(c) Equipment manufactured or imported before November 15, 1993 for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances will be considered certified if it is capable of achieving the level of evacuation specified in Table 3 of this section when tested using a properly calibrated pressure gauge:

Table 3—Levels of Evacuation Which Must Be Achieved by Recovery or Recycling Machines Intended for Use With Appliances[1]

[Manufactured before November 15, 1993]

Type of air-conditioning or refrigeration equipment with which recovery or recycling machine is intended to be used	Inches of vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)
HCFC-22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0
HCFC-22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Very high-pressure equipment	0
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	4
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Low-pressure equipment	25

[1]Except for small appliances, MVACs, and MVAC-like appliances.

(d) Equipment manufactured or imported on or after November 15, 1993 and before September 22, 2003, for use during the maintenance, service, or repair of small appliances must be certified by an approved equipment testing organization to be capable of achieving the requirements described in either paragraph

(d)(1) or (d)(2) of this section. Equipment manufactured or imported on or after September 22, 2003, for use during the maintenance, service, or repair of small appliances must be certified by an approved equipment testing organization to be capable of either paragraph (d)(1) or (d)(3) of this section:

(1) Recovering 90% of the refrigerant in the test stand when the compressor of the test stand is operating and 80% of the refrigerant when the compressor of the test stand is not operating when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) Achieving a four-inch vacuum under the conditions of appendix B1 of this subpart, based upon ARI Standard 740–1993; or

(3) Achieving a four-inch vacuum under the conditions of appendix B2 of this subpart, based upon ARI Standard 740–1995.

(e) Equipment manufactured or imported before November 15, 1993 for use with small appliances will be considered certified if it is capable of either:

(1) Recovering 80% of the refrigerant in the system, whether or not the compressor of the test stand is operating, when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) Achieving a four-inch vacuum when tested using a properly calibrated pressure gauge.

(f) Equipment manufactured or imported on or after November 15, 1993 for use during the maintenance, service, or repair of MVAC-like appliances must be certified in accordance with §82.36(a).

(g) Equipment manufactured or imported before November 15, 1993 for use during the maintenance, service, or repair of MVAC-like appliances must be capable of reducing the system pressure to 102 mm of mercury vacuum under the conditions of the SAE Standard, SAE J1990 (appendix A to 40 CFR part 82, subpart B).

(h) Manufacturers and importers of equipment certified under paragraphs (b) and (d) of this section must place a label on each piece of equipment stating the following:

THIS EQUIPMENT HAS BEEN CERTIFIED BY [APPROVED EQUIPMENT TESTING ORGANIZATION] TO MEET EPA's MINIMUM REQUIREMENTS FOR RECYCLING OR RECOVERY EQUIPMENT INTENDED FOR USE WITH [APPROPRIATE CATEGORY OF APPLIANCE].

The label shall also show the date of manufacture and the serial number (if applicable) of the equipment. The label shall be affixed in a readily visible or accessible location, be made of a material expected to last the lifetime of the equipment, present required information in a manner so that it is likely to remain legible for the lifetime of the equipment, and be affixed in such a manner that it cannot be removed from the equipment without damage to the label.

(i) The Administrator will maintain a list of equipment certified pursuant to paragraphs (b), (d), and (f) of this section by manufacturer and model. Persons interested in obtaining a copy of the list should send written inquiries to the address in §82.160(a).

(j) Manufacturers or importers of recycling or recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs or MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must periodically have approved equipment testing organizations conduct either:

(1) Retests of certified recycling or recovery equipment in accordance with paragraph (a) of this section or

(2) Inspections of recycling or recovery equipment at manufacturing facilities to ensure that each equipment model line that has been certified under this section continues to meet the certification criteria.

Such retests or inspections must be conducted at least once every three years after the equipment is first certified.

(k) An equipment model line that has been certified under this section may have its certification revoked if it is subsequently determined to fail to meet the certification criteria. In such cases, the Administrator or her or his designated representative shall give notice to the manufacturer or importer setting forth the basis for her or his determination.

(l) Equipment used to evacuate refrigerant from MVACs and MVAC-like appliances before they are disposed of must be certified in accordance with §82.36(a).

(m) Equipment used to evacuate refrigerant from small appliances before they are disposed of must be capable of either:

(1) Removing 90% of the refrigerant when the compressor of the small appliance is operating and 80% of the refrigerant when the compressor of the small appliance is not operating, when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use With Small Appliances; or

(2) Evacuating the small appliance to four inches of vacuum when tested using a properly calibrated pressure gauge.

(n) Effective October 22, 2003, equipment that is advertised or marketed as “recycling equipment” must be capable of recycling the standard contaminated refrigerant sample of appendix B2 of this subpart (based upon ARI Standard 740–1995), section 5, to the levels in the following table when tested under the conditions of appendix B2 of this subpart:

Maximum Levels of Contaminants Permissible in Refrigerant Processed Through Equipment Advertised as “Recycling” Equipment

Contaminants	Low-pressure (R–11, R–123, R–113) systems	R–12 systems	All other systems
Acid Content (by wt.)	1.0 PPM	1.0 PPM	1.0 PPM.
Moisture (by wt.)	20 PPM	10 PPM	20 PPM.
Noncondensable Gas (by vol.)	N/A	2.0%	2.0%.
High Boiling Residues (by vol.)	1.0%	0.02%	0.02%.
Chlorides by Silver Nitrate Test	No turbidity	No turbidity	No turbidity.
Particulates	Visually clean	Visually clean	Visually clean.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42957, Aug. 19, 1994; 68 FR 43807, July 24, 2003; 73 FR 34649, June 18, 2008]

§ 82.160 Approved equipment testing organizations.

(a) Any equipment testing organization may apply for approval by the Administrator to certify equipment pursuant to the standards in §82.158 and appendices B2 or C of this subpart. The application shall be mailed to: Section 608 Recycling Program Manager; Global Programs Division; Mail Code: 6205J; U.S. Environmental Protection Agency; 1200 Pennsylvania Avenue, NW.; Washington, DC 20460.

(b) Applications for approval must include written information verifying the following:

(1) The list of equipment present at the organization that will be used for equipment testing.

(2) Expertise in equipment testing and the technical experience of the organization's personnel.

(3) Thorough knowledge of the standards and recordkeeping and reporting requirements as they appear in §§82.158 and 82.166 and Appendices B2 and/or C (as applicable) of this subpart.

(4) The organization must describe its program for verifying the performance of certified recycling and recovery equipment manufactured over the long term, specifying whether retests of equipment or inspections of equipment at manufacturing facilities will be used.

(5) The organization must have no conflict of interest and receive no direct or indirect financial benefit from the outcome of certification testing.

(6) The organization must agree to allow the Administrator access to records and personnel to verify the information contained in the application.

(c) Organizations may not certify equipment prior to receiving approval from EPA. If approval is denied under this section, the Administrator or her or his designated representative shall give written notice to the organization setting forth the basis for her or his determination.

(d) If at any time an approved testing organization is found to be conducting certification tests for the purposes of this subpart in a manner not consistent with the representations made in its application for approval under this section, the Administrator reserves the right to revoke approval in accordance with §82.169. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42962, Aug. 19, 1994; 68 FR 43808, July 24, 2003]

§ 82.161 Technician certification.

(a) Effective November 14, 1994, technicians, except technicians who successfully completed voluntary certification programs that apply for approval under §82.161(g) by December 9, 1994, must be certified by an approved technician certification program under the requirements of this paragraph (a). Effective May 15, 1995, all technicians must be certified by an approved technician certification program under the requirements of this paragraph (a).

(1) Technicians, as defined in §82.152, who maintain, service, or repair small appliances must be properly certified as Type I technicians.

(2) Technicians who maintain, service, or repair medium-, high-, or very high-pressure appliances, except

small appliances, MVACs, and MVAC-like appliances, or dispose of medium-, high-, or very high-pressure appliances, except small appliances, MVACs, and MVAC-like appliances, must be properly certified as Type II technicians.

(3) Technicians who maintain, service, or repair low-pressure appliances or dispose of low-pressure appliances must be properly certified as Type III technicians.

(4) Technicians who maintain, service, or repair low- and high-pressure equipment as described in §82.161(a) (1), (2) and (3) must be properly certified as Universal technicians.

(5) Technicians who maintain, service, or repair MVAC-like appliances must either be properly certified as Type II technicians or complete the training and certification test offered by a training and certification program approved under §82.40.

(6) Apprentices are exempt from this requirement provided the apprentice is closely and continually supervised by a certified technician while performing any maintenance, service, repair, or disposal that could reasonably be expected to release refrigerant from appliances into the environment. The supervising certified technician is responsible for ensuring that the apprentice complies with this subpart.

(b) *Test Subject Material.* The Administrator shall maintain a bank of test questions divided into four groups, including a core group and three technical groups. The Administrator shall release this bank of questions only to approved technician certification programs. Tests for each type of certification shall include a minimum of 25 questions drawn from the core group and a minimum of 25 questions drawn from each relevant technical group. These questions shall address the subject areas listed in appendix D.

(c) *Program Approval.* Persons may seek approval of any technician certification program (program), in accordance with the provisions of this paragraph, by submitting to the Administrator at the address in §82.160(a) verification that the program meets all of the standards listed in appendix D and the following standards:

(1) *Alternative Examinations.* Programs are encouraged to make provisions for non-English speaking technicians by providing tests in other languages or allowing the use of a translator when taking the test. If a translator is used, the certificate received must indicate that translator assistance was required. A test may be administered orally to any person who makes this request, in writing, to the program at least 30 days before the scheduled date for the examination. The letter must explain why the request is being made.

(2) *Recertification.* The Administrator reserves the right to specify the need for technician recertification at some future date, if necessary, by placing a notice in theFederal Register.

(3) *Proof of Certification.* Programs must issue individuals a wallet-sized card to be used as proof of certification, upon successful completion of the test. Programs must issue an identification card to technicians that receive a score of 70 percent or higher on the closed-book certification exam, within 30 days. Programs providing Type I certification using the mail-in format, must issue a permanent identification card to technicians that receive a score of 84 percent or higher on the certification exam, no later than 30 days after the program has received the exam and any additional required material. Each card must include, at minimum, the name of the certifying program, and the date the organization became a certifying program, the name of the person certified, the type of certification, a unique number for the certified person, and the following text:

[Name of person] has been certified as a [Type I, Type II, Type III, and/or Universal, as appropriate] technician as required by 40 CFR part 82, subpart F.

(4) The Administrator reserves the right to consider other factors deemed relevant to ensure the effectiveness of certification programs.

(d) If approval is denied under this section, the Administrator shall give written notice to the program setting forth the basis for her or his determination.

(e) If at any time an approved program violates any of the above requirements, the Administrator reserves the right to revoke approval in accordance with §82.169. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

(f) Authorized representatives of the Administrator may require technicians to demonstrate on the business entity's premises their ability to perform proper procedures for recovering and/or recycling refrigerant. Failure to demonstrate or failure to properly use the equipment may result in revocation of the certificate. Failure to abide by any of the provisions of this subpart may also result in revocation or suspension of the certificate. If a technician's certificate is revoked, the technician would need to recertify before maintaining, servicing, repairing or disposing of any appliances.

(g)(1) Any person seeking approval of a technician certification program may also seek approval to certify technicians who successfully completed a voluntary certification program operated previously by that person. Interested persons must submit to the Administrator at the address in §82.160(a) verification that the voluntary certification program substantially complied with most of the standards of §82.161(c) and appendix D of subpart F of this part. If the program did not test or train participants on some elements of the test subject material, the person must submit supplementary information on the omitted material to the Administrator for approval and verify that the approved information will be provided to technicians pursuant to section j of appendix D of subpart F of this part. In this case, the person may not issue a certification card to a technician until he or she has received a signed statement from the technician indicating that the technician has read the supplementary information. Approval may be granted for Type I, Type II, or Type III certification, or some combination of these, depending upon the coverage in the voluntary certification program of the information in each Type. In order to have their voluntary programs considered for approval, persons must submit applications both for approval as a technician certification program and for approval as a voluntary program by December 9, 1994.

(2)(i) Persons who are approved to certify technicians who successfully completed their voluntary programs pursuant to §82.161(g)(1) must:

(A) Notify technicians who successfully completed their voluntary programs of the Administrator's decision within 60 days of that decision;

(B) Send any supplementary materials required pursuant to §82.161(g)(1) to technicians who successfully completed their voluntary programs within 60 days of the Administrator's decision; and

(C) Send certification cards to technicians who successfully completed their voluntary programs within 60 days of receipt of signed statements from the technicians indicating that the technicians have read the supplementary information.

(ii) Persons who are disapproved to certify technicians who successfully completed their voluntary programs pursuant to §82.161(g)(1) must notify technicians who successfully completed their voluntary programs of the Administrator's decision within 30 days of that decision.

(iii) Persons who withdraw applications for voluntary program approval submitted pursuant to §82.161(g)(1)

must inform technicians who successfully completed their voluntary programs of the withdrawal by the later of 30 days after the withdrawal or December 9, 1994.

(3) Technicians who successfully completed voluntary certification programs may receive certification in a given Type through that program only if:

(i) The voluntary certification program successfully completed by the technician is approved for that Type pursuant to §82.161(g)(1);

(ii) The technician successfully completed the portions of the voluntary certification program that correspond to that Type; and

(iii) The technician reads any supplementary materials required by the Administrator pursuant to §82.161(g)(1) and section j of appendix D of subpart F of this part, and returns the signed statement required by §82.161(g)(1).

[58 FR 28712, May 14, 1993, as amended at 59 FR 42957, 42962, Aug. 19, 1994; 68 FR 43808, July 24, 2003; 69 FR 11980, Mar. 12, 2004]

§ 82.162 Certification by owners of recovery and recycling equipment.

(a) No later than August 12, 1993, or within 20 days of commencing business for those persons not in business at the time of promulgation, persons maintaining, servicing, or repairing appliances except for MVACs, and persons disposing of appliances except for small appliances and MVACs, must certify to the Administrator that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the maintenance, service, or repair of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) The name and address of the purchaser of the equipment, including the county name;

(2) The name and address of the establishment where each piece of equipment is or will be located;

(3) The number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) The manufacturer name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) The certification must also include a statement that the equipment will be properly used in servicing or disposing of appliances and that the information given is true and correct. Owners or lessees of recycling or recovery equipment having their places of business in:

Connecticut

Maine

Massachusetts

New Hampshire

Rhode Island

Vermont

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region I; Mail Code SEA; JFK Federal Building; One Congress Street, Suite 1100; Boston, MA 02114–2023.

Owners or lessees of recycling or recovery equipment having their places of business in:

New York

New Jersey

Puerto Rico

Virgin Islands

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region II (2DECA-AC); 290 Broadway, 21st Floor; New York, NY 10007–1866.

Owners or lessees of recycling or recovery equipment having their places of business in:

Delaware

District of Columbia

Maryland

Pennsylvania

Virginia

West Virginia

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region III—Wheeling Operations Office; Mail Code 3AP12; 303 Methodist Building; 11th and Chapline Streets; Wheeling, WV 26003.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alabama

Florida

Georgia

Kentucky

Mississippi

North Carolina

South Carolina

Tennessee

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region IV(APT-AE); Atlanta Federal Center; 61 Forsyth Street, SW.; Atlanta, GA

30303.

Owners or lessees of recycling or recovery equipment having their places of business in:

Illinois

Indiana

Michigan

Minnesota

Ohio

Wisconsin

must send their certifications to:

CAA section 608 Enforcement Contact, EPA Region V (AE17J); 77 West Jackson Blvd.; Chicago, IL 60604–3507.

Owners or lessees of recycling or recovery equipment having their places of business in:

Arkansas

Louisiana

New Mexico

Oklahoma

Texas

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region VI (6EN-AA); 1445 Ross Avenue, Suite 1200; Dallas, Texas 75202.

Owners or lessees of recycling or recovery equipment having their places of business in:

Iowa

Kansas

Missouri

Nebraska

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region VII; Mail Code APCO/ARTD; 901 North 5th Street; Kansas City, KS; 66101.

Owners or lessees of recycling or recovery equipment having their places of business in:

Colorado

Montana

North Dakota

South Dakota

Utah

Wyoming

must send their certifications to:

CAA section 608 Enforcement Contact, EPA Region VIII, Mail Code 8ENF-T, 999 18th Street, Suite 500, Denver, CO 80202–2466.

Owners or lessees of recycling or recovery equipment having their places of business in:

American Samoa

Arizona

California

Guam

Hawaii

Nevada

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region IX; Mail Code AIR–5; 75 Hawthorne Street; San Francisco, CA 94105.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alaska

Idaho

Oregon

Washington

must send their certifications to:

CAA section 608 Enforcement Contact; EPA Region X (OAQ–107); 1200 Sixth Avenue; Seattle, WA 98101.

(b) Certificates under paragraph (a) of this section are not transferable. In the event of a change of ownership of an entity that maintains, services, or repairs appliances except MVACs, or that disposes of appliances except small appliances, MVACs, and MVAC-like appliances, the new owner of the entity shall certify within 30 days of the change of ownership pursuant to paragraph (a) of this section.

(c) No later than August 12, 1993, persons recovering refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances must certify to the Administrator that such person has acquired recovery equipment that meets the standards set forth in §82.158 (l) and/or (m), as applicable, and that such person is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the disposal of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) The name and address of the purchaser of the equipment, including the county name;

(2) The name and address of the establishment where each piece of equipment is or will be located;

(3) The number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) The manufacturer's name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) The certification must also include a statement that the equipment will be properly used in recovering refrigerant from appliances and that the information given is true and correct. The certification shall be sent to the appropriate address in paragraph (a).

(d) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of certification under paragraph (a) or (c) of this section. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42962, Aug. 19, 1994; 69 FR 11980, Mar. 12, 2004]

§ 82.164 Reclaimer certification.

Effective May 11, 2004, all persons reclaiming used refrigerant for sale to a new owner, except for persons who properly certified under this section prior to May 11, 2004, must certify to the Administrator that such person will:

(a) Reprocess refrigerant to all of the specifications in Appendix A of this subpart (based on ARI Standard 700–1995, *Specification for Fluorocarbons and Other Refrigerants*) that are applicable to that refrigerant;

(b) Verify that the refrigerant meets these specifications using the analytical methodology prescribed in Appendix A, which includes the primary methodologies included in the appendix to the ARI Standard 700–1995;

(c) Release no more than 1.5 percent of the refrigerant during the reclamation process; and

(d) Dispose of wastes from the reclamation process in accordance with all applicable laws and regulations.

(e) The data elements for certification are as follows:

(1) The name and address of the reclaimer;

(2) A list of equipment used to reprocess and analyze the refrigerant; and

(3) The owner or a responsible officer of the reclaimer must sign the certification stating that the refrigerant will be reprocessed to all of the specifications in Appendix A of this subpart (based on ARI Standard 700–1995, *Specification for Fluorocarbons and Other Refrigerants*) that are applicable to that refrigerant, that the refrigerant's conformance to these specifications will be verified using the analytical methodology prescribed in Appendix A (which includes the primary methodologies included in the appendix to the ARI Standard 700–1995), that no more than 1.5 percent of the refrigerant will be released during the reclamation process, that wastes from the reclamation process will be properly disposed of, that the owner or responsible officer of the reclaimer will maintain records and submit reports in accordance with §82.166(g) and (h), and that the information given is true and correct. The certification should be sent to the following address: U.S. Environmental Protection Agency; Global Programs Division (6205J); 1200 Pennsylvania Avenue, NW., Washington, DC 20460; Attn: Section 608 Recycling Program Manager—Reclaimer Certification.

(f) Certificates are not transferable. In the event of a change in ownership of an entity which reclaims refrigerant, the new owner of the entity shall certify within 30 days of the change of ownership pursuant to this section.

(g) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of the certification of the reclaimer in accordance with §82.169. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42957, 42962, Aug. 19, 1994; 59 FR 55927, Nov. 9, 1994; 68 FR 43809, July 24, 2003; 69 FR 11980, Mar. 12, 2004]

§ 82.166 Reporting and recordkeeping requirements.

(a) All persons who sell or distribute or offer to sell or distribute any refrigerant must retain invoices that indicate the name of the purchaser, the date of sale, and the quantity of refrigerant purchased.

(b) Purchasers of refrigerant who employ certified technicians may provide evidence that at least one technician is properly certified to the wholesaler who sells them refrigerant; the wholesaler must then keep this information on file and may sell refrigerant to the purchaser or his authorized representative even if such purchaser or authorized representative is not a properly certified technician. In such cases, the purchaser must notify the wholesaler in the event that the purchaser no longer employs at least one properly certified technician. The wholesaler is then prohibited from selling refrigerants to the purchaser until such time as the purchaser employs at least one properly certified technician. At that time, the purchaser must provide new evidence that at least one technician is properly certified.

(c) Approved equipment testing organizations must maintain records of equipment testing and performance and a list of equipment that meets EPA requirements. A list of all certified equipment shall be submitted to EPA within 30 days of the organization's approval by EPA and annually at the end of each calendar year thereafter.

(d) Approved equipment testing organizations shall submit to EPA within 30 days of the certification of a new model line of recycling or recovery equipment the name of the manufacturer and the name and/or serial number of the model line.

(e) Approved equipment testing organizations shall notify EPA if retests of equipment or inspections of manufacturing facilities conducted pursuant to §82.158(j) show that a previously certified model line fails to meet EPA requirements. Such notification must be received within thirty days of the retest or inspection.

(f) Programs certifying technicians must maintain records in accordance with section (g) of appendix D of this subpart.

(g) Reclaimers must maintain records of the names and addresses of persons sending them material for reclamation and the quantity of the material (the combined mass of refrigerant and contaminants) sent to them for reclamation. Such records shall be maintained on a transactional basis.

(h) Reclaimers must maintain records of the quantity of material sent to them for reclamation, the mass of refrigerant reclaimed, and the mass of waste products. Reclaimers must report this information to the Administrator annually within 30 days of the end of the calendar year.

(i) Persons disposing of small appliances, MVACs, and MVAC-like appliances must maintain copies of signed statements obtained pursuant to §82.156(f)(2).

(j) Persons servicing appliances normally containing 50 or more pounds of refrigerant must provide the owner/operator of such appliances with an invoice or other documentation, which indicates the amount of refrigerant added to the appliance.

(k) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep servicing records documenting the date and type of service, as well as the quantity of refrigerant added. The owner/operator must keep records of refrigerant purchased and added to such appliances in cases where owners add their own refrigerant. Such records should indicate the date(s) when refrigerant is added.

(l) Technicians certified under §82.161 must keep a copy of their certificate at their place of business.

(m) All records required to be maintained pursuant to this section must be kept for a minimum of three years unless otherwise indicated. Entities that dispose of appliances must keep these records on-site.

(n) The owners or operators of appliances must maintain on-site and report to EPA Headquarters at the address listed in §82.160 the information specified in paragraphs (n)(1), (n)(2), and (n)(3) of this section, within the timelines specified under §82.156 (i)(1), (i)(2), (i)(3) and (i)(5) where such reporting or recordkeeping is required. This information must be relevant to the affected appliance.

(1) An initial report to EPA under §82.156(i)(1)(i), (i)(2), or (i)(5)(i) regarding why more than 30 days are needed to complete repairs must include: Identification of the facility; the leak rate; the method used to determine the leak rate and full charge; the date a leak rate above the applicable leak rate was discovered; the location of leak(s) to the extent determined to date; any repair work that has been completed thus far and the date that work was completed; the reasons why more than 30 days are needed to complete the work and an estimate of when the work will be completed. If changes from the original estimate of when work will be completed result in extending the completion date from the date submitted to EPA, the reasons for these changes must be documented and submitted to EPA within 30 days of discovering the need for such a change.

(2) If the owners or operators intend to establish that the appliance's leak rate does not exceed the applicable allowable leak rate in accordance with §82.156(i)(3)(v), the owner or operator must submit a plan to fix other outstanding leaks for which repairs are planned but not yet completed to achieve a rate below the applicable allowable leak rate. A plan to fix other outstanding leaks in accordance with §82.156(i)(3)(v) must include the following information: The identification of the facility; the leak rate; the method used to determine the leak rate and full charge; the date a leak rate above the applicable allowable leak rate was discovered; the location of leak(s) to the extent determined to date; and any repair work that has been completed thus far, including the date that work was completed. Upon completion of the repair efforts described in the plan, a second report must be submitted that includes the date the owner or operator submitted the initial report concerning the need for additional time beyond the 30 days and notification of the owner or operator's determination that the leak rate no longer exceeds the applicable allowable leak rate. This second report must be submitted within 30 days of determining that the leak rate no longer exceeds the applicable allowable leak rate.

(3) Owners or operators must maintain records of the dates, types, and results of all initial and follow-up verification tests performed under §82.156(i)(3). Owners or operators must submit this information to EPA within 30 days after conducting each test only where required under §82.156 (i)(1), (i)(2), (i)(3) and (i)(5). These reports must also include: Identification and physical address of the facility; the leak rate; the method

used to determine the leak rate and full charge; the date a leak rate above the applicable allowable leak rate was discovered; the location of leak(s) to the extent determined to date; and any repair work that has been completed thus far and the date that work was completed. Submitted reports must be dated and include the name of the owner or operator of the appliance, and must be signed by an authorized company official.

(o) The owners or operators of appliances must maintain on-site and report to EPA at the address specified in §82.160 the following information where such reporting and recordkeeping is required and in the timelines specified in §82.156 (i)(7) and (i)(8), in accordance with §82.156 (i)(7) and (i)(8). This information must be relevant to the affected appliance and must include:

(1) The identification of the industrial process facility;

(2) The leak rate;

(3) The method used to determine the leak rate and full charge;

(4) The date a leak rate above the applicable allowable rate was discovered.

(5) The location of leaks(s) to the extent determined to date;

(6) Any repair work that has been completed thus far and the date that work was completed;

(7) A plan to complete the retrofit or retirement of the system;

(8) The reasons why more than one year is necessary to retrofit or retire the system;

(9) The date of notification to EPA; and

(10) An estimate of when retrofit or retirement work will be completed. If the estimated date of completion changes from the original estimate and results in extending the date of completion, the owner or operator must submit to EPA the new estimated date of completion and documentation of the reason for the change within 30 days of discovering the need for the change, and must retain a dated copy of this submission.

(p)(1) Owners or operators who wish to exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain records on-site to support the amount of refrigerant claimed as sent for destruction. Records shall be based on a monitoring strategy that provides reliable data to demonstrate that the amount of refrigerant claimed to have been destroyed is not greater than the amount of refrigerant actually purged and destroyed and that the 98 percent or greater destruction efficiency is met. Records shall include flow rate, quantity or concentration of the refrigerant in the vent stream, and periods of purge flow.

(2) Owners or operators who wish to exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain on-site and make available to EPA upon request the following information after the first time the exclusion is utilized by the facility:

(i) The identification of the facility and a contact person, including the address and telephone number;

(ii) A general description of the refrigerant appliance, focusing on aspects of the appliance relevant to the purging of refrigerant and subsequent destruction;

(iii) A description of the methods used to determine the quantity of refrigerant sent for destruction and type of records that are being kept by the owners or operators where the appliance is located;

(iv) The frequency of monitoring and data-recording; and

(v) A description of the control device, and its destruction efficiency.

This information must also be included, where applicable, in any reporting requirements required for compliance with the leak repair and retrofit requirements for industrial process refrigeration equipment, as set forth in paragraphs (n) and (o) of this section.

(q) Owners or operators choosing to determine the full charge as defined in §82.152 of an affected appliance by using an established range or using that methodology in combination with other methods for determining the full charge as defined in §82.152 must maintain the following information:

(1) The identification of the owner or operator of the appliance;

(2) The location of the appliance;

(3) The original range for the full charge of the appliance, its midpoint, and how the range was determined;

(4) Any and all revisions of the full charge range and how they were determined; and

(5) The dates such revisions occurred.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42957, Aug. 19, 1994; 60 FR 40443, Aug. 8, 1995; 69 FR 11981, Mar. 12, 2004; 70 FR 1992, Jan. 11, 2005]

§ 82.169 Suspension and revocation procedures.

(a) Failure to abide by any of the provisions of this subpart may result in the revocation or suspension of the approval to certify technicians (under §82.161), approval to act as a recovery/recycling equipment testing organization (under §82.160), or reclaimer certification (under §82.164), hereafter referred to as the "organization." In such cases, the Administrator or her or his designated representative shall give notice of an impending suspension to the person or organization setting forth the facts or conduct that provide the basis for the revocation or suspension.

(b) Any organization that has received notice of an impending suspension or revocation may choose to request a hearing and must file that request in writing within 30 days of the date of the Agency's notice at the address listed in §82.160 and shall set forth their objections to the revocation or suspension and data to support the objections.

(c) If the Agency does not receive a written request for a hearing within 30 days of the date of the Agency's notice, the revocation will become effective upon the date specified in the notice of an impending suspension.

(d) If after review of the request and supporting data, the Administrator or her or his designated representative finds that the request raises a substantial factual issue, she or he shall provide the organization with a hearing.

(e) After granting a request for a hearing the Administrator or her or his designated representative shall designate a Presiding Officer for the hearing.

(f) The hearing shall be held as soon as practicable at a time and place determined by the Administrator, the designated representative, or the Presiding Officer.

(g) The Administrator or her or his designated representative may, at his or her discretion, direct that all argument and presentation of evidence be concluded within a specified period established by the Administrator or her or his designated representative. Said period may be no less than 30 days from the date that the first written offer of a hearing is made to the applicant. To expedite proceedings, the Administrator or her or his designated representative may direct that the decision of the Presiding Officer (who need not be the Administrator) shall be the final EPA decision.

(h) Upon appointment pursuant to paragraph (e) of this section, the Presiding Officer will establish a hearing file. The file shall consist of the following:

(1) The notice issued by the Administrator under §82.169(a);

(2) the request for a hearing and the supporting data submitted therewith;

(3) all documents relating to the request for certification and all documents submitted therewith; and

(4) correspondence and other data material to the hearing.

(i) The hearing file will be available for inspection by the petitioner at the office of the Presiding Officer.

(j) An applicant may appear in person or may be represented by counsel or by any other duly authorized representative.

(k) The Presiding Officer, upon the request of any party or at his or her discretion, may arrange for a pre-hearing conference at a time and place he or she specifies. Such pre-hearing conferences will consider the following:

(1) Simplification of the issues;

(2) Stipulations, admissions of fact, and the introduction of documents;

(3) Limitation of the number of expert witnesses;

(4) Possibility of agreement disposing of any or all of the issues in dispute; and

(5) Such other matters as may aid in the disposition of the hearing, including such additional tests as may be agreed upon by the parties.

(l) The results of the conference shall be reduced to writing by the Presiding Officer and made part of the record.

(m) Hearings shall be conducted by the Presiding Officer in an informal but orderly and expeditious manner. The parties may offer oral or written evidence, subject to the exclusion by the Presiding Officer of irrelevant, immaterial, and repetitious evidence.

(n) Witnesses will not be required to testify under oath. However, the Presiding Officer shall call to the attention of witnesses that their statements may be subject to the provisions of 18 U.S.C. 1001, which imposes penalties for knowingly making false statements or representations or using false documents in any matter within the jurisdiction of any department or agency of the United States.

(o) Any witness may be examined or cross-examined by the Presiding Officer, the parties, or their representatives.

(p) Hearings shall be reported verbatim. Copies of transcripts of proceedings may be purchased by the petitioner from the reporter.

(q) All written statements, charts, tabulations, and similar data offered in evidence at the hearings shall, upon a showing satisfactory to the Presiding Officer of their authenticity, relevancy, and materiality, be received in evidence and shall constitute a part of the record.

(r) Oral argument may be permitted at the discretion of the Presiding Officer and shall be reported as part of the record unless otherwise ordered by the Presiding Officer.

(s) The Presiding Officer shall make an initial decision that shall include written findings and conclusions and the reasons or basis regarding all the material issues of fact, law, or discretion presented on the record. The findings, conclusions, and written decision shall be provided to the parties and made a part of the record. The initial decision shall become the decision of the Administrator without further proceedings, unless there is an appeal to the Administrator or motion for review by the Administrator within 20 days of the date the initial decision was filed.

(t) On appeal from or review of the initial decision, the Administrator or her or his designated representative shall have all the powers which he or she would have in making the initial decision, including the discretion to require or allow briefs, oral argument, the taking of additional evidence, or a remand to the Presiding Officer for additional proceedings. The decision by the Administrator or her or his designated representative shall include written findings and conclusions and the reasons or basis therefore on all the material issues of fact, law, or discretion presented on the appeal or considered in the review.

[68 FR 43809, July 24, 2003]

Appendix A to Subpart F of Part 82—Specifications for Fluorocarbon and Other Refrigerants

This appendix is based on the Air-Conditioning and Refrigeration Institute Standard 700–1995.

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to evaluate and accept/reject refrigerants regardless of source (*i.e.,* new, reclaimed and/or repackaged) for use in new and existing refrigeration and air-conditioning products as required under 40 CFR part 82.

1.1.1 *Intent.* This standard is intended for the guidance of the industry including manufacturers, refrigerant reclaimers, repackagers, distributors, installers, servicemen, contractors and for consumers.

1.1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon and other refrigerants regardless of source and lists acceptable test methods. These refrigerants are R–113; R–123; R–11; R–114; R–124; R–12; R–401C; R–406A; R–500; R–401A; R–409A; R–401B; R–411A; R–22; R–411B; R–502; R–402B; R–408A; R–402A; R–13; R–503 as referenced in the ANSI/ASHRAE Standard 34–1992. (American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc., Standard 34–1992). Copies may be obtained from ASHRAE Publications Sales, 1791 Tullie Circle, NE, Atlanta, GA 30329. Copies may also be inspected at Environmental Protection Agency; Office

of Air and Radiation Docket; 1301 Constitution Ave., NW., Room B108; Washington, DC 20460.

Section 3. Definitions

3.1 *"Shall," "Should," "Recommended,"* or *"It Is Recommended."* "Shall," "should," "recommended," or "it is recommended" shall be interpreted as follows:

3.1.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the appendix is claimed.

3.1.2 *Should, Recommended,* or *It is Recommended.* "Should", "recommended", or "it is recommended" is used to indicate provisions which are not mandatory but which are desirable as good practice.

Section 4. Characterization of Refrigerants and Contaminants

4.1 *Characterization.* Characterization of refrigerants and contaminants addressed are listed in the following general classifications:

4.1.1 *Characterization*

a. Gas Chromatography

b. Boiling point and boiling point range

4.1.2 *Contaminants*

a. Water

b. Chloride

c. Acidity

d. High boiling residue

e. Particulates/solids

f. Non-condensables

g. Impurities including other refrigerants

Section 5. Sampling, Summary of Test Methods and Maximum Permissible Contaminant Levels

5.1 *Referee Test.* The referee test methods for the various contaminants are summarized in the following paragraphs. Detailed test procedures are included in *Appendix C to ARI Standard 700–1995: Analytical Procedures for ARI Standard 700–1995,* 1995, Air-Conditioning and Refrigeration Institute. *Appendix C to ARI Standard 700–1995* is incorporated by reference. [This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Air-Conditioning and Refrigeration Institute, 4301 North Fairfax Drive, Arlington, Virginia 22203. Copies may also be inspected at Public Docket No. A–92–01, Environmental Protection Agency, 1301 Constitution Ave., NW., Washington, DC, 20460 or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.] If alternative test methods are employed, the user must be able to demonstrate that they produce results equivalent to the specified referee method.

5.2 *Refrigerant Sampling*

5.2.1 *Sampling Precautions.* Special precautions should be taken to assure that representative samples are obtained for analysis. Sampling shall be done by trained laboratory personnel following accepted sampling and safety procedures.

5.2.2 *Gas Phase Sample.* A gas phase sample shall be obtained for determining the non-condensables. Since non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant, care must be exercised to eliminate introduction of air during the sample transfer. Purging is not an acceptable procedure for a gas phase sample since it may introduce a foreign product. Since R–11, R–113, and R–123 have normal boiling points at or above room temperature, non-condensable determination is not required for these refrigerants.

5.2.2.1 *Connection.* The sample cylinder shall be connected to an evacuated gas sampling bulb by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling bulb.

5.2.2.2 *Equalizing Pressures.* After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Allow the pressure to equilibrate and close valves.

5.2.3 *Liquid Phase Sample.* A liquid phase sample is required for all tests listed in this standard except the test for non-condensables.

5.2.3.1 *Preparation.* Place a clean, empty sample cylinder with the valve open in an oven at 110 °C (230 °F) for one hour. Remove it from the oven while hot, immediately connect to an evacuation system and evacuate to less than 1 mm mercury (1000 microns). Close the valve and allow it to cool. Weigh the empty cylinder.

5.2.3.2 *Manifolding.* The valve and lines from the unit to be sampled shall be clean and dry. The cylinder shall be connected to an evacuated gas sampling cylinder by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling cylinder.

5.2.3.3 *Liquid Sampling.* After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Take the sample as a liquid by chilling the sample cylinder slightly. Accurate analysis requires that the sample container be filled to at least 60% by volume, however under no circumstances should the cylinder be filled to more than 80% by volume. This can be accomplished by weighing the empty cylinder and then the cylinder with refrigerant. When the desired amount of refrigerant has been collected, close the valve(s) and disconnect the sample cylinder immediately.

5.2.3.4 *Record Weight.* Check the sample cylinder for leaks and record the gross weight.

5.3 *Refrigerant Characterization.*

5.3.1 *Primary Method.* The primary method shall be gas chromatography (GC) as described in *Appendix C to ARI Standard 700–1995.* The chromatogram of the sample shall be compared to known standards.

5.3.2 *Alternative Method.* Determination of the boiling point and boiling point range is an acceptable alternative test method which can be used to characterize refrigerants. The test method shall be that described in the Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421 B, dated March 5, 1982, section 4.4.3.

5.3.3 *Required Values.* The required values for boiling point and boiling point range are given in Table 1A, *Physical Properties of Single Component Refrigerants;* Table 1B, *Physical Properties of Zeotropic Blends (400 Series Refrigerants);* and Table 1C, *Physical Properties of Azeotropic Blends (500 Series Refrigerants).*

5.4 *Water Content.*

5.4.1 *Method.* The Coulometric Karl Fischer Titration shall be the primary test method for determining the water content of refrigerants. This method is described in *Appendix C to ARI Standard 700–1995.* This method can be used for refrigerants that are either a liquid or a gas at room temperature, including refrigerants 11, 113, and 123. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested. Proper operation of the analytical method requires special equipment and an experienced operator. The precision of the results is excellent if proper sampling and handling procedures are followed. Refrigerants containing a colored dye can be successfully analyzed for water using this method.

5.4.2 *Limits.* The value for water content shall be expressed as parts per million (ppm) by weight and shall not exceed the maximum specified (*see* Tables 1A, 1B, and 1C).

5.5 *Chloride.*

The refrigerant shall be tested for chloride as an indication of the presence of hydrochloric acid and/or metal chlorides. The recommended procedure is intended for use with new or reclaimed refrigerants. Significant amounts of oil may interfere with the results by indicating a failure in the absence of chloride.

5.5.1 *Method.* The test method shall be that described in *Appendix C to ARI Standard 700–1995.* The test will show noticeable turbidity at chloride levels of about 3 ppm by weight or higher.

5.5.2 *Turbidity.* The results of the test shall not exhibit any sign of turbidity. Report the results as "pass" or "fail."

5.6 *Acidity.*

5.6.1 *Method.* The acidity test uses the titration principle to detect any compound that is highly soluble in water and ionizes as an acid. The test method shall be that described in *Appendix C to ARI Standard 700–1995.* This test may not be suitable for determination of high molecular weight organic acids; however these acids will be found in the high boiling residue test outlined in 5.7. The test requires a 100 to 120 gram sample and has a detection limit of 0.1 ppm by weight calculated as HCl.

5.6.2 *Limits.* The maximum permissible acidity is 1 ppm by weight as HCl.

5.7 *High Boiling Residue.*

5.7.1 *Method.* High boiling residue shall be determined by measuring the residue of a standard volume of refrigerant after evaporation. The refrigerant sample shall be evaporated at room temperature or at a temperature 45 °C (115 °F) for all refrigerants, except R–113 which shall be evaporated at 60 °C (140 °F), using a Goetz bulb as specified in *Appendix C to ARI Standard 700–1995.* Oils and/or organic acids will be captured by this method.

5.7.2 *Limits.* The value for high boiling residue shall be expressed as a percentage by volume and shall not exceed the maximum percent specified (*see* Tables 1A, 1B, and 1C). An alternative gravimetric method is

described in *Appendix C to ARI Standard 700–1995.*

5.8 *Method of Tests for Particulates and Solids.*

5.8.1 *Method.* A measured amount of sample is evaporated from a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of the Goetz bulb prior to the evaporation of refrigerant. Presence of dirt, rust or other particulate contamination is reported as "fail." For details of this test method, refer to Part 3 of *Appendix C to ARI Standard 700–1995.*

5.9 *Non-Condensables.*

5.9.1 *Sample.* A vapor phase sample shall be used for determination of non-condensables. Non-condensable gases consist primarily of air accumulated in the vapor phase of refrigerants. The solubility of air in the refrigerants liquid phase is extremely low and air is not significant as a liquid phase contaminant. The presence of non-condensable gases may reflect poor quality control in transferring refrigerants to storage tanks and cylinders.

5.9.2 *Method.* The test method shall be gas chromatography with a thermal conductivity detector as described in *Appendix C to ARI Standard 700–1995.*

5.9.3 *Limit.* The maximum level of non-condensables in the vapor phase of a refrigerant in a container shall not exceed 1.5% by volume (*see* Tables 1A, 1B, and 1C).

5.10 *Impurities, including Other Refrigerants.*

5.10.1 *Method.* The amount of other impurities including other refrigerants in the subject refrigerant shall be determined by gas chromatography as described in *Appendix C to ARI Standard 700–1995.*

5.10.2 *Limit.* The subject refrigerant shall not contain more than 0.5% by weight of impurities including other refrigerants (*see* Tables 1A, 1B, and 1C).

Section 6. Reporting Procedure

6.1 *Reporting Procedure.* The source (manufacturer, reclaimer or repackager) of the packaged refrigerant shall be identified. The refrigerant shall be identified by its accepted refrigerant number and/or its chemical name. Maximum permissible levels of contaminants are shown in Tables 1A, 1B, and 1C. Test results shall be tabulated in a like manner.

Table 1A. Physical Properties of Single Component Refrigerants

	REPORTING UNITS	REFERENCE (SUBCLAUSE)	R-11	R-12	R-13	R-22	R-113	R-114	R-123	R-124
CHARACTERISTICS:										
BOILING POINT[1]	°F @ 1.00 ATM	—	74.9	21.6	-114.6	-41.4	117.6	38.8	82.6	12.2
	°C @ 1.00 ATM	—	23.8	-29.8	-81.4	-40.8	47.6	3.8	27.9	-11.0
BOILING POINT RANGE[1]	K	—	0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.3
TYPICAL ISOMER CONTENT	BY WEIGHT	—					0-1% R-113A	0-30% R-114A	0-8% R-123A	0-5% R-124A
VAPOR PHASE CONTAMINANTS:										
AIR AND OTHER NON-CONDENSABLES	% BY VOLUME @ 25°C	5.9	N/A[2]	1.5	1.5	1.5	N/A[2]	1.5	N/A[2]	1.5
LIQUID PHASE CONTAMINANTS:										
WATER	PPM BY WEIGHT	5.4	20	10	10	10	20	10	20	10
ALL OTHER IMPURITIES INCLUDING REFRIGERANTS	% BY WEIGHT	5.1	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HIGH BOILING RESIDUE	% BY VOLUME	5.7	0.01	0.01	0.05	0.01	0.03	0.01	0.01	0.01
PARTICULATES/SOLIDS	VISUALLY CLEAN TO PASS	5.8	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
ACIDITY	PPM BY WEIGHT	5.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CHLORIDES[3]	NO VISIBLE TURBIDITY	5.5	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

View or download PDF

Table 1B. Physical Properties of Zeotropic Blends (400 Series Refrigerants)

	REPORTING UNITS	REFERENCE (SUBCLAUSED)	R-401A	R-401B	R-402A	R-402B	R-406A [3]
CHARACTERISTICS:							
REFRIGERANT COMPONENTS			R-22/152A/124	R-22/152A/124	R-125/290/22	R-125/290/22	R-22/600A/142B
NOMINAL COMP, WEIGHT%			53/13/34	61/11/28	60/2/38	38/2/60	55/4/41
ALLOWABLE COMP, WEIGHT%			51-54/11.5-13.5/33-35	59-63/9.5-11.5/27-29	58-62/1-3/36-40	36-40/1-3/58-62	53-57/3-5/40-42
BOILING POINT [1]	°F @ 1.00 ATM	—	-27.7 TO -18.1	-30.4 TO -21.2	-54.8 TO -53.9	-53.3 TO -49.0	-32.7 TO -15.0
	°C @ 1.00 ATM	—	-33.2 TO -27.8	-34.7 TO -29.6	-48.2 TO -47.7	-47.4 TO -45.0	-36.0 TO -26.1
BOILING POINT RANGE [1]	K	—	5.4	5.1	0.5	2.4	9.9
VAPOR PHASE CONTAMINANTS:							
AIR AND OTHER NON-CONDENSABLES	% BY VOLUME 25°C	5.9	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:							
WATER	PPM BY WEIGHT	5.4	10	10	10	10	10
ALL OTHER IMPURITIES INCLUDING REFRIGERANTS	% BY WEIGHT	5.1	0.50	0.50	0.50	0.50	0.50
HIGH BOILING RESIDUE	% BY VOLUME	5.7	0.01	0.01	0.01	0.01	0.01
PARTICULATES/SOLIDS	VISUALLY CLEAN TO PASS	5.8	PASS	PASS	PASS	PASS	PASS
ACIDITY	PPM BY WEIGHT	5.6	1.0	1.0	1.0	1.0	1.0

View or download PDF

Table 1B (continued). Physical Properties of Zeotropic Blends (400 Series Refrigerants)

	REPORTING UNITS	REFERENCE (SUBCLAUSE)	R-407C	R-408A	R-409A	R-410A	R-410B	R-411A [3]	R-411B [3]
CHARACTERISTICS									
REFRIGERANT COMPONENTS			R-32/125/134A	R125/143A/22	R22/124/142B	R32/125	R32/125	R1270/22/152A	R1270/22/152A
NOMINAL COMP, WEIGHT%			23/25/52	7/46/47	60/25/15	50/50	45/55	1.5/87.5/11.0	3/94/3
ALLOWABLE COMP, WEIGHT%			22-24/23-27/50-54	5-9/45-47/45-49	58-62/23-27/14-16	48.5-50.5/49.4-51.5	44-46/54-56	0.5-1.5/87.5-89.5/10-11	2-3/94-96/2-3
BOILING POINT [1]	°F - 1.00 ATM °C - 1.00 ATM	— —	46.4 TO -33.0 -43.6 TO -36.6	-48.8 TO -47.9 -44.9 TO -44.4	-32.4 TO -18.2 -35.8 TO -27.9	-60.1 TO -60.0 -51.2 TO -51.1	-60.3 TO -60.2 -51.3 TO -51.2		
BOILING POINT RANGE [1]	K	—	7.0	0.5	7.9	0.1	0.1		
VAPOR PHASE CONTAMINANTS: AIR AND OTHER NON-CONDENSABLES	% BY VOLUME - 25°C	5.9	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:									
WATER	PPM BY WEIGHT	5.4	10	10	10	10	10	10	10
ALL OTHER IMPURITIES INCLUDING REFRIGERANTS	% BY WEIGHT	5.1	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HIGH BOILING RESIDUE	% BY VOLUME	5.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PARTICULATES/SOLIDS	VISUALLY CLEAN TO PASS	5.8	PASS	PASS	PASS	PASS	PASS	PASS	PASS
ACIDITY	PPM BY WEIGHT	5.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 1C. Physical Properties of Azeotropic Blends (500 Series Refrigerants)

	REPORTING UNITS	REFERENCE (SUBCLAUSE)	R500	R502	R503	R507	R508 [3]
CHARACTERISTICS:							
REFRIGERANT COMPONENTS			R12/152A	R22/115	R23/13	R125/143A	R23/116
NOMINAL COMP. WEIGHT%			73.8/26.2	48.8/51.2	40.1/59.9	50/50	39/61
ALLOWABLE COMP. WEIGHT%			72.8-74.8/ 25.2-27.2	44.8-52.8/ 47.2-55.2	39-41/ 59-61	49-51/ 49-51	37-41/ 59-63
BOILING POINT [1]	°F @ 1.00 ATM	—	-28.1	-49.7	-127.7	-52.1	-123.5
	°C @ 1.00 ATM	—	-33.4	-45.4	-88.7	-46.7	-86.4
BOILING POINT RANGE [1]	K	—	0.5	0.5	0.5	0.5	0.5
VAPOR PHASE CONTAMINANTS:							
AIR AND OTHER NON-CONDENSABLES	% BY VOLUME 25°C	5.9	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:							
WATER	PPM BY WEIGHT	5.4	10	10	10	10	10
ALL OTHER IMPURITIES INCLUDING REFRIGERANTS	% BY WEIGHT	5.1	0.50	0.50	0.50	0.50	0.50
HIGH BOILING RESIDUE	% BY VOLUME	5.7	0.05	0.01	0.01	0.01	0.01
PARTICULATES/SOLIDS	VISUALLY CLEAN TO PASS	5.8	PASS	PASS	PASS	PASS	PASS
ACIDITY	PPM BY WEIGHT	5.6	1.0	1.0	1.0	1.0	1.0
CHLORIDES [2]	NO VISIBLE TURBIDITY	5.5	PASS	PASS	PASS	PASS	PASS

[1] BOILING POINTS AND BOILING POINT RANGES, ALTHOUGH NOT REQUIRED, ARE PROVIDED FOR INFORMATIONAL PURPOSES.

[2] RECOGNIZED CHLORIDE LEVEL FOR PASS/FAIL IS 3PPM.

[3] SHADED COLUMNS DENOTE REFRIGERANTS FOR WHICH ANALYTICAL DATA IS NOT AVAILABLE.

View or download PDF

Appendix A. References—Normative

Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of this standard.

ASHRAE Terminology of Heating, Ventilating, Air Conditioning and Refrigeration, American Society of Heating Refrigeration and Air-Conditioning Engineers, 1992, 1791 Tullie Circle NE., Atlanta, GA 30329–2305; U.S.A.

ASHRAE Standard 34–1992, *Number Designation and Safety Classification of Refrigerants,* American Society of Heating Refrigeration and Air-Conditioning Engineers, 1992, 1791 Tullie Circle NE., Atlanta, GA 30329–2305; U.S.A.

Appendix C to ARI Standard 700–1995: Analytical Procedures to ARI Standard 700–1995, Specifications for Fluorocarbon and Other Refrigerants, Air-Conditioning and Refrigeration Institute, 1995, 4301 North Fairfax Drive, Suite 425, Arlington, VA 22203; U.S.A.

Federal Specification for *Fluorocarbon Refrigerants, BB–F–1421–B,* dated March 5, 1992, Office of the Federal Register, National Archives and Records Administration, 1992, 800 North Capitol Street, NW., Washington, D.C. 20402; U.S.A.

[69 FR 11981, Mar. 12, 2004]

Appendix A1 to Subpart F of Part 82—Generic Maximum Contaminant Levels

Contaminant	Reporting units
Air and Other Non-condensables	1.5% by volume @ 25 °C (N/A for refrigerants used in low-pressure appliances[1]).
Water	10 ppm by weight 20 ppm by weight (for refrigerants used in low-pressure appliances[1]).
Other Impurities Including Refrigerant	0.50% by weight.
High boiling residue	0.01% by volume.
Particulates/solids	visually clean to pass.
Acidity	1.0 ppm by weight.
Chlorides (chloride level for pass/fail is 3ppm)	No visible turbidity.

[1]Low-pressure appliances means an appliance that uses a refrigerant with a liquid phase saturation pressure below 45 psia at 104 °F.

Blend Compositions (Where Applicable)

Nominal composition (by weight%)	Allowable composition (by weight%)
Component constitutes 25% or more	±2.0
Component constitutes less than 25% but greater than 10%	±1.0
Component constitutes less than or equal to 10%	±0.5

[69 FR 11988, Mar. 12, 2004]

Appendix B1 to Subpart F of Part 82—Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment

This appendix is based on the Air-Conditioning and Refrigeration Institute Standard 740–1993.

Refrigerant Recovery/Recycling Equipment

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish methods of testing for rating and evaluating the performance of refrigerant recovery, and/or recycling equipment, and general equipment requirements (herein referred to as "equipment") for containment or purity levels, capacity, speed, and purge loss to minimize emission into the atmosphere of designated refrigerants.

1.1.1 This standard is intended for the guidance of the industry, including manufacturers, refrigerant reclaimers, repackers, distributors, installers, servicemen, contractors and for consumers.

1.1.2 This standard is not intended to be used as a guide in defining maximum levels of contaminants in recycled or reclaimed refrigerants used in various applications.

1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard defines general equipment requirements and the test apparatus, test mixtures, sampling and analysis techniques that will be used to determine the performance of recovery and/or recycling equipment for various refrigerants including R11, R12, R13, R22, R113, R114, R123, R134a, R500, R502, and R503, as referenced in the ANSI/ASHRAE Standard 34–1992, "Number Designation of Refrigerants" (American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.).

Section 3. Definitions

3.1 *Recovered refrigerant.* Refrigerant that has been removed from a system for the purpose of storage, recycling, reclamation or transportation.

3.2 Recover. Reference 40 CFR 82.152.

3.3 Recycle. Reference 40 CFR 82.152.

3.4 Reclaim. Reference 40 CFR 82.152.

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

3.6 *Push/Pull Method.* 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.

3.7 *Recycle Rate.* The amount of refrigerant processed (in pounds) divided by the time elapsed in the recycling mode in pounds per minute. For equipment which uses a separate recycling sequence, the recycle rate does not include the recovery rate (or elapsed time). For equipment which 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.

3.8 *Equipment Classification.*

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

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

3.9 *"Shall", "Should", "Recommended"* or *"It is Recommended",* "Shall" "Should", "recommended", or

"it is recommended" shall be interpreted as follows:

3.9.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.9.2 *Should, Recommended,* or *It is Recommended,* "Should", "recommended", is used to indicate provisions which are not mandatory but which are desirable as good practice.

Section 4. General Equipment Requirements

4.1 The equipment manufacturer shall provide operating instructions, necessary maintenance procedures, and source information for replacement parts and repair.

4.2 The equipment shall indicate when any filter/drier(s) needs replacement. This requirement can be met by use of a moisture transducer and indicator light, by use of a sight glass/moisture indicator, or by some measurement of the amount of refrigerant processed such as a flow meter or hour meter. Written instructions such as "to change the filter every 400 pounds, or every 30 days" shall not be acceptable except for equipment in large systems where the Liquid Recovery Rate is greater than 25 lbs/min [11.3 Kg/min] where the filter/drier(s) would be changed for every job.

4.3 The equipment shall either automatically purge non-condensables if the rated level is exceeded or alert the operator that the non-condensable level has been exceeded. While air purge processes are subject to the requirements of this section, there is no specific requirement to include an air purge process for "recycle" equipment.

4.4 The equipment's refrigerant loss due to non-condensable purging shall not be exceeded 5% by weight of total recovered refrigerant. (See Section 9.4)

4.5 Internal hose assemblies shall not exceed a permeation rate of 12 pounds mass per square foot [5.8 g/cm^2] of internal surface per year at a temperature of 120 F [48.8 °C] for any designated refrigerant.

4.6 The equipment shall be evaluated at 75 F [24 °C] per 7.1. Normal operating conditions range from 50 °F to 104 F [10 °C to 40 °C].

4.7 *Exemptions:*

4.7.1 Equpment intended for recovery only shall be exempt from sections 4.2 and 4.3.

Table 1—Standard Contaminated Refrigerant Samples

	R11	R12	R13	R22	R113	R114	R123	R134a	R500	R502	R503
Moisture content:											
PPM by weight of pure refrigerant	100	80	30	200	100	85	100	200	200	200	30
Particulate content:											
PPM by weight of pure refrigerant characterized by[1]	80	80	80	80	80	80	80	80	80	80	80
Acid content:											
PPM by weight of pure refrigerant—(mg KOH per kg refrig.) characterized by[2]	500	100	NA	500	400	200	500	100	100	100	NA

Mineral oil content:											
% by weight of pure refrigerant	20	5	NA	5	20	20	20	5	5	5	NA
Viscosity (SUS)	300	150		300	300	300	300	150	150	150	
Non condensable gases air content % volume[3]>	NA	3	3	3	NA	3	3	3	3	3	3

[1]Particulate content shall consist of inert materials and shall comply with particulate requirements in *ASHRAE* Standard 63.2, "Method of Testing of Filtration Capacity of Refrigerant Liquid Line Filters and Filter Driers."

[2]Acid consists of 60% oleic acid and 40% hydrochloric acid on a total number basis.

[3]Synthetic ester based oil.

Section 5. Contaminated Refrigerants

5.1 The standard contaminated refrigerant sample shall have the characteristics specified in Table 1, except as provided in 5.2

5.2 Recovery equipment not rated for any specific contaminant can be tested with new or reclaimed refrigerant.

Section 6. Test Apparatus

6.1 Self Contained Equipment Test Apparatus. The apparatus as shown in Figure 1 consists of a 3 cubic foot [0.085 m^3] mixing chamber with a conical-shaped bottom, although a larger mixing chamber is permissible. The size of the mixing chamber depends upon the size of the equipment. The outlet at the bottom of the cone and all restrictions and valves for liquid and vapor refrigerant lines in the test apparatus shall be a minimum of 0.375 in. [9.5 mm] inside diameter or equivalent. The minimum inside diameter for large equipment for use on chillers shall be 1.5 in. [38 mm.]. The mixing chamber shall contain various ports for receiving liquid refrigerant, oil, and contaminants. A recirculating line connected from the bottom outlet through a recirculating pump and then to a top vapor port shall be provided for stirring of the mixture. Isolation valves may be required for the pump. Alternative stirring means may be used if demonstrated to be equally effective.

6.1.1 For liquid refrigerant feed, the liquid valve is opened. For vapor refrigerant feed, the vapor valve is opened and refrigerant passes through an evaporator coil. Flow is controlled by a thermostatic expansion valve to create 5 F [3 °C] superheat at an evaporator temperature of 70 F ±3 F[21 °C±2°]. The evaporator coil or equivalent evaporator means shall be either sized large enough for the largest system or be sized for each system.

6.1.2 An alternative method for vapor refrigerant feed is to pass through a boiler and then an automatic pressure regulating valve set at refrigerant saturation pressure at 75 F ±3 F [24 °C ±2 °C].

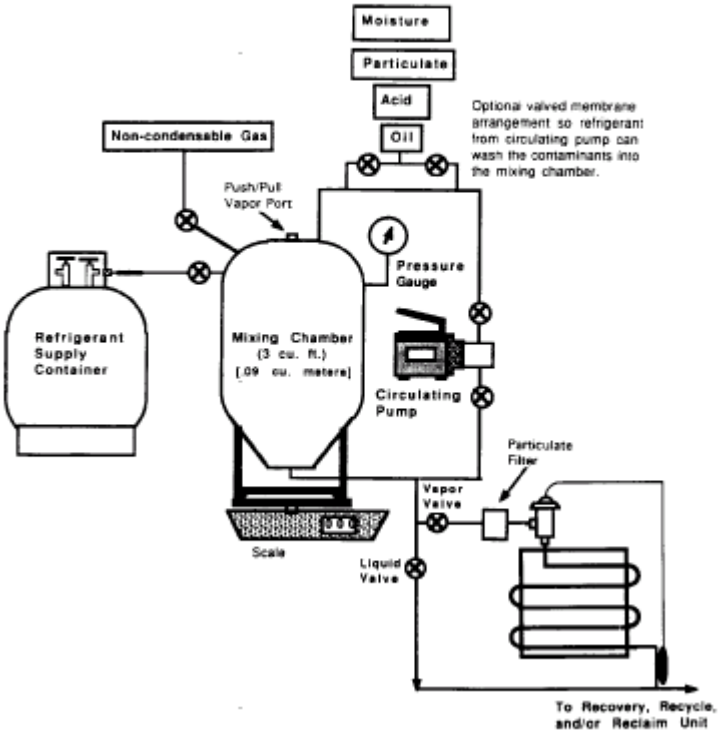
6.2 System Dependent Equipment Test Apparatus. This test apparatus is to be used for final recovery vacuum rating of all system dependent equipment.

6.2.1 The test apparatus shown in Figure 2 consists of a complete refrigeration system. The manufacturer shall identify the refrigerants to be tested. The test apparatus can be modified to facilitate operation or testing of the system dependent equipment if the modifications to the apparatus are specifically described

within the manufacturer's literature. (*See Figure 2* .) A1/4inch [6.3 mm] balance line shall be connected across the test apparatus between the high and low pressure sides, with an isolation valve located at the connection to the compressor high side. A1/4inch [6.3 mm] access port with a valve core shall be located in the balance line for the purpose of measuring final recovery vacuum at the conclusion of the test.

FIGURE 1

Test Apparatus for Self-Contained Equipment

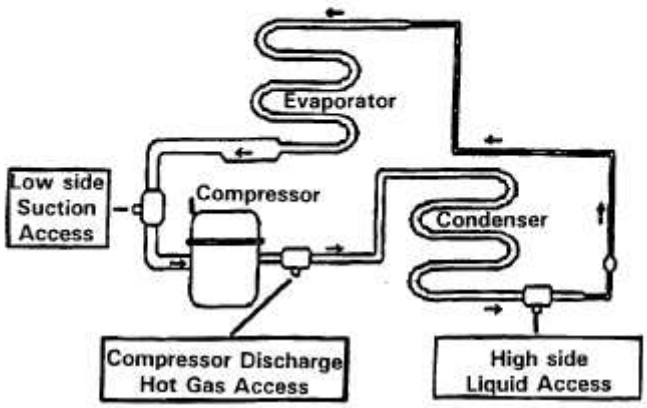


View or download PDF

FIGURE 2

System-Dependent Equipment Test Apparatus

Configuration of a standard air conditioning or refrigeration system for use as a test apparatus



View or download PDF

Section 7. Performance Testing

7.1 Contaminant removal and performance testing shall be conducted at 75 F ±2 F [23.9 °C ±1.1 °C].

7.1.1 The equipment shall be prepared for operation per the instruction manual.

7.1.2 The contaminated sample batch shall consist of not less than the sum of the amounts required to complete steps 7.1.2.2 and 7.1.2.3 below.

7.1.2.1 A liquid sample shall be drawn from the mixing chamber prior to starting the test to assure quality control of the mixing process.

7.1.2.2 Vapor refrigerant feed testing, if elected, shall normally be processed first. After the equipment reaches stabilized conditions of condensing temperature and/or storage tank pressure, the vapor feed recovery rate shall be measured. One method is to start measuring the vapor refrigerant recovery rate when 85% of refrigerant remains in the mixing chamber and continue for a period of time sufficient to achieve the accuracy in 9.2. If liquid feed is not elected, complete Step 7.1.2.4.

7.1.2.3 Liquid refrigerant feed testing, if elected, shall be processed next. After the equipment reaches stabilized conditions, the liquid feed recovery rate shall be measured. One method is to wait 2 minutes after starting liquid feed and then measure the liquid refrigerant recovery rate for a period of time sufficient to achieve the accuracy in 9.1. Continue liquid recovery operation as called for in 7.1.2.4.

7.1.2.4 Continue recovery operation until all liquid is removed from the mixing chamber and vapor is removed to the point where the equipment shuts down per automatic means or is manually stopped per the operating instructions.

7.1.2.5 After collecting the first contaminated refrigerant sample batch, the liquid and vapor value of the apparatus shall be closed and the mixing chamber pressure recorded after 1 minute as required in 9.5. After preparing a second contaminated refrigerant sample batch, continue recovery until the storage container reaches 80% liquid fill level. After recycling and measuring the recycle rate per section 7.1.3, set this container aside for the vapor sample in 8.2.2.

7.1.2.6 Interruptions in equipment operations as called for in instruction manual are allowable.

7.1.3 Recycle as called for in equipment operating instructions. Determine recycle rate by appropriate means as required in 9.3.

7.1.4 Repeat steps 7.1.2, 7.1.2.4, and 7.1.3 with contaminated refrigerant sample until equipment indicator(s) show need to change filter(s). It will not be necessary to repeat the recycle rate determination in 7.1.3.

7.1.4.1 For equipment with a multiple pass recirculating filter system, analyze the contents of the previous storage container.

7.1.4.2 For equipment with a single pass filter system, analyze the contents of the current storage container.

7.1.5 Refrigerant loss due to the equipment's non-condensable gas purge shall be determined by appropriate means. (See Section 9.4.)

7.2 System Dependent Equipment. This procedure shall be used for vacuum rating of all system dependent

equipment. Liquid refrigerant recovery rate, vapor refrigerant recovery rate, and recycle rate are not tested on system dependent systems.

7.2.1 The apparatus operation and testing shall be conducted at 75 F ±2 F. [23.9 °C. ±/1.1. °C.].

7.2.2 The apparatus shall be charged with refrigerant per its system design specifications.

7.2.3 For measurement of final recovery vacuum as required in 9.5, first shut the balance line isolation valve and wait 1 minute for pressure to balance. Then connect and operate the recovery system per manufacturers recommendations. When the evacuation is completed, open the balance line isolation valve and measure the pressure in the balance line.

Section 8. Sampling and Chemical Analysis Methods

8.1 The referee test methods for the various contaminants are summarized in the following paragraphs. Detailed test procedures are included in Appendix A "Test Procedures for ARI STD 700." If alternate test methods are employed, the user must be able to demonstrate that they produce results equivalent to the specified referee method.

8.2 *Refrigerant Sampling.*

8.2.1 *Sampling Precautions.* Special precautions should be taken to assure that representative samples are obtained for analysis. Sampling shall be done by trained laboratory personnel following accepted sampling and safety procedures.

8.2.2 *Gas Phase Sample.* A gas phase sample shall be obtained for determining the non-condensables. Since non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant, care must be exercised to eliminate introduction of air during the sample transfer. Purging is not and acceptable procedure for a gas phase sample since it may introduce a foreign product. Since R11, R113 and R123 have normal boiling points at or above room temperature, noncondensable determination is not required for these refrigerants.

8.2.2.1 The sample cylinder shall be connected to an evacuated gas sampling bulb by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling bulb.

8.2.2.2 After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Allow the pressure to equilibrate and close valves.

8.2.3 *Liquid Phase Sample.* A liquid phase sample is required for all tests listed in this standard, except the test for non-condensables.

8.2.3.1 Place an empty sample cylinder with the valve open in an oven at 230 F [110 °C] for one hour. Remove it from the oven while hot, immediately connect to an evacuation system and evacuate to less than 1mm. mercury (1000 microns). Close the valve and allow it to cool.

8.2.3.2 The valve and lines from the unit to be sampled shall be clean and dry. Connect the line to the sample cylinder loosely. Purge through the loose connection. Make the connection tight at the end of the purge period. Take the sample as a liquid by chilling the sample cylinder slightly. Accurate analysis requires that the sample container be filled to at least 60% by volume; however under no circumstances should the cylinder be filled to more than 80% by volume. This can be accomplished by weighing the empty cylinder and then the cylinder with refrigerant. When the desired amount of refrigerant has been collected, close the

valve(s) and disconnect the sample cylinder immediately.

8.2.3.3 Check the sample cylinder for leaks and record the gross weight.

8.3 *Water Content.*

8.3.1. The Coulometric Karl Fischer Titration shall be the primary test method for determining the water content of refrigerants. This method is described in Appendix A. This method can be used for refrigerants that are either a liquid or a gas at room temperature, including Refrigerants 11 and 13. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested. Proper operation of the analytical method requires special equipment and an experienced operator. The precision of the results is excellent if proper sampling and handling procedures are followed. Refrigerants containing a colored dye can be successfully analyzed for water using this method.

8.3.2 The Karl Fischer Test Method is an acceptable alternative test method for determining the water content of refrigerants. This method is described in ASTM Standard for "Water in gases Using Karl Fisher Reagent" E700–79, reapproved 1984 (American Society for Testing and Materials, Philadelphia, PA).

8.3.3 Report the moisture level in parts per million by weight if a sample is required.

8.4 *Chloride.* The refrigerant shall be tested for chlorides as an indication of the presence of hydrochloric or similar acids. The recommended procedure is intended for use with new or reclaimed refrigerants. Significant amounts of oil may interfere with the results by indicating a failure in the absence of chlorides.

8.4.1 The test method shall be that described in Appendix A "Test Procedures for ARI–700." The test will show noticeable turbidity at equivalent chloride levels of about 3 ppm by weight or higher.

8.4.2 The results of the test shall not exhibit any sign of turbity. Report results as "pass" or "fail."

8.5 *Acidity.*

8.5.1 The acidity test uses the titration principle to detect any compound that is highly soluble in water and ionizes as an acid. The test method shall be that described in Appendix A. "Test Procedures for ARI–700." The test may not be suitable for determination of high molecular weight organic acids; however these acids will be found in the high boiling residue test outlined in Section 5.7. The test requires about a 100 to 120 gram sample and has a low detection limit of 0.1 ppm by weight as HC1.

8.6 High Boiling Residue.

8.6.1 High boiling residue will be determined by measuring the residue of a standard volume of refrigerant after evaporation. The refrigerant sample shall be evaporated at room temperature or a temperature 50 F [10°.0C], above the boiling point of the sample using a Goetz tube as specified in Appendix A "Test Procedures for ARI–700." Oils and or organic acids will be captured by this method.

8.6.2 The value for high boiling residue shall be expressed as a percentage by volume.

8.7 Particulates/Solids.

8.7.1 A measured amount of sample is evaporated from a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of the empty Goetz bulb after the sample has evaporated completely. Presence of dirt, rust or other particulate contamination is reported a "fail." For details of this test method, refer to Appendix B "Test Procedures for ARI–700."

8.8 Non-Condensables

8.8.1 A vapor phase sample shall be used for determination of non-condensables. Non-condensable gases consist primarily of air accumulated in the vapor phase of refrigerant containing tanks. The solubility of air in the refrigerants liquid phase is extremely low and air is not significant as a liquid phase contaminant. The presence of non-condensable gases may reflect poor quality control in transferring refrigerants to storage tanks and cylinders.

8.8.2 The test method shall be gas chromatography with a thermal conductivity detector as described in Appendix A "Test Procedures for ARI–700."

8.8.2.1 The Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421B, dated March 5, 1992, section 4.4.2 (perchloroethylene method) is an acceptable alternate test method.

8.8.3 Report the level of non-condensable as percent by volume.

Section 9. Performance Calculation and Rating

9.1 The liquid refrigerant recovery rate shall be expressed in pounds per minute [kg/min] and measured by weight change at the mixing chamber (See Figure 1) divided by elapsed time to an accuracy within .02 lbs/min. [.009 kg/min]. Ratings using the Push/Pull method shall be identified "Push/Pull". Equipment may be rated by both methods.

9.2 The vapor refrigerant recovery rate shall be expressed in pounds per minute [kg/min] and measured by weight change at the mixing chamber (See Figure 1) divided by elapsed time to an accuracy within .02 lbs/min. [.0.009 kg/min].

9.3 The recycle rate is defined in 3.7 and expressed in pounds per minute [kg/min] of flow and shall be per ASHRAE 41.7–84 "Procedure For Fluid Measurement Of Gases" or ASHRAE 41.8–89 "Standard Method of Flow of Fluids—Liquids."

9.3.1 For equipment using multipass recycling or a separate sequence, the recycle rate shall be determined by dividing the net weight W of the refrigerant to be recycled by the actual time T required to recycle the refrigerant. Any set-up or operator interruptions shall not be included in the time T. The accuracy of the recycle rate shall be within .02 lbs/min. [.009 kg/min].

9.3.2 If no separate recycling sequence is used, the recycle rate shall be the higher of the vapor refrigerant recovery rate or the liquid refrigerant recovery rate. The recycle rate shall match a process which leads to contaminant levels in 9.6. Specifically, a recovery rate determined from bypassing a contaminant removal device cannot be used as a recycle rate when the contaminant levels in 9.6 are determined by passing the refrigerant through the containment removal device.

9.4 Refrigerant loss due to non-condensable purging shall be less than 5%. This rating shall be expressed as "passed" if less than 5%.

This calculation will be based upon net loss of non-condensables and refrigerant due to the purge divided by the initial net content. The net loss shall be determined by weighing before and after the purge, by collecting purged gases, or an equivalent method.

9.5 The final recovery vacuum shall be the mixing chamber pressure called for in 7.1.2.5 expressed in inches of mercury vacuum, [mm Hg or kP]. The accuracy of the measurement shall be within ±.1 inch

[±2.5mm] of Hg and rounding down to the nearest whole number.

9.6 The contaminant levels remaining after testing shall be published as follows:

Moisture content, PPM by weight

Chloride ions, Pass/Fail

Acidity, PPM by weight

High boiling residue, percentage by volume

Particulate/solid, Pass/Fail

Non-condensables, % by volume

9.7 Product Literature: Except as provided under product labelling in Section 11. performance ratings per 9.1, 9.2, 9.3, and 9.5 must be grouped together and shown for all listed refrigerants (11.2) subject to limitations of 9.8. Wherever any contaminant levels per 9.6 are rated, all ratings in 9.6 must be shown for all listed refrigerants subject to limitations of 9.8. The type of equipment in 11.1 must be included with either grouping. Optional ratings in 9.8 need not be shown.

9.8 Ratings shall include all of the parameters for each designed refrigerant in 11.2 as shown in Tables 2 and 3.

Table 2—Performance

Parameter/type of equipment	Recovery	Recovery/ recycle	Recycle	System dependent equipment
Liquid refrigerant recovery rate	([2])	([2])	N/A	N/A
Vapor refrigerant recovery rate	([2])	([2])	N/A	N/A
Final recovery vacuum	([1])	([1])	N/A	([1])
Recycle rate	N/A	([1])	([1])	N/A
Refrigerant loss due to non-condensable purging	([3])	([1])	([1])	N/A

[1]Mandatory rating.

[2]For a recovery or recovery/recycle unit, one must rate for either liquid feed only or vapor feed only or can rate for both. If rating only the one, the other shall be indicated by "N/A."

[3]For Recovery Equipment, these parameters are optional. If not rated, use N/A.

Table 3—Contaminants

Contaminant/type of equipment	Recovery	Recovery/recycle	Recycle	System dependent equipment
Moisture content	(*)	x	x	NA.
Chloride ions	(*)	x	x	NA.

Acidity	(*)	x	x	NA.
High boiling residue	(*)	x	x	NA.
Particulates	(*)	x	x	NA.
Non-condensables	(*)	x	x	NA.

*For Recovery Equipment, these parameters are optional. If not rated, use N/A.

xMandatory rating.

Section 10. Tolerances

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

Section 11. Product Labelling

11.1 *Type of equipment.* The type of equipment shall be as listed:

11.1.1 Recovery only

11.1.2 System Dependent Recovery

11.1.3 Recovery/Recycle

11.1.4 Recycle only

11.2 Designated refrigerants and the following as applicable for each:

11.2.1 Liquid Recovery Rate

11.2.2 Vapor Recovery Rate

11.2.3 Final Recovery Vacuum

11.2.4 Recycle Rate

11.3 The nameplate shall also conform to the labeling requirements established for certified recycling and recovery equipment established at 40 CFR 82.158(h).

Attachment to Appendix B1

Particulate Used in Standard Contaminated Refrigerant Sample.

1. Particulate Specification

1.1 The particulate material pm will be a blend of 50% coarse air cleaner dust as received, and 50% retained on a 200-mesh screen. The coarse air cleaner dust is available from: AC Spark Plug Division, General Motors Corporation, Flint, Michigan.

1.2 Preparation of Particulate Materials

To prepare the blend of contaminant, first wet screen a quantity of coarse air cleaner dust on a 200-mesh screen (particle retention 74 pm). This is done by placing a portion of the dust on a 200-mesh screen and running water through the screen while stirring the dust with the fingers. The fine contaminant particles passing through the screen are discarded. The +200 mesh particles collected on the screen are removed and dried for one hour at 230 F [110 °C]. The blend of standard contaminant is prepared by mixing 50% by weight of coarse air cleaner dust as received after drying for one hour at 230 F [110 °C] with 50% by weight of the +200 mesh screened dust.

1.3 The coarse air cleaner dust as received and the blend used as the standard contaminant have the following approximate particle size analysis: Wt. % in various size ranges, pm.

Size range	As received	Blend
0–5	12	6
5–10	12	6
10–20	14	7
20–40	23	11
40–80	30	32
80–200	9	38

[58 FR 28712, May 14, 1993, as amended at 59 FR 42960, Aug. 19, 1994. Redesignated and amended at 68 FR 43815, July 24, 2003]

Appendix B2 to Subpart F of Part 82—Performance of Refrigerant Recovery, Recycling, and/or Reclaim Equipment

This appendix is based on the Air-Conditioning and Refrigeration Institute Standard 740–1995.

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish methods of testing for rating and evaluating the performance of refrigerant recovery, and/or recycling equipment and general equipment requirements (herein referred to as "equipment") for contaminant or purity levels, capacity, speed and purge loss to minimize emission into the atmosphere of designated refrigerants.

Section 2. Scope

2.1 *Scope.* This standard applies to equipment for recovering and/or recycling single refrigerants, azeotropics, zeotropic blends, and their normal contaminants from refrigerant systems. This standard defines the test apparatus, test gas mixtures, sampling procedures and analytical techniques that will be used to determine the performance of refrigerant recovery and/or recycling equipment (hereinafter, "equipment").

Section 3. Definitions

3.1 *Definitions.* All terms in this appendix will follow the definitions in §82.152 unless otherwise defined in this appendix.

3.2 *Clearing Refrigerant.* Procedures used to remove trapped refrigerant from equipment before switching from one refrigerant to another.

3.3 *High Temperature Vapor Recovery Rate.* For equipment having at least one designated refrigerant (see

11.2) with a boiling point in the range of −50 to +10 °C, the rate will be measured for R–22, or the lowest boiling point refrigerant if R–22 is not a designated refrigerant.

3.4 *Published Ratings.* A statement of the assigned values of those performance characteristics, under stated rating conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. As used herein, the term "published rating" includes the rating of all performance characteristics shown on the unit or published in specifications, advertising or other literature controlled by the manufacturer, at stated rating conditions.

3.5 *Push/Pull Method.* 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.

3.6 *Recycle Flow Rate.* The amount of refrigerant processed divided by the time elapsed in the recycling mode. For equipment which uses a separate recycling sequence, the recycle rate does not include the recovery rate (or elapsed time). For equipment which does not use a separate recycling sequence, the recycle rate is a rate based solely on the higher of the liquid or vapor recovery rate, by which the contaminant levels were measured.

3.7 *Residual Trapped Refrigerant.* Refrigerant remaining in equipment after clearing.

3.8 *Shall, Should, Recommended* or *It Is Recommended* shall be interpreted as follows:

3.8.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with this appendix is claimed.

3.8.2 *Should, Recommended* or *It Is Recommended* is used to indicate provisions which are not mandatory but which are desirable as good practice.

3.9 Standard Contaminated Refrigerant Sample. A mixture of new or reclaimed refrigerant and specified quantities of identified contaminants which constitute the mixture to be processed by the equipment under test. These contaminant levels are expected only from severe service conditions.

3.10 *Trapped Refrigerant.* The amount of refrigerant remaining in the equipment after the recovery or recovery/recycling operation but before clearing.

3.11 *Vapor Recovery Rate.* The average rate that refrigerant is withdrawn from the mixing chamber between two pressures as vapor recovery rate is changing pressure and temperature starting at saturated conditions either 24 °C or at the boiling point 100 kPa (abs), whichever is higher. The final pressure condition is 10% of the initial pressure, but not lower than the equipment final recovery vacuum and not higher than 100 kPa (abs).

Section 4. General Equipment Requirements

4.1 *Equipment Information.* The equipment manufacturer shall provide operating instructions, necessary maintenance procedures and source information for replacement parts and repair.

4.2 *Filter Replacement.* The equipment shall indicate when any filter/drier(s) needs replacement. This requirement can be met by use of a moisture transducer and indicator light, by use of a sight glass/moisture indicator or by some measurement of the amount of refrigerant processed such as a flow meter or hour meter. Written instructions such as "to change the filter every 181 kg, or every 30 days" shall not be

acceptable except for equipment in large systems where the liquid recovery rate is greater than 11.3 kg/min where the filter/drier(s) would be changed for every job.

4.3 *Purge of Non-Condensable.* If non-condensables are purged, the equipment shall either automatically purge non-condensables or provide indicating means to guide the purge process.

4.4 *Purge Loss.* The total refrigerant loss due to purging non-condensables, draining oil and clearing refrigerant (*see* 9.5) shall be less than 3% (by weight) of total processed refrigerant.

4.5 *Permeation Rate.* High pressure hose assemblies5/8in. [16 mm] nominal and smaller shall not exceed a permeation rate of 3.9 g/cm^2 /yr (internal surface) at a temperature of 48.8 °C. Hose assemblies that UL recognized as having passed ANSI/UL 1963 requirements shall be accepted without testing. See 7.1.4.

4.6 *Clearing Trapped Refrigerant.* For equipment rated for more than one refrigerant, the manufacturer shall provide a method and instructions which will accomplish connections and clearing within 15 minutes. Special equipment, other than a vacuum pump or manifold gauge set shall be furnished. The clearing procedure shall not rely upon the storage cylinder below saturated pressure conditions at ambient temperature.

4.7 *Temperature.* The equipment shall be evaluated at 24 °C with additional limited evaluation at 40 °C. Normal operating conditions range from 10 °C to 40 °C.

4.8 *Exemptions.* Equipment intended for recovery only shall be exempt from 4.2 and 4.3.

Section 5. Contaminated Refrigerants

5.1 *Sample Characteristics.* The standard contaminated refrigerant sample shall have the characteristics specified in Table 1, except as provided in 5.2.

5.2 *Recovery-Only Testing.* Recovery equipment not rated for any specific contaminant shall be tested with new or reclaimed refrigerant.

Section 6. Test Apparatus

6.1 *General Recommendations.* The recommended test apparatus is described in the following paragraphs. If alternate test apparatus are employed, the user shall be able to demonstrate that they produce results equivalent to the specified referee apparatus.

6.2 *Self-Contained Equipment Test Apparatus.* The apparatus, shown in Figure 1, shall consist of:

6.2.1 *Mixing Chamber.* A mixing chamber consisting of a tank with a conical-shaped bottom, a bottom port and piping for delivering refrigerant to the equipment, various ports and valves for adding refrigerant to the chamber and stirring means for mixing.

6.2.2 *Filling Storage Cylinder.* The storage cylinder to be filled by the refrigerant transferred shall be cleaned and at the pressure of the recovered refrigerant at the beginning of the test. It will not be filled over 80%, by volume.

6.2.3 *Vapor Feed.* Vapor refrigerant feed consisting of evaporator, control valves and piping to create a 3.0 °C superheat condition at an evaporating temperature of 21 °C ±2K.

6.2.4 *Alternative Vapor Feed.* An alternative method for vapor feed shall be to pass the refrigerant through

a boiler and then through an automatic pressure regulating valve set at different saturation pressures, moving from saturated pressure at 24 °C to final pressure of recovery.

6.2.5 *Liquid Feed.* Liquid refrigerant feed consisting of control valves, sampling port and piping.

6.2.6 *Instrumentation.* Instrumentation capable of measuring weight, temperature, pressure and refrigerant loss, as required.

Table 1—Standard Contaminated Refrigerant Samples

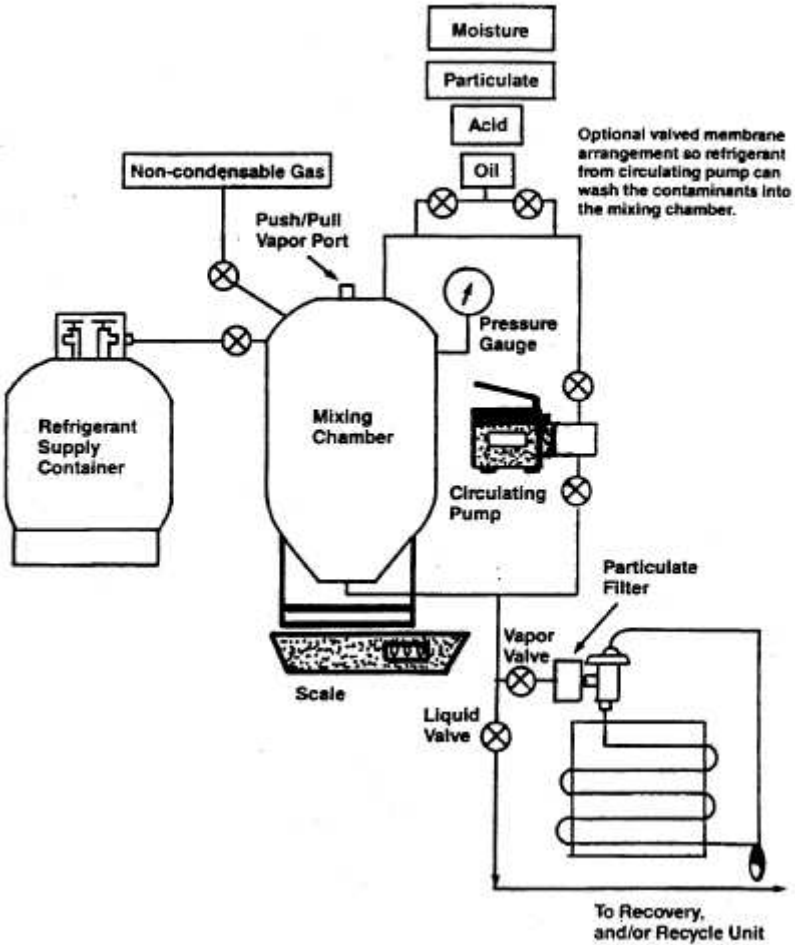
	R11	**R12**	**R13**	**R22**	**R113**	**R114**	**R123**	**R134a**	**R500**	**R502**	**R503**
Moisture Content: ppm by Weight of Pure refrigerant	100	80	30	200	100	85	200	200	200	200	30
Particulate Content: ppm by Weight of Pure Refrigerant Characterized by[1]	80	80	NA	80	80	80	80	80	80	80	NA
Acid Content: ppm by Weight of Pure Refrigerant—(mg KOH per kg Refrigerant) Characterized by[2]	500	100	NA	500	400	200	500	100	100	100	NA
Mineral Oil Content:											
% by Weight of Pure Refrigerant	20	5	NA	5	20	20	20	5	5	5	NA
Viscosity (SUS)	300	150		300	300	300	300	150[3]	150	150	
Non-Condensable Gases (Air Content): % by Volume	NA	3	3	3	NA	3	NA	3	3	3	3

[1]Particulate content shall consist of inert materials and shall comply with particulate requirements in appendix B.

[2]Acid consists of 60% oleic acid and 40% hydrochloric acid on a total number basis.

[3]Synthetic ester-based oil.

Figure 1. Test Apparatus for Self-Contained Equipment



View or download PDF

6.3 *Size.* The size of the mixing chamber shall be a minimum of .09 m^3 . The bottom port and the refrigerant feed shall depend on the size of the equipment. Typically, the mixing valves and piping shall be 9.5 mm. For large equipment to be used on chillers, the minimum inside diameter of ports, valves and pipings shall be the smaller of the manufacturer's recommendation or 37 mm.

6.4 *System Dependent Equipment Test Apparatus.* This test apparatus is to be used for final recovery vacuum rating of all system dependent equipment.

6.4.1 *Test Setup.* The test apparatus shown in Figure 2 consists of a complete refrigeration system. The manufacturer shall identify the refrigerants to be tested. The test apparatus can be modified to facilitate operation or testing of the system dependent equipment if the modifications to the apparatus are specifically described within the manufacturer's literature. (*See* Figure 2.) A 6.3 mm balance line shall be connected across the test apparatus between the high and low-pressure sides, with an isolation valve located at the connection to the compressor high side. A 6.3 mm access port with a valve core shall be located in the balance line for the purpose of measuring final recovery vacuum at the conclusion of the test.

Section 7. Performance Testing

7.1 *General Testing.*

7.1.1 *Temperatures.* Testing shall be conducted at an ambient temperature of 24 °C ±1K except high temperature vapor recovery shall be at 40 °C ±1K. The evaporator conditions of 6.2.3 shall be maintained as long as liquid refrigerant remains in the mixing chamber.

7.1.2 *Refrigerants.* The equipment shall be tested for all designated refrigerants (*see* 11.2). All tests in Section 7 shall be completed for each refrigerant before starting tests with the next refrigerant.

7.1.3 *Selected Tests.* Tests shall be as appropriate for the equipment type and ratings parameters selected (*see* 9.9, 11.1 and 11.2).

7.1.4 *Hose Assemblies.* For the purpose of limiting refrigerant emissions to the atmosphere, hose assemblies shall be tested for permeation according to ANSI/UL Standard 1963, Section 40.10.

7.2 *Equipment Preparation and Operation.* The equipment shall be prepared and operated per the operating instructions.

7.3 *Test Batch.* The test batch consisting of refrigerant sample (*see* Section 5) of the test refrigerant shall be prepared and thoroughly mixed. Continued mixing or stirring shall be required during the test while liquid refrigerant remains in the mixing chamber. The mixing chamber shall be filled to 80% level by volume.

7.3.1 *Control Test Batch.* Prior to starting the test for the first batch for each refrigerant, a liquid sample will be drawn from the mixing chamber and analyzed per Section 8 to assure that contaminant levels match Table 1 within ±10 ppm for moisture, ±20 ppm for particulate, ±20 ppm for oleic acid and ±0.5% for oil.

7.4 *Recovery Tests (Recovery and Recovery/Recycle Equipment).*

7.4.1 *Determining Recovery Rates.* The liquid and vapor refrigerant recovery rates shall be measured during the first test batch for each refrigerant (*see* 9.1, 9.2 and 9.4). Equipment preparation and recovery cylinder changeover shall not be included in elapsed time measurements for determining vapor recovery rate and liquid refrigerant recovery rate. Operations such as subcooling the recovery cylinder shall be included. Recovery cylinder shall be the same size as normally furnished or specified in the instructions by the equipment manufacturer. Oversized tanks shall not be permitted.

7.4.1.1 *Liquid Refrigerant Recovery Rate.* If elected, the recovery rate using the liquid refrigerant feed means (*see* 6.2.5) shall be determined. After the equipment reaches stabilized conditions of condensing temperature and/or recovery cylinder pressure, the recovery process shall be stopped and an initial weight shall be taken of the mixing chamber (*see* 9.2). The recovery process shall be continued for a period of time sufficient to achieve the accuracy in 9.4. The recovery process shall be stopped and a final weight shall be taken of the mixing chamber.

Configuration of standard air conditioning or refrigeration system for use as a test apparatus

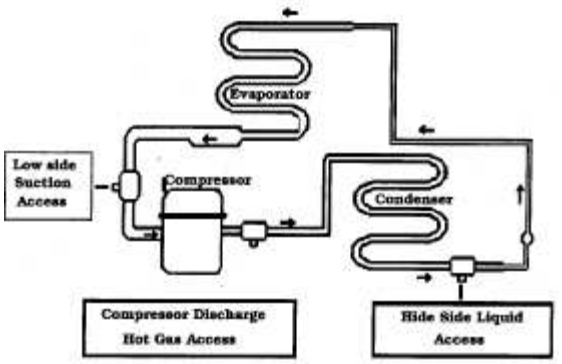


Figure 2. System Dependent Equipment Test Apparutus

View or download PDF

7.4.1.2 *Vapor Refrigerant Recovery Rate.* If elected, the average vapor flow rate shall be measured to accuracy requirements in clause 9.4 under conditions with no liquid refrigerant in the mixing chamber. The liquid recovery feed means shall be used. At initial conditions of saturated vapor at the higher of 24 °C or the boiling temperature (100 kPa absolute pressure), the weight of the mixing chamber and the pressure shall be recorded. At final conditions representing pressure in the mixing chamber of 10% of the initial condition, but not less than the final recovery vacuum (*see* 9.6) nor more than 100 kPa, measure the weight of the mixing chamber and the elapsed time.

7.4.1.3 *High Temperature Vapor Recovery Rate.* Applicable for equipment having at least one designated refrigerant (*see* 11.2) with a boiling point between −50 °C and +10 °C. Measure the rate for R–22, or the refrigerant with the lowest boiling point if R–22 is not a designated refrigerant. Repeat the test in 7.4.1.2 at saturated conditions at 40 °C and continue to operate equipment to assure it will achieve the final recovery vacuum (*see* 7.4.3).

7.4.2 *Recovery Operation.* This test is for determining the final recovery vacuum and the ability to remove contaminants as appropriate. If equipment is rated for liquid recovery (*see* 7.4.1.3), liquid recovery feed means described in 6.2.5 shall be used. If not, vapor recovery means described in 6.2.3 or 6.2.4 shall be used. Continue recovery operation until all liquid is removed from the test apparatus and vapor is removed to the point where equipment shuts down by automatic means or is manually shut off per operating instructions.

7.4.2.1 *Oil Draining.* Capture oil from the equipment at intervals as required in the instructions. Record the weight of the container. Completely remove refrigerant from oil by evacuation or other appropriate means. The weight difference shall be used in 9.5.2.

7.4.3 *Final Recovery Vacuum.* At the end of the first test batch for each refrigerant, the liquid valve and vapor valve of the apparatus shall be closed. After waiting 1 minute, the mixing chamber pressure shall be recorded (*see* 9.6).

7.4.4 *Residual Refrigerant.* This test will measure the mass of remaining refrigerant in the equipment after clearing and therefore the potential for mixing refrigerants (*see* 4.6).

7.4.4.1 *Initial Conditions.* At the end of the last test for each batch for each refrigerant, the equipment shall be disconnected from the test apparatus (Figure 1). Recycle per 7.5, if appropriate. Perform refrigerant

clearing operations as called for in the instruction manual. Capture and record the weight of any refrigerant which would have been emitted to the atmosphere during the clearing process for use in 9.5. If two loops are used for recycling, trapped refrigerant shall be measured for both.

7.4.4.2 *Residual Trapped Refrigerant.* Evacuate an empty test cylinder to 1.0 kPa absolute. Record the empty weight of the test cylinder. Open all valves to the equipment so as to provide access to all trapped refrigerant. Connect the equipment to the test cylinder and operate valves to recover the residual refrigerant. Record the weight of the test cylinder using a recovery cylinder pressure no less than specified in 6.2.2. Place the test cylinder in liquid nitrogen for a period of 30 minutes or until a vacuum of 1000 microns is reached, whichever occurs first.

7.5 *Recycling Tests (Recovery/Recycle Equipment).*

7.5.1 *Recycling Operation.* As each recovery cylinder is filled in 7.4.2, recycle according to operating instructions. There will not necessarily be a separate recycling sequence. Note non-condensable purge measurement in 9.5.

7.5.1.1 *Recycle Flow Rate.* While recycling the first recovery cylinder for each refrigerant, determine the recycling flow rate by appropriate means (*see* 9.3) to achieve the accuracy required in 9.4.

7.5.2 *Non-Condensable Sample.* After completing 7.4.3, prepare a second test batch (7.3). Recover per 7.4.2 until the current recovery cylinder is filled to 80% level by volume. Recycle per 7.5.1. Mark this cylinder and set aside for taking the vapor sample. For equipment having both an internal tank of at least 3 kg refrigerant capacity and an external recovery cylinder, two recovery cylinders shall be marked and set aside. The first is the cylinder described above. The second cylinder is the final recovery cylinder after filling it to 80% level by volume and recycling.

7.5.3 *Liquid Sample for Analysis.* Repeat steps 7.3, 7.4.2 and 7.5.1 with further test batches until indication means in 4.2 show the filter/drier(s) need replacing.

7.5.3.1 *Multiple Pass.* For equipment with a separate recycling circuit (multiple pass), set aside the current cylinder and draw the liquid sample (*see* 7.4) from the previous cylinder.

7.5.3.2 *Single Pass.* For equipment with the single pass recycling circuit, draw the liquid sample (*see* 7.4) from the current cylinder.

7.6 *Measuring Refrigerant Loss.* Refrigerant loss due to non-condensables shall be determined by appropriate means (*see* 9.5.1). The loss could occur in 7.4.1, 7.4.2 and 7.5.1.

Section 8. Sampling and Chemical Analysis Methods

8.1 *Chemical Analysis.* Chemical analysis methods shall be specified in appropriate standards such as ARI 700–95 and Appendix C to ARI Standard 700–95.

8.2 *Refrigerant Sampling.*

8.2.1 *Water Content.* The water content in refrigerant shall be measured by the Karl Fischer Analytical Method or by the Karl Fischer Coulometric techniques. Report the moisture level in parts per million by weight.

8.2.2 *Chloride Ions.* Chloride ions shall be measured by turbidity tests. At this time, quantitative results have not been defined. Report chloride content as “pass” or “fail.” In the future, when quantitative results

are possible, report chloride content as parts per million by weight.

8.2.3 *Acidity.* The acidity test uses the titration principle. Report the acidity in parts per million by weight (mg KOH/kg) of sample.

8.2.4 *High Boiling Residue.* High boiling residues shall use measurement of the volume of residue after evaporating a standard volume of refrigerant. Using weight measurement and converting to volumetric units is acceptable. Report high boiling residues as percent by volume.

8.2.5 *Particulates/Solids.* The particulates/solids measurement employs visual examination. Report results as "pass" or "fail."

8.2.6 *Non-condensables.* The level of contamination by non-condensable gases in the base refrigerant being recycled shall be determined by gas chromatography. Report results as percent by volume.

Section 9. Performance Calculation and Rating

9.1 *Vapor Refrigerant Recovery Rate.* This rate shall be measured by weight change of the mixing chamber divided by elapsed time (*see* 7.4.1.2). The units shall be kg/min and the accuracy shall be per 9.4.

9.1.1 *High Temperature Vapor Recovery Rate.*

9.2 *Liquid Refrigerant Recovery Rate.* This rate shall be measured by weight change of the mixing chamber divided by elapsed time (*see* 7.4.1.3). The units shall be kg/min and the accuracy shall be per 9.4.

9.3 *Recycle Flow Rate.* The recycle flow rate shall be as defined in 3.10, expressed in kg/min, and the accuracy shall be per 9.4.

9.3.1 For equipment using multi-pass recycling or a separate sequence, the recycle rate shall be determined by dividing the net weight W of the refrigerant to be recycled by the actual time T required to recycle. Any set-up or operator interruptions shall not be included in the time T.

9.3.2 If no separate recycling sequence is used, the recycle rate shall be the higher of the vapor refrigerant recovery rate or the liquid refrigerant recovery rate. The recycle rate shall match a process which leads to contaminant levels in 9.9. Specifically, a recovery rate determined from bypassing a contaminant removal device cannot be used as a recycle rate when the contaminant levels in 9.9 are determined by passing the refrigerant through the contaminant removal device.

9.4 *Accuracy of Flow Rates.* The accuracy of test measurements in 9.1, 9.2 and 9.3 shall be ±008 kg/min or flow rates up to .42 kg/min and ±2.0% for flow rates larger than .42 kg/min. Ratings shall be expressed to the nearest .02 kg/min.

9.5 *Refrigerant Loss.* This calculation will be based upon the net loss of refrigerant which would have been eliminated in the non-condensable purge process (*see* 7.5.1), the oil draining process (*see* 7.4.2.1) and the refrigerant clearing process (*see* 7.4.4.1), all divided by the net refrigerant content of the test batches. The refrigerant loss shall not exceed 3% by weight.

9.5.1 *Non-Condensable Purge.* Evacuate an empty container to 2 kPa absolute. Record the empty weight of the container. Place the container in a dry ice bath. Connect the equipment purge connection to the container and operate purge according to operating instructions so as to capture the non-condensables and lost refrigerant. Weigh the cylinder after the recycling is complete. Equivalent means are permissible.

9.5.2 *Oil Draining.* Refrigerant removed from the oil after draining shall be collected and measured in accordance with 7.4.2.1.

9.5.3 *Clearing Unit.* Refrigerant captured during the clearing process shall be measured in accordance with 7.4.4.1.

9.6 *Final Recovery Vacuum.* The final recovery vacuum shall be the mixing chamber pressure in 7.4.3 expressed in kPa. The accuracy of the measurement shall be within 0.33 kPa.

9.7 *Residual Trapped Refrigerant.* The amount of residual trapped refrigerant shall be the final weight minus the initial weight of the test cylinder in 7.4.4.2, expressed in kg. The accuracy shall be ±0.02 kg and reported to the nearest 0.05 kg.

9.8 *Quantity Recycled.* The amount of refrigerant processed before changing filters (*see* 7.5.3) shall be expressed in kg to an accuracy of ±1%.

9.9 *Contaminant Levels.* The contaminant levels remaining after testing shall be published as follows:

Moisture content, ppm by weight

Chloride ions, pass/fail

Acidity, ppm by weight

High boiling residue, % (by volume)

Particulates-solid, pass/fail (visual examination)

Non-condensables, % (by volume)

9.10 *Minimum Data Requirements for Published Ratings.* Published ratings shall include all of the parameters as shown in Tables 2 and 3 for each refrigerant designated by the manufacturer.

Section 10. Tolerances

10.1 *Tolerances.* Performance related parameters shall not be less favorable than the published ratings.

Section 11. Marking and Nameplate Data

11.1 *Marking and Nameplate Data.* The nameplate shall display the manufacturer's name, model designation, type of equipment, designated refrigerants, capacities and electrical characteristics where applicable. The nameplate shall also conform to the labeling requirements established for certified recycling and recovery equipment established at 40 CFR 82.158(h).

Recommended nameplate voltages for 60 Hertz systems shall include one or more of the utilization voltages shown in Table 1 of ARI Standard 110–90. Recommended nameplate voltages for 50 Hertz systems shall include one or more of the utilization voltages shown in Table 1 of IEC Standard Publication 38, IEC Standard Voltages.

11.2 *Data for Designated Refrigerants.* For each refrigerant designated, the manufacturer shall include all the following that are applicable per Table 2:

a. Liquid Recovery Rate

b. Vapor Recovery Rate

c. High Temperature Vapor Recovery Rate

d. Final Recovery Vacuum

e. Recycle Flow Rate

f. Residual Trapped Refrigerant

g. Quantity Recycled

Table 2—Performance

Parameter/Type of equipment	Recovery	Recovery/Recycle	Recycle	System dependent equipment
Liquid Refrigerant Recovery Rate	([1])	([1])	N/A	N/A
Vapor Refrigerant Recovery Rate	([1])	([1])	N/A	N/A
High Temp. Vapor Recovery Rate	([1])	([1])	N/A	N/A
Final Recovery Vacuum	([X])	([X])	N/A	([X])
Recycle Flow Rate	N/A	([X])	([X])	N/A
Refrigerant Loss	([3])	([X])	([X])	([3])
Residual Trapped Refrigerant	([2])	([2])	([2])	([2])
Quantity Recycled	N/A	([X])	([X])	N/A

[X]Mandatory rating.

[1]For a recovery or recovery/recycle unit, one must rate either liquid refrigerant recovery rate or vapor refrigerant recovery rate or one can rate for both. If rating only the one, the other shall be indicated by N/A, “not applicable.”

[2]Mandatory rating for equipment tested for multiple refrigerants.

[3]Mandatory rating if multiple refrigerants, oil separation or non-condensable purge are rated.

Note: For recovery equipment, these parameters are optional. If not rated use N/A, “not applicable.”

Table 3—Contaminants

Contaminant/Type of equipment	Recovery	Recovery/Recycle	Recycle	System dependent equipment

Moisture Content	(*)	(^{X})	(^{X})	N/A
Chloride Ions	(*)	(^{X})	(^{X})	N/A
Acidity	(*)	(^{X})	(^{X})	N/A
High Boiling Residue	(*)	(^{X})	(^{X})	N/A
Particulates	(*)	(^{X})	(^{X})	N/A
Non-Condensables	(*)	(^{X})	(^{X})	N/A

*For recovery equipment, these parameters are optional. If not rated, use N/A, "not applicable."

^{X}Mandatory rating.

Attachment 1 to Appendix B2 to Subpart F of Part 82—References

Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of this standard.

• ANSI/UL Standard 1963, *Refrigerant Recovery/Recycling Equipment,* First Edition, 1989, American National Standards Institute/Underwriters Laboratories, Inc.

• ARI Standard 110–90, *Air-Conditioning and Refrigerating Equipment Nameplate Voltages,* Air-Conditioning and Refrigeration Institute

• ARI Standard 700–95, *Specifications for Fluorocarbon and Other Refrigerants,* Air-Conditioning and Refrigeration Institute

• ASHRAE Terminology of Heating, Ventilation, Air Conditioning, Refrigeration, & Refrigeration, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1991

• IEC Standard Publication 38, *IEC Standard Voltages,* International Electrotechnical Commission, 1983

Attachment 2 to Appendix B2 to Subpart F of Part 82-Particulate Used in Standard Contaminated Refrigerant Sample

1. Particulate Specification

B1.1 The particulate material (pm) will be a blend of 50% coarse air cleaner dust as received, and 50% retained on a 200-mesh screen. The coarse air cleaner dust is available from: AC Spark Plug Division; General Motors Corporation; Flint, Michigan.

B1.2 *Preparation of Particulate Materials.*

To prepare the blend of contaminant, first wet screen a quantity of coarse air cleaner dust on a 200-mesh screen (particle retention 74 pm). This is done by placing a portion of the dust on a 200-mesh screen and running water through the screen while stirring the dust with the fingers. The fine contaminant particles passing through the screen are discarded. The +200-mesh particles collected on the screen are removed and dried for one hour at 110 °C. The blend of standard contaminant is prepared by mixing 50% by weight of coarse air cleaner dust as received (after drying for one hour at 110 °C) with 50% by weight of the +200 mesh screened dust.

B1.3 *Particle Size Analysis.*

The coarse air cleaner dust as received and the blend used as the standard contaminant have the following approximate particle size analysis:

Wt. % in various size ranges, pm.

Size range	As received	Blend
0–5	12	6
5–10	12	6
10–20	14	7
20–40	23	11
40–80	30	32
80–200	9	38

[68 FR 43815, July 24, 2003; 68 FR 54678, Sept. 18, 2003]

Appendix C to Subpart F of Part 82—Method for Testing Recovery Devices for Use With Small Appliances

Recovery Efficiency Test Procedure for Refrigerant Recovery Equipment Used on Small Appliances

The following test procedure is utilized to evaluate the efficiency of equipment designed to recover ozone depleting refrigerants (or any substitute refrigerant subject to the recycling rules promulgated pursuant to section 608 of the Clean Air Act Amendments of 1990) from small appliances when service of those appliances requires entry into the sealed refrigeration system or when those appliances are destined for disposal. This procedure is designed to calculate on a weight or mass basis the percentage of a known charge of CFC-12 refrigerant removed and captured from a test stand refrigeration system. Captured refrigerant is that refrigerant delivered to a container suitable for shipment to a refrigerant reclaimer plus any refrigerant remaining in the recovery system in a manner that it will be transferred to a shipping container after additional recovery operations.

The test stand refrigeration system required for this procedure is constructed with standard equipment utilized in currently produced household refrigerator and freezer products. The procedure also accounts for compressor oils that might be added to or removed from the test stand compressor or any compressor used in the recovery system.

I. Test Stand

Test stands are constructed in accordance with the following standards.

1. Evaporator—5/16in. outside dia. with 30 cu. in. volume.

2. Condenser—1/4in. outside dia. with 20 cu. in volume.

3. Suction line capillary heat exchanger—appropriate for compressor used.

4. An 800–950 Btu/hr high side case (rotary) compressor; or (depending on the test senario);

5. An 800–9500 Btu/hr low side case (reciprocating) compressor.

A person seeking to have its recovery system certified shall specify the compressors by manufacturer and model that are to be used in test stands constructed for evaluation of its equipment, and the type and quantity of compressor to be used in those compressors. Only a compressor oil approved for use by the compressor's manufacturer may be specified, and the quantity of compressor oil specified shall be an appropriate quantity for the type of oil and compressor to be used. In order to reduce the cost of testing, the person seeking certification of its recovery system may supply an EPA approved third party testing laboratory with test stands meeting these standards for use in evaluating its recovery system.

II. Test Conditions

Tests are to be conducted at 75 degrees F, plus or minus 2 degrees F (23.9 C ±1.1 C). Separate tests are conducted on both high side case compressor stands and low side case compressor stands. Separate tests are also conducted with the test stand compressor running during the recovery operation, and without the test stand compressor running during the recovery operation, to calculate the system's recovery efficiency under either condition.

These tests are to be performed using a representative model of all equipment used in the recovery system to deliver recovered refrigerant to a container suitable for shipment to a refrigerant reclaimer. The test stands are to be equipped with access valves permanently installed as specific by the recovery system's vendor to represent the valves used with that system in actual field operations.

A series of five (5) recovery operations are to be performed for each compressor scenario and a recovery efficiency is calculated based on the total quantity of refrigerant captured during all five (5) recoveries. Alternatively, at the request of the recovery system's vendor, a recovery efficiency is to be calculated for each recovery event. In this case, a statistically significant number of recovery operations are to be performed. Determination of what is a statistically significant number of recoveries is to be calculated as set out below. These individual recovery efficiencies are then averaged.

There are four (4) compressor scenarios to be tested. These are a high side case compressor in working condition; a high side case compressor in nonworking condition; a low side case compressor in working condition; and a low side case compressor in nonworking condition. Recovery efficiencies calculated for the two working compressor scenarios are to be averaged to report a working compressor performance. The two nonworking compressor efficiencies are also to be averaged to report a nonworking compressor performance.

If large scale equipment is required in the system to deliver recovered refrigerant to a refrigerant reclaimer (eg. carbon desorption equipment) and it is not possible to have that equipment evaluated under the procedure, the system's vendor shall obtain engineering data on the performance of that large scale equipment that will reasonably demonstrate the percentage refrigerant lost when processed by that equipment. That data will be supplied to any person required to evaluate the performance of those systems. The following procedure will also be modified as needed to determine the weight of refrigerant recovered from a test stand and delivered to a container for shipment to the large process equipment for further processing. The percentage loss documented to occur during processing is then to be applied to the recovery efficiencies calculated in this modified procedure to determine the overall capture efficiency for the entire system.

The following are definitions of symbols used in the test procedure.

Test Stand:

“TSO” means an original test stand weight.

"TSC" means a charged test stand weight.

Shipping Containers:

"SCO" means the original or empty weight of shipping container(s).

"SCF" means the final or full weight of shipping container(s).

Recover/Transfer System:

"RSO" means the original weight of a recovery/transfer system.

"RSF" means the final weight of a recovery/transfer system.

"OL" means the net amount of oil added/removed from the recovery device and/or transfer device between the beginning and end of the test for one compressor scenario.

Weighing steps are conducted with precision and accuracy of plus or minus 1.0 gram.

III. Test Procedure

1. Evacuate the test stand to 20 microns vacuum (pressure measured at a vacuum pump) for 12 hours.

2. Weigh the test stand (TSO).

3. If this is the first recovery operation being performed for a compressor scenario (or if a recovery efficiency is to be calculated for each recovery event), then weigh all devices used in the recovery system to deliver recovered refrigerant to a container suitable for shipment or delivery to a refrigerant reclaimer. Weigh only devices that can retain refrigerant in a manner that it will ultimately be transferred to a shipping container without significant release to the atmosphere (RSO).

4. Weigh final shipping containers (SCO).

5. Charge the test stand with an appropriate CFC-12 charge (either 6 oz. or 9 oz.).

6. Run the test stand for four (4) hours with 100% run time.

7. Turn off the test stand for twelve (12) hours. During this period evaporate all condensation that has collected on the test stand during step 6.

8. Weigh the test stand (TSC).

9. Recover CFC-12 from the test stand and perform all operations needed to transfer the recovered refrigerant to one of the shipping containers weighed in step 4. All recovery and transfer operations are to be performed in accordance with the operating instructions provided by the system's vendor. The compressor in the test stand is to remain "off" or be turned "on" during the recovery operation depending on whether the test is for a nonworking or working compressor performance evaluation. If a recovery efficiency is to be calculated for each recovery event, transfer the captured refrigerant to a shipping container and then skip to step 13. Otherwise continue. If the system allows for multiple recovery operations to be performed before transferring recovered refrigerant to a shipping container, the transfer operation can be delayed until either the maximum number of recovery operations allowed before a transfer is required have been performed, or the last of the five (5) recovery operations has been performed.

10. Perform any oil removal or oil addition operations needed to properly maintain the test stand and the devices used for recovery or transfer operations. Determine the net weight of the oil added or removed from the recovery device and/or transfer device. (OP1 for oil added, OP2 for oil removed).

11. Evacuate the test stand to 20 microns vacuum for 4 hours.

12. Return to step 2 unless five (5) recovery operations have been performed.

13. Weigh all final shipping containers that received recovered refrigerant (SCF).

14. Weigh the equipment weighed in step three (3) above (RSF). If a recovery efficiency is to be calculated for each recovery event, perform calculations and return to step one (1) for additional recoveries.

IV. Calculations

A. *For Five (5) Consecutive Recoveries*

Refrigerant Recoverable equals the summation of charged test stand weights minus original test stand weights.

$$\text{Refrigerant Recoverable} = \sum_{i=1}^{5} \left(TSC_i - TSO_i\right)$$

Oil Loss equals the net weight of oil added to and removed from the recovery device and/or transfer device.

$$OL = \sum_{i=1}^{5} \left(OP1_i - OP2_i\right)$$

Refrigerant Recovered equals the final weight of shipping containers minus the initial weight of final shipping containers, plus final recovery system weight, minus original recovery system weight, plus the net value of all additions and removals of oil from the recovery and transfer devices.

$$\text{Refrigerant Recovered} = \left(\sum_{i=1}^{n} SCF_i - SCO_i\right) + RSF - RSO - OL$$

n=number of shipping containers used.

Recovery Efficiency equals Refrigerant Recovered divided by Refrigerant Recoverable times 100%.

$$\text{Recovery Efficiency} = \frac{\text{Refrigerant Recovered}}{\text{Refrigerant Recoverable}}\ 100\%$$

B. *For Individual Recoveries*

Refrigerant Recoverable equals the charged test stand weight minus the original test stand weight.

$$\text{Refrigerant Recoverable} = TSCO - TSO$$

Refrigerant Recovered equals the final weight of the shipping container minus the initial weight of the shipping container plus the final weight of the recovery system minus the original recovery system weight.

$$\text{Refrigerant Recovered} = SCF - SCO + RSF - RSO$$

Recovery Efficiency equals Refrigerant Recovered divided by Refrigerant Recoverable times 100 percent.

$$\text{Recovery Efficiency} = \frac{\text{Refrigerant Recovered}}{\text{Refrigerant Recoverable}} \ 100\%$$

C. *Calculation of a Statistically Significant Number of Recoveries*

$$N_{add} = \left((t * sd)/(.10 * X)\right)^2 - N$$

Where:

N_{add}=the number of additional samples required to achieve 90% confidence.

sd=Standard deviation, or $(X/(N-1)^5)$

X=Sample average

N=Number of samples tested

Number of samples	t for 90% confidence
2	6.814
3	2.920
4	2.353
5	2.132
6	2.015
7	1.943
8	1.895
9	1.860
10	1.833

Procedure:

1. Compute N_{add}after completing two recoveries.

2. If $N_{add}>0$, then run an additional test.

3. Re-compute N_{add}. Continue to test additional samples until $N_{add}<0$.

V. Test Procedure Approval and Certification

Each vendor of capture equipment for small appliances desiring certification will provide a representative model of its capture system and its recommended recovery procedures to an EPA approved third party laboratory for testing in accordance with this procedure. The third party laboratory will certify recovery systems that when tested in accordance with this procedure demonstrate a sufficient recovery efficiency to meet EPA regulatory requirements.

Appendix D to Subpart F of Part 82—Standards for Becoming a Certifying Program for Technicians

Standards for Certifying Programs

a. Test Preparation

Certification for Type II, Type III and Universal technicians will be dependent upon passage of a closed-book, proctored test, administered in a secure environment, by an EPA-approved certifying program.

Certification for Type I technicians will be dependent upon passage of an EPA-approved test, provided by an EPA-approved certifying program. Organizations providing Type I certification only, may chose either an on-site format, or a mail-in format, similar to what is permitted under the MVACs program.

Each certifying program must assemble tests by choosing a prescribed subset from the EPA test bank. EPA expects to have a test bank with a minimum of 500 questions, which will enable the certifying program to generate multiple tests in order to discourage cheating. Each test must include 25 questions drawn from Group 1 and 25 questions drawn from each relevant technical Group. Tests for Universal technicians will include 100 questions (25 from Group 1 and 25 from each relevant technical Group). Each 50-question test represents 10 percent of the total test bank. Questions should be divided in order to sufficiently cover each topic within the Group.

Each certifying program must show a method of randomly choosing which questions will be on the tests. Multiple versions of the test must be used during each testing event. Test answer sheets or (for those testing via the computer medium) computer files must include the name and address of the applicant, the name and address of the certifying program, and the date and location at which the test was administered.

Training material accompanying mail-in Type I tests must not include sample test questions mimicking the language of the certification test. All mail-in material will be subject to review by EPA.

Certifying programs may charge individuals reasonable fees for the administration of the tests. EPA will publish a list of all approved certifying programs periodically, including the fees charged by the programs. This information will be available from the Stratospheric Ozone Protection Hotline.

b. Proctoring

A certifying program for Type II, Type III and Universal technicians must designate or arrange for the designation of at least one proctor registered for each testing event. If more than 50 people are taking tests at the same time at a given site, the certifying organization must adhere to normal testing procedures, by designating at least one additional proctor or monitor for every 50 people taking tests at that site.

The certification test for Type II, Type III and Universal technicians is a closed-book exam. The proctors must ensure that the applicants for certification do not use any notes or training materials during testing. Desks or work space must be placed in a way that discourages cheating. The space and physical facilities are

to be conducive to continuous surveillance by the proctors and monitors during testing.

The proctor may not receive any benefit from the outcome of the testing other than a fee for proctoring. Proctors cannot know in advance which questions are on the tests they are proctoring.

Proctors are required to verify the identity of individuals taking the test by examining photo identification. Acceptable forms of identification include but are not limited to drivers' licenses, government identification cards, passports, and military identification.

Certifying programs for Type I technicians using the mail-in format, must take sufficient measures at the test site to ensure that tests are completed honestly by each technician. Each test for Type I certification must provide a means of verifying the identification of the individual taking the test. Acceptable forms of identification include but are not limited to drivers' licenses numbers, social security numbers, and passport numbers.

c. Test Security

A certifying program must demonstrate the ability to ensure the confidentiality and security of the test questions and answer keys through strict accountability procedures. An organization interested in developing a technician certification program will be required to describe these test security procedures to EPA.

After the completion of a test, proctors must collect all test forms, answer sheets, scratch paper and notes. These items are to be placed in a sealed envelope.

d. Test Content

All technician certification tests will include 25 questions from Group I. Group I will ask questions in the following areas:

I. Environmental impact of CFCs and HCFCs

II. Laws and regulations

III. Changing industry outlook

Type I, Type II and Type III certification tests will include 25 questions from Group II. Group II will ask questions covering sector-specific issues in the following areas:

IV. Leak detection

V. Recovery Techniques

VI. Safety

VII. Shipping

VII. Disposal

Universal Certification will include 75 questions from Group II, with 25 from each of the three sector-specific areas.

e. Grading

Tests must be graded objectively. Certifying programs must inform the applicant of their test results no later than 30 days from the date of the test. Type I certifying programs using the mail-in format, must notify the applicants of their test results no later than 30 days from the date the certifying programs received the completed test and any required documentation. Certifying programs may mail or hand deliver the results.

The passing score for the closed-book Type I, Type II, Type III and Universal certification test is 70 percent. For Type I certification tests using the mail-in format, passing score is 84 percent.

f. Proof of Certification

Certifying programs must issue a standard wallet-sized identification card no later than 30 days from the date of the test. Type I certifying programs using mail-in formats must issue cards to certified technicians no later than 30 days from the date the certifying program receives the completed test and any required documentation.

Each wallet-sized identification card must include, at a minimum, the name of the certifying program including the date the certifying program received EPA approval, the name of the person certified, the type of certification, a unique number for the certified person and the following text:

[name of person] has been certified as [Type I, Type II, Type III and/or Universal—as appropriate] technician as required by 40 CFR part 82, subpart F.

g. Recordkeeping and Reporting Requirements

1. Certifying programs must maintain records that include, but are not limited to, the names and addresses of all individuals taking the tests, the scores of all certification tests administered, and the dates and locations of all testing administered.

2. EPA must receive an activity report from all approved certifying programs by every January 30 and June 30, the first to be submitted following the first full six-month period for which the program has been approved by EPA. This report will include the pass/fail rate and testing schedules. This will allow the Agency to determine the relative progress and success of these programs. If the certifying program believes a test bank question needs to be modified, information about that question should also be included.

3. Approved certifying programs will receive a letter of approval from EPA. Each testing center must display a copy of that letter at their place of business.

4. Approved technician certification programs that voluntarily plan to stop providing the certification test must forward all records required by this appendix, §§82.161, and 82.166 to another program currently approved by EPA in accordance with this appendix and with §82.161. Approved technician certification programs that receive records of certified technicians from a program that no longer offers the certification test must inform EPA in writing at the address listed in §82.160 within 30 days of receiving these records. The notification notice must include the name and address of the program to which the records have been transferred. If another currently approved program willing to accept the records cannot be located, these records must be submitted to EPA at the address listed at §82.160.

5. Technician certification programs that have had their certification revoked in accordance with §82.169 must forward all records required by this appendix, §§82.161, and 82.166 to EPA at the address listed in §82.160.

h. Additional Requirements

EPA will periodically inspect testing sites to ensure compliance with EPA regulations. If testing center discrepancies are found, they must be corrected within a specified time period. If discrepancies are not corrected, EPA may suspend or revoke the certifying programs's approval. The inspections will include but are not limited to a review of the certifying programs' provisions for test security, the availability of space and facilities to conduct the administrative requirements and ensure the security of the tests, the availability of adequate testing facilities and spacing of the applicants during testing, a review of the proper procedures regarding accountability, and that there is no evidence of misconduct on the part of the certifying programs, their representatives and proctors, or the applicants for certification.

If the certifying programs offer training or provide review materials to the applicants, these endeavors are to be considered completely separate from the administration of the certification test.

i. Approval Process

EPA anticipates receiving a large number of applications from organizations seeking to become certifying programs. In order to certify as many technicians as possible in a reasonable amount of time, EPA will give priority to national programs. Below are the guidelines EPA will use:

First: Certifying programs providing at least 25 testing centers with a minimum of one site in at least 8 different states will be considered.

Second: Certifying programs forming regional networks with a minimum of 10 testing centers will be considered.

Third: Certifying programs providing testing centers in geographically isolated areas not sufficiently covered by the national or regional programs will be considered.

Fourth: All other programs applying for EPA approval will be considered.

Sample application forms may be obtained by contacting the Stratopheric Ozone Hotline at 1–800–296–1996.

j. Grandfathering

EPA will grandfather technicians who successfully completed voluntary programs whose operators seek and receive EPA approval to grandfather these technicians, in accordance with §82.161(g). As part of this process, these certifying programs may be required to send EPA-approved supplementary information to ensure the level of the technicians' knowledge. Technicians will be required to read this supplementary information as a condition of certification. The certifying programs will also issue new identification cards meeting the requirements specified above.

k. Sample Application

EPA has provided a sample application. The Agency designed the application to demonstrate the information certifying programs must provide to EPA. Programs are not required to use this form or this format.

[58 FR 28712, May 14, 1993, as amended at 59 FR 42960, 42962, Aug. 19, 1994; 59 FR 55927, Nov. 9, 1994; 68 FR 54678, Sept. 18, 2003]

Browse Previous | Browse Next

For questions or comments regarding e-CFR editorial content, features, or design, email ecfr@nara.gov.

For questions concerning e-CFR programming and delivery issues, email webteam@gpo.gov.

Section 508 / Accessibility