AHRI Standard 740
(formerly ARI Standard 740)

1998 Standard for

Refrigerant Recover/Recycling Equipment

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IMPORTANT

SAFETY RECOMMENDATIONS

It is strongly recommended that the product be designed, constructed, assembled and installed in accordance with nationally recognized safety requirements appropriate for products covered by this standard.

ARI, as a manufacturers' trade association, uses its best efforts to develop standards employing state-of-the-art and accepted industry practices. However, ARI does not certify or guarantee safety of any products, components or systems designed, tested, rated, installed or operated in accordance with these standards or that any tests conducted under its standards will be non-hazardous or free from risk.

ARI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The Certification Program includes recovery, recovery/recycle and recycle equipment including System Dependent Equipment.

Certified Ratings

The following Certified Ratings are verified by tests at rating conditions specified in Section 4:

1. Liquid Recovery Rate (kg/min)
2. Vapor Recovery Rate (kg/min)
3. Final Recovery Vacuum Level (kPa)
4. Recycle Flow Rate (kg/min)
5. Moisture (PPM by wt.)
6. Acid (PPM by wt.)
7. Non-Condensables (% by vol.)
8. High Temperature Vapor Recovery Rate (kg/min)
9. Residual Trapped Refrigerant (kg)
10. Quantity of Refrigerant Processed at Rated Conditions (kg)
11. High Boiling Residue (% by vol.)

Note:

This standard supersedes ARI Standard 740-95.

Price $15.00 (M) $30.00 (NM)
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REFRIGERANT RECOVERY/RECYCLING EQUIPMENT

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for refrigerant recovery/recycling equipment: definitions; test requirements, rating requirements, minimum data requirements for published ratings, operating requirements, marking and nameplate data; and conformance conditions. It establishes methods of testing for rating and evaluating the performance of refrigerant recovery/recycling equipment for contaminant or purity levels, capacity, speed, purge loss to minimize emission into the atmosphere of designated refrigerants and to assure that recycling equipment meets the minimum purity requirements for refrigerants established in the Industry Recycling Guide (IRG-2).

1.1.1 *Intent.* This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

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

Section 2. Scope

2.1 *Scope.* This standard applies to equipment for recovering and/or recycling single refrigerants, azeotropes, 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").

2.1.1 Equipment shall be as defined in 3.3.1 and 3.3.2.

2.1.2 Refrigerants used to evaluate equipment shall be pure halogenated hydrocarbons, azeotropes and blends containing halogenated hydrocarbons.

Section 3. Definitions

3.1 *Definitions.* All terms in this document will follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning, and Refrigeration* unless otherwise defined in this section.

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

3.3 *Equipment Classification.*

3.3.1 *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.

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

3.4 *High Temperature Vapor Recovery Rate.* For equipment having at least one designated refrigerant (see 8.2) 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.

3.5 *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. Theses 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.

3.5.1 *Standard Rating.* A rating based on tests performed at Standard Rating Conditions.

3.5.2 *Application Rating.* A rating based on tests performed at Application Rating Conditions (other than Standard Rating Conditions).

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 *Rating Conditions.* Any set of operating conditions under which a single level of performance results, and which causes only that level of performance to occur.

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3.7.1 *Standard Rating Conditions.* Rating conditions used as the basis of comparison of performance characteristics.

3.8 *Reclaim.* To process used refrigerant to new product specifications. Chemical analysis of the refrigerant shall be required to determine that appropriate specifications are met. The identification of contaminants and required chemical analysis shall be specified by reference to national or international standards for new product specifications.

3.9 *Recover.* To remove refrigerant in any condition from a system and store it in an external container.

3.10 *Recycle.* To reduce contaminants in used refrigerants by separating oil, removing non-condensables and reducing moisture, acidity and particulate matter to the levels prescribed in Industry Recycling Guide (IRG-2).

3.11 *Recycle Equipment.* Equipment that recycles and whose type of equipment is "Recovery/Recycle" or "Recycle."

3.12 *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.

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

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

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

3.14.2 *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.

3.15 *Standard Contaminated Refrigerant Sample.* A mixture of new or reclaimed refrigerant and specified quantities of identified contaminants which constitute the mixture to be Representative test refrigerants other than those designated in the third column of Table 4 may be selected for test purposes to form multiple individual refrigerants within a chosen category. If the representative test refrigerant is replacing a normally designated representative test refrigerant per Table 4, then the refrigerant with the highest vapor pressure within the category is used as the representative test refrigerant.

processed by the equipment under test. These contaminant levels are expected only from severe service conditions.

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

3.17 *Vapor Recovery Rate.* The average rate that refrigerant is withdrawn from the mixing chamber between two pressures as vapor recovery rate is changing depending on the pressure. (The initial condition is vapor only at saturation pressure and temperature at either 24°C or at the boiling point 100 kPa, 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.).

Section 4. Test Requirements

4.1 *Testing Requirements.* All standard ratings shall be verified by tests conducted in accordance with the provisions set forth in Appendix C to this standard.

4.1.1 *Equipment.* Equipment shall be tested using all components as recommended by the manufacturer.

4.1.2 *Electrical Conditions.* Tests shall be made at the electrical characteristics specified on the unit nameplate.

Section 5. Rating Requirements

5.1 *Standard Rating Conditions.* Published Ratings shall include all of the standard ratings as shown in Tables 2 and 3, for each refrigerant designated by the manufacturer. The standard contaminated refrigerant sample shall have the characteristics specified in Table 1, except that recovery equipment not rated for any specific contaminant shall be tested with new or reclaimed refrigerant. Testing shall be conducted at an ambient temperature of 24°C ±1°C except high temperature vapor recovery shall be 40°C ±1°C.

For purposes of characterized performance, refrigerants have been categorized as shown in Table 4. Representative test refrigerant(s) have been selected within each category for test and rating purposes as shown in Table 4. Designated individual refrigerants may be selected for testing and rating.

5.2 *Tolerances.* Performance related parameters shall be equal to or better than the published ratings.

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Section 6. Minimum Data Requirements for Published Ratings

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

Section 7. Operating Requirements

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

7.2 *Filter Replacement for Recycle Equipment.* 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. Manufacturer must provide maximum quantity recycled or filter change interval in their written instructions.

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

7.4 *Purge Loss.* The total refrigerant loss due to purging non-condensables, draining oil and clearing refrigerant (see C7.5) shall be less than 3% (by weight) of total processed refrigerant.

7.5 *Permeation Rate.* High pressure hose assemblies 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 which have been UL recognized as having passed ANSI/UL 1963 requirements shall be accepted without testing. See C5.1.4.

7.6 *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.

7.7 *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.

7.8 *Purity Requirements.* Recycle equipment must meet the purity requirements prescribed in the Industry Recycling Guide (IRG-2).

7.9 *Exemptions.* Equipment intended for recovery only shall be exempt from 7.2, 7.3 and 7.8.

Section 8. Marking and Nameplate Data

8.1 *Marking and Nameplate Data.* The nameplate shall display the manufacturer's name, model designation, type of equipment, designated refrigerant(s) and electrical characteristics where applicable.

Recommended nameplate voltages for 60 Hertz systems shall include one or more of the equipment nameplate voltages shown in Table 1 of ARI Standard 110. 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.

8.1.1 *Type of Equipment.*

a. Recovery, Recovery/Recycle, or Recycle
b. Self-Contained or System Dependent

8.1.2 *Designated Refrigerants.*

a. *Category(ies).* If rating for all refrigerants within a category.
b. *Refrigerant(s)* If rating for designated individual refrigerants.

8.2 *Data for Designated Refrigerants.* For each refrigerant category designated, the manufacturer shall include all the following that are applicable per Table 2 for all refrigerants per Section C5.1.2.

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