AHRI Standard 740

2015 Standard for

Performance Rating of Refrigerant Recovery Equipment and Recovery/Recycling Equipment

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IMPORTANT

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AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. AHRI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

Note:

This standard supersedes AHRI Standard 740-98.

AHRI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The Certification Program includes Recovery, Recovery/Recycling and Recycling Equipment including System Dependent Equipment.

Certified Ratings

The following Certified Ratings are verified by tests at Rating Conditions specified in Section 4:

1. Push/pull Liquid Recovery Rate, kg/min
2. Liquid Recovery Rate, kg/min
3. Vapor Recovery Rate, kg/min
4. High Temperature Vapor Recovery Rate, kg/min
5. Final Recovery Vacuum Level, kPa
6. Recycle Flow Rate, kg/min
7. Refrigerant Loss, kg
8. Residual Trapped Refrigerant, kg
9. Quantity of Refrigerant Processed at Rated Conditions, kg
10. Moisture Content, ppm by wt.
11. Chloride Ions, pass/fail
12. Acid Content, ppm by wt.
13. High Boiling Residue, % by vol.
14. Particulates/solids, pass/fail
15. Non-condensables, % by vol.

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PERFORMANCE RATING OF REFRIGERANT RECOVERY EQUIPMENT AND RECOVERY/RECYCLING EQUIPMENT

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for refrigerant Recovery Equipment and 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 Equipment and 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 Recovery Equipment and Recovery/Recycling Equipment meets the minimum purity requirements for refrigerants in Section 7.8.

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 non-flammable (safety Class I), as per ASHRAE Standard 34, 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 Equipment and Recovery/Recycling Equipment.

2.1.1 Equipment shall be as defined in Sections 3.2.1 and 3.2.2.

2.1.2 Refrigerants used to evaluate equipment within the scope of this standard shall be pure halogenated hydrocarbons, and blends containing halogenated hydrocarbons that are listed in AHRI Standard 700 and either are defined as ozone depleting substances (ODS) under 40 CFR 82.3 or have been designated as acceptable or acceptable with use restrictions by the U.S. EPA Significant New Alternatives Policy (SNAP) program.

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the current edition of ASHRAE Terminology website (https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology) unless otherwise defined in this section.

3.1 *Clearing Refrigerant.* Procedures used to remove Trapped Refrigerants from the refrigerant Recovery Equipment and Recovery/Recycling Equipment before switching from one refrigerant to another.

3.2 *Equipment Classification.*

3.2.1 *Self-contained Equipment.* Recovery Equipment or Recovery/Recycling Equipment that is capable of refrigerant extraction without the assistance of components contained within an air-conditioning or refrigeration system.

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

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3.3 *High Temperature Vapor Recovery Rate.* For equipment within the scope of this standard having at least one designated refrigerant (see Section 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.

3.4 *Published Ratings.* A statement of the assigned values of those performance characteristics, under stated Rating Conditions, by which a unit may be chosen for 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.

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

3.5 *Push/Pull Method.* 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 *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.

3.6.1 *Standard Rating Conditions.* Rating Conditions used as the basis of comparison for performance characteristics.

3.7 *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.

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

3.9 *Recovery Equipment.* Equipment that removes refrigerant in any condition from a system into 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 Section 7.8.

3.11 *Recovery/Recycling Equipment.* Equipment that recovers refrigerant from a system and recycles the refrigerant, or equipment that only recycles the refrigerant (i.e. “Recycling Equipment”).

3.12 *Recycle Flow Rate.* The ratio of the amount of refrigerant processed to the time elapsed in the recycling mode. For equipment within the scope of this standard which uses a separate recycling sequence, the recycle rate does not include the recovery rate. 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, as determined by the method used to measure the contaminant levels.

Note: For equipment within the scope of this standard which uses a separate recycling sequence, the recycle rate also does not include elapsed time.

3.13 *Residual Trapped Refrigerant.* Refrigerant remaining in refrigerant Recovery Equipment and Recovery/Recycling Equipment after Clearing Refrigerant.

3.14 *"Shall" or "Should."* “Shall” or “should” 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.* “Should” 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 processed by the equipment within the scope of this standard under test. These contaminant levels are expected only from severe service conditions.

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3.16 *Trapped Refrigerant.* The amount of refrigerant remaining in the refrigerant Recovery Equipment and Recovery/Recycling Equipment after the recovery or recovery/recycling operation before Clearing Refrigerant.

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.

Note: The initial condition is vapor only at saturation pressure and temperature at either 24°C or at the boiling point at 100 kPa, whichever is higher. The final pressure condition is 10% of the initial pressure, but not lower than the equipment within the scope of this standard 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 performed 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 1 and 2, for each refrigerant designated by the manufacturer. The Standard Contaminated Refrigerant Sample shall have the characteristics specified in Table 3, 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.

Refrigerants have been categorized as shown in Table 4. For the purpose of simplifying performance testing, refrigerant(s) have been selected as representative(s) for performance evaluation within each category. If desired, a manufacturer may substitute the highest pressure refrigerant for the recommended refrigerant(s) for a given category (per Table 4). Performance testing using the representative refrigerant or the highest pressure refrigerant will allow the recovery unit to be certified for multiple individual refrigerants within a chosen category.

5.2 *Tolerances.* Performance related parameters shall be equal to or better than the Published Ratings.

Section 6. Minimum Data Requirements for Published Ratings

6.1 *Minimum Data Requirements for Published Ratings.* As a minimum, Published Ratings shall include all of the Standard Ratings as shown in Tables 1 and 2 for each refrigerant designated by the manufacturer. All claims to rating within the scope of this standard shall include the statement "Rated in accordance with AHRI Standard 740." All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of AHRI Standard 740."

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Table 1. Performance Ratings for Refrigerant Recovery Equipment and Recovery/Recycling Equipment[4,5]

Parameter	Type of Equipment			
	Recovery	Recovery/ Recycling	Recycling	System Dependent Equipment
Push/Pull Liquid Recovery Rate, kg/min	X[1]	X[1]	N/A	N/A
Liquid Refrigerant Recovery Rate, kg/min	X[1]	X[1]	N/A	N/A
Vapor Refrigerant Recovery Rate, kg/min	X[1]	X[1]	N/A	N/A
High Temperature Vapor Recovery Rate, kg/min	X[1]	X[1]	N/A	N/A
Final Recovery Vacuum Level, kPa	X	X	N/A	X
Recycle Flow Rate, kg/min	N/A	X	X	N/A
Refrigerant Loss, kg	X[2]	X	X	X[3]
Residual Trapped Refrigerant, kg	X[3]	X[2]	X[2]	X[2]
Quantity of Refrigerant Processed at Rated Conditions, kg	N/A	X	X	N/A

Notes:
1. For a recovery or recovery/recycling unit, establish a rating for either liquid refrigerant recovery rate or vapor refrigerant recovery rate or both. If rating only one, the other rate shall be indicated by N/A, "not applicable."
2. Mandatory rating if multiple refrigerants, oil separation or non-condensable purge are rated.
3. Mandatory rating for equipment within the scope of this standard tested for multiple refrigerants.
4. "X" denotes mandatory rating or equipment requirements.
5. "N/A" indicates "Not Applicable" for a parameter that does not have a rating.

Table 2. Contaminant Removal Ratings for Refrigerant Recovery Equipment and Recovery/Recycling Equipment[1,2]

Contaminant	Type of Equipment			
	Recovery	Recovery/Recycling	Recycling	System Dependent Equipment
Moisture Content, ppm by weight	N/A	X	X	N/A
Chloride Ions, pass/fail	N/A	X	X	N/A
Acid Content, ppm by weight	N/A	X	X	N/A
High Boiling Residue, % by volume	N/A	X	X	N/A
Particulates/solids, pass/fail	N/A	X	X	N/A
Non-condensables, % by volume	N/A	X	X	N/A

Notes:
1. X denotes Mandatory rating.
2. N/A indicates "Not Applicable."

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