

in 40 CFR part 82, subpart F appendix B, which was based on the Air-Conditioning and Refrigeration Institute's 1993 standard for refrigerant recycling and recovery equipment (*i.e.*, ARI Standard 740–1993) and will now be based upon ARI Standard 740–1995. These changes, all of which have already been adopted by industry into the ARI Standard 740–1995, include: Adoption of a new and more representative method for measuring the equipment's refrigerant recovery rate; measurements of the equipment's recovery rate and final vacuum at high temperatures; a limit on the total quantity of refrigerant that may be released from equipment during non-condensable purging, oil draining, and equipment clearing; a measurement of the quantity of refrigerant left in the condenser of equipment after clearing has occurred; standards for external hose permeability; and a requirement that equipment be tested with recovery cylinders that are representative of those used with the equipment in the field.

In addition, EPA is requiring that equipment that is advertised as "recycling equipment" be capable of recycling refrigerants to the contamination levels (except that for "Other Refrigerants") set forth in the IRG–2 table of Maximum Contaminant Levels of Recycled Refrigerants in Same Owner's Equipment. As discussed in more detail below, EPA is adopting these changes to help ensure that recycling of refrigerant is maximized and that emissions of refrigerant from refrigerant recovery and recycling equipment are minimized.

EPA received many supportive comments on its proposed adoption of the above requirements. Comments recommending changes to the proposed requirements or requesting more information on their implementation are discussed in more detail below.

1. Measurement of Vapor Recovery Rates

As proposed, EPA is requiring a more representative measurement of recovery equipment's vapor recovery rate. As discussed in the proposal, the ARI Standard 740–1993 was adopted by EPA in the May 14, 1993 final rulemaking as appendix A. Appendix A required measurement of the maximum vapor recovery rate, but two pieces of equipment with identical maximum recovery rates can have very different average recovery rates. This is because equipment characteristics that are not important to vapor recovery rates at the beginning of recovery, such as compressor clearance, become increasingly important as recovery

progresses. Although EPA has not established minimum vapor or liquid recovery rates, the Agency believes that the best possible information on these rates should be available to technicians to ensure that they purchase recycling and recovery equipment that best suits their needs. EPA also believes that technicians with adequate recovery equipment are less likely than technicians with slow equipment to interrupt the recovery procedure before it is complete. Thus, EPA is adopting the more recent version of the ARI Standard 740 (*i.e.*, ARI Standard 740–1995), which includes a measure of the average recovery rate.

The new test measures the change in mass and time elapsed as the pressure of the test chamber is lowered from the saturation pressure of the refrigerant at 24°C (75°F) (or from atmospheric pressure, if the refrigerant boils at a temperature above 75°F) to the lower of atmospheric pressure or 10% of the initial pressure. EPA specifically requested comment on adopting ARI Standard 740–1995 as the method of measuring the average recovery rate of recycling and recovery appliances, and on whether there was any reason to retain ARI Standard 740–1993 as the basis for appendix B of 40 CFR part 82, subpart F. EPA received no comments opposing or recommending changes to the more representative method of measuring the vapor recovery rate of equipment.

2. High-Temperature Testing

EPA is adopting the proposed requirement that the vapor recovery rate and final recovery vacuum of recovery and recycling equipment be measured at 40°C (104°F), in addition to 24°C (75°F), for recovery and recycling equipment intended for use with high-pressure refrigerants. As discussed in the NPRM, recovery and recycling equipment used in the field are likely to have to function at temperatures considerably higher than 75°F (61 FR 7866). The performance of recovery and recycling equipment is likely to be affected by such high temperatures. High temperatures raise the saturation pressure of the refrigerant in the recovery tank, thus raising the compression ratio against which the compressor in the recovery device must work to evacuate the refrigerant from an appliance. This can both slow recovery and prevent the equipment from achieving vacuums that it can achieve at 75°F. In some cases, equipment can actually stop running at high temperatures, because pressures rise too high or because the motor overheats or draws too much current in its attempt

to recover the refrigerant, tripping safety switches. Underwriters Laboratories (UL) reported that more than 50 percent of refrigerant recovery and recycling units initially failed to operate continuously during high temperature testing that is required as part of UL's safety testing (Air Docket A–92–01, Category: VI–B7–14; 2/22/96 letter to Deborah Ottinger/USEPA, from Glenn Woo and Steve Leva/UL regarding Equipment Construction features affecting certification testing).⁴

EPA believes that the high-temperature tests included in the revised ARI Standard 740 provide useful information on equipment's ability and quickness to draw vacuums at high temperatures. At the same time, these tests are likely to reveal many of the problems that might occur in equipment operated at high temperatures in the field (as has UL's safety test at 104°F), such as thermal or electrical overloading of motors. The test requires that the mixing chamber, a container with a minimum volume of three cubic feet, be filled with refrigerant vapor (but no liquid) at the refrigerant's saturation pressure at 104°F. As in the 75°F test, this vapor is then recovered until the final recovery vacuum is reached. Also as in the 75°F test, the vapor recovery rate is measured while the pressure in the mixing chamber is reduced to 10% of the initial pressure. Because repeating the test with all of the refrigerants for which the equipment is rated would considerably raise the costs of certification, the high-temperature test is performed with one refrigerant, R–22. If the recycling or recovery equipment is not rated for R–22, then equipment is tested with the refrigerant with the lowest boiling point, and therefore the highest saturation pressure for which it is rated. If the equipment is not rated for refrigerants with boiling points in the range of –50° to 10°C, the high-temperature test is not performed.

EPA received two comments concerning the proposed adoption of the high-temperature testing requirement (as part of ARI Standard 740–1995), one in opposition and the other expressing concern that it would be the first of many requirements to test equipment at a variety of temperatures. The commenter, while stating that EPA had set forth a "convincing explanation why additional testing [at higher temperatures] was necessary," expressed concern that EPA "will have to issue more, and more, and more specifications [regarding testing at

⁴ The equipment was redesigned to operate at elevated temperatures before it was UL listed.