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10 CFR Part 430

Energy Conservation Program for Consumer Products: Test Procedure for Residential Central Air Conditioners and Heat Pumps; Proposed Rule

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 430

[Docket No. EE–RM/TP–02–002]

RIN 1904–AB55

Energy Conservation Program for Consumer Products: Test Procedure for Residential Central Air Conditioners and Heat Pumps

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of proposed rulemaking and public meeting.

SUMMARY: The Department of Energy (DOE or the Department) is proposing to amend its test procedure for residential central air conditioners and heat pumps. The proposal implements test procedure changes for small-duct, high-velocity systems, multiple-split systems, two-capacity units, and updates references to the current American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standards. The proposal also clarifies issues associated with sampling and rating both tested and untested systems. The Department will hold a public meeting to discuss and receive comments on the proposal.

DATES: The Department will hold a public meeting on Wednesday, August 23, 2006, from 9 a.m. to 4 p.m., in Washington, DC. The Department must receive requests to speak at the public meeting before 4 p.m., Wednesday, August 9, 2006. The Department must receive a signed original and an electronic copy of statements to be given at the public meeting before 4 p.m., Wednesday, August 16, 2006.

The Department will accept comments, data, and information regarding the notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than September 18, 2006. See section IV, ''Public Participation,'' of this NOPR for details.

ADDRESSES: You may submit comments, identified by docket number EE–RM/TP–02–002 and/or RIN number 1904–AB55, by any of the following methods:

1. *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.

2. *E-mail: cactestprocedure2006@ee.doe.gov.* Include docket number EE–RM/TP–02–002 and/or RIN number 1904–AB55 in the subject line of the message.

3. *Mail:* Ms. Brenda Edwards-Jones, U.S. Department of Energy, Building Technologies Program, Mail-stop EE–2J, NOPR for Test Procedure for Residential Central Air Conditioners and Heat Pumps, docket number EE–RM/TP–02–002 and/or RIN number 1904–AB55, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Please submit one signed original paper copy.

4. *Hand Delivery/Courier:* Ms. Brenda Edwards-Jones, U.S. Department of Energy, Building Technologies Program, Room 1J–018, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–2945. Please submit one signed original paper copy.

Instructions: All submissions received must include the agency name and docket number or Regulatory Information Number (RIN) for this rulemaking. For detailed instructions on submitting comments and additional information on the rulemaking process, see section IV of this document (Public Participation).

Docket: For access to the docket to read background documents or comments received, visit the U.S. Department of Energy, Forrestal Building, Room 1J–018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC, 20585–0121, Telephone Number: (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards-Jones at the above telephone number for additional information regarding visiting the Resource Room. Please note: The Department's Freedom of Information Reading Room (formerly Room 1E–190 at the Forrestal Building) is no longer housing rulemaking materials.

FOR FURTHER INFORMATION CONTACT: Michael Raymond, Project Manager, Test Procedures for Residential Central Air Conditioners and Heat Pumps, Docket No. EE–RM/TP–02–002, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121, Telephone Number: (202) 586–9611, e-mail: *Michael.raymond@ee.doe.gov;*

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SUPPLEMENTARY INFORMATION:

I. Summary of the Proposed Rule

A. Overview

DOE completed a multi-year rulemaking process to update the DOE test procedure for residential central air conditioners and heat pumps on October 11, 2005, when it published an amended test procedure in the **Federal Register**. (70 FR 59122) (Hereafter referred to as the October 2005 final rule.) Today's notice initiates a new rulemaking that addresses several test procedure issues that were identified too late in the prior rulemaking to allow stakeholders an opportunity to comment on them. The October 2005 final rule was concerned almost exclusively with Appendix M to Subpart B (the test method proper), which was completely replaced. Today's revision has significant updates to Subpart B itself, in 10 CFR section 430.24 (units to be tested). These revisions concern topics such as the alternative rating method used to provide efficiency ratings for untested split system combinations, data submission requirements, and sampling requirements. There are also revisions to the test procedure proper in

Appendix M. These revisions have no common theme. Most are concerned with improving the accuracy of the test procedure, and with extending coverage to new central air conditioner features.

B. Authority

Part B of Title III of the Energy Policy and Conservation Act (EPCA or the Act) establishes the Energy Conservation Program for Consumer Products Other Than Automobiles (Program). (42 U.S.C. 6291 *et seq.*) The products currently subject to this Program (''covered products'') include residential central air conditioners and heat pumps, the subject of today's notice.

Under the Act, the Program consists of three parts: testing, labeling, and the Federal energy conservation standards. The Federal Trade Commission (FTC) is responsible for labeling, and DOE implements the remainder of the program. The Department, in consultation with the National Institute of Standards and Technology (NIST), is authorized to establish or amend test procedures as appropriate for each of the covered products. (42 U.S.C. 6293) The purpose of the test procedures is to measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative, average use cycle or period of use. The test procedure must not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The central air conditioner and heat pump test procedures appear in title 10 of the Code of Federal Regulations (CFR), part 430, subpart B, Appendix M.

If a test procedure is amended, DOE is required to determine to what extent, if any, the new test procedure amendments would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that an amended test procedure would alter the measured energy efficiency of a covered product, DOE is required to amend the applicable energy conservation standard with respect to such test procedure. In determining any such amended energy conservation standard, DOE is required to measure the energy efficiency or energy use of a representative sample of covered products that minimally comply with the existing standard. The average efficiency or energy use of these representative samples, tested using the amended test procedure, constitutes the amended standard. (42 U.S.C. 6293(e)(2))

Beginning 180 days after a test procedure for a covered product is prescribed, no manufacturer, distributor, retailer, or private labeler may make representations with respect to the energy use, efficiency, or cost of energy consumed by such products, except as reflected in tests conducted according to the DOE procedure.

C. Background

The latest revision of the DOE test procedure for central air conditioners and heat pumps—which covers units having rated cooling capacities of less than 65,000 Btu/h—was published as a final rule on October 11, 2005 (70 FR 59122), effective April 10, 2006.

After the January 22, 2001, publication of the proposed rule for the above rulemaking, stakeholders urged additional test procedure revisions. On December 13, 2002, DOE received stakeholder views on these revisions during a public workshop. (Hereafter referred to as the December 2002 workshop.) Written comments were received from the American Council for an Energy-Efficient Economy (ACEEE), Unico, Inc., Carrier Corporation, Lennox International, York International, and the Air-Conditioning and Refrigeration Institute (ARI). In addition, five requests for test procedure waiver have been received from manufacturers of multi-split central air conditioners. These waivers are necessary because the current test procedure is inadequate for testing these products.

This test procedure revision addresses changes requested by stakeholders, either directly or through test procedure waiver requests. A full list of the changes appears in the next section. The primary reasons for these changes are: (1) To implement test procedure revisions that are needed because of new energy efficiency standards for small-duct, high-velocity (SDHV) systems; (2) to better address multi-split units test procedure waivers; and (3) to address sampling and rating issues that have been raised since the new minimum energy efficiency standards became effective on January 23, 2006.

D. Summary of the Test Procedure Revisions

Today's proposed rule includes twelve substantive changes to the test procedure in Appendix M. It includes eight substantive changes and four non-substantive changes to other parts of the CFR that concern rating of central air conditioners and heat pumps. The proposed test procedure changes are:

Proposed substantive changes to Appendix M:

1. Imposing higher minimum external-static-pressure requirements and adding test-setup modifications for testing small-duct, high-velocity systems. (Sections 2.2, 2.4.1, 2.5.4.2, and 3.1.4.1.2)

2. Reinstating the option of conducting a cyclic test at high capacity when testing a two-capacity unit. (Sections 3.2.3, 3.4, 3.5, 3.5.3, 3.6.3, 3.8, 3.8.1, 4.1.3.3, and 4.2.3.3)

3. Shortening the maximum duration of a Frost Accumulation Test on a two-capacity heat pump when it is operating at low capacity. (Section 3.9)

4. Using default equations to approximate the performance of a two-capacity heat pump operating at low capacity, instead of conducting a Frost Accumulation Test. (Section 3.6.3)

5. For modulating multi-split systems: Allowing indoor units to cycle off, allowing the manufacturer to specify the compressor speed used during certain tests, and introducing a new algorithm for estimating power consumption. (Sections 2.1, 2.2.3, 2.4.1, 3.2.4, 3.6.4, 4.1.4.2, and 4.2.4.2)

6. Extending the duct-loss correction to the indoor capacities used for calculating seasonal energy efficiency ratio (SEER) and heating seasonal performance factor (HSPF). (Sections 3.3, 3.4, 3.5, 3.7, 3.9.1, and 3.11)

7. Defining ''repeatable'' for cyclic tests. (Section 3.5)

8. Articulating a definition of ''standard air.'' (Definition 1.37)

9. Changing one of the cooling-mode outdoor test conditions for units having a two-capacity compressor. (Sections 3.2.3 and 4.1.3)

10. Renaming ''Cooling and Heating Certified Air Volume Rates'' to ''Full-load Air Volume Rates.'' (Definition 1.34)

11. Modifying the criterion for using an air volume rate that is less than the manufacturer's specified value. (Sections 3.1.4.1.1 and 3.1.4.4.3)

12. Revising references to ASHRAE Standards (e.g., Standards 23, 37 and 116) that have been reaffirmed (i.e., reviewed and approved by ASHRAE with no substantive changes) or revised too recently to have been included in the amended test procedure published on October 11, 2005.

Proposed substantive changes to other parts of the CFR that affect the testing and rating of residential central air conditioners and heat pumps:

1. New data-submission-requirements when verifying an alternative rating method. 10 CFR 430.24(m)(6).

2. Guidance on the inclusion of pre-production units in the sample population used to determine and validate the published ratings. 10 CFR 430.24.

3. Clarification of the sample population used to validate the rated

SEER and the rated HSPF. 10 CFR 430.24(m).

4. Clarification of the definition of a ''highest sales volume combination.'' 10 CFR 430.24(m)(2).

5. Upper limit on the difference between calculated and tested SEER and HSPF values. 10 CFR 430.24(m), 10 CFR 430.2.

6. Clarification of the published ratings for untested split-system combinations. 10 CFR 430.24.

7. Adding requirement that ratings for an air conditioner or heat pump that is rated with a furnace include the model number of that furnace as part of the overall equipment model number. 10 CFR 430.62(a)(4).

8. For products such as multi-splits which have multiple indoor units, instituting a ''tested combination'' as an alternative to testing the combination with ''the largest volume of retail sales.'' 10 CFR 430.24(m)(2), 10 CFR 430.2.

Proposed non-substantive changes to related portions of the CFR:

1. Clarification of a private labeler's (i.e., a third party) responsibility for ensuring that reported ratings are based on an approved alternative method for rating untested combinations or on laboratory test data. 10 CFR 430.24(m)(5).

2. Revisions to the definition of ''coil family.'' 10 CFR 430.2.

3. New definition for ''private labeler'' within § 430.2.

4. Definitions of terms: ''indoor unit,'' ''outdoor unit,'' ''ARM/simulation adjustment factor,'' and ''tested combination.'' 10 CFR 430.2.

An expanded discussion of each proposed substantive change is provided in the next section. The complete test procedure is not printed as part of today's proposed rule. Instead, only the specific sections of the test procedure and related parts of the CFR where changes are proposed are printed. These specific, proposed changes are set forth at the end of this notice.

II. Discussion

A. Proposed Substantive Changes to the Test Procedure in Appendix M

1. *Imposing higher minimum external-static-pressure requirements and adding test-setup modifications for testing small-duct, high-velocity systems.* Based on consideration of comments received at the December 2002 workshop, DOE today proposes minimum external-static-pressure levels for SDHV systems that are higher, by 1.0 inch of water, than the minimums that apply for all other units. For example, for equipment having rated cooling capacities from 29,000 to 42,500 Btu/h, the minimum external static pressures are 0.15 inches of water for conventional blower-coil systems and 1.15 inches of water for SDHV systems.

Changes to the test procedure that complement the proposed testing of SDHV systems at the higher external static pressures are also proposed today. Changes are proposed that pertain to both the equipment setup and the test setup. For example, because the external-static-pressure taps for the laboratory test setup are located downstream of the indoor unit, all balance dampers or restrictor devices on, or inside, the unit must be set fully open or on the lowest restriction setting. To avoid potential abuses of using static regain to meet the lab-measured, higher external-static requirements and to otherwise avoid attempts to qualify a conventional unit as a SDHV unit, limits are proposed to the size of the duct connected to the outlet of the indoor unit. For cases where a closed-loop, air-enthalpy test apparatus is used on the indoor side, DOE proposes to limit the airflow resistance on the inlet side of the indoor blower-coil to a maximum value of 0.1 inch of water. The balance of the airflow resistance shall be imposed on the supply side of the indoor blower. Such loading is consistent with a field application of a SDHV system and its smaller supply ducts and room diffusers. Finally, the test setup shall include an adjustable air damper that is positioned immediately upstream of the airflow measuring apparatus. This damper can minimize air leakage in the airflow measuring apparatus at points upstream of the flow nozzle by reducing the pressure difference between the duct and the surrounding ambient. A maximum differential of 0.5 inches of water is proposed. If practicable, the outlet air damper box used for cyclic tests can double as this adjustable air damper.

Regarding the above-proposed new requirements for equipment and test setup, only one was discussed at the December 13, 2002 workshop. This requirement concerns the distribution of the external resistance between the supply and return sides when using a closed-loop test setup. No attendee opposed this addition, and no opposing views were voiced in the written comments that followed. The other proposed additions were raised in written comments from Unico, Inc. (Unico), a SDHV manufacturer. (Unico, No. 7) [1]

A definition for SDHV systems was developed by industry members during the previous test procedure rulemaking, and was adopted as Definition 1.35 (10 CFR 430.2) in the October 2005 final rule. The combination of this definition, the higher, lab-verified minimum external-static-pressure requirements, and limits on supply-duct sizes provides a safeguard against conventional systems being classified improperly as SDHV systems.

Today's proposed rule does not include changes to the definition of ''SDHV system.'' The requirement remains that all SDHV systems must be capable of operating at an external static pressure of 1.2 inches of water, or higher, at their Full-Load Air Volume Rate. During the brief discussion of this issue at the December 2002 workshop, there was support for making the definition congruent with the newly proposed testing requirements (Public Hearing Tr., pages 20, 69). However, DOE believes that the difference between the definition (fixed-minimum external static pressure of 1.2 inches of water) and the test procedure requirement (variable-minimum external static pressure of 1.1–1.2 inches of water, depending on capacity) is acceptable. Any unit meeting the definition can be tested under the test procedure. The test procedure's variable-minimum, external-static-pressure requirements reflect similar variable static-pressure requirements for conventional systems. The only effects of changing the definition to incorporate a variable-minimum, external-static-pressure requirement would be to make the definition more complicated and somewhat less stringent. DOE has determined that it would not improve the current definition of ''SDHV system'' if DOE made it congruent with the newly proposed lab testing requirements.

The DOE's Office of Hearings and Appeals (OHA) issued a decision and order on May 24, 2004, that requires SDHV systems manufactured on or after January 23, 2006, to achieve SEER and Heating Seasonal Performance Factor (HSPF) ratings that are not less than 11.0 and 6.8, respectively. While the changes proposed today would change the measure of energy efficiency for SDHV units, the amendments proposed were known by OHA and taken into consideration when OHA issued exceptions to the central air conditioner

[1] A notation in the form ''Unico, No. 7 at 4'' identifies a written comment DOE received in this rulemaking. This notation refers to a comment (1) by Unico, (2) in document number 7 in the docket in this matter, and (3) appearing at page 4 of document number 7. No page number may be cited if it is not needed because of the brevity of the comment, or, as here, the comment is in the form of a series of e-mails.

standards for SDHV units.[2] DOE expects that the test procedure amendments, as proposed, will not cause any SDHV product to become noncompliant with the energy efficiency standards for SDHV units set by OHA. DOE requests comments on the proposed changes, whether they will change the measure of energy use and whether they will cause any SDHV model to be non-compliant with DOE's energy efficiency standards. In particular, DOE requests stakeholders to submit lab test results that show the impact of these changes on the measure of efficiency and on compliance with the standard.

The specific changes proposed within the DOE test procedure that pertain to the above discussion on SDHV systems appear in sections 2.2, 2.4.1, 2.5.4.2, and 3.1.4.1.2 of the central air conditioner and heat pump test procedure.[3]

2. *Reinstating the option of conducting a cyclic test at high capacity when testing a two-capacity unit.* Beginning with the January 17, 1980, effective date of the DOE test procedure for central air conditioners and heat pumps, the test procedure provided a rarely used option of conducting cyclic testing at high capacity on two-capacity units. The October 2005 final rule eliminated the option of testing to obtain a cyclic-degradation coefficient for high capacity, $C_D(k = 2)$ and instead assigned the coefficient the same value as the cyclic-degradation coefficient for low capacity, $C_D(k = 2) = C_D(k = 1)$, in order to simplify the test procedure. The change, however, caused some two-capacity units (i.e., ones that lock out low capacity at certain outdoor temperatures) to lose a small SEER or HSPF rating boost, usually in the 0.1 range, that would have been gained by the optional test. There are cases where a 0.1 boost in SEER or HSPF would be of great value to a manufacturer. Thus, today's proposed rule includes the option of testing to determine the high-capacity C_D. Assigning the value for the low-capacity C_D as the high-capacity C_D now becomes the default option instead of testing at high capacity. Reinstating the option of testing to determine the high-capacity C_D was supported at the December 2002 workshop (Public Hearing Tr., pages 67–68).

The specific changes proposed within the DOE test procedure that pertain to the reinstatement of the optional, high-capacity cyclic tests are shown in sections 3.2.3, 3.4, 3.5, 3.5.3, 3.6.3, 3.8, 3.8.1, 4.1.3.3, and 4.2.3.3 of the central air conditioner and heat pump test procedure.

3. *Shortening the maximum duration of a Frost Accumulation Test on a two-capacity heat pump when it is operating at low capacity.* A frost accumulation test at low capacity is required if the heat pump cycles between low and high heating capacities while matching the building load at temperatures of 37°F and lower. Completing such a frost accumulation test, as presently specified, can be difficult, as discussed below. DOE is proposing changes that seek to reduce the test burden, while avoiding changing the measure of HSPF.

During a frost accumulation test, the official test period lasts for one complete cycle, from defrost termination to defrost termination—or 12 hours, whichever occurs first. Most heat pumps conduct a complete cycle well in advance of the 12-hour time limit, at least with single-speed units or two-capacity heat pumps operating at high capacity. When running a frost accumulation test at low capacity, however, the outdoor coil builds frost more slowly or not at all. As a result, frost accumulation tests on two-capacity heat pumps having a demand defrost and running at low capacity take much longer to complete, potentially requiring the full 12 hours—that is, if the test condition tolerances can be maintained over the extended period.

The frost accumulation test conditions are, in themselves, a challenge to maintain. The task is more difficult when testing a two-capacity heat pump at low capacity. The test-room air reconditioning system has to be sized to accommodate high-capacity operation and so is more likely mismatched and oversized. The level of difficulty also increases because of having to maintain the test-room tolerances over a comparatively longer period. More opportunity exists for a perturbation in the operation of the heat pump or the test-room reconditioning system to shift the test conditions beyond the allowed tolerances.

Three related modifications to the test procedure were discussed at the December 2002, workshop. The first option is to change the maximum test interval from 12 hours to either 3 or 6 hours. A second option is to state in the test procedure that the controls of the heat pump may be overridden during frost accumulation tests at low capacity in order to force a defrost cycle prior to 12 hours. In this case, the manufacturer would specify the time interval after which defrost would be manually initiated. The third option is to add a default equation that could be used instead of running the test.

The rationale for the first option comes from draft revisions of International Standards Organization (ISO) standards that cover the testing and rating of residential heat pumps and air conditioners, ISO Standards 5151 and 13253. (ISO/DIS 5151R, Non-ducted Air Conditioners and Heat Pumps—Testing and Rating for Performance; ISO/DIS 13253R, Ducted Air Conditioners and Air-to-Air Heat Pumps—Testing and Rating for Performance) Currently, these draft revisions call for all heating-capacity tests to last a maximum of three hours when using the air-enthalpy test method. The second option would be an extension of the procedure that was instituted in the October 2005 test procedure to handle heat pumps that use history-dependent demand-defrost controls. The manually initiated option was invoked to avoid running an excessive number of cycles before repeatable defrost cycles occurred. The third option is consistent with the existing alternative allowed when testing variable-speed heat pumps. Instead of running frost accumulation tests at both the intermediate speed and at maximum speed, the manufacturer has the option of using a specified equation to approximate the maximum-speed heating capacity and average power at 35°F outdoor temperature.

At the December 2002 workshop, two manufacturers, Trane and Copeland, spoke in favor of the default equation (Public Hearing Tr., pages 62–63). Ducane spoke in favor of a shorter maximum test time, 6 hours instead of 12 hours (Public Hearing Tr., page 62). ACEEE expressed a desire for making no change that ultimately discourages innovation (Public Hearing Tr., page 64). York favored letting the manufacturer specify the duration of the heating cycle (Public Hearing Tr., page 65). There was also a discussion of making the third option, which is a default equation, the default procedure. It was suggested that if a manufacturer wanted to test, it could use either the first or second option (Public Hearing Tr., page 66).

After considering recommendations from NIST, based on its experience, and discussions with industry members familiar with running frost accumulation tests, DOE believes that if

[2] *SpacePak/Unico,* 29 DOE ¶ 81,002 (2004).

[3] For the aid of the reader, the January 1, 2006, CFR includes both the central air conditioner test procedure as it existed prior to the October 2005 final rule (Appendix M to Subpart B of 10 CFR Part 430) and the test procedure as it exists as a result of the October 2005 final rule (Appendix M, Nt. to Subpart B of 10 CFR Part 430). References to the central air conditioner and heat pump test procedures in today's proposed rule are to the test procedure as it exists as a result of the October 2005 final rule (Appendix M, Nt. to Subpart B of 10 CFR Part 430). It is referred to as either the central air conditioner and heat pump test procedure or the October 2005 test procedure.

a heat pump has not defrosted in six hours, it is either (1) not building frost or (2) is completely frosted and probably has been so for more than half of the interval. In both cases, the benefits from continuing to run the test past 6 hours are none to minimal. For the ''not-building-frost'' case, extending the test is going to have virtually no impact on the average heating capacity and average power consumption. For the ''completely frosted'' alternative, the tested values of average performance might diminish, but at such a slow rate as to be insignificant.

Any benefit from an extended frost accumulation test, in addition, is further reduced because of the comparatively smaller impact of a low-capacity frost accumulation test on HSPF. The results of the low-capacity frost accumulation test affect low-capacity performance for the 22, 27, 32, and 37°F temperature bins. For two-capacity heat pumps, operating time over this bin temperature range is typically split between low and high capacities rather than being exclusively at low capacity.

DOE believes a reduction in the manufacturers' test burden is merited and that any change in the measure of HSPF will be negligible. Thus, DOE today proposes that the maximum duration of a frost accumulation test at low capacity be changed from 12 hours to 6 hours. This test procedure change is shown in section 3.9 of the central air conditioner and heat pump test procedure.

4. *Using default equations to approximate the performance of a two-capacity heat pump operating at low capacity, instead of conducting a Frost Accumulation Test.* This section builds on the discussion of the previous section. Although the proposed amendment discussed above will reduce the test burden, DOE believes the test burden remains considerable, especially if HSPF is relatively insensitive to the performance data derived from the test. One example would be a two-capacity heat pump that locks out low-capacity operation at outdoor temperatures lower than 35 °F. Such a lockout feature would result in the average capacity and power consumption from the low-capacity frost accumulation test being used only for 37 °F-bin calculations.

DOE is amenable to allowing an alternative to conducting a low-capacity frost accumulation test as long as the alternative yields conservative estimates of average capacity and power consumption. DOE has not been able to obtain information on typical performance degradation at frosting conditions. Data is needed to quantify how much the heat pump's performance at low-capacity and 35 °F outdoor temperature departs from the average capacity and power derived from linearly interpolating between the steady-state-heating-performance data at 47 and 17 °F. Lacking such data, DOE is following the recommendation made at the December 2002, workshop and proposes using the same default equations that it permits for variable-speed heat pumps in lieu of running a frost accumulation test at maximum speed. These equations estimate that the average heating-capacity and power-consumption values will be 90 percent, and 98.5 percent, respectively, of the interpolated, steady-state values. These percentages, when applied to low-capacity operation, provide conservative estimates of performance and are proposed in this rulemaking.

DOE prefers to have current laboratory data on which to base the selected conservative defaults. Thus, DOE requests that the industry share its results from testing two-capacity heat pumps at low capacity for the 47, 35, and 17 °F test conditions. The change, as proposed, is shown in section 3.6.3 of the central air conditioner and heat pump test procedure.

5. *For modulating multi-split systems: allowing indoor units to cycle off, allowing the manufacturer to specify the compressor speed used during certain tests, and introducing a new algorithm for estimating power consumption.* Certain parts of the current test procedure are poorly suited for testing and rating modulating multi-splits. In particular, three areas where shortcomings exist are (1) the requirement that all indoor coils operate during all tests, (2) the selection of the modulation levels for conducting tests on variable-speed systems (maximum, minimum, and a specified intermediate speed), and (3) the calculation algorithm for estimating performance over the intermediate speed/capacity range. The first area of concern results from a requirement developed for mini-split systems and then wrongly extended to multi-split systems. The second and third shortcomings stem from test levels and a calculation algorithm that are reasonable for one-condenser-to-one-evaporator-coil, variable-speed units but less suited for multi-splits.

In an effort to incrementally improve the test procedure's coverage of multi-splits, DOE proposes: (1) Allowing one or more indoor coils to cycle off during any test, if this occurs in normal operation, (2) allowing the manufacturer to specify the compressor speed used during the minimum-capacity and intermediate-speed tests, and (3) introducing a different algorithm for estimating power consumption in the intermediate-speed range. Another test procedure change is to remove the limitation on the use of only one indoor test room. Using two or more indoor test rooms may provide the flexibility needed to test certain multi-splits as complete systems. DOE recognizes that this change, however, will not be a solution to the prevailing problem where many multi-split systems cannot be lab tested, even in the most versatile test facility, due to the too-large number of indoor coils.

The allowance for turning off one or more indoor coils during any lab test, if this occurs in normal operation, will more likely be relevant during the intermediate and minimum speed/capacity tests. However, one or more indoor coils may not operate during a maximum-capacity test if the particular multi-split is configured using multiple indoor coils whose cumulative rated capacities exceed the rated capacity of the outdoor unit. During testing, DOE proposes that indoor coils that are cycled off be isolated in order to avoid any induced space conditioning, so that the aggregated, measured capacity includes no contribution from an inactive coil.

At the December 2002 workshop, and in the comments following the workshop, stakeholders did not make any objection to testing multi-splits in the lab in a manner more representative of field operation. (Public Hearing Tr., page 54) Allowing on/off control of indoor coils in the lab is consistent with this position.

As for the two other amendments relating to multi-splits that are proposed in this notice, a brief review of background information is helpful. Within the DOE test procedure, variable-speed air conditioners and heat pumps were first covered as a result of amendments to the central air conditioner and heat pump test procedures published by DOE in 1988. (53 FR 8304, March 14, 1988) These amendments addressed the designs of variable-speed systems marketed at the time: split systems having a single indoor coil and a single outdoor coil (*i.e.*, one-condenser-to-one-evaporator-coil systems). These systems could typically modulate, such that minimum-speed operation corresponded to capacities in the range of 40 to 60 percent of the maximum-speed capacity. More importantly, for the operating region where the unit modulates to produce a capacity equal to the building load, these systems operate most efficiently at the minimum speed with efficiency monotonically decreasing as the system ramped to maximum speed.

Further, because EER and COP are more linear than power consumption, DOE used efficiency as the parameter for interpolating within the DOE test procedure.[4]

The range of modulation of multi-splits is greater than for any previously evaluated one-condenser-to-one-evaporator-coil, variable-speed system. Most multi-splits can modulate their capacity to levels approaching 10 percent of rated capacity. Rated capacity, for some multi-splits, can be 5 to 10 percent lower than their maximum capacity, thus adding to the actual range of modulation. Multi-split manufacturers have informed DOE and NIST that both the minimum and maximum operating capacities correspond to points of declining efficiency with peak efficiency typically occurring in the 50-to-70 percent speed/capacity range. Thus, for a fixed set of ambient conditions, the efficiency-versus-modulation curve is expected to be hump-shaped.

The central air conditioner and heat pump test procedure's current algorithm calls for fitting a second-order polynomial (i.e., quadratic equation) to the efficiency values for the three available data points: the minimum-speed balance point, the intermediate-speed balance point, and the maximum-speed balance point. The curve fit is used to obtain an estimate of efficiency over the outdoor temperature range where the unit would modulate to provide a space conditioning capacity that equals the building load. Power consumption at any intermediate speed operating point is derived from the paired capacity and efficiency values (i.e., power = building load/EER) corresponding to the chosen outdoor (bin) temperature.

The above algorithm is well suited for one-condenser-to-one-evaporator-coil, variable-speed systems because the intermediate-speed, efficiency-versus-modulation data is monotonic and nearly linear. Due to insufficient data, DOE cannot quantify the value of using the algorithm with multi-split units. In the worst case, multi-split efficiency may deviate significantly from the balanced, parabolic shape that would be predicted by the second-order-polynomial fit. Another potential problem is that the efficiency at the intermediate-speed balance point will likely not be the peak efficiency point. As a result, the predicted peak efficiency is defined by the curve fit and not verified in the lab. The algorithm is not well suited for multi-split units, because the predicted efficiency curve may overestimate the performance of one unit while underestimating the performance of another unit.

DOE seeks data showing how the capacity and power consumption of multi-split units vary as a function of the modulation level and outdoor test conditions. Lacking such data, DOE proposes to calculate steady-state efficiency (EER and COP) over the intermediate-speed range using piece-wise linear fits: a line connecting the minimum- and intermediate-capacity balance points and a line connecting the intermediate- and maximum-capacity balance points. The linear fits should yield a conservative estimate of performance but are favored because of concern that the second-order fit may provide poor and most-likely inflated estimates.

Associated with the proposal to use a piece-wise linear fit of steady-state efficiency, DOE also proposes that the multi-split manufacturer shall specify the system capacity (i.e., compressor speed, indoor coil configurations, fan speeds, etc.) used for the cooling and heating intermediate speed/capacity tests. This change is being proposed so that the manufacturer has an opportunity to verify the peak-efficiency capabilities of the multi-split unit being tested. Defining two other capacities, maximum and minimum, are the last points specific to this multi-split discussion.

DOE proposes that multi-splits be tested at their maximum capacity (maximum compressor speed), or full load, not their rated capacity. The tested compressor speed shall be the maximum for continuous duty operation as allowed by the unit's controls. For clarity, this tested capacity is not a ''turbo'' mode where a higher operating speed(s) is allowed but for only a limited time interval. This clearer definition of the maximum speed/capacity test applies to all variable-speed systems, not just multi-splits.

DOE considered an alternative approach of allowing the manufacturer to specify the compressor capacity/speed used for maximum-capacity tests. However, in use, the variable-capacity system operates at capacities/speeds above this rated capacity. DOE's goal is to specify tests that yield a performance map that is as encompassing and representative as possible. Specifying the maximum-capacity tests as proposed in this notice is consistent with this goal. The approach is also consistent with the full-load testing approach taken in comparable ISO standards, 13253, 5151, and 15042. (ISO/DIS 15042P, Multi-split System Air-Conditioners and Air-to-Air Heat Pumps—Testing and Rating for Performance)

DOE next considered the option of allowing an additional test at the manufacturer's rated cooling capacity, for the sole purpose of defining the building load line used for the SEER bin calculations. DOE decided not to introduce this option due to possible confusion from having two SEER's. There could be one SEER based on a building load line tied to the unit's performance at the A-Test condition at maximum capacity, and a second SEER based on the load line derived using the rated capacity at the A-Test conditions. Manufacturers of variable-capacity systems, including multi-splits, can still show the impact of sizing the unit based on a rated capacity.

From a testing standpoint, conducting tests at the true minimum capacity, possibly 10 percent of full load, is difficult. The test room reconditioning system has difficulty operating against such low loads and maintaining test conditions within tolerance. Thus, the multi-split's performance at its true minimum capacity may have to be determined by extrapolation of test data collected at higher capacities where the tests are more easily conducted. In this case, some short test would be needed to verify the true minimum operating capacity of the multi-split. Alternatively, SEER and HSPF could be calculated based only on the operational range verified in the steady-state lab tests. For example, if a multi-split were tested at 30 percent of capacity even though it was reportedly able to ramp down to 10 percent of capacity, the SEER and HSPF calculations would be conducted assuming that the unit would cycle on and off at building loads that fell below the 30 percent capacity curve.

DOE proposes that the minimum-capacity test be conducted at a capacity specified by the manufacturer. The operating level can be either the equipment's true minimum or a capacity that is greater than the true minimum but nonetheless chosen by the manufacturer as its designated minimum capacity. DOE prefers that multi-split manufacturers specify a tested minimum capacity for which test-room tolerances are readily maintainable. As with the maximum-capacity test, the tested capacity shall be one that the unit could maintain indefinitely, if needed. DOE further proposes that SEER and HSPF shall be calculated assuming that the tested minimum capacity corresponds to the actual minimum capacity. Extrapolation

[4] Domanski, Piotr A., ''Recommended Procedure for Rating and Testing of Variable Speed Air Source Unitary Air Conditioners and Heat Pumps,'' NBSIR 88–3781, National Institute of Standards and Technology, May 1988.

of performance data will not be permitted for the case where the tested minimum is actually higher than the true minimum. DOE, however, is open to comments on how to verify the true minimum-capacity operation such that extrapolation of performance data could be incorporated.

At the December 2002 workshop, Trane recommended that a multi-split manufacturer make a recommendation on the new test points, possibly through a waiver petition (Public Hearing Tr., pages 55–56). Copeland, and to a certain extent, ACEEE, expressed concern that multi-splits may be difficult to test with the DOE test procedure for central air conditioners and heat pumps (Public Hearing Tr., pages 58–61). Since the workshop, DOE has received four waiver petitions from manufacturers of residential multi-split systems. All four petitions take the approach of seeking waivers from the DOE test procedures due to shortcomings in the test procedure (*e.g.,* no credit for a simultaneous heating and cooling mode), the lack of an alternative method for rating untested combinations, and the fact that many multi-split combinations simply cannot be lab tested because they have too many indoor coils. These limitations are among those multi-split issues that will be addressed in the future.

The changes proposed in this notice are offered to address some of the test procedure shortcomings pertaining to residential multi-split units. At this time, DOE prefers to pursue covering multi-splits within the central air conditioner and heat pump test procedure rather than pursue development of a ''multi-split-only'' test procedure. DOE welcomes comments on the proposed test procedure changes. For those that feel multi-split systems are so different as to merit coverage in a separate test procedure, DOE asks that they provide suggestions on the possible structure of such a test procedure.

The specific changes proposed within the DOE test procedure that pertain to the above discussion on multi-split systems are shown in sections 2.1, 2.2.3, 2.4.1, 3.2.4, 3.6.4, 4.1.4.2, and 4.2.4.2 of the central air conditioner and heat pump test procedure.

6. *Extending the duct-loss correction to the indoor capacities used for calculating SEER and HSPF.* In the recently published test procedure final rule, a capacity correction for duct losses was added. This correction was added for compatibility with existing industry practice. Regrettably, the correction was applied too narrowly. As published, the correction was only used when evaluating whether the required 6-percent energy balance was achieved between the primary and secondary test methods for measuring capacity. The correction is also to be used to adjust the indoor capacities used in calculating SEER and HSPF. Today's proposed rule includes this corrective action, with one exception. The exception applies to the two indoor capacities used for calculating a cyclic-degradation coefficient, CD. The effort involved in accounting for the duct losses, especially during a cyclic test, is judged as overly burdensome, given the adjustment's small effect. Its impact is further reduced because the CD calculation only requires the ratio of the two indoor capacities. Duct losses are minimal because the test procedure requires that the supply ductwork be insulated to an R–19 level.

This topic spurred little discussion at the December 2002 workshop. In fact, the only related substantive discussion was whether the correction could be made within the then-pending final rulemaking. DOE spoke in favor of the issue being considered in a second, separate rulemaking, and so it is included here. The specific changes proposed within the DOE test procedure that pertain to the above discussion are shown in sections 3.3, 3.4, 3.5, 3.7, 3.9.1, and 3.11 in the central air conditioner and heat pump test procedure.

7. *Defining ''repeatable'' for cyclic tests.* In the October 2005 final rule, the following requirement is provided in section 3.5e regarding the duration of a cyclic test: ''After completing a minimum of two complete compressor OFF/ON cycles, determine the overall cooling delivered and total electrical energy consumption during any subsequent data collection interval where the test tolerances given in Table 8 are satisfied.'' (70 FR 59122) Many test laboratories, however, let the test continue until the results are repeatable. These laboratories take extra time to make sure that they have it right; they go further than the specified ''one good interval and done'' test procedure requirement.

In today's proposed rule, DOE proposes to include the additional requirement that repeatable results be obtained before terminating a cyclic test. DOE plans to follow industry practice for what qualifies as ''repeatable.'' At the December 2002 workshop, two attendees spoke to this issue (Public Hearing Tr., pp. 42–43). After the workshop, NIST discussed the issue with these two attendees, Excel Comfort Systems (Excel) and Intertek Testing Services (ITS). Excel indicated that it typically runs 5 OFF/ON cycles and compares the Γ, the time-integrated temperature difference on the indoor side, from each ''on'' cycle. The goal is to have the Γ values vary by 0.04 °F·hr or less. ITS looks at two parameters when making a judgment on repeatable cycles. On the capacity side, ITS seeks consecutive cycles in which the average indoor side air temperature difference changes by 0.3 °F or less. On the input side, ITS seeks consecutive cycles where the average system power consumption for the complete OFF/ON interval changes by 5 watts or less. The ITS criterion for capacity is slightly less stringent than the Excel Comfort Systems criterion. The input side criterion imposed by ITS offsets this slight difference.

DOE favors defining ''repeatable results'' in terms of both the unit's average capacity (i.e., using the integrated temperature difference) and its average power consumption. As compared to the above two industry members and their respective in-house criteria, DOE today proposes comparatively looser target levels. They are: Γ values that vary by 0.05 °F·hr or less; and consecutive cycles where the average system power consumption changes by 10 watts or less. See section 3.5 of the test procedure for the specific changes proposed on implementing and defining repeatable results for a cyclic test.

8. *Articulating a definition of ''standard air.''* The October 2005 final rule contains a definition for ''standard air'' (see § 1.37, Appendix M, Nt. to Subpart B of 10 CFR part 430). This definition was, at the time, consistent with the definition contained in the public review draft of ASHRAE Standard 37–1988R (see 10 CFR 430.22(5)3). During the public review process, the definition in the ASHRAE Standard was modified to highlight that mass density is the key defining parameter, not the combination of the dry air's temperature and pressure. DOE proposes to amend its definition of ''standard air'' so that it matches the definition that appears in ASHRAE Standard 37–2005. This change is included among the list of substantive changes to emphasize that consistency with the revised ASHRAE standard language causes standard air volume rates to be expressed in terms of dry air, not moist air. The proposed update is shown in the definition of ''standard air'' in section 1.37 of the central air conditioner and heat pump test procedure.

9. *Changing one of the cooling-mode outdoor test conditions for units having a two-capacity compressor.* To minimize the testing burden, the

cooling-mode tests for air conditioners and heat pumps having a two-capacity compressor are conducted only at 82 °F and 95 °F outdoor-dry-bulb temperatures. The 82 °F and 95 °F test conditions tend to bracket the key temperature bins in which maximum compressor capacity most affects the SEER bin calculation. By comparison, the 82 °F and 95 °F test conditions span a range that tends to be higher than the key temperature bins in which minimum compressor capacity most affects the SEER bin calculations. As a result, for the lowest outdoor temperature bins (i.e., 67 °F, 72 °F, and 77 °F), cooling capacity and electrical power consumption at low (stage) compressor capacity are derived from linearly extrapolating the 82° and 95 °F test results. These extrapolated capacities and powers are more susceptible to inaccuracies and, unfortunately, can potentially reward poor performance. In the latter case, for example, increased electrical power consumption during the A_1 Test at 95 °F and low compressor capacity could potentially result in a higher SEER. The higher power consumption for the A_1 Test could cause the power consumption for the heavily weighted 67 °F, 72 °F, and 77 °F bins to be underestimated to the point that they more than offset the higher power consumptions for 87 °F and higher temperature bins.

In today's proposed rule, DOE proposes to change the outdoor conditions used for certain tests on two-capacity air conditioners and heat pumps. The first change is the elimination of the steady-state A_1 Test at 95 °F outdoor temperature. Instead, two-capacity units will now be tested at an outdoor-dry-bulb temperature of 67 °F, and in those few cases where it applies, at an outdoor-wet-bulb temperature of 53.5 °F. The results from this new steady-state test, designated the F_1 Test, shall be used in conjunction with the results from the current low-capacity test at 82 °F outdoor-dry-bulb temperature (i.e., the B_1 Test) to determine the low-capacity cooling capacity and power consumption values used in SEER bin calculations. With this change, those outdoor temperature bins where low-capacity operation dominates will now be more accurately derived by interpolating, as opposed to extrapolating.

The above change caused DOE to consider two additional changes. Currently, the two tests used to determine the low-capacity, cooling-mode cyclic-degradation coefficient, $C^c_D(k=1)$, are conducted at 82 °F outdoor-dry-bulb temperature. Given the change to 67 °F outdoor-dry-bulb temperature for one wet-coil steady-state test, DOE also proposes to conduct the two dry-coil tests at 67 °F. These changes make the test conditions for two-capacity units consistent with the test conditions specified for variable-speed systems. These two additional 67 °F tests are denoted by the same identifiers used for the comparable variable-speed tests: The optional dry-coil steady-state test is the G_1 Test and the optional dry-coil cyclic test is the I_1 test.

The specific changes proposed within the DOE test procedure pertaining to new outdoor test conditions for one required, and two optional, cooling mode tests for two-capacity units are shown in sections 3.2.3 and 4.1.3 of the test procedure. These changes are combined with DOE's earlier proposal to reinstate the two optional dry-coil tests at high capacity.

10. *Renaming ''Cooling and Heating Certified Air Volume Rates'' to ''Full-load Air Volume Rates.''* The October 2005 final rule introduced proper names for the air volume rates associated with the many tests that are described in the test procedure. The name given to the air volume rate that is used during most tests was ''Certified Air Volume Rate,'' prefixed with the qualifier ''Cooling'' or ''Heating.'' Typically, the word ''certified'' is used within the industry to identify parameters that are subject to verification checks and, if appropriate, penalties for failure to comply with the rules for accurately reporting the certified parameter. Examples of such certified parameters are SEER, HSPF, and rated capacity. To avoid confusion on whether air volume rate is a ''certified parameter''—which it is not—DOE proposes substituting the word ''Full-load'' for ''Certified'' within the proper name of the particular air volume rate. DOE considered other substitutes, including ''Nominal,'' ''Rated,'' ''Tested,'' and ''Target.'' DOE welcomes comments on alternative substitutes. In addition, DOE seeks comments on instituting this change within the definition for small-duct, high-velocity systems in section 1.35 of the central air conditioner and heat pump test procedure.

11. *Modifying the criterion for using an air volume rate that is less than the manufacturer's specified value.* The October 2005 final rule rigidly specified the air volume rate to use during each test. In particular, DOE definitively stated in section 3.1.4.1.1 of the central air conditioner and heat pump test procedure that there are only two circumstances in which the test lab could use an air volume rate that is less than the manufacturer's specified value. The criterion for these circumstances, which applies to ducted blower-coil systems having a fixed-speed, multi-speed, or variable-speed, variable-air-volume-rate indoor fan, is reexamined in this rulemaking.

The first lab test is the A or A_2 Test (except for heating-only heat pumps). For this test, the unit must generate an external static pressure that is equal to or greater than the applicable value listed in the test procedure: 0.10, 0.15, or 0.20 inches of water, the value being assigned based on the unit's (expected) rated cooling capacity. When running the A or A_2 Test, the test lab will either achieve the manufacturer's specified air volume rate and observe the corresponding external static pressure, or it will achieve the specified minimum external static pressure and observe the air volume rate. If this check indicates that the indoor unit, as configured, cannot provide the manufacturer's specified air volume rate and meet the minimum external-static requirement, the central air conditioner and heat pump test procedure (section 3.1.4.4.3a) says to ''incrementally change the setup of the indoor fan (e.g., fan motor pin settings, fan motor speed) until the Table 2 [minimum static] requirement is met while maintaining the same [target] air volume rate.'' The central air conditioner and heat pump test procedure continues, in the section cited above: ''If the indoor fan setup changes cannot provide the minimum external static, then reduce the air volume rate until the correct Table 2 minimum is equaled.'' This last case covers one of two cases where the test lab can use an air volume rate that is less than the value specified by the manufacturer. The second case is the more global stipulation to set the air volume rate to 37.5 scfm per 1000 Btu/h if the manufacturer's specified air volume rate yields a higher ratio.

Since the publication of the final rule, DOE now understands that this approach is too rigid and is inconsistent with industry practice. Specifically, although the test requirement to achieve the minimum external static pressure has been universally upheld, the requirement that this be done by first changing the motor's speed has not been universally employed. In particular, for cases in which the specified minimum external static pressure is achieved at an air volume rate that is slightly less than the value specified by the manufacturer, the testing customarily proceeds using this slightly lower air volume rate rather than increasing the speed setting of the fan motor.

The desired approach should account for normal equipment tolerances and variability, and should be compatible with allowing the manufacturer to specify an air volume rate representative of the average indoor unit, for each indoor unit model. The current, more rigid, approach causes manufacturers to specify an air volume rate at the low end of the range for a typical model.

Because the current algorithm does not account for the inherent variability in fan motors, housings, and wheels, DOE proposes to add an overall tolerance when assigning the indoor-air volume rate used for testing. This change will result in more representative testing, because of the use of an average air volume rate, rather than a rate on the low end of the range. DOE proposes to assign a tolerance of −5 percent on the air volume rate specified by the manufacturer. Thus, if the indoor unit can attain the minimum external static pressure while operating at an indoor air volume rate that is between 0 and −5 percent of the manufacturer-specified value, then this lab air volume rate shall be used. The tolerance of −5 percent is recommended because it is representative of indoor blower variations and also because a maximum tolerance of −5 percent in air volume rate typically causes a change in total capacity that is within the uncertainty of the measurement.

Proposed language for effecting the above change is provided in the last section of this notice as part of the revised section 3.1.4.1.1 of the central air conditioner and heat pump test procedure and, for ducted, heating-only heat pumps, section 3.1.4.4.3. DOE requests comments on the approach of including the tolerance within the setup algorithm, and assigning it as a one-sided tolerance. DOE also requests data concerning the selection of −5 percent as the tolerance.

12. *Revising references to ASHRAE Standards (e.g., Standards 23, 37, 116) that have been reaffirmed (i.e., reviewed and approved by ASHRAE with no substantive changes) or revised too recently to have been included in the amended test procedure published on October 11, 2005.* ASHRAE Standard 23, ''Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units,'' and Standard 37 ''Methods of Testing for Rating Unitary Air-Conditioning and Heat Pump Equipment'' completed the revision, public review, and publication process in 2005. ASHRAE Standard 116, ''Methods of Testing for Rating for Seasonal Efficiency of Unitary Air Conditioners and Heat Pumps,'' completed the reaffirmation, public review, and publication process in 2005. When an ASHRAE standard is revised, substantive changes are made. Reaffirmations, by comparison, contain only non-substantive changes and so do not alter the technical content of the document. To DOE's knowledge, the proposal to reference these current versions of the three ASHRAE standards will not affect the SEER and HSPF ratings calculated using the current or proposed DOE test procedure.

B. Proposed Substantive Changes to Other Parts of the CFR That Affect the Testing and Rating of Residential Central Air Conditioners and Heat Pumps

1. *New data-submission-requirements when verifying an alternative rating method.* Presently the CFR states that the manufacturer must supply test data on four different split-system combinations. 10 CFR 430.24(m)(6)(iii) Each split-system combination must be other than the combination with the highest sales volume. Overall, test data on four different indoor units and two different models of outdoor units are required. Two of the indoor units are to be tested with one model of outdoor unit; the remaining two indoor units are to be tested with the second model of outdoor unit.

Two additional requirements are also currently specified in § 430.24(m)(6)(iii). First, the tested capacities of the two models of outdoor units, when paired with their respective highest-sales-volume indoor unit, shall differ by at least a factor of two. Second, the two indoor units tested with the same model of outdoor unit are required to be from two different coil families. Finally, in addition to data on the four (mixed system) combinations, performance ratings on the outdoor units alone, or on the outdoor units when coupled to their highest-sales-volume indoor unit, are also required.

Some manufacturers find it difficult to, or simply cannot, meet the above requirements. For example, an independent coil manufacturer who sells indoor units from only one coil family for a given capacity range, will not be able to meet the two-different-coil-families requirement. The requirement of using only two models of outdoor units may also cause difficulty. Often the manufacturers will submit ARI certification test data for verification purposes in order to avoid having to pay for additional testing. A manufacturer is more likely to have test data on its indoor units tested with four different outdoor units than to have data where the same model of outdoor unit was used with two different indoor coils.

At the December 2002 workshop, Excel Comfort Systems suggested that waivers be considered for those cases where a company cannot meet the present requirements for verification data (Public Hearing Tr., pages 48–50). Unico spoke in favor of using any valid, available data to verify an alternative rating method (Public Hearing Tr., page 51). Other manufacturers present (Trane, Lennox, and Carrier) emphasized assuring that the data used for verification is representative of the manufacturer's existing product line (Public Hearing Tr., pages 52–53).

NIST, with industry input, reviewed section § 430.24(m)(6) and (8) and recommended additions to the existing requirements. Based on NIST recommendations, DOE has decided that the present requirements are acceptable but additional options should be incorporated to allow flexibility without affecting the quality of the validation process. For example, as proposed, data from two, three, or four outdoor units may be used to meet the requirements for data on four systems. Presently, only two outdoor units are used to create the four required systems.

A related issue raised at the December 2002 workshop was whether any new limits should be allowed concerning the use of ''old'' verification data (Public Hearing Tr., pages 35–36, 51–53). The adjective ''old'' here can mean verification data for a split system where the indoor, outdoor, or both units are no longer manufactured, or where the data was collected many years ago. In the former case, one question that may influence a decision on allowing the use of data based on an obsolete indoor unit is whether the remaining product line includes coils from the same coil family. As a step toward offering clarification on acceptable verification data, DOE proposes to specifically address the case in which submitted data includes an obsolete indoor coil. In such cases, the data will be accepted if the indoor coil is from the same coil family as other indoor coils that are still in production.

The above proposed changes, along with those revisions discussed in the next few sections, contribute to a rather comprehensive revision of § 430.24(m), ''Units to be tested.'' The entire content of the proposed 430.24(m) is provided in the regulatory language section following this notice.

2. *Guidance on the inclusion of pre-production units in the sample population used to determine and validate the published ratings.* DOE

seeks to have all manufacturers subject to the same requirements and to have them apply consistent practices in meeting the DOE regulatory requirements. In the area of selecting a sample population, the first paragraph of § 430.24, ''Units to be tested,'' states that ''a sample shall be selected and tested comprised of units which are production units, or are representative of production units of the basic model being tested, and shall meet the following applicable criteria.'' Similar language is repeated in a subsection specific to central air conditioners and heat pumps, § 430.24(m)(2)(i): ''A sample of sufficient size, composed of production units or representing production units, shall be tested * * *'' Today's proposed rule seeks to build on this requirement by explicitly stating that pre-production units may be used as part of the sample population, but only if fabricated using the same tooling as used for production units (see section 430.24(m)(1) in the regulatory language section following this notice). DOE seeks comment on this proposal and any other alternative requirements that should be used to disqualify a pre-production unit from being used to obtain certified ratings for its full-production counterpart.

3. *Clarification of the sample population used to validate the rated SEER and the rated HSPF.* Today's proposed rule includes a requirement within § 430.24(m)(1)(iii) that a manufacturer must use the same heat pump results for both SEER and HSPF when obtaining certified ratings. For example, a manufacturer cannot test five heat pumps in cooling and heating and then use the results from units 1, 3, and 5 as the basis for the certified SEER while using the results from units 2, 4, and 5 as the basis for the certified HSPF. With one exception, each heat pump unit of the sample population must be tested in both the cooling and heating mode and their respective results used in determining the certified SEER and HSPF for the particular heat pump model. The one exception is the case where the manufacturer obtains a sample SEER or HSPF that is equal to or greater than the value at which the manufacturer will certify, while the other seasonal rating descriptor (HSPF or SEER, respectively) is below a threshold value being targeted by the manufacturer. In this case only, one or more additional units may be tested in the operating mode, cooling or heating, that corresponds to this marginal rating and the results used as part of the sample population for that descriptor. DOE invites comments on the proposal.

4. *Clarification of the definition of a ''highest sales volume combination.''* ARI recently implemented an internal policy whereby all highest-sales-volume tested combinations for unitary air conditioners having a rated SEER less than 14 must be coil-only units. ARI waives this requirement for through-the-wall and ductless equipment. The ARI policy also requires that all unitary air conditioners having a rated SEER of 14 or higher must have a coil-only rating for each model of outdoor unit.

The ARI policy improves the likelihood that the outdoor unit, in combination with any compatible indoor unit, will meet the federal energy efficiency standards. The default values for the fan heat and fan power prescribed in the DOE test procedure when rating coil-only systems typically yield a conservative estimate of indoor performance. As in the past, SEER and HSPF ratings for coil-only listings are expected to remain clustered below the listings for blower coils, for the same outdoor unit. The coil-only policy helps avoid the situation in which an outdoor unit combined with a blower coil has a tested SEER of 13.0 or 13.5, while the same outdoor unit, combined with a coil-only indoor unit, would have a tested SEER of only 12.0 or 12.5. Thus, the policy improves the chances that all combinations with a given outdoor unit meet DOE's energy conservation standards.

The ARI policy is consistent with the DOE requirement to test each outdoor unit with its highest-sales-volume indoor unit. Historically, split-system condensing units are much more often installed with coil-only indoor units than with blower-coil units. And, for those comparatively fewer blower-coil installations, most do not use the highest efficiency motors, which are usually variable-speed motors. Thus, now and for the immediate future, the probability that a split-system condensing unit will be most often installed with a blower coil is low, and the chances of the highest-sales-volume application including a blower coil having the highest-efficiency motor is remote.

The ARI policy is consistent with current and past assignments of highest-sales-volume combinations for split-system air conditioners. A review of past ARI Unitary Directories shows that the vast majority of listings designate a coil-only system as the highest-sales-volume combination (HSVC). For those comparatively few cases where a blower-coil combination was so designated, the ratings frequently corresponded to substantially higher SEER equipment, such as modulating systems.

The ARI policy avoids the scenario in which a manufacturer chooses to designate its highest-rated split-system combination as the highest-sales-volume combination. The process of proving or disproving whether sales volume supports such a designation would be difficult. If allowed, such a designation might lead to many sub-13-SEER combinations being sold—if not by a system manufacturer, then with the systems sold with third-party indoor units. Although such rated coil-only combinations would still have to meet the 13-SEER standard and, for ARI members, be subject to certification verification tests, these two safeguards are not as rigorous as the sample-population testing required for highest-sales-volume combinations. Thus, the ARI policy protects against increased availability of truly sub-13-SEER combinations.

In making exceptions for through-the-wall and ductless systems, and by including the 14-SEER delimiter, the ARI policy recognizes that there are cases where blower-coil combinations are the predominant, if not exclusive, option. However, the outdoor units for the two exception cases are highly unlikely, if not impossible, to combine with a typical coil-only indoor unit. A HSVC having a SEER rating of 14 or greater is unlikely to yield a sub-13 SEER system when combined with a compatible coil-only indoor unit. The policy leaves little chance for sub-13 SEER combinations to become readily available to the installer in the field.

DOE agrees with the ARI policy and believes that its main elements should apply to all manufacturers, not just ARI member companies. Therefore, DOE seeks to adopt those aspects of the ARI policy that better define the requirements of a highest-sales-volume combination. In doing so, DOE proposes one change and two additions. The one change is to have the policy apply to all split-system air conditioners that use a single-speed compressor rather than to units having a rated SEER less than 14. DOE believes this change offers a slightly cleaner delimiter. One addition is to add small-duct, high-velocity systems to the list of exceptions. The second addition is an exception for split-system air conditioners having design features (*e.g.*, controls, proprietary interface cabling and handshaking) that prevent its installation with all coil-only indoor units. This second addition is offered as a compromise to manufacturers who intend to sell only blower-coils with particular outdoor units. In this case,

the manufacturer must accept the burden of preventing cases where these same outdoor units are installed with third-party, coil-only indoor units. The system manufacturer must do more than include written disclaimers that the outdoor units may not be so applied; the manufacturer must incorporate some feature that only allows blower-coil combinations and prevents all coil-only misapplications.

The text for this proposed clarification of what constitutes a highest-sales-volume combination is provided in § 430.24(m)(2).

5. *Upper limit on the difference between calculated and tested SEER and HSPF values.* Ratings for untested split-system combinations can exceed the ratings of the highest-sales-volume tested combination on which the former ratings are based. Ideally, these ratings increases occur because of differences between the type of expansion device, the type of blower (including with or without fan delay), and the type of coil used in the two different indoor units. The rating offsets, however, are also due to the inherent limitations of the alternative rating method, the quality of input data used for the ARM calculations, and, possibly, how the ARM itself is applied.

At a DOE public workshop held on March 29, 2001, Carrier Corporation reported cases where two systems using the same outdoor unit and very similar indoor units had published ratings that differed by as much as 10 percent, or one full SEER point. (Public Hearing Tr., page 208) The higher rated combination was either subject to spot checks as part of the ARI certification program, or had its representations reviewed by a professional engineer for accuracy. However, the effectiveness of these checks was questioned because, in the case of the former, a five-percent tolerance must be allowed and, in the case of the latter, no guidance was provided as to how to evaluate or quantify the accuracy.

To their credit, ARI members sought to address the problem internally by pursuing two changes. The first change was for system manufacturers to provide the Independent Coil Manufacturers (ICM) with better data (i.e., condenser curves) on which to base the ICM mixed system ratings—better data in, better predictions out. The second change was to conduct more spot checks on combinations rated by ICMs and, when a failure did occur, to require re-ratings for all combinations using the failed indoor unit. Previously, only the one combination that failed certification testing was re-rated. The impact of these changes is yet to be fully assessed but is expected to mitigate the problem of inconsistent ratings among competing manufacturers.

As a further step, DOE today proposes to place an upper limit on the allowed offsets between predicted versus measurement-based ratings. Whereas presently ratings from DOE-approved alternative rating methods receive blanket acceptance, the proposed change would introduce an upper limit offset of 5 percent. Five percent is proposed because of an argument put forth by Carrier Corporation that 5 percent is the upper limit of the practical efficiency increase that could be achieved (Carrier, No. 1). DOE believes that this 5-percent limit will reduce the occurrence of inflated ratings and therefore proposes a 5-percent-upper-limit offset. However, this proposed limit would only apply to cases where the difference in performance should be smallest: Where the HSVC system is a coil-only unit and the untested system is a coil-only unit. Manufacturers having non-highest-sales-volume combinations whose ratings are expected to exceed the 5-percent offset limit have the option of obtaining the ratings by testing. This existing test option, which is found in 10 CFR 430.24(m)(2)(i), is not subject to the proposed 5-percent limit. The proposed approach would apply to any untested combination, whether offered by the system manufacturer or an ICM.

DOE proposes placing limits on the offsets predicted by an alternative rating method in § 430.24(m)(4)(iii) and seeks comments on whether limits should be imposed in other cases, not just when both combinations are coil-only. Finally, data that either confirms or refutes the proposed limit of 5 percent is requested.

6. *Clarification of the published ratings for untested split-system combinations.* The test procedure states that the ARM shall be used to obtain ''representative values of the measures of energy consumption.'' (See § 430.24 (m)(2)(ii).) DOE seeks to improve upon the existing definition by adding new quantitative requirements. Thus, DOE today proposes amendments to § 430.24(m)(4) that require published ratings for an untested split-system combination to be equal to, or lower than, the value calculated using the DOE-approved ARM. For those manufacturers who use the laboratory data from the HSVC testing to adjust their ARM or a simulation subcomponent, the resulting ''adjustment factor'' shall be applied to the ARM calculations for untested combinations that use the same outdoor unit. This adjustment factor, if used, shall be limited to causing a maximum change of five-percent higher ratings than those obtained by applying the ARM without adjustment.

For cases where the HSVC and the untested combination are both coil-only units, the limit described in item 5 above, ''Upper limit on the difference between calculated and tested SEER and HSPF values,'' also applies, and therefore may cause the published rating to be less than the value calculated using the manufacturer's ARM, as adjusted by the ''adjustment factor'' described above. This proposal, like the previous one above, should tend to curb artificially inflated efficiency ratings for untested split-system combinations.

7. *Adding requirement that ratings for an air conditioner or heat pump that is rated with a furnace include the model number of that furnace as part of the overall equipment model number.* System manufacturers sometimes seek SEER and HSPF ratings for complete systems consisting of a coil-only air conditioner or heat pump and a particular model of furnace. To more clearly delineate published ratings obtained for such systems, DOE proposes to require that the model number of the furnace be included as part of the published model number, most likely as an add-on to the indoor unit model number. This proposed clarification is reflected in the proposed revisions to § 430.62(a)(4)(i) and (ii).

8. *For products such as multi-splits which have multiple indoor units, instituting a ''tested combination'' as an alternative to testing the combination with ''the largest volume of retail sales.''* Currently, manufacturers are required to select for testing the combination manufactured by the condensing unit manufacturer likely to have the largest volume of retail sales. For combinations having multiple indoor units, the combination with the largest volume of retail sales may be difficult to identify and too complex to test. DOE is therefore proposing an equivalent ''tested combination,'' which should remove one impediment to the testing of multi-split units.

C. Proposed Non-Substantive Changes to Related Portions of the CFR

1. *Clarification of a private labeler's (i.e., a third party) responsibility for ensuring that reported ratings are based on an approved alternative method for rating untested combinations or on laboratory test data.* The responsibilities of private labelers are set forth in Subpart F, Certification and Enforcement, but are delineated in § 430.24. DOE proposes language

clarifying that private labelers, as well as manufacturers, must seek DOE approval to use an ARM. If the system manufacturer or the ICM has a DOE-approved ARM for the products in question, the same ARM may be used by the private labeler.

2. *Revisions to the definition of ''coil family.''* DOE proposes minor modifications to the existing definition, adding a few specifics, including examples of fin shapes: ''flat, wavy, louvered, lanced,'' and re-formatting for improved readability.

3. *New definition for ''private labeler'' within § 430.2*. DOE proposes to incorporate the definition from the statute, 42 U.S.C. 6291(15). Hitherto, private labelers were not explicitly referenced in 10 CFR 430.24, but the proposed revision does explicitly reference them (see item 1, above). In order to facilitate the clarification of private labeler responsibility, DOE proposes to incorporate the statutory definition into the definitions section, § 430.2.

4. *Definitions of terms: ''Indoor unit,'' ''outdoor unit,'' ''ARM/simulation adjustment factor,'' and ''tested combination.''* The terms ''indoor unit'' and ''outdoor unit'' are used in the current test procedure, and in the proposed revisions, but are not defined. DOE proposes definitions based on the current definition of ''condensing unit'' in § 430.2. DOE proposes definitions of the new terms ''ARM/simulation adjustment factor'' and ''tested combination'' which are included in proposed amendments to 10 CFR 430.24(m). The ARM/simulation adjustment factor was developed by NIST and DOE as part of an effort to improve the accuracy of mixed system ratings. The definition of ''tested combination'' is a minor revision to the term as proposed in DOE's publication of a multi-split petition for waiver. (71 FR 14858, March 24, 2006)

D. Effect of Test Procedure Revisions on Compliance With Standards

DOE believes the revisions proposed today will not affect the ratings of air conditioners and heat pumps with SEER and HSPF ratings that minimally comply with the current DOE energy conservation standards. Some of the proposed revisions are projected to slightly change the ratings of some higher efficiency, two-capacity systems. The proposed changes that only affect higher-efficiency systems (relative to the 2006 EPCA minimums), if adopted, would not invoke the requirement for DOE to amend its energy conservation minimum standards. More specific discussions concerning the impact of the proposed changes are offered below.

The proposed changes unique to the testing of small-duct, high velocity systems are needed to more accurately measure their performance. DOE's decision in SpacePak/Unico, 29 DOE ¶ 81,002 (2004), on exception relief efficiency standards for SDHV systems manufacturers—11.0 SEER and 6.8 HSPF—came after the higher minimum external-static-pressure requirements of section II.A.1 and the new definition of an SDHV system were evaluated. Therefore, any impact from testing at the higher static pressures has already been considered.

Reinstating the option of conducting a cyclic test at high-capacity, when testing a two-capacity unit, is projected to very minimally increase the measured SEER or HSPF rating. This option will be used only when the unit locks out low-capacity operation, typically at the more extreme outdoor temperatures. At these more extreme temperatures, the unit would be modeled as having a relatively high load-factor. The more extreme temperatures also correspond to temperature bins having comparatively few fractional hours. The combination acts to minimize the impact of the cyclic-degradation coefficient. Thus, the burden of running this optional test would only be considered when a manufacturer is very close to achieving a target rating and needs less than 0.2 SEER/HSPF increase in the measured SEER/HSPF to achieve this target. So, a possible scenario is a two-capacity unit that reverts to second-stage cooling only at temperatures above 90 °F and the optional, high-capacity cyclic test yields a C_D that bumps the measured SEER from 16.85 to 17.0.

Two proposed changes specific to two-capacity heat pumps are shortening the duration of the low-capacity Frost Accumulation Test from 12 hours to 6 hours, and allowing the use of default equations in lieu of testing. As noted above in section II.A.3, the former is only expected to affect the average space heating capacity and power use at low-stage and 35 °F to the point of causing a minimal, systematic increase in the derived HSPF for the rare case where the heat pump remains completely frosted beyond 6 hours during this low-capacity test. Such a heat pump would be expected to perform very poorly during the required, high-capacity Frost Accumulation Test, and thus yield a HSPF rating that was at the low end for two-capacity heat pumps. Such performance would likely be unacceptable to most manufacturers.

Using default equations in lieu of conducting the low-capacity Frost Accumulation Test would negatively impact the measured HSPF. DOE estimates that the HSPF could be as much as 0.3 points lower if the default equations are used to obtain the value corresponding to Region IV and the minimum design-heating requirement.

The changes proposed for testing and rating modulating multi-split systems, as outlined above in section II.A.5 certainly will impact their SEER and HSPF ratings. These changes, however, are necessary to allow a reasonable approximation of these performance descriptors. The current test procedure is simply deficient in covering these relatively new products, as is best evidenced by the numerous requests for test procedure waivers that have been submitted by manufacturers of these products. However, it is too early to know the impact, if any, of these changes on such equipment that only minimally complies with the current energy conservation standards.

The proposed changes to adopt the long-standing industry practice of adjusting measured capacities to account for the losses in the outlet ductwork is not expected to cause an increase in SEER or HSPF. This expectation results because the test procedure is simply catching up with current practice.

The proposed change to define ''repeatable'' when conducting cyclic tests is viewed as improving repeatability and thus having a random effect on the derived cyclic-degradation coefficient and, ultimately, the calculated SEER and HSPF. Similarly, making the definition of ''standard air'' consistent with the definition in the 2005 version of ASHRAE Standard 37 will have no effect on the SEER and HSPF as calculated using the October 2005 final rule.

Finally, changing the low-capacity cooling-mode test condition from 95 °F to 67 °F for two-capacity units is projected to change the calculated SEER very minimally—within ± 0.1 SEER points—in most cases. However, the reduction in SEER could be very considerable if the power consumption during the 95 °F test at low capacity is increased in an effort to obtain lower estimates, through extrapolation, of the power consumption for low-capacity at temperatures less than 82 °F. In general, the impact of the change will be measurable if the unit's electrical power draw increases atypically at higher outdoor temperatures when operating at low-capacity. Manufacturers will now seek to avoid this because it reduces the SEER rating.

III. Procedural Requirements

A. Review Under Executive Order 12866

It has been determined that today's regulatory action is not a ''significant regulatory action'' under Executive Order 12866, ''Regulatory Planning and Review.'' 58 FR 51735 (October 4, 1993). Accordingly, this action was not subject to review by the Office of Management and Budget under the Executive Order.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires preparation of an initial regulatory flexibility analysis for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. The Department has made its procedures and policies available on the Office of General Counsel's web site: *http://www.gc.doe.gov.*

The Department reviewed today's proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. This proposed rule prescribes test procedures that will be used to test compliance with energy conservation standards. The proposed rule affects central air conditioner and heat pump test procedures and would not have a significant economic impact, but rather would provide common testing methods. Therefore DOE certifies that the proposed rule would not have a ''significant economic impact on a substantial number of small entities,'' and the preparation of a regulatory flexibility analysis is not warranted. The Department will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act

This rulemaking will impose no new information or record keeping requirements. Accordingly, Office of Management and Budget clearance is not required under the Paperwork Reduction Act. (44 U.S.C. 3501 et seq.)

D. Review Under the National Environmental Policy Act

In this proposed rule, the Department proposes amendments to test procedures that may be used to implement future energy conservation standards for central air conditioners. The Department has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321 et seq. The rule is covered by Categorical Exclusion A5, for rulemakings that interpret or amend an existing rule without changing the environmental effect, as set forth in the Department's NEPA regulations in Appendix A to Subpart D, 10 CFR part 1021. This rule will not affect the quality or distribution of energy usage and, therefore, will not result in any environmental impacts. Accordingly, neither an environmental impact statement nor an environmental assessment is required.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. The Department has examined today's proposed rule and has determined that it does not preempt State law and does not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's proposed rule. States can petition the Department for a waiver of such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform'' (61 FR 4729, February 7, 1996) imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. The Department has completed the required review and determined that, to the extent permitted by law, this proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal

governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA (62 FR 12820) (also available at *http://www.gc.doe.gov*). The proposed rule published today contains neither an intergovernmental mandate nor a mandate that may result in expenditure of $100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act of 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

The Department has determined, under Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights,'' 53 FR 8859 (March 18, 1988), that this proposed regulation, if promulgated as a final rule, would not result in any takings which might require compensation under the Fifth Amendment to the United States Constitution.

J. Review Under the Treasury and General Government Appropriations Act of 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. The OMB's guidelines were published at 67 FR 8452 (February 22, 2002), and DOE's guidelines were published at 67 FR 62446 (October 7, 2002). The Department has reviewed today's notice under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001) requires Federal agencies to prepare and submit to the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use. Today's regulatory action would not have a significant adverse effect on the supply, distribution, or use of energy and, therefore, is not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration (FEA) Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. 15 U.S.C. 788. Section 32 provides that where a proposed rule contains or involves use of commercial standards, the rulemaking must inform the public of the use and background of such standards.

The proposed rule incorporates testing methods contained in the following commercial standards: (1) ASHRAE Standard 23–2005, ''Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units;'' (2) ASHRAE Standard 37–2005, ''Methods of Testing for Rating Unitary Air-Conditioning and Heat Pump Equipment;'' (3) ASHRAE Standard 116–2005, and ''Methods of Testing for Rating for Seasonal Efficiency of Unitary Air Conditioners and Heat Pumps. The Department has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 323(b) of the Federal Energy Administration Act, i.e., whether they were developed in a manner that fully provides for public participation, comment, and review.

As required by section 32(c) of the Federal Energy Administration Act of 1974, as amended, DOE will consult with the Attorney General and the Chairman of the Federal Trade Commission before prescribing a final rule about the impact on competition of using the methods contained in these standards.

IV. Public Participation

A. Attendance at Public Meeting

The time and date of the public meeting are listed in the **DATES** section at the beginning of this notice of proposed rulemaking. The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 1E–245, 1000 Independence Avenue, SW., Washington, DC 20585–0121. To attend the public meeting, please notify Ms. Brenda Edwards-Jones at (202) 586–2945. Foreign nationals visiting DOE Headquarters are subject to advance security screening procedures, requiring a 30-day advance notice. Any foreign national wishing to participate in the meeting should advise DOE of this fact as soon as possible by contacting Ms. Brenda Edwards-Jones to initiate the necessary procedures.

B. Procedure for Submitting Requests to Speak

Any person who has an interest in today's notice, or who is a representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation. Such persons may hand-deliver requests to speak, along with a computer diskette or CD in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format to the address shown in the **ADDRESSES** section at the beginning of this notice of proposed rulemaking between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Requests may also be sent by mail or e-mail to: *Brenda.Edwards-Jones@ee.doe.gov.*

Persons requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. The Department requests persons selected to be heard to submit an advance copy of their statements at least two weeks before the public meeting. At its discretion, DOE may permit any person who cannot supply an advance copy of

their statement to participate, if that person has made advance alternative arrangements with the Building Technologies Program. The request to give an oral presentation should ask for such alternative arrangements.

C. Conduct of Public Meeting

The Department will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with 5 U.S.C. 553 and section 336 of EPCA, 42 U.S.C. 6306. A court reporter will be present to record the proceedings and prepare a transcript. The Department reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting, interested parties may submit further comments on the proceedings as well as on any aspect of the rulemaking until the end of the comment period.

The public meeting will be conducted in an informal, conference style. The Department will present summaries of comments received before the public meeting, allow time for presentations by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a prepared general statement (within time limits determined by DOE), before the discussion of specific topics. The Department will permit other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. Department representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the public meeting.

The Department will make the entire record of this proposed rulemaking, including the transcript from the public meeting, available for inspection at the U.S. Department of Energy, Forrestal Building, Room 1J–018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC, (202) 586–9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

The Department will accept comments, data, and information regarding the proposed rule before or after the public meeting, but no later than the date provided at the beginning of this notice of proposed rulemaking. Please submit comments, data, and information electronically. Send them to the following e-mail address: *cactestprocedure2006@ee.doe.gov.* Submit electronic comments in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format and avoid the use of special characters or any form of encryption. Comments in electronic format should be identified by the docket number EE–RM/TP–02–002 and/or RIN number 1904–AB55, and wherever possible carry the electronic signature of the author. Absent an electronic signature, comments submitted electronically must be followed and authenticated by submitting the signed original paper document. No telefacsimiles (faxes) will be accepted.

According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit two copies: one copy of the document including all the information believed to be confidential, and one copy of the document with the information believed to be confidential deleted. The Department of Energy will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to the Department when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

E. Issues on Which DOE Seeks Comment

The Department is particularly interested in receiving comments and views of interested parties concerning:

1. Whether any of the proposed changes would affect the measure of energy efficiency, and if so, to what degree, of any central air conditioner or heat pump.

2. Whether the proposed changes would prevent any model from complying with the DOE energy conservation standards.

3. The default equations for calculating low-capacity performance of two-capacity heat pumps at the 35 °F test condition (see proposed revisions to section 3.6.3). DOE requests data from testing at low capacity for the 47, 35, and 17 °F test conditions.

4. The proposed changes specific to multi-split systems. For example, how should the test procedure account for their full range of modulation even though tests may not be possible at the true minimum capacity?

5. Whether a separate test procedure for multi-splits should be developed.

6. Whether the proposed quantitative measures to improve the repeatability of cyclic tests (i.e., tolerance on both the cycle-to-cycle integrated temperature difference and average power consumption) are justified.

7. The impact of conducting as many as three low-capacity tests at the 67 °F test condition.

8. Whether there is a better descriptor than ''Full-load'' for replacing ''Certified'' when identifying the air-volume rate used for most lab tests. Should the selected descriptor also be incorporated into the definition for a small-duct, high-velocity system (see 1.35): ''at least 1.2 inches (of water) when operated at the certified air volume rate of 220–350 cfm per rated ton of cooling * * *''?

9. The proposed approach for establishing the Full-load, Air-Volume Rate for blower coil units, with its 0 to −5 percent tolerance during the setup process. Data showing the typical variation in blower performance is requested.

10. The changes proposed within 10 CFR 430.24, ''Units to be tested,'' that pertain to the alternative rating method (ARM). Comments and data are sought that address the proposed options for ARM verification data, the information on the contents of a submittal package, and the explicit limits on the ARM-derived ratings (e.g., a maximum 5 percent limit for cases where both the untested and HSVC units are coil-only systems).

11. When a pre-production unit should be accepted or excluded from

the tested sample population used to obtain the certified ratings.

12. The proposal for improving the definition of a highest-sales-volume combination, which only applies to single-speed air conditioners.

13. The proposed definition of a ''tested combination,'' for combinations having multiple indoor units?

DOE also welcomes comments on any problems that have arisen with the October 2005 final rule. In that regard, DOE has received inquiries regarding two changes contained in the 2005 test procedure.

The October 2005 final rule contains amendments to the definition of a demand-defrost control system (definition 1.21) while also singling out one such system, a time-adaptive-defrost control system (definition 1.42). In order to avoid the excessive number of frost/defrost cycles needed to obtain repeatable performance during a Frost accumulation Test, the October 2005 final rule allows the controls of the time-adaptive system to be overridden. The frosting interval during the official test period, in this case only, now ends by manually initiating a defrost cycle at an elapsed time specified by the manufacturer (see section 3.9 of Appendix M, Nt., to Subpart B of 10 CFR part 430). To varying degrees, most heat pumps having a demand defrost-control system require multiple frost/defrost cycles in the laboratory before repeatable performance results. The need for running several complete cycles alone, or in combination with relatively long frosting intervals, can lead to long test times. The question arises whether there are cases involving other control systems where changes may be required in the future to reduce the testing burden. DOE seeks comments on this question.

The October 2005 final rule included a requirement in section 3.1.4.2 that ''for ducted two-capacity units that are tested without an indoor fan installed, the Cooling Minimum Air Volume Rate is the higher of (1) the rate specified by the manufacturer or, (2) 75 percent of the Cooling Full-Load Air Volume Rate.'' For heating, in addition, section 3.1.4.5 directs the tester to ''use the Cooling Minimum Air Volume Rate as the Heating Minimum Air Volume Rate.'' An alternative approach considered during the prior rulemaking was to exclude option (2) above—75 percent of the Cooling Full-Load Air Volume Rate—and simply have the manufacturer specify the Cooling Minimum Air Volume Rate. Although these two alternatives were extensively debated before publishing the October 2005 final rule, the issue has been revived. The sales of two-capacity units is likely to increase following the higher 2006 DOE efficiency standards and, as a result, there is increasing attention to test procedure requirements for these products. The reasoning behind the October 2005 final rule approach is that most furnaces in the current housing stock (to which a two-capacity coil-only unit would be applied) contain multi-speed blowers. For these multi-speed furnace blowers, a typical air volume rate at the lowest speed setting is 75 percent of the maximum air volume rate. For many other two-capacity units, however, the default minimum air volume rate is higher than the air volume rate at the lowest speed setting. Although satisfied with its earlier decision on this topic, DOE seeks improvements to the test procedure to ensure that two-capacity coil-only units are appropriately tested. For example, does the test procedure need to cover the effect of a blower kit accessory that ensures a proper coil-only field installation? DOE seeks comments on this point, in particular, and also on the general issue of rating two-capacity coil-only units. If there is sufficient response, DOE would consider addressing these issues in a future rulemaking.

V. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of today's Notice of Proposed Rulemaking.

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Energy conservation, Household appliances.

Issued in Washington, DC, on June 30, 2006.

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For the reasons set forth in the preamble, the Department proposes to amend part 430 of Chapter II of Title 10, Code of Federal Regulations, to read as follows:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

2. Section 430.2 is amended in subpart A by revising the definition of ''coil family'' and adding definitions of ''ARM/simulation adjustment factor,'' ''indoor unit,'' ''outdoor unit,'' ''private labeler'' and ''tested combination,'' in alphabetical order, to read as follows:

§ 430.2 Definitions.

* * * * *

ARM/simulation adjustment factor means a factor used to improve the accuracy of a DOE-approved alternative rating method (ARM) for untested split system central air conditioners or heat pumps. The adjustment factor associated with each outdoor unit shall be set such that it reduces the difference between the SEER (HSPF) determined using the ARM and the tested rating for the highest sales volume combination. The ARM/simulation adjustment factor is an integral part of the ARM and must be a DOE-approved element in accordance with 10 CFR 430.24(m)(4) to (m)(6).

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Coil family means:

(1) A group of coils with the same basic design features that affect the heat exchanger performance. Examples of particular features in different categories are:

(i) General configuration: A-shape, V-shape, slanted or flat top.

(ii) Heat transfer surface on the refrigerant side: flat, grooved.

(iii) Heat transfer surface on the air side: flat, wavy, louver, lanced.

(iv) Tube material: copper, aluminum.

(v) Fin material: copper, aluminum.

(vi) Coil circuitry.

(2) When a group of coils has all these features in common, it constitutes a ''coil family.''

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Indoor unit means a component of a split-system central air conditioner or heat pump that is designed to transfer heat between the refrigerant and the indoor air, and which consists of an indoor coil, a cooling mode expansion device, and may include an air moving device.

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Outdoor unit means a component of a split-system central air conditioner or heat pump that is designed to transfer heat between the refrigerant and the outdoor air, and which consists of an outdoor coil, compressor(s), an air moving device, and in addition for heat pumps, a heating mode expansion device, reversing valve, and defrost controls.

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Private labeler means an owner of a brand or trademark on the label of a consumer product which bears a private label. A consumer product bears a private label if:

(1) Such product (or its container) is labeled with the brand or trademark of

a person other than a manufacturer of such product,

(2) The person with whose brand or trademark such product (or container) is labeled has authorized or caused such product to be so labeled, and

(3) The brand or trademark of a manufacturer of such product does not appear on such label.

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Tested combination means a split system with multiple indoor coils having the following features:

(1) The basic model of a system used as a tested combination shall consist of one outdoor unit, with one or more compressors, that is matched with between 2 and 5 indoor units designed for individual operation.

(2) The indoor units shall—

(i) Represent the highest sales volume type models;

(ii) Together, have a capacity that is between 95% and 105% of the capacity of the outdoor unit;

(iii) Not, individually, have a capacity that is greater than 50% of the capacity of the outdoor unit;

(iv) Have a fan speed that is consistent with the manufacturer's specifications; and

(v) All have the same external static pressure.

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3. Section 430.23 is amended in subpart B by revising paragraph (m)(5) to read as follows:

§ 430.23 Test procedure for measures of energy consumption.

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(m) * * *

(5) All measures of energy consumption shall be determined by the test method as set forth in appendix M to this subpart; or by an alternate rating method set forth in § 430.24(m)(4) as approved by the Assistant Secretary for Energy Efficiency and Renewable Energy in accordance with § 430.24(m)(5).

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4. Section 430.24 is amended in subpart B by revising paragraph (m) to read as follows:

§ 430.24 Units to be tested.

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(m)(1) For central air conditioners and heat pumps, each single-package system, and each condensing unit (outdoor unit) of a split-system, when combined with a selected indoor unit, shall have a sample of sufficient size tested in accordance with the applicable provisions of this subpart. To be included in the sample population, any pre-production units must have been fabricated using the same tooling as used for full-production units. The represented values for any model of single-package system, or for any model of a tested split-system combination shall be assigned such that—

(i) Any represented value of estimated annual operating cost, energy consumption or other measure of energy consumption of the central air conditioner or heat pump for which consumers would favor lower values shall be no less than the higher of:

(A) The mean of the sample; or

(B) The upper 90-percent confidence limit of the true mean divided by 1.05; and

(ii) Any represented value of the energy efficiency or other measure of energy consumption of the central air conditioner or heat pump for which consumers would favor higher values shall be no greater than the lower of:

(A) The mean of the sample; or

(B) The lower 90-percent confidence limit of the true mean divided by 0.95.

(iii) For heat pumps, all units of the sample population shall be tested in both the cooling and heating modes and the results used for determining the heat pump's certified SEER and HSPF ratings in accordance with paragraph (m)(1)(ii) of this section. When the manufacturer calculates SEER and HSPF ratings in accordance with paragraph (m)(1)(ii) of this section, and the value of one descriptor (SEER or HSPF) is equal to or greater than the value the manufacturer will certify in accordance with 10 CFR 430.62, while the other descriptor (HSPF or SEER) is below the value the manufacturer will certify, one or more additional units may be tested in the operating mode (cooling or heating, but not both) that corresponds to this marginal rating, and the results included in the sample population for calculating the marginal descriptor.

(2) For split-system air conditioners and heat pumps, the model of indoor unit selected for tests pursuant to paragraph (m)(1) of this section shall be the indoor unit manufactured by the outdoor unit (or system) manufacturer that is likely to have the largest volume of retail sales in combination with the particular model of outdoor unit. For combinations that have more than one indoor unit, a ''tested combination,'' as defined in 10 CFR 430.2, shall be used for tests pursuant to paragraph (m)(1) of this section. Components of similar design may be substituted without requiring additional testing if the represented measures of energy consumption continue to satisfy the applicable sampling provisions of paragraphs (m)(1)(i) and (m)(1)(ii) of this section. However, for any split-system air conditioner having a single-speed compressor, the indoor unit selected for tests pursuant to paragraph (m)(1) of this section shall be the indoor *coil-only* unit manufactured by the system manufacturer that is likely to have the largest volume of retail sales with the particular model of outdoor unit. This *coil-only* requirement is annulled for split-system air conditioners that are only sold and installed with *blower-coil* indoor units (e.g., mini-splits, multi-splits, small-duct high-velocity, and through-the-wall units) and any other outdoor units that are designed solely for application with OEM-supplied blower-coils and thus have features that prevent their installation with third-party coil-only indoor units. This coil-only requirement does not apply to split-system heat pumps. For every other split-system combination that includes the same model of outdoor unit but a different model of indoor unit, whether the indoor unit is manufactured by the same manufacturer or by a component manufacturer, either—

(i) A sample of sufficient size, comprised of production and/or pre-production units, shall be tested as complete systems with the resulting ratings for the outdoor unit-indoor unit combination obtained in accordance with paragraphs (m)(1)(i) and (m)(1)(ii) of this section; any pre-production units included in the sample population must have been fabricated using the same tooling as used for the full production units; or

(ii) The representative values of the measures of energy consumption shall be based on an alternative rating method (ARM) that has been approved by DOE in accordance with the provisions of paragraphs (m)(4) through (m)(6) of this section.

(3) Whenever the representative values of the measures of energy consumption, as determined by the provisions of paragraph (m)(2)(ii) of this section, do not agree within five percent of the representative values of the measures of energy consumption as determined by actual testing, the representative values determined by actual testing shall be used.

(4) The basis of the alternative rating method referred to in paragraph (m)(2)(ii) of this section shall be a representation of the test data and calculations of a mechanical vapor-compression refrigeration cycle. The major components in the refrigeration cycle shall be modeled as ''fits'' to manufacturer performance data or by graphic or tabular performance data. Heat transfer characteristics of coils may be modeled as a function of face area, number of rows, fins per inch,

refrigerant circuitry, air-flow rate and entering-air enthalpy. Additional performance-related characteristics to be considered may include type of expansion device, refrigerant flow rate through the expansion device, power of the indoor fan and cyclic-degradation coefficient. Ratings for untested combinations shall be derived from the ratings of the tested highest-sales-volume combination (HSVC), or from the tested combination. The SEER and/or HSPF ratings for an untested combination shall be set equal to or less than the lower of:

(i) The SEER and HSPF calculated using the alternative rating method (ARM), as adjusted based on the maximum allowed ARM/simulation adjustment factor. This adjustment factor is allowed in cases in which the manufacturer uses laboratory data from the HSVC testing to adjust its ARM or a simulation subcomponent and then applies the factor to ratings for untested combinations having the same outdoor unit. This adjustment factor, if used, shall not cause a change in ratings greater than five percent compared to the result of the ARM without the adjustment factor; or

(ii) Five percent higher than the ratings of the tested HSVC. This five percent limit only applies when the indoor unit of both the untested combination and the HSVC is a coil-only design (i.e., no indoor blower). Ratings above this limit can only be obtained for the non-HSVC by testing in accordance with paragraph (m)(1)(ii) of this section.

(5) Manufacturers or private labelers who elect to use an alternative rating method for determining measures of energy consumption under paragraphs (m)(2)(ii) and (m)(4) of this section must submit a request for DOE to review the alternative rating method. Send the request to the Assistant Secretary of Energy Efficiency and Renewable Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Approval must be received from the Assistant Secretary to use the alternative method before the alternative method may be used for rating split system central air conditioners and heat pumps. If a manufacturer has a DOE-approved ARM for products also distributed in commerce by a private labeler, the ARM may also be used by the private labeler for rating these products.

(6) Each request to DOE for approval of an alternative rating method shall include:

(i) The name, mailing address, telephone number, and e-mail address of the official representing the manufacturer.

(ii) Complete documentation of the alternative rating method to allow DOE to evaluate its technical adequacy. The documentation shall include a description of the methodology, state any underlying assumptions, and explain any correlations. The documentation should address how the method accounts for the cyclic-degradation coefficient, the type of expansion device, and, if applicable, the indoor fan-off delay. The requestor shall submit any computer programs—including spreadsheets—having less than 200 executable lines that implement the ARM. Longer computer programs must be identified and sufficiently explained, as specified above, but their inclusion in the initial submittal package is optional. Applicability or limitations of the ARM (e.g., only covers single-speed units when operating in the cooling mode, covers units with rated capacities of 3 tons or less, not applicable to the manufacturer's product line of non-ducted systems, etc.) shall be stated in the documentation.

(iii)(A) Complete test data from laboratory tests on four mixed (i.e., non-highest-sales-volume combination) systems per each ARM. The four mixed systems must include four different indoor units and at least two different outdoor units. A particular model of outdoor unit may be tested with up to two of the four indoor units. The four systems must include two low-capacity mixed systems and two high-capacity mixed systems. The low-capacity mixed systems may have any capacity. The rated capacity of each high-capacity mixed system must be at least a factor of two higher than its counterpart low-capacity mixed system.

(B) The four indoor units must come from at least two different coil families, with a maximum of two indoor units coming from the same coil family. Data for two indoor units from the same coil family, if submitted, must come from testing with one of the ''low-capacity mixed systems'' and one of the ''high capacity mixed systems.'' A mixed system indoor coil may come from the same coil family as the highest-sales-volume-combination indoor unit (i.e., the ''matched'' indoor unit) for the particular outdoor unit. Data on mixed systems where the indoor unit is now obsolete will be accepted towards the ARM-validation submittal requirement if it is from the same coil family as other indoor units still in production.

(C) The first two sentences of paragraph (m)(6)(iii)(B) of this section shall not apply if the manufacturer offers indoor units from only one coil family. In this case only, all four indoor coils must be selected from this one coil family. If approved, the ARM shall be specifically limited to applications for this one coil family.

(iv) All product information on each mixed system indoor unit, each matched system indoor unit, and each outdoor unit needed to implement the proposed ARM. The calculated ratings for the four mixed systems, as determined using the proposed ARM, shall be provided along with any other related information that will aid the verification process.

(7) Manufacturers that elect to use an alternative rating method for determining measures of energy consumption under paragraphs (m)(2)(ii) and (m)(4) of this section must either subject a sample of their units to independent testing on a regular basis, e.g., through a voluntary certification program, or have the representations reviewed and certified by an independent state-registered professional engineer who is not an employee of the manufacturer. The registered professional engineer is to certify that the results of the alternative rating procedure accurately represent the energy consumption of the unit(s). The manufacturer is to keep the registered professional engineer's certifications on file for review by DOE for as long as said combination is made available for sale by the manufacturer. Any proposed change to the alternative rating method must be approved by DOE prior to its use for rating.

(8) Manufacturers who choose to use computer simulation or engineering analysis for determining measures of energy consumption under paragraphs (m)(2)(ii) through (m)(6) of this section shall permit representatives of the Department of Energy to inspect for verification purposes the simulation method(s) and computer program(s) used. This inspection may include conducting simulations to predict the performance of particular outdoor unit—indoor unit combinations specified by DOE, analysis of previous simulations conducted by the manufacturer, or both.

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Appendix M—[Amended]

5. Appendix M to subpart B of part 430 is amended:

a. In section 1. Definitions:

1. Section 1.5 is amended by removing ''23–93'' and adding in its place ''23–05''; and by removing ''1993'' and adding in its place ''2005.''

2. Section 1.6 is amended by removing ''37–88'' and adding in its place ''37–05''; and by removing ''1988'' and adding in its place ''2005.''

3. Section 1.12 is amended by adding ''RA(05)'' after ''116–95''; and adding ''and reaffirmed in 2005'' after ''1995.''

4. Section 1.37 is revised to read as set forth below.

b. In section 2, Testing Conditions:

1. Sections 2.1a, 2.2a, 2.2b, 2.2.3, 2.2.5, 2.4.1, and 2.4.2 are revised to read as set forth below.

2. Section 2.5.3 is amended by revising the first sentence to read as set forth below.

3. New section 2.5.4.3 is added to read as set forth below.

4. Section 2.6a is amended by adding in the first sentence ''(RA05)'' after ''116–95.''

5. Section 2.6b is amended in the second sentence, and in the last sentence, by removing ''37–88'' and adding in its place ''37–05.''

6. Section 2.10.2 is amended in the third and fourth sentences, by removing ''37–88'' and adding in its place ''37–05.''

7. Section 2.10.3 is amended in the second sentence, by removing ''7.6.2,'' and adding in its place ''7.5.2,'' and by removing ''37–88'' and adding in its place ''37–05'' in the second and third sentences.

8. Section 2.11a is amended in the first sentence, by removing ''37–88'' and adding in its place ''37–05.''

9. Section 2.13 is amended in the second sentence, by removing ''37–88'' and adding in its place ''37–05.''

c. In section 3, Testing Procedures:

1. Section 3.1.1 is amended in the seventh sentence, by removing ''37–88'' and adding in its place ''37–05.''

2. Section 3.1.4.1.1 title is revised and Table 2 to paragraph (c) is revised to read as set forth below.

3. Section 3.1.5 is amended in the first sentence by removing ''37–88'' and adding in its place ''37–05.''

4. Section 3.1.6 is amended in the first and second sentences, by removing ''7.8.3.1 and 7.8.3.2'' and adding in its place ''7.7.2.1 and 7.7.2.2,'' and in the first sentence, by removing ''37–88'' and adding in its place ''37–05'', and by adding a new sentence after the second sentence, to read as set forth below.

5. Sections 3.2.3a. and 3.2.3d. are revised to read as set forth below.

6. Table 5 to section 3.2.3 is revised to read as set forth below.

7. Section 3.2.4 is amended by adding a new paragraph c to read as set forth below.

8. Table 6 to section 3.2.4 is revised to read as set forth below.

9. Section 3.3b is amended in both the first and second sentences, by removing ''Table 5,'' and adding in its place ''Table 3,'' and in the first sentence by removing ''37–88'' and adding in its place ''37–05.''

10. Section 3.3c is amended in the first sentence by removing ''section 7.3.3.1 of ASHRAE Standard 37–88,'' and adding in its place ''sections 7.3.3.1 and 7.3.3.3 of ASHRAE Standard 37–05.''

11. The title of sections 3.4 and 3.5 is revised to read as set forth below.

12. Section 3.5e is revised to read as set forth below.

13. The first two sentences of section 3.5.3 are revised to read as set forth below.

14. Section 3.6.3 is revised to read as set forth below.

15. Table 11 to section 3.6.3 is revised to read as set forth below.

16. Section 3.6.4 is amended by adding a new paragraph c to read as set forth below.

17. Table 12 to section 3.6.4 is revised to read as set forth below.

18. Section 3.7a is amended in the fifth sentence by removing ''Table 5 of ASHRAE Standard 37–88'' and adding in its place ''Table 3 of ASHRAE Standard 37–05,'' and in the sixth sentence, by removing ''Table 5'' and adding in its place ''Table 3.''

19. Section 3.7b is amended by revising the first sentence to read as set forth below.

20. The title of section 3.8 is revised to read as set forth below.

21. The introductory text (preceding the equation) for section 3.8.1 is revised to read as set forth below.

22. Section 3.9c is revised to read as set forth below.

23. Section 3.9f is amended by revising the fifth sentence to read as set forth below.

24. Section 3.9.1a is amended by adding a new sentence at the end of the section directly before section 3.9.1.b to read as set forth below.

25. Section 3.11.1.3b is revised to read as set forth below.

26. Section 3.11.2a is amended by revising the seventh sentence to read as set forth below.

27. Section 3.11.2b is revised to read as set forth below.

28. Section 3.11.3 is revised to read as set forth below.

d. In section 4, CALCULATIONS OF SEASONAL PERFORMANCE DESCRIPTORS:

1. Section 4.1.3 is amended by revising the introductory text, equations 4.1.3–1 and 4.1.3–2, and the paragraph preceding equation 4.1.3–3 to read as set forth below.

2. Section 4.1.3.3 is amended by revising the equation for PLFj and the text between the equation and Table 16 to read as set forth below.

3. Section 4.1.4.2 is amended by adding text at the end of the section to read as set forth below.

4. Section 4.2.3.3 is amended by revising the equation for PLFj and the text following the equation to read as set forth below.

5. Section 4.2.4.2 is amended by adding text at the end of the section to read as set forth below.

The additions and revisions read as follows:

Appendix M to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps

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1. Definitions

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1.37 Standard Air means dry air having a mass density of 0.075 lb/ft^3.

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2. Testing Conditions

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2.1 *Test room requirements.* a. Test using two side-by-side rooms, an indoor test room and an outdoor test room. For multiple-split air conditioners and heat pumps (see Definition 1.30), however, use as many available indoor test rooms as needed to accommodate the total number of indoor units. These rooms must comply with the requirements specified in sections 8.1.2 and 8.1.3 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22).

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2.2 *Test unit installation requirements.* a. Install the unit according to section 8.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). With respect to interconnecting tubing used when testing split-systems, however, follow the requirements given in section 6.1.3.5 of ARI Standard 210/240–2003 (incorporated by reference, see § 430.22). When testing triple-split systems (see Definition 1.44), use the tubing length specified in section 6.1.3.5 of ARI Standard 210/240–2003 (incorporated by reference, see § 430.22) to connect the outdoor coil, indoor compressor section, and indoor coil while still meeting the requirement of exposing 10 feet of the tubing to outside conditions. When testing non-ducted systems having multiple indoor coils, connect each indoor fan-coil to the outdoor unit using: (a) 25 feet of tubing, or (b) tubing furnished by the manufacturer, whichever is longer. If they are needed to make a secondary measurement of capacity, install refrigerant pressure measuring instruments as described in section 8.2.5 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). Refer to section 2.10 of this Appendix to learn which secondary methods require refrigerant pressure measurements. At a minimum, insulate the low-pressure line(s) of a split-system with insulation having an inside diameter that matches the refrigerant tubing and a nominal thickness of ½ inch.

b. For units designed for both horizontal and vertical installation or for both up-flow and down-flow vertical installations, the manufacturer must specify the orientation used for testing. Conduct testing with the following installed:

(1) The most restrictive filter(s);

(2) Supplementary heating coils; and

(3) Other equipment specified as part of the unit, including all hardware used by a heat comfort controller if so equipped (see Definition 1.28). For small-duct, high-velocity systems, configure all balance dampers or restrictor devices on or inside the unit to fully open or lowest restriction.

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2.2.3 Special requirements for multi-split air conditioners and heat pumps, and systems composed of multiple mini-split units (outdoor units located side-by-side) that would normally operate using two or more indoor thermostats. Allow the controls of the multi-split or multiple mini-split air conditioner or heat pump (see Definitions 1.30 and 1.29, respectively) to determine the number of indoor coils, if any, whose fans are turned off during a given test. For any indoor coil whose fan is automatically turned off during a test, take steps to cease forced airflow through this indoor coil and block its outlet duct. Because these types of systems will have more than one indoor fan and possibly multiple outdoor fans and compressor systems, references in this test procedure to a single indoor fan, outdoor fan, and compressor means all indoor fans, all outdoor fans, and all compressor systems that are active during a test.

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2.2.5 Charging according to the ''manufacturer's published instructions,'' as stated in section 8.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22), means the manufacturer's installation instructions that come packaged with the unit. If a unit requires charging but the installation instructions do not specify a charging procedure, then evacuate the unit and add the nameplate refrigerant charge. Where the manufacturer's installation instructions contain two sets of refrigerant charging criteria, one for field installations and one for lab testing, use the field installation criteria. For third-party testing, the test laboratory may consult with the manufacturer about the refrigerant charging procedure and make any needed corrections so long as they do not contradict the published installation instructions. The manufacturer may specify an alternative charging criteria to the third-party laboratory so long as the manufacturer thereafter revises the published installation instructions accordingly.

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2.4.1 Outlet plenum for the indoor unit. a. Attach a plenum to the outlet of the indoor coil. (Note: for some packaged systems, the indoor coil may be located in the outdoor test room.) For non-ducted systems having multiple indoor coils, attach a plenum to each indoor coil outlet. Add a static pressure tap to each face of the (each) outlet plenum, if rectangular, or at four evenly distributed locations along the circumference of an oval or round plenum. Create a manifold that connects the four static pressure taps. Figure 1 shows two of the three options allowed for the manifold configuration; the third option is the broken-ring, four-to-one manifold configuration that is shown in Figure 7a of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). See Figures 7a, 7b, 7c, and 8 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22) for the cross-sectional dimensions and minimum length of the (each) plenum and the locations for adding the static pressure taps for units tested with and without an indoor fan installed. For a non-ducted system having multiple indoor coils, have all outlet plenums discharge air into a single common duct. At the plane where each plenum enters the common duct, install an adjustable airflow damper and use it to equalize the static pressure in each plenum. For multi-split units tested using more than one indoor test room, create a common duct within each test room that contains multiple indoor coils. Each common duct should feed a separate outlet air temperature grid (section 2.5.4) and airflow measuring apparatus (section 2.6).

b. For small-duct, high-velocity systems, install an outlet plenum that has a diameter that is equal to or less than the value listed below. The limit depends only on the cooling Full-Load Air Volume Rate (see section 3.1.4.1.1) and is effective regardless of the flange dimensions on the outlet of the unit (or an air supply plenum adapter accessory, if installed in accordance with the manufacturers installation instructions).

Cooling full-load air volume rate (SCFM)	Maximum diameter* of outlet plenum (inches)
≤ 500	6
501 to 700	7
701 to 900	8
901 to 1100	9
1101 to 1400	10
1401 to 1750	11

*If the outlet plenum is rectangular, calculate its equivalent diameter using (4A)/P, where A is the area and P is the perimeter of the rectangular plenum, and compare it to the listed maximum diameter.

2.4.2 Inlet plenum for the indoor unit. Install an inlet plenum when testing a coil-only indoor unit or a packaged system where the indoor coil is located in the outdoor test room. Add static pressure taps at the center of each face of this plenum, if rectangular, or at four evenly distributed locations along the circumference of an oval or round plenum. Make a manifold that connects the four static-pressure taps using one of the three configurations specified in section 2.4.1. See Figures 7b, 7c, and Figure 8 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22) for cross-sectional dimensions, the minimum length of the inlet plenum, and the locations of the static-pressure taps. When testing a ducted unit having an indoor fan (and the indoor coil is in the indoor test room), the manufacturer has the option to test with or without an inlet plenum installed. Space limitations within the test room may dictate that the manufacturer choose the latter option. If used, construct the inlet plenum and add the four static-pressure taps as shown in Figure 8 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). Manifold the four static-pressure taps using one of the three configurations specified in section 2.4.1. Never use an inlet plenum when testing a non-ducted system.

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2.5.3 Section 6.5.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22) describes the method for fabricating static pressure taps. * * *

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2.5.4.3 *Minimizing air leakage.* For small-duct, high-velocity systems, install an air damper near the end of the interconnecting duct, just prior to the transition to the airflow measuring apparatus of Section 2.6. In order to minimize air leakage, adjust this damper such that the pressure in the receiving chamber of the airflow measuring apparatus is no more than 0.5 inches of water higher than the surrounding test room ambient. In lieu of installing a separate damper, use the outlet air damper box of Section 2.5 and 2.5.4.1 if it allows variable positioning. Also apply these steps to any conventional indoor blower unit that creates a static pressure within the receiving chamber of the airflow measuring apparatus that exceeds the test room ambient pressure by more than 0.5 inches of water.

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3. Testing Procedures

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3.1.4.1.1 Cooling Full-Load Air Volume Rate for Ducted Units. * * *

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c. * * *

TABLE 2.—MINIMUM EXTERNAL STATIC PRESSURE FOR DUCTED SYSTEMS TESTED WITH AN INDOOR FAN INSTALLED

Rated cooling (1) or heating (2) capacity (Btu/h)	Minimum external resistance (3) (inches of water)	
	All other systems	Small-duct, high-velocity systems (4, 5)
Up Thru 28,800	0.10	1.10

TABLE 2.—MINIMUM EXTERNAL STATIC PRESSURE FOR DUCTED SYSTEMS TESTED WITH AN INDOOR FAN INSTALLED—Continued

Rated cooling [1] or heating [2] capacity (Btu/h)	Minimum external resistance [3] (inches of water)	
	All other systems	Small-duct, high-velocity systems [4, 5]
29,000 to 42,500	0.15	1.15
43,000 and Above	0.20	1.20

[1] For air conditioners and heat pumps, the value cited by the manufacturer in published literature for the unit's capacity when operated at the A or A_2 Test conditions.
[2] For heating-only heat pumps, the value the manufacturer cites in published literature for the unit's capacity when operated at the H1 or $H1_2$ Test conditions.
[3] For ducted units tested without an air filter installed, increase the applicable tabular value by 0.08 inches of water.
[4] See Definition 1.35 to determine if the equipment qualifies as a small-duct, high-velocity system.
[5] If a closed-loop, air-enthalpy test apparatus is used on the indoor side, limit the resistance to airflow on the inlet side of the indoor blower coil to a maximum value of 0.1 inches of water. Impose the balance of the airflow resistance on the supply side.

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3.1.6 * * * (**Note:** In the first printing of ASHRAE Standard 37–2005, the second IP equation for Q_{mi} should read, $1097CA_n\sqrt{P_v V'_n}$.) * * *

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3.2.3 Tests for a unit having a two-capacity compressor. (See Definition 1.45.)

a. Conduct four steady-state wet coil tests: the A_2, B_2, B_1, and F_1 Tests. Use the two optional dry-coil tests, the steady-state G_1 Test and the cyclic I_1 Test, to determine the cooling-mode cyclic-degradation coefficient, C^c_D. If the two optional tests are not conducted, assign C^c_D the default value of 0.25. Table 5 specifies test conditions for these six tests.

* * * * *

d. If a two-capacity air conditioner or heat pump locks out low-capacity operation at higher outdoor temperatures, then use the two optional dry-coil tests, the steady-state C_2 Test and the cyclic D_2 Test, to determine the cooling-mode cyclic-degradation coefficient that only applies to on/off cycling from high capacity, C^c_D (k = 2). If the two optional tests are not conducted, assign C^c_D (k = 2) the same value as determined or assigned for the low-capacity cyclic-degradation coefficient, [or equivalently, C^c_D (k = 1)].

TABLE 5.—COOLING MODE TEST CONDITIONS FOR UNITS HAVING A TWO-CAPACITY COMPRESSOR

Test description	Air entering indoor unit temperature (°F)		Air entering outdoor unit temperature (°F)		Compressor capacity	Cooling air volume rate
	Dry bulb	Wet bulb	Dry bulb	Wet bulb		
A_2 Test—required (steady, wet coil).	80	67	95	[1] 75	High	Cooling Full-Load.[2]
B_2 Test—required (steady, wet coil).	80	67	82	[1] 65	High	Cooling Full-Load.[2]
B_1 Test—required (steady, wet coil).	80	67	82	[1] 65	Low	Cooling Minimum.[3]
F_1 Test—required (steady, wet coil).	80	67	67	[1] 53.5	Low	Cooling Minimum.[3]
G_1 Test—optional (steady, dry-coil).	80	[4]	67	.....	Low	Cooling Minimum.[3]
I_1 Test—optional (cyclic, dry-coil).	80	[4]	67	.....	Low	[5]
C_2 Test—optional (steady, dry-coil).	80	[4]	82	.....	High	Cooling Full-Load.[2]
D_2 Test—optional (cyclic, dry-coil).	80	[4]	82	.....	High	[6]

[1] The specified test condition only applies if the unit rejects condensate to the outdoor coil.
[2] Defined in Section 3.1.4.1.
[3] Defined in Section 3.1.4.2.
[4] The entering air must have a low enough moisture content so no condensate forms on the indoor coil. DOE recommends using an indoor air wet-bulb temperature of 57 °F or less.
[5] Maintain the airflow nozzle(s) static pressure difference or velocity pressure during the ON period at the same pressure or velocity as measured during the C_1 Test.
[6] Maintain the airflow nozzle(s) static pressure difference or velocity pressure during the ON period at the same pressure or velocity as measured during the C_2 Test.

3.2.4 Tests for a unit having a variable-speed compressor. * * *

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c. For multiple-split air conditioners and heat pumps (only), the following procedures supersede the above requirements: For all Table 6 tests specified for a minimum compressor speed, use the compressor speed specified by the manufacturer. The manufacturer should prescribe a speed that allows successful completion of the Table 6 tests while deviating as little as possible from the unit's actual lowest cooling-mode operating speed. The manufacturer must also specify the compressor speed used for the Table 6 E_V Test, a cooling-mode intermediate compressor speed that falls within ¼ and ¾ of the difference between the tested

maximum and minimum cooling-mode speeds. The manufacturer should prescribe an intermediate speed that is expected to yield the highest EER for the given E_V Test conditions.

TABLE 6.—COOLING MODE TEST CONDITION FOR UNITS HAVING A VARIABLE-SPEED COMPRESSOR

Test description	Air entering indoor unit temperature (°F)		Air entering outdoor unit temperature (°F)		Compressor speed	Cooling air volume rate
	Dry bulb	Wet bulb	Dry bulb	Wet bulb		
A_2 Test—required (steady, wet coil)	80	67	95	(1) 75	Maximum (2)	Cooling Full-Load.(3)
B_2 Test—required (steady—wet coil)	80	67	82	(1) 65	Maximum (2)	Cooling Full-Load.(3)
E_V Test—required (steady, wet coil)	80	67	87	(1) 69	Intermediate	Cooling Intermediate.(4)
B_1 Test—required (steady, wet coil)	80	67	82	(1) 65	Minimum	Cooling Minimum.(5)
F_1 Test—required (steady, wet coil)	80	67	67	(1) 53.5	Minimum	Cooling Minimum.(5)
G_1 Test (6)—optional (steady, dry-coil)	80	(6)	67		Minimum	Cooling Minimum.(5)
I_1 Test (6)—optional (cyclic, dry-coil)	80	(6)	67		Minimum	(7)

(1)The specified test condition only applies if the unit rejects condensate to the outdoor coil.
(2)Configured for the maximum continuous duty operation as allowed by the unit's controls.
(3)Defined in Section 3.1.4.1.
(4)Defined in Section 3.1.4.3.
(5)Defined in Section 3.1.4.2.
(6)The entering air must have a low enough moisture content so no condensate forms on the indoor coil. DOE recommends using an indoor air wet bulb temperature of 57 °F or less.
(7)Maintain the airflow nozzle(s) static pressure difference or velocity pressure during the ON period at the same pressure difference or velocity pressure as measured during the G_1 Test.

* * * * *

3.4 Test procedures for the optional steady-state dry-coil cooling-mode tests (the C, C_1, C_2, and G_1 Tests).

* * * * *

3.5 Test procedures for the optional cyclic dry-coil cooling-mode tests (the D, D_1, D_2, and I_1 Tests).

* * * * *

e. For consecutive compressor OFF/ON cycles, evaluate whether the below criterion for repeatable results is met. After completing a minimum of two complete OFF/ON compressor cycles, determine the overall cooling delivered and total electrical energy consumption during any subsequent data collection interval where the test tolerances given in Table 8 and the below criterion for repeatable results is satisfied.

$$1)\ \left|\Gamma_{m+1}-\Gamma_m\right| \le 0.05\ ^{\circ}\mathrm{F}\cdot\mathrm{hr}, \text{ and}$$

$$2)\ \left|\left(\frac{e_{cyc,dry}}{\Delta\tau_{cyc,dry}}\right)_{m+1}-\left(\frac{e_{cyc,dry}}{\Delta\tau_{cyc,dry}}\right)_{m}\right| \le 10\ \mathrm{W},$$

For the above criterion, *m* represents the cycle number and Γ, $e_{cyc,dry}$, and $\Delta\tau_{cyc,dry}$ are defined later in this same section. If available, use electric resistance heaters (see Section 2.1) to minimize the variation in the inlet air temperature.

* * * * *

3.5.3 Cooling-mode cyclic-degradation coefficient calculation. Use the two optional dry-coil tests to determine the cooling-mode cyclic-degradation coefficient, C^c_D. Append ''(k=2)'' to the coefficient if it corresponds to a two-capacity unit cycling at high capacity. If the two optional tests are not conducted, assign C^c_D the default value of 0.25. The default value for two-capacity units cycling at high capacity, however, is the low-capacity coefficient, i.e., C^c_D (k=2) =C^c_D. Evaluate C^c_D using the above results and those from the section 3.4 dry-coil steady-state test.* * *

* * * * *

3.6.3 Tests for a heat pump having a two-capacity compressor (see Definition 1.45), including two-capacity, northern heat pumps (see Definition 1.46). a. Conduct one Maximum Temperature Test ($H0_1$), two High Temperature Tests ($H1_2$ and $H1_1$), one Frost Accumulation Test ($H2_2$), and one Low Temperature Test ($H3_2$). Conduct an additional Frost Accumulation Test ($H2_1$) and Low Temperature Test ($H3_1$) if both of the following conditions exist:

1. Knowledge of the heat pump's capacity and electrical power at low compressor capacity for outdoor temperatures of 37 °F and less is needed to complete the section 4.2.3 seasonal performance calculations, and

2. The heat pump's controls allow low-capacity operation at outdoor temperatures of 37 °F and less.

If the above two conditions are met, an alternative to conducting the $H2_1$ Frost Accumulation is to use the following equations to approximate the capacity and electrical power:

$$\dot{Q}_h^{k=1}(35) = 0.90\cdot\left\{\dot{Q}_h^{k=1}(17) + 0.6\cdot\left[\dot{Q}_h^{k=1}(47) - \dot{Q}_h^{k=1}(17)\right]\right\}$$

$$\dot{E}_h^{k=1}(35) = 0.985\cdot\left\{\dot{E}_h^{k=1}(17) + 0.6\cdot\left[\dot{E}_h^{k=1}(47) - \dot{E}_h^{k=1}(17)\right]\right\}$$

Determine the quantities $\dot{Q}^{k=1}_h$ (47) and $\dot{E}^{k=1}_h$ (47) from the $H1_1$ Test and evaluate them according to Section 3.7. Determine the quantities $\dot{Q}^{k=1}_h$ (17)and $\dot{E}^{k=1}_h$ (17) from the $H3_1$ Test and evaluate them according to Section 3.10. b. Conduct the optional Maximum Temperature Cyclic Test ($H0C_1$) to determine the heating-mode cyclic-degradation coefficient, C^h_D. If this optional test is not conducted, assign C^h_D the default value of 0.25. If a two-capacity heat pump locks out low capacity operation at lower outdoor temperatures, conduct the optional High Temperature Cyclic Test ($H1C_2$) to determine the high-capacity heating-mode

cyclic-degradation coefficient, C^h_D (k=2). If this optional test at high capacity is not conducted, assign C^h_D (k=2) the same value as determined or assigned for the low-capacity cyclic-degradation coefficient, C^h_D [or equivalently, C^h_D (k=1)]. Table 11 specifies test conditions for these nine tests.

TABLE 11.—HEATING MODE TEST CONDITIONS FOR UNITS HAVING A TWO-CAPACITY COMPRESSOR

Test description	Air entering indoor unit temperature (°F)		Air entering outdoor unit temperature (°F)		Compressor capacity	Heating air volume rate
	Dry bulb	Wet bulb	Dry bulb	Wet bulb		
$H0_1$ Test (required, steady)	70	(max)60	62	56.5	Low	Heating Minimum.(1)
$H0C_1$ Test (optional, cyclic)	70	(max)60	62	56.5	Low	(2)
$H1_2$ Test (required, steady)	70	(max)60	47	43	High	Heating Full-Load.(3)
$H1C_2$ Test (optional, cyclic)	70	(max)60	47	43	High	(4)
$H1_1$ Test (required)	70	(max)60	47	43	Low	Heating Minimum.(1)
$H2_2$ Test (required)	70	(max)60	35	33	High	Heating Full-Load.(3)
$H2_1$ Test(5, 6) (required)	70	(max)60	35	33	Low	Heating Minimum.(3)
$H3_2$ Test (required, steady)	70	(max)60	17	15	High	Heating Full-Load.(3)
$H3_1$ Test(5) (required, steady)	70	(max)60	17	15	Low	Heating Minimum.(1)

(1) Defined in Section 3.1.4.5.
(2) Maintain the airflow nozzle(s) static pressure difference or velocity pressure during the ON period at the same pressure or velocity as measured during the $H0_1$ Test.
(3) Defined in Section 3.1.4.4.
(4) Maintain the airflow nozzle(s) static pressure difference or velocity pressure during the ON period at the same pressure or velocity as measured during the $H1_2$ Test.
(5) Required only if the heat pump's performance when operating at low compressor capacity and outdoor temperatures less than 37 °F is needed to complete the Section 4.2.3 HSPF calculations.
(6) If table note #5 applies, the Section 3.6.3 equations for $\dot{Q}^h_{k=1}$ (35) and $\dot{E}^h_{k=1}$ (17) may be used in lieu of conducting the $H2_1$ Test.

3.6.4 Tests for a heat pump having a variable-speed compressor.

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c. For multiple-split heat pumps (only), the following procedures supersede the above requirements: For all Table 12 tests specified for a minimum compressor speed, use the compressor speed specified by the manufacturer. The manufacturer should prescribe a speed that allows successful completion of the Table 12 tests while deviating as little as possible from the heat pump's actual lowest heating-mode operating speed. The manufacturer must also specify the compressor speed used for the Table 12 $H2_V$ Test, a heating-mode intermediate compressor speed that falls within ¼ and ¾ of the difference between the tested maximum and minimum heating-mode speeds. The manufacturer should prescribe an intermediate speed that is expected to yield the highest COP for the given $H2_V$ Test conditions.

TABLE 12.—HEATING MODE TEST CONDITION FOR UNITS HAVING A VARIABLE-SPEED COMPRESSOR

Test description	Air entering indoor unit temperature (°F)		Air entering outdoor unit temperature (°F)		Compressor speed	Heating air volume rate
	Dry bulb	Wet bulb	Dry bulb	Wet bulb		
H01 Test (required, steady)	70	(max) 60	62	56.5	Minimum	Heating Minimum (1)
$H0C_1$ Test (optional, steady)	70	(max) 60	62	56.5	Minimum	(2)
$H1_2$ Test (required, steady)	70	(max) 60	47	43	Maximum (3)	Heating Full-Load (4)
$H1_1$ Test (required, steady)	70	(max) 60	47	43	Minimum	Heating Minimum (1)
$H1_N$ Test (optional, steady)	70	(max) 60	47	43	Cooling Mode Maximum.	Heating Nominal (5)
$H2_2$ Test (optional)	70	(max) 60	35	33	Maximum (3)	Heating Full-Load (4)
$H2_V$ Test	70	(max) 60	35	33	Intermediate	Heating Intermediate (6)
$H3_2$ Test (required, steady)	70	(max) 60	17	15	Maximum (3)	Heating Full-Load (4)

(1) Defined in Section 3.1.4.5.
(2) Maintain the airflow nozzle(s) static pressure difference or velocity pressure during an ON period at the same pressure or velocity as measured during the $H0_1$ Test.
(3) Configured for the maximum continuous duty operation as allowed by the unit's controls when heating.
(4) Defined in Section 3.1.4.4.
(5) Defined in Section 3.1.4.7.
(6) Defined in Section 3.1.4.6.

* * * * *

3.7 a. * * *

b. Calculate indoor-side total heating capacity as specified in sections 7.3.4.1 and 7.3.4.3 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22).

* * *

3.8 Test procedures for the optional cyclic heating mode tests (the $H0C_1$, H1C, $H1C_1$ and $H1C_2$ Tests).

* * * * *

3.8.1 Heating mode cyclic degradation coefficient calculation. Use the results from the optional cyclic test and the required steady-state test that were conducted at the same test conditions to determine the heating-mode cyclic-degradation coefficient, C^h_D. Add ''(k=2)'' to the coefficient if it corresponds to a two-capacity unit cycling at high capacity. If the optional test is not conducted, assign C^h_D the default value of

0.25. The default value for two-capacity units cycling at high capacity, however, is the low-capacity coefficient, i.e., $C^h_D(k = 2) = C^h_D$.

* * *

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3.9 * * *

c. The official test period begins when the preliminary test period ends, at defrost termination. The official test period ends at the termination of the next occurring automatic defrost cycle. When testing a heat pump that uses a time-adaptive defrost control system (see Definition 1.42), however, manually initiate the defrost cycle that ends the official test period at the instant indicated by instructions provided by the manufacturer. If the heat pump has not undergone a defrost after 12 hours, immediately conclude the test and use the results from the full 12-hour period to calculate the average space heating capacity and average electrical power consumption. For the $H2_1$ Test, use a maximum official test period of 6 hours instead of 12 hours. For heat pumps that turn the indoor fan off during the defrost cycle, take steps to cease forced airflow through the indoor coil and block the outlet duct whenever the heat pump's controls cycle off the indoor fan. If it is installed, use the outlet damper box described in section 2.5.4.1 to affect the blocked outlet duct.

* * * * *

f. * * * Sample measurements used in calculating the air volume rate (refer to sections 7.7.2.1 and 7.7.2.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22)) at equal intervals that span 10 minutes or less. (Note: In the first printing of ASHRAE Standard 37–2005, the second IP equation for Q_{mi} should read:

$$1097CA_n\sqrt{P_V v'_n}.) * * *$$

* * * * *

3.9.1 Average space heating capacity and electrical power calculations.

a. * * *

To account for the effect of duct loses, adjust Q^k_h (35) in accordance with section 7.3.4.3 of ASHRAE Standard 37–05.

* * * * *

3.11.1.3 Official test.

* * * * *

b. For space cooling tests, calculate capacity from the outdoor air-enthalpy measurements as specified in section 7.3.3.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). Calculate heating capacity based on outdoor air-enthalpy measurements as specified in section 7.3.4.2 of the same ASHRAE Standard. Adjust outdoor-side capacities according to section 7.3.3.4 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22) to account for line losses when testing split systems. Do not correct the average electrical power measurement as described in section 8.6.2 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22).

3.11.2 If using the Compressor Calibration Method as the secondary test method.

a. * * * Otherwise, conduct the calibration tests according to ASHRAE Standard 23–05 (incorporated by reference, see § 430.22), ASHRAE Standard 41.9–00 (incorporated by reference, see § 430.22), and section 7.4 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22).

b. Calculate space cooling and space heating capacities using the compressor calibration method measurements as specified in section 7.4.5 and 7.4.6 respectively, of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22).

3.11.3 If using the Refrigerant-Enthalpy Method as the secondary test method. Conduct this secondary method according to section 7.5 of ASHRAE Standard 37–05 (incorporated by reference, see § 430.22). Calculate space cooling and heating capacities using the refrigerant-enthalpy method measurements as specified in sections 7.5.4 and 7.5.5, respectively, of the same ASHRAE Standard.

4. Calculations of Seasonal Performance Descriptors

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4.1.3 SEER calculations for an air conditioner or heat pump having a two-capacity compressor. Calculate SEER using Equation 4.1–1. Evaluate the space cooling capacity, $Q^{k=1}_c(T_j)$, and electrical power consumption, $E^{k=1}_c(T_j)$, of the test unit when operating at low compressor capacity and outdoor temperature T_j using,

$$\dot{Q}^{k=1}_c(T_j) = \dot{Q}^{k=1}_c(67) + \frac{\dot{Q}^{k=1}_c(82) - Q^{k=1}_c(67)}{82-67}\cdot(T_j - 67) \qquad (4.1.3\text{-}1)$$

$$\dot{E}^{k=1}_c(T_j) = E^{k=1}_c(67) + \frac{E^{k=1}_c(82) - E^{k=1}_c(67)}{82-67}\cdot(T_j - 67) \qquad (4.1.3\text{-}2)$$

where $Q^{k=1}_c(82)$ and $E^{k=1}_c(82)$ are determined from the B_1 Test, $Q^{k=1}_c(67)$ and $E^{k=1}_c(67)$ and $E^{k=1}_c(67)$ are determined from the F_1 Test, and all are calculated as specified in section 3.3. Evaluate the space cooling capacity, $Q^{k=2}_c(T_j)$, and electrical power consumption, $E^{k=2}_c(T_j)$, of the test unit when operating at high compressor capacity and outdoor temperature T_j using,

* * * * *

4.1.3.3 * * *

$PLF_j = 1 - C^c_D(k = 2) . [1 - X^{k=2}(T_j)]$, the part load factor, dimensionless.

Obtain the fraction bin hours for the cooling season,

$$\frac{n_j}{N},$$

from Table 16. Use Equations 4.1.3–3 and 4.1.3–4, respectively, to evaluate $Q^{k=2}_c(T_j)$ and $E^{k=2}_c(T_j)$. Use $C^c_D(k=2)$ as determined in sections 3.2.3 and 3.5.3.

* * * * *

4.1.4.2 * * *

For multiple-split air conditioners and heat pumps (only), the following procedures supersede the above requirements for calculating $EER^{k=i}(T_j)$. For each temperature bin where $T_1 < T_j < T_v$,

$$EER^{k=i}(T_j) = EER^{k=1}(T_1) + \frac{EER^{k=v}(T_v) - EER^{k=1}(T_1)}{T_v - T_1}\cdot(T_j - T_1)\cdot$$

For each temperature bin where $T_v \le T_j < T_2$,

$$EER^{k=i}(T_j) = EER^{k=v}(T_v) + \frac{EER^{k=2}(T_2) - EER^{k=v}(T_v)}{T_2 - T_v}\cdot(T_j - T_v)\cdot$$

* * * * *

4.2.3.3 * * * .

$PLF_j = 1 - C^h_D (k = 2) \cdot [1 - X^{k=2} (T^j)]$.

Use $C^h_D (k = 2)$ as determined in sections 3.6.3 and 3.8.1. Determine the low temperature cut-out factor, $\delta' (T_j)$, using Equation 4.2.3–3.

* * * * *

4.2.4.2 * * *

For multiple-split air conditioners and heat pumps (only), the following procedures supersede the above requirements for calculating $COP^{k=i}_h (T_j)$. For each temperature bin where $T_3 > T_j > T_{vh}$,

$$COP_h^{k=i}\left(T_j\right) = COP_h^{k=1}\left(T_3\right) + \frac{COP_h^{k=v}\left(T_{vh}\right) - COP_h^{k=1}\left(T_3\right)}{T_{vh} - T_3} \cdot \left(T_j - T_3\right).''$$

For each temperature bin where $T_{vh} \geq T_j > T_4$,

* * * * *

$$COP_h^{k=i}(T_j) = COP_h^{k=v}\ (T_{vh}) + \frac{COP_h^{k=2}(T_4) - COP_h^{k=v}(T_{vh})}{T_4 - T_{vh}} \cdot (T_j - T_{vh}) \cdot ''$$

* * * * *

6. Section 430.62 is amended in subpart F by revising paragraphs (a)(4)(i) and (ii) to read as follows:

§ 430.62 Submission of data.

(a) * * *

(4) * * *

(i) Central air conditioners, the seasonal energy efficiency ratio. For central air conditioners whose seasonal energy efficiency ratio is based on an installation that includes a particular model of furnace, the certification report shall include the product class (as denoted in § 430.32, manufacturer's name, private labeler's name (if applicable) and manufacturer's model number of the furnace.

(ii) Central air conditioning heat pumps, the seasonal energy efficiency ratio and heating seasonal performance factor. For central air conditioner heat pumps whose seasonal energy efficiency ratio and/or heating seasonal performance factor is based on an installation that includes a particular model of furnace, the certification report shall include the product class (as denoted in § 430.32), manufacturer's name, private labeler's name (if applicable) and manufacturer's model number of the furnace.

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