[6450-01-P]

DEPARTMENT OF ENERGY

[Case Number 2019-004; EERE-2019-BT-WAV-0009]

Energy Conservation Program: Decision and Order Granting a Waiver to GD Midea Air Conditioning Equipment Co. LTD. from the Department of Energy Room Air Conditioner Test Procedure

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

ACTION: Notice of decision and order.

SUMMARY: The U.S. Department of Energy ("DOE") gives notice of a Decision and Order (Case Number 2019-004) that grants to GD Midea Air Conditioning Equipment Co. LTD. ("Midea") a waiver from specified portions of the DOE test procedure for determining the energy efficiency of specified room air conditioner basic models. Under the Decision and Order, Midea is required to test and rate the specified basic models of its room air conditioners in accordance with the alternate test procedure specified in the Decision and Order.

DATES: The Decision and Order is effective on **[INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**. The Decision and Order will terminate upon the compliance date of any future amendment to the test procedure for room air conditioners located at title 10 of

the Code of Federal Regulations ("CFR"), part 430, subpart B, appendix F that addresses the issues presented in this waiver. At that time, Midea must use the relevant test procedure for this product for any testing to demonstrate compliance with the applicable standards, and any representations of energy use.

FOR FURTHER INFORMATION CONTACT: Ms. Lucy deButts, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. E-mail: *AS_Waiver_Requests@ee.doe.gov*.

Ms. Sarah Butler, U.S. Department of Energy, Office of the General Counsel, Mail Stop GC-33, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585-0103. Telephone: (202) 586-1777. Email: *Sarah.Butler@hq.doe.gov*.

SUPPLEMENTARY INFORMATION: In accordance with Title 10 of the Code of Federal Regulations (10 CFR 430.27(f)(2)), DOE gives notice of the issuance of its Decision and Order as set forth below. The Decision and Order grants Midea a waiver from the applicable test procedure at 10 CFR part 430, subpart B, appendix F for specified basic models of room air conditioners and provides that Midea must test and rate such room air conditioners using the alternate test procedure specified in the Decision and Order. Midea's representations concerning the energy efficiency of the specified basic models must be based on testing according to the provisions and restrictions in the alternate test procedure set forth in the Decision and Order, and the representations must fairly disclose the test results. Distributors, retailers, and private

labelers also must comply with the same requirements when making representations regarding the energy efficiency of these products. (42 U.S.C. 6293(c))

Manufacturers not currently distributing room air conditioners in commerce in the United States that employ a technology or characteristic that results in the same need for a waiver from the applicable test procedure must petition for and be granted a waiver prior to the distribution in commerce of those products in the United States. 10 CFR 430.27(j). Manufacturers may also submit a request for interim waiver pursuant to the requirements of 10 CFR 430.27.

Signing Authority

This document of the Department of Energy was signed on May 8, 2020, by Alexander N. Fitzsimmons, Deputy Assistant Secretary for Energy Efficiency, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on May 20, 2020.

Treena V. Garrett,
Federal Register Liaison Officer,
U.S. Department of Energy.

Case # 2019-004
Decision and Order

I. Background and Authority

The Energy Policy and Conservation Act, as amended ("EPCA"),[1] authorizes the U.S. Department of Energy ("DOE") to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B[2] of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain types of consumer products. These products include room air conditioners, the focus of this document. (42 U.S.C. 6292(a)(2))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the

[1] All references to EPCA in this document refer to the statute as amended through America's Water Infrastructure Act of 2018, Public Law 115-270 (Oct. 23, 2018).
[2] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated as Part A.

applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of that product (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the product complies with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The test procedure for room air conditioners is contained at 10 CFR part 430, subpart B, appendix F ("Appendix F").

Any interested person may submit a petition for waiver from DOE's test procedure requirements. 10 CFR 430.27(a)(1). DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 430.27(f)(2). DOE may grant the waiver subject to conditions, including adherence to alternate test procedures. *Id.*

II. Midea's Petition for Waiver: Assertions and Determinations

By letter dated March 25, 2019, Midea America, Inc. filed a petition for waiver and a petition for interim waiver from the DOE room air conditioner test procedure set forth in Appendix F on behalf of GD Midea Air Conditioning Equipment Co. LTD. ("Midea"). According to Midea, the current DOE test procedure for room air conditioners, which provides for testing at full-load performance only (*i.e.*, at a single indoor and high-temperature outdoor operating condition), does not take into account the benefits of variable-speed room air conditioners, with their part-load performance characteristics, and misrepresents their actual energy consumption.[3] Midea noted that Appendix F requires testing room air conditioners only with full-load performance, in part, as a result of DOE having previously concluded that widespread use of part-load technology in room air conditioners was not likely to be stimulated by the development of a part-load metric. 76 FR 972, 1016 (January 6, 2011).

Midea stated that, to operate in the most efficient possible manner, variable-speed room air conditioners adjust the compressor rotation speed based upon demand to maintain the desired temperature in the home without turning the compressor and blower motor(s) on and off. Midea claimed that, compared to room air conditioners without variable-speed compressors, this ability to adjust to conditions results in both significant energy savings and faster cooling. Midea asserted that, because the DOE test procedure does not account for part-load characteristics, the results of the test procedure are not representative of the benefits of variable-speed room air conditioners.

[3] The specific basic models for which the petition applies are Midea brand room air conditioner basic models MAW08V1DWT, MAW08V1QWT, MAW10V1DWT, MAW10V1QWT, MAW12V1DWT, and MAW12V1QWT. These basic model names were provided by Midea in its March 25, 2019 petition.

Midea requested testing the basic models specified in its petition according to the test procedure for variable-speed room air conditioners prescribed by DOE in an interim waiver granted to LG Electronics USA, Inc. ("LG"). That waiver required testing variable-speed room air conditioners according to the test procedure in Appendix F, except that, instead of a single rating condition, testing of a variable-speed room air conditioner occurred at four rating conditions. 83 FR 30717 ("LG Notice of Petition for Waiver"). On May 8, 2019, DOE issued a Decision and Order to LG that supersedes the interim waiver ("LG Decision and Order") and includes additional specifications from DOE. 84 FR 20111.

On December 13, 2019, DOE published a notice that announced its receipt of the petition for waiver and granted Midea an interim waiver. 84 FR 68159 ("Midea Notice of Petition for Waiver"). In the Midea Notice of Petition for Waiver, DOE presented Midea's claim that the results of the test procedure in Appendix F are not representative of the actual energy consumption of the variable-speed room air conditioners specified in Midea's petition for wavier and the requested alternate test procedure described above.

In the Midea Notice of Petition for Wavier, DOE reviewed the alternate procedure suggested by Midea in the March 25, 2019 letter, along with the additional performance modeling and analysis performed by DOE conducted in evaluation of the LG Interim Waiver.[4] Based on this review, DOE determined that the alternate test procedure specified in the LG

[4] The modeling and analysis conducted in evaluation of the LG Interim Waiver is available at: *https://www.regulations.gov/docket?D=EERE-2018-BT-WAV-0006.*

Decision and Order (which is based on the alternate test procedure recommended by Midea) would allow for a more accurate measurement of efficiency of the specified basic models of variable-speed room air conditioners, while alleviating problems with testing and efficiency representations of the basic models specified by Midea.

Under the alternate test procedure prescribed in the Interim Waiver Order issued to Midea, the test unit's weighted-average combined energy efficiency ratio ("CEER") metric is calculated from the individual CEER values obtained at four rating conditions. The room air conditioner weighting factors for each rating temperature are based on the fractional temperature bin hours provided in Table 19 of DOE's test procedure for central air conditioners (10 CFR part 430, subpart B, appendix M (''Appendix M'')). This weighted-average value is adjusted to normalize it against the expected weighted-average CEER under the same four rating conditions of a theoretical comparable single-speed room air conditioner. This theoretical air conditioner is one that at the 95 degree Fahrenheit (°F) test condition performs the same as the variable-speed test unit, but with differing performance at the other rating conditions. The differing performance is due to optimization of the refrigeration system efficiency through compressor speed adjustments to eliminate cycling losses and better match the cooling load. To determine the test unit's final rated CEER value, the measured performance of the variable-speed room air conditioner when tested at the 95 °F rating condition according to Appendix F is multiplied by a performance adjustment factor. The factor reflects the average performance improvement due to the variable-speed compressor across multiple rating conditions.

Additionally, DOE included the following specifications in the alternate test procedure. First, DOE provided compressor speed definitions to harmonize the alternate test procedure with industry standards. Second, because fixed compressor speeds are critical to the repeatability of the alternate test procedure, the Interim Waiver Order requires that Midea provide all necessary instructions to maintain the compressor speeds required for each test condition.[5] This includes the compressor frequency set points at each test condition, instructions necessary to maintain the compressor speeds required for each test condition, and the control settings used for the variable components.[6] Third, DOE modified the annual energy consumption and corresponding cost calculations by specifying the correct method to incorporate electrical power input data in 10 CFR 430.23(f) to ensure EnergyGuide labels present consistent and appropriate information to consumers. Fourth, DOE adjusted the CEER calculations in Appendix F for clarity. Fifth, as discussed in the LG Decision and Order, DOE did not allow the option provided in the LG Interim Waiver and suggested by the Midea's petition for waiver to test the specified variable-speed room air conditioners using the air-enthalpy method. There were two reasons for this. One was that, compared to the calorimeter method, the air-enthalpy method's measured results differ; and two, there is heat transfer within and through the unit chassis that the calorimeter method captures but the air-enthalpy method does not. 84 FR 20111, 20117. Sixth, to ensure that the low and intermediate compressor speeds result in representative cooling capacities under

[5] Docket No. EERE-2019-BT-WAV-0009-0003

[6] Pursuant to 10 CFR 1004.11, if the manufacturer submits information that it believes to be confidential and exempt by law from public disclosure, the manufacturer should submit via email, postal mail, or hand delivery two well-marked copies: One copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

reduced loads, the low compressor speed definition required that the test unit's measured cooling capacity at the 82 °F rating condition be no less than 47 percent and no greater than 57 percent of the measured cooling capacity when operating at the full compressor speed at the 95 °F rating condition.[7,8]

In the Midea Notice of Petition for Waiver, DOE also solicited comments from interested parties on all aspects of the petition and the specified alternate test procedure. *Id.* DOE received one substantive comment, jointly submitted by Pacific Gas and Electric Company ("PG&E"), San Diego Gas and Electric ("SDG&E"), and Southern California Edison ("SCE") (hereinafter

[7] The compressor speed nomenclature and definition clarifications are derived from to the Air-Conditioning, Heating, and Refrigeration Institute ("AHRI") Standard 210/240-2017, "Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment," and adapted to be applicable to room ACs. Equation 11.60 in AHRI Standard 210/240-2017 relates the building load to an AC's full-load cooling capacity and outdoor temperature, and assumes full-load operation at 98 °F outdoor temperature. To provide consistency with the full-load test condition for room ACs, DOE adjusted (*i.e.*, normalized) this equation to reflect full-load operation at 95 °F outdoor temperature. Using the adjusted equation suggests that the representative cooling load at the 82 °F rating condition would be 57 percent of the full-load cooling capacity for room air conditioners. DOE recognizes that variable-speed room ACs may use compressors that vary their speed in discrete steps and may not be able to operate at a speed that provides exactly 57 percent cooling capacity. Therefore, the defined cooling capacity associated with the low compressor speed is presented as a 10-percent range rather than a single value. 57 percent cooling load is the upper bound of the 10-percent range defining the cooling capacity associated with the lower compressor speed (*i.e.*, the range is defined as 47 to 57 percent). This ensures that the variable-speed room AC is capable of matching the representative cooling load (57 percent of the maximum) at the 82 °F rating condition, while providing the performance benefits associated with variable-speed operation. In contrast, if the 10-percent range were to be defined as, for example, 52 to 62 percent (with 57 percent as the midpoint), a variable-speed room AC could be tested at 60 percent, for example, without demonstrating the capability to maintain variable-speed performance down to 57 percent.

[8] Two aspects of the cooling load range are important: 1) the cooling load at 82 °F should be no more than 57 percent of the full-load cooling capacity according to AHRI Standard 210/240-2017, and 2) a 10-percent tolerance on the measured cooling capacity is necessary because some variable-speed room ACs adjust speed in discrete steps, so it may not be possible to achieve the 57-percent condition exactly. To provide for the 10-percent tolerance, DOE requires the 57-percent cooling load condition as the upper end of the range and allows down to a 47-percent cooling load. This ensures the cooling load never exceeds 57 percent.

the "California IOUs"). On January 27, 2020, Midea subsequently submitted a rebuttal statement (pursuant to 10 CFR 430.27(d)(3)) in response to this comment.[9]

The California IOUs recommended that DOE deny Midea's petition for waiver and rescind the interim waiver. They urged DOE to address the issues raised in the petition for waiver through a room air conditioner test procedure rulemaking rather than by granting Midea a test procedure waiver. The California IOUs contend that the waiver review process does not allow stakeholders sufficient opportunity to consider, evaluate, and review the proposed significant changes to the room air conditioner test procedure in the alternate test procedure specified by DOE in the Midea Notice of Interim Waiver. The California IOUs added that the number of amendments to the alternate test procedure granted to LG in the LG Decision and Order proposed by DOE for the Midea Notice of Interim Waiver show that more extensive discussion of the issues raised in Midea's petition for waiver are required. (California IOUs, No. 5 at p. 1)

In its rebuttal statement, Midea stated that it is appropriate for DOE to grant a test procedure waiver and then subsequently consider similar changes to the test procedure in a rulemaking. Midea asserted that the purpose of the DOE test procedure waiver process is to grant manufacturers relief more quickly than the rulemaking process, and then to ensure that the same test procedure changes are considered more generally through the rulemaking process. Midea further commented that 10 CFR 430.27(j) provides a framework for considering waivers

[9] DOE also received a non-substantive comment submitted anonymously. Comments and the rebuttal statement can be accessed at: *https://www.regulations.gov/docket?D=EERE-2019-BT-WAV-0009.*

regarding the same technology addressed in a prior waiver, as in this case with the LG Decision and Order. Additionally, Midea stated that the most recent version of the Association of Home Appliance Manufacturers ("AHAM") room air conditioner test procedure, AHAM RAC-1-2019, incorporates the same approach to testing variable-speed room air conditioners as DOE specifies in the alternate test procedure, further supporting Midea's petition for waiver. (Midea, No. 7 at pp.4–5)

DOE generally agrees with Midea's response, and notes that, pursuant to 10 CFR 430.27(h), DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model(s) for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy or water consumption characteristics as to provide materially inaccurate comparative data. As discussed, DOE has made such a determination. Following the grant of any waiver, DOE must publish a notice of proposed rulemaking in the *Federal Register* to amend its regulations so as to eliminate the need for continuation of the waiver and that, as soon thereafter as practicable, DOE must publish a final rule in the *Federal Register*. 10 CFR 430.27(l). Therefore, variable-speed room air conditioner performance will be addressed in the next test procedure rulemaking. Pursuant to 10 CFR 430.27(h)(2), waivers addressed by DOE in a test procedure rulemaking terminate on the effective date of the final rule.

The California IOUs also questioned the use of weighting factors for the four test conditions in the alternate test procedure based on factors in the central air conditioner test

procedure in Appendix M. They stated that DOE has not sufficiently justified how room air conditioner operation is similar enough to that of central air conditioners to justify use of the same weighting schema. (California IOUs, No. 5 at p. 2)

As the California IOUs noted, the test condition weighting factors specified in the alternate test procedure are those in Appendix M, the test procedure for central air conditioners and heat pumps. The Appendix M values are based on Air-Conditioning, Heating, and Refrigeration Institute ("AHRI") Standard 210/240-2008 "Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment" ("AHRI 210/240-2008"), which provides test condition outdoor temperature weighting factors based on building loads, not specifically for central air conditioners. Although room air conditioners may be used under different conditions than central air conditioners, the building load calculation and weighting factor table provided in AHRI 210/240-2008 specifically account for different outdoor temperatures and resulting building loads, and therefore are equally suitable for room air conditioners and central air conditioners. AHRI 210/240-2008 is an industry recognized consensus standard. In addition, DOE adjusted this weighting to eliminate lower temperatures at which room air conditioners would not typically be used.

The California IOUs also stated that the sources for the two modeling adjustment factors used to determine the increased capacity and reduced electrical power input of a comparable theoretical single-speed room air conditioner performance at lower temperature outdoor test conditions are unclear. As a result, the California IOUs claimed that DOE had not demonstrated that a CEER value for a variable-speed room air conditioner determined using the alternate test

procedure would be comparable to a CEER for a single-speed room air conditioner. (California IOUs, No. 5 at p. 2)

In response to the California IOUs comments, Midea stated that DOE has already addressed the California IOUs' concerns about the modeling adjustment factors in the LG Decision and Order. Midea added that these arguments do not demonstrate why DOE should not grant Midea a waiver. (Midea, No. 7 at pp. 2–3)

The capacity and power modeling adjustment factors in section 5.4.1 of the alternate test procedure are the same as those in the alternate test procedure granted to LG in the LG Decision and Order. DOE confirmed these adjustment factors for that alternate test procedure because they aligned with DOE test data and modeling, and is including them in the alternate test procedure for Midea for the same reasons. Therefore, DOE is confident that the capacity and power modeling adjustment factor values suggested by LG to estimate performance of a theoretical comparable single-speed room air conditioner at reduced outdoor temperature conditions are appropriate and representative of expected performance.

With respect to the performance adjustment factor calculated in section 5.4.8 of the alternate test procedure, DOE requires the use of this factor to ensure that variable-speed room air conditioner CEER values determined using the alternate test procedure are comparable to single-speed room air conditioner values determined in accordance with the current single-speed test method. The performance adjustment factor is calculated as the percentage improvement of the weighted-average CEER value of the variable-speed room air conditioner compared to the

weighted-average CEER value of a theoretical comparable single-speed room air conditioner under the four defined test conditions. After calculating the performance adjustment factor, it is multiplied by the CEER value of the variable-speed unit when tested at the 95 °F test condition according to Appendix F, resulting in the final CEER metric for the variable-speed room air conditioner. By using this approach, all CEER values are based on room air conditioner performance at the 95 °F test condition, with variable-speed room air conditioners appropriately receiving credit for their higher efficiency compared to single-speed units at other operating conditions.

For the reasons explained here and in the Midea Notice of Petition for Waiver, absent a waiver, the basic models identified by Midea in its petition cannot be tested and rated for energy consumption on a basis representative of their true energy consumption characteristics. DOE has reviewed the recommended procedure suggested by Midea and concludes that, as modified in the Interim Waiver Order, it will allow for the accurate measurement of the energy use of the product, while alleviating the testing problems associated with Midea's implementation of DOE's applicable room air conditioner test procedure for the specified basic models.

Thus, DOE is requiring that Midea test and rate specified room air conditioner basic models according to the alternate test procedure specified in this Decision and Order, which is identical to the procedure provided in the interim waiver.

This Decision and Order is applicable only to the basic models specified and does not extend to any other basic models. DOE evaluates and grants waivers for only those basic models

specifically set out in the petition, not future models that may be manufactured by the petitioner. Midea may request that DOE extend the scope of this waiver to include additional basic models that employ the same technology as those specified in this waiver. 10 CFR 430.27(g). Midea may also submit another petition for waiver from the test procedure for additional basic models that employ a different technology and meet the criteria for test procedure waivers. 10 CFR 430.27(a)(1).

DOE notes that it may modify or rescind the waiver at any time upon DOE's determination that the factual basis underlying the petition for waiver is incorrect, or upon a determination that the results from the alternate test procedure are unrepresentative of the basic models' true energy consumption characteristics. 10 CFR 430.27(k)(1). Likewise, Midea may request that DOE rescind or modify the waiver if the company discovers an error in the information provided to DOE as part of its petition, determines that the waiver is no longer needed, or for other appropriate reasons. 10 CFR 430.27(k)(2).

As set forth above, the test procedure specified in this Decision and Order is not the same as the test procedure offered by Midea. If Midea believes that the alternate test method it suggested provides representative results and is less burdensome than the test method required by this Decision and Order, Midea may submit a request for modification under 10 CFR 430.27(k)(2) that addresses the concerns that DOE has specified with that procedure. Midea may also submit another less burdensome alternative test procedure not expressly considered in this notice under the same provision.

III. Consultations with Other Agencies

In accordance with 10 CFR 430.27(f)(2), DOE consulted with the Federal Trade Commission staff concerning the Midea petition for waiver.

IV. Order

After careful consideration of all the material that was submitted by Midea, the information presented in the LG Notice of Petition for Waiver, and comment received in this matter, it is **ORDERED** that:

(1) Midea must, as of the date of publication of this Order in the *Federal Register*, test and rate the following room air conditioner basic models with the alternate test procedure as set forth in paragraph (2):

Brand	Basic Model
Midea	MAW08V1DWT
Midea	MAW08V1QWT
Midea	MAW10V1DWT
Midea	MAW10V1QWT
Midea	MAW12V1DWT
Midea	MAW12V1QWT

(2) The alternate test procedure for the Midea basic models specified in paragraph (1) of this Order is the test procedure for room air conditioners prescribed by DOE at 10 CFR part 430, subpart B, appendix F and 10 CFR 430.23(f), except: (i) the combined energy efficiency ratio ("CEER") is determined as detailed below, and (ii) the average annual energy consumption

referenced in 10 CFR 430.23(f)(3) is calculated as detailed below. In addition, for each basic model specified in paragraph (1), compressor speeds at each test condition and control settings for the variable components are to be maintained according to the instructions Midea submitted to DOE (*https://www.regulations.gov/document?D=EERE-2019-BT-WAV-0009-0003*). All other requirements of Appendix F and DOE's other relevant regulations remain applicable.

In 10 CFR 430.23, in paragraph (f) revise paragraph (3)(i) to read as follows:

The electrical power input in kilowatts as calculated in section 5.2.1 of appendix F to this subpart, and

In 10 CFR 430.23, in paragraph (f) revise paragraph (5) to read as follows:

(5) Calculate the combined energy efficiency ratio for room air conditioners, expressed in Btu's per watt-hour, as follows:

(i) Calculate the quotient of:

(A) The cooling capacity as determined at the 95 °F outdoor test condition, $Capacity_1$, in Btus per hour, as measured in accordance with section 5.1 of appendix F to this subpart multiplied by the representative average-use cycle of 750 hours of compressor operation per year, divided by

(B) The combined annual energy consumption, in watt hours, which is the sum of the annual energy consumption for cooling mode, calculated in section 5.4.2 of appendix F to this subpart for test condition 1 in Table 1 of appendix F to this subpart, and the standby mode and off mode energy consumption, as measured in accordance with section 5.3 of appendix F to this subpart. Multiply the sum of the annual energy consumption in cooling mode and standby mode

and off mode energy consumption by a conversion factor of 1,000 to convert kilowatt-hours to watt-hours.

(ii) Multiply the quotient calculated in paragraph (f)(5)(i) of this section by (1 + Fp), where Fp is the variable-speed room air conditioner unit's performance adjustment factor as calculated in section 5.4.8 of appendix F to this subpart.

(iii) Round the resulting value from paragraph (f)(5)(ii) of this section to the nearest 0.1 Btu per watt-hour.

In 10 CFR part 430, Subpart B, Appendix F:

Add in Section 1, *Definitions*:

1.8 "Single-speed" means a type of room air conditioner that cannot automatically adjust the compressor speed based on detected conditions.

1.9 "Variable-speed" means a type of room air conditioner that can automatically adjust the compressor speed based on detected conditions.

1.10 "Full compressor speed (full)" means the compressor speed specified by GD Midea Air Conditioning Equipment Co. LTD. (Docket No. EERE-2019-BT-WAV-0009-0003) at which the unit operates at full load testing conditions.

1.11 "Intermediate compressor speed (intermediate)" means the compressor speed higher than the low compressor speed by one third of the difference between low compressor speed and full compressor speed with a tolerance of plus 5 percent (designs with non-discrete compressor speed stages) or the next highest inverter frequency step (designs with discrete compressor speed steps).

1.12 “Low compressor speed (low)” means the compressor speed specified by GD Midea Air Conditioning Equipment Co. LTD. (Docket No. EERE-2019-BT-WAV-0009-0003) at which the unit operates at low load test conditions, such that $Capacity_4$, the measured cooling capacity at test condition 4 in Table 1 of this appendix, is no less than 47 percent and no greater than 57 percent of $Capacity_1$, the measured cooling capacity with the full compressor speed at test condition 1 in Table 1 of this appendix.

1.13 “Theoretical comparable single-speed room air conditioner” means a theoretical single-speed room air conditioner with the same cooling capacity and electrical power input as the variable-speed room air conditioner unit under test, with no cycling losses considered, at test condition 1 in Table 1 of this appendix .

Add to the end of Section 2.1 *Cooling*:

For the purposes of this waiver, test each unit following the cooling mode test a total of four times: one test at each of the test conditions listed in Table 1 of this appendix, consistent with section 3.1 of this appendix.

Revise Section 3.1, *Cooling mode,* to read as follows:

Cooling mode. Establish the test conditions described in sections 4 and 5 of ANSI/AHAM RAC-1 (incorporated by reference; see 10 CFR 430.3) and in accordance with ANSI/ASHRAE 16 (incorporated by reference; see 10 CFR 430.3), with the following exceptions: Conduct the set of four cooling mode tests with the test conditions in Table 1 of this appendix. Set the compressor speed required for each test condition in accordance with

instructions GD Midea Air Conditioning Equipment Co. LTD provided to DOE (Docket No. EERE-2019-BT-WAV-0009-0003).

Table 1: Indoor and Outdoor Inlet Air Test Conditions – Variable-Speed Room Air Conditioners

Test Condition	Evaporator Inlet (Indoor) Air, °*F*		Condenser Inlet (Outdoor) Air, °*F*		Compressor Speed
	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	
Test Condition 1	80	67	95	75	Full
Test Condition 2	80	67	92	72.5	Full
Test Condition 3	80	67	87	69	Intermediate
Test Condition 4	80	67	82	65	Low

Replace Section 5.1 to read as follows:

Calculate the condition-specific cooling capacity (expressed in Btu/h), $Capacity_{tc}$, for each of the four cooling mode rating test conditions (tc), as required in section 6.1 of ANSI/AHAM RAC-1 (incorporated by reference; see 10 CFR 430.3) and in accordance with ANSI/ASHRAE 16 (incorporated by reference; see 10 CFR 430.3). Notwithstanding the requirements of 10 CFR 430.23(f), when reporting cooling capacity pursuant to 10 CFR 429.15(b)(2) and calculating energy consumption and costs pursuant to 10 CFR 430.23(f), use the cooling capacity determined for test condition 1 in Table 1 of this appendix.

Replace Section 5.2 to read as follows:

Determine the condition-specific electrical power input (expressed in watts), P_{tc}, for each of the four cooling mode rating test conditions, as required by section 6.5 of ANSI/AHAM RAC-1 (incorporated by reference; see 10 CFR 430.3) and in accordance with ANSI/ASHRAE 16

(incorporated by reference; see 10 CFR 430.3). Notwithstanding the requirements of 10 CFR 430.23(f), when reporting electrical power input pursuant to 10 CFR 429.15(b)(2) and calculating energy consumption and costs pursuant to 10 CFR 430.23(f)(5), use the electrical power input value measured for test condition 1 in Table 1 of this appendix. Notwithstanding the requirements of 10 CFR 430.23(f), when calculating energy consumption and costs pursuant to 10 CFR 430.23(f)(3), use the weighted electrical power input, P_{wt}, calculated in section 5.2.1 of this appendix, as the electrical power input.

Insert a new Section 5.2.1:

5.2.1 *Weighted electrical power input.* Calculate the weighted electrical power input in cooling mode, P_{wt}, expressed in watts, as follows:

$$P_{wt} = \sum_{tc} P_{tc} \times W_{tc}$$

Where:

P_{wt} = weighted electrical power input, in watts, in cooling mode.

P_{tc} = electrical power input, in watts, in cooling mode for each test condition in Table 1 of this appendix.

W_{tc} = weighting factors for each cooling mode test condition: 0.05 for test condition 1, 0.16 for test condition 2, 0.31 for test condition 3, and 0.48 for test condition 4.

tc represents the cooling mode test condition: "1" for test condition 1 (95 °F condenser inlet dry-bulb temperature), "2" for test condition 2 (92 °F), "3" for test condition 3 (87 °F), and "4" for test condition 4 (82 °F).

Add a new Section 5.4, following Section 5.3 *Standby mode and off mode annual energy consumption*:

5.4 *Variable-speed room air conditioner unit's performance adjustment factor.* Calculate the performance adjustment factor (Fp) as follows:

5.4.1 *Theoretical comparable single-speed room air conditioner*. Calculate the cooling capacity, expressed in British thermal units per hour (Btu/h), and electrical power input, expressed in watts, for a theoretical comparable single-speed room air conditioner at all cooling mode test conditions.

$$Capacity_{ss\_tc} = Capacity_1 \times (1 + (M_c \times (95 - T_{tc})))$$

$$P_{ss\_tc} = P_1 \times (1 - (M_p \times (95 - T_{tc})))$$

Where:

$Capacity_{ss\_tc}$ = theoretical comparable single-speed room air conditioner cooling capacity, in Btu/h, calculated for each of the cooling mode test conditions in Table 1 of this appendix.

$Capacity_1$ = variable-speed room air conditioner unit's cooling capacity, in Btu/h, measured in section 5.1 of this appendix for test condition 1 in Table 1 of this appendix.

P_{ss_tc} = theoretical comparable single-speed room air conditioner electrical power input, in watts, calculated for each of the cooling mode test conditions in Table 1 of this appendix.

P_1 = variable-speed room air conditioner unit's electrical power input, in watts, measured in section 5.2 of this appendix for test condition 1 in Table 1 of this appendix.

M_c = adjustment factor to determine the increased capacity at lower outdoor test conditions, 0.0099.

M_p = adjustment factor to determine the reduced electrical power input at lower outdoor test conditions, 0.0076.

T_{tc} = condenser inlet dry-bulb temperature for each of the test conditions in Table 1 of this appendix (in °F).

95 is the condenser inlet dry-bulb temperature for test condition 1 in Table 1 of this appendix, 95 °F.

tc as explained in section 5.2.1 of this appendix.

5.4.2 *Variable-speed room air conditioner unit's annual energy consumption for cooling mode at each cooling mode test condition.* Calculate the annual energy consumption for cooling mode under each test condition, AEC_{tc}, expressed in kilowatt-hours per year (kWh/year), as follows:

$$AEC_{tc} = 0.75 \times P_{tc}$$

Where:

AEC_{tc} = variable-speed room air conditioner unit's annual energy consumption, in kWh/year, in cooling mode for each test condition in Table 1 of this appendix.

P_{tc} as defined in section 5.2.1 of this appendix.

tc as explained in section 5.2.1 of this appendix.

0.75 is 750 annual operating hours in cooling mode multiplied by a 0.001 kWh/Wh conversion factor from watt-hours to kilowatt-hours.

5.4.3 *Theoretical comparable single-speed room air conditioner annual energy consumption for cooling mode at each cooling mode test condition.* Calculate the annual energy consumption for a theoretical comparable single-speed room air conditioner for cooling mode under each test condition, AEC_{ss_tc}, expressed in kWh/year.

$$AEC_{ss\_tc} = 0.75 \times P_{ss\_tc}$$

Where:

AEC_{ss_tc} = theoretical comparable single-speed room air conditioner annual energy consumption, in kWh/year, in cooling mode for each test condition in Table 1 of this appendix.

P_{ss_tc} = theoretical comparable single-speed room air conditioner electrical power input, in watts, in cooling mode for each test condition in Table 1 of this appendix, calculated in section 5.4.1 of this appendix.

tc as explained in section 5.2.1 of this appendix.

0.75 as defined in section 5.4.2 of this appendix.

5.4.4 *Variable-speed room air conditioner unit's combined energy efficiency ratio at each cooling mode test condition.* Calculate the variable-speed room air conditioner unit's combined energy efficiency ratio, $CEER_{tc}$, for each test condition, expressed in Btu/Wh.

$$CEER_{tc} = \frac{Capacity_{tc}}{\left(\frac{AEC_{tc} + E_{TSO}}{0.75}\right)}$$

Where:

$CEER_{tc}$ = variable-speed room air conditioner unit's combined energy efficiency ratio, in Btu/Wh, for each test condition in Table 1 of this appendix.

$Capacity_{tc}$ = variable-speed room air conditioner unit's cooling capacity, in Btu/h, for each test condition in Table 1 of this appendix, measured in section 5.1 of this appendix.

AEC_{tc} = variable-speed room air conditioner unit's annual energy consumption, in kWh/yr, in cooling mode for each test condition in Table 1 of this appendix, calculated in section 5.4.2 of this appendix.

E_{TSO} = standby mode and off mode annual energy consumption for room air conditioners, in kWh/year, calculated in section 5.3 of this appendix.

tc as explained in section 5.2.1 of this appendix.

0.75 as defined in section 5.4.2 of this appendix.

5.4.5 *Theoretical comparable single-speed room air conditioner combined energy efficiency ratio at each cooling mode test condition.* Calculate the combined energy efficiency ratio for a theoretical comparable single-speed room air conditioner, $CEER_{ss\_tc}$, for each test condition, expressed in Btu/Wh.

$$CEER_{ss\_tc} = \frac{Capacity_{ss\_tc}}{\left(\frac{AEC_{ss\_tc} + E_{TSO}}{0.75}\right)}$$

Where:

$CEER_{ss\_tc}$ = theoretical comparable single-speed room air conditioner combined energy efficiency ratio, in Btu/Wh, for each test condition in Table 1 of this appendix.

$Capacity_{ss\_tc}$ = theoretical comparable single-speed room air conditioner cooling capacity, in Btu/h, for each test condition in Table 1 of this appendix, in Btu/h, calculated in section 5.4.1 of this appendix.

AEC_{ss_tc} = theoretical comparable single-speed room air conditioner annual energy consumption for each test condition in Table 1 of this appendix, in kWh/year, calculated in section 5.4.3 of this appendix.

E_{TSO} = standby mode and off mode annual energy consumption for room air conditioners, in kWh/year, calculated in section 5.3 of this appendix.

tc as explained in section 5.2.1 of this appendix.

0.75 as defined in section 5.4.2 of this appendix.

5.4.6 *Theoretical comparable single-speed room air conditioner adjusted combined energy efficiency ratio for each cooling mode test condition.* Calculate the adjusted combined energy efficiency ratio for a theoretical comparable single-speed room air conditioner, $CEER_{ss\_tc\_adj}$, with cycling losses considered, expressed in Btu/Wh.

$$CEER_{ss\_tc\_adj} = CEER_{ss\_tc} \times CLF_{tc}$$

Where:

$CEER_{ss\_tc\_adj}$ = theoretical comparable single-speed room air conditioner adjusted combined energy efficiency ratio, in Btu/Wh, for each test condition in Table 1 of this appendix.

$CEER_{ss\_tc}$ = theoretical comparable single-speed room air conditioner adjusted combined energy efficiency ratio, in Btu/Wh, for each test condition in Table 1 of this appendix, calculated in section 5.4.5 of this appendix.

CLF_{tc} = cycling loss factor for each cooling mode test condition: 1 for test condition 1, 0.971 for test condition 2, 0.923 for test condition 3, and 0.875 for test condition 4.

tc as explained in section 5.2.1 of this appendix.

5.4.7 *Weighted combined energy efficiency ratio.* Calculate the weighted combined energy efficiency ratio for the variable-speed room air conditioner unit, $CEER_{wt}$, and theoretical comparable single-speed room air conditioner, $CEER_{ss\_wt}$, expressed in Btu/Wh.

$$CEER_{wt} = \sum_{tc} CEER_{tc} \times W_{tc}$$

$$CEER_{ss\_wt} = \sum_{tc} CEER_{ss\_tc\_adj} \times W_{tc}$$

Where:

$CEER_{wt}$ = variable-speed room air conditioner unit's weighted combined energy efficiency ratio, in Btu/Wh.

$CEER_{ss\_wt}$ = theoretical comparable single-speed room air conditioner weighted combined energy efficiency ratio, in Btu/Wh.

$CEER_{tc}$ = variable-speed room air conditioner unit's combined energy efficiency ratio, in Btu/Wh, at each test condition in Table 1 of this appendix, calculated in section 5.4.4 of this appendix.

$CEER_{ss\_tc\_adj}$ = theoretical comparable single-speed room air conditioner adjusted combined energy efficiency ratio, in Btu/Wh, at each test condition in Table 1 of this appendix, calculated in section 5.4.6 of this appendix.

W_{tc} as defined in section 5.2.1 of this appendix.

tc as explained in section 5.2.1 of this appendix.

5.4.8 *Variable-speed room air conditioner unit's performance adjustment factor.*

Calculate the variable-speed room air conditioner unit's performance adjustment factor, F_p.

$$F_p = \frac{\left(CEER_{wt} - CEER_{ss\_wt}\right)}{CEER_{ss\_wt}}$$

Where:

F_p = variable-speed room air conditioner unit's performance adjustment factor.

$CEER_{wt}$ = variable-speed room air conditioner unit's weighted combined energy efficiency ratio, in Btu/Wh, calculated in section 5.4.7 of this appendix.

$CEER_{ss\_wt}$ = theoretical comparable single-speed room air conditioner weighted combined energy efficiency ratio, in Btu/Wh, calculated in section 5.4.7 of this appendix.

(3) *Representations*. Midea may not make representations about the efficiency of any basic model specified in paragraph (1) for any purpose, including, for example, compliance and marketing, unless the basic model has been tested in accordance with the provisions set forth above and such representations fairly disclose the results of such testing.

(4) This waiver shall remain in effect according to the provisions of 10 CFR 430.27.

(5) DOE issues this waiver to Midea on the condition that the statements, representations, and documents provided by Midea are valid. Any modifications to the controls or configurations of a basic model subject to this waiver will render the waiver invalid with respect to that basic model, and Midea will either be required to use the current Federal test procedure or submit a new application for a test procedure waiver. DOE may rescind or modify this waiver at any time if it determines the factual basis underlying the petition for waiver is incorrect, or the results from the alternate test procedure are unrepresentative of a basic model's true energy consumption characteristics. 10 CFR 430.27(k)(1). Likewise, Midea may request that DOE rescind or modify the waiver if Midea discovers an error in the information provided to DOE as part of its petition, determines that the waiver is no longer needed, or for other appropriate reasons. 10 CFR 430.27(k)(2).

(6) Midea remains obligated to fulfill any certification requirements set forth at 10 CFR part 429.

Signed in Washington, DC, on May 8, 2020.

Alexander N. Fitzsimmons
Deputy Assistant Secretary
for Energy Efficiency
Energy Efficiency and Renewable Energy

[FR Doc. 2020-11214 Filed: 5/22/2020 8:45 am; Publication Date: 5/26/2020]