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(3) International Commission on Illumination (CIE). The CIE standards listed in this paragraph may be obtained from the International Commission on Illumination, CIE Bureau Central, Kegelgasse 27, A-1030, Vienna, Austria. CIE publications are also available from TLA Lighting Consultants, 7 Pond Street, Salem, MA 10970, (508) 745-6870.

1. International Commission on Illumination (CIE) Publication No. 13.2 1974, corrected reprint 1993, "Method of Measuring and Specifying Color Rendering Properties of Light Sources," ISBN 3 900 734 39 9

(4) International Electrotechnical Commission. Copies of the International Electrotechnical Commission Publications can be obtained from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036, (212) 642-4936.

1. IEC 705, "Methods for Measuring the Performance of Microwave Ovens for Household and Similar Purposes," Section 4, Methods of Measurement, Paragraph 13 "Electrical Power Input Measurement," and Paragraph 14 "Efficiency" (1988).
2. IEC 705, Amendment 2, "Methods for Measuring the Performance of Microwave Ovens for Household and Similar Purposes," Section 4, Methods of Measurement, Paragraph 12 "Microwave Power Output Measurement" (1993).

(5) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Publication Sales, 1791 Tullie Circle, NE, Atlanta, GA 30329, (1-800-5-ASHRAE).

1. American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 103-1993, "Methods of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers," (with Errata of October 24, 1996) except for sections 3.0, 7.2.2.5, 8.6.1.1, 9.1.2.2, 9.5.1.1, 9.5.1.2.1, 9.5.1.2.2, 9.5.2.1, 9.7.1, 10.0, 11.2.12, 11.3.12, 11.4.12, 11.5.12 and appendices B and C.
2. American National Standards Institute Standard Z21.56-1994, "Gas-Fired Pool Heaters," section 2.9.

(6) American Society of Mechanical Engineers (ASME). The ASME standards listed in this paragraph may be obtained from the American Society of Mechanical Engineers, Service Center, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007.

1. ASME/ANSI Standard A112.18.1M-1996, "Plumbing Fixture Fittings."
2. ASME/ANSI Standard A112.19.6-1995, "Hydraulic Requirements for Water Closets and Urinals."

(7) Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872-5955, "American National Standard, Household Electric Dishwashers, ANSI/AHAM DW-1-1992," hereinafter referred to as ANSI/AHAM DW-1.

(c) *Reference Standards.* (1) *General.* The standards listed in this paragraph are referred to in the DOE test procedures and elsewhere in 10 CFR part 430 but are not incorporated by reference. These sources are given here for information and guidance.

(2) *List of References.*

1. National Voluntary Laboratory Accreditation Program Handbook 150-01, "Energy Efficient Lighting Products, Lamps and Luminaires, August 1993." National Voluntary Laboratory Accreditation Program, NIST, Gaithersburg, MD.
2. "Illuminating Engineering Society Lighting Handbook," 8th Edition, New York, NY 1993.

[59 FR 49474, Sept. 28, 1994, as amended at 62 FR 29239, May 29, 1997; 62 FR 51981, Oct. 3, 1997; 63 FR 13316, Mar. 18, 1998; 66 FR 65095, Dec. 18, 2001; 68 FR 51899, Aug. 29, 2003; 69 FR 18803, Apr. 9, 2004]

§ 430.23 Test procedures for the measurement of energy and water consumption.

(a) *Refrigerators and refrigerator-freezers.* (1) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers without an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers with an anti-

sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated annual operating cost for any other specified cycle type for electric refrigerators and electric refrigerator-freezers shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the specified cycle type, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 to this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(4) The energy factor for electric refrigerators and electric refrigerator-freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be—

(i) For electric refrigerators and electric refrigerator-freezers not having an anti-sweat heater switch, the quotient of (A) the adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart, divided by (B) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart, the resulting quotient then being rounded off to the second decimal place, and

(ii) For electric refrigerators and electric refrigerator-freezers having an anti-sweat heater switch, the quotient of (A) the adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart, divided

by (B) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of electric refrigerators and electric refrigerator-freezers equals the representative average use cycle of 365 cycles per year times the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart.

(6) Other useful measures of energy consumption for electric refrigerators and electric refrigerator-freezers shall be those measures of energy consumption for electric refrigerators and electric refrigerator-freezers which the Secretary determines are likely to assist consumers in making purchasing decisions which are derived from the application of appendix A1 of this subpart.

(7) The estimated regional annual operating cost for externally vented electric refrigerators and externally vented electric refrigerator-freezers without an anti-sweat heater switch shall be the product of the following three factors:

(i) The representative average-use cycle of 365 cycles per year,

(ii) The regional average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(8) The estimated regional annual operating cost for externally vented electric refrigerators and externally vented electric refrigerator-freezers with an

anti-sweat heater switch shall be the product of the following three factors:

(i) The representative average-use cycle of 365 cycles per year,

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the regional average per-cycle energy consumption for a test cycle with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart, and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(9) The estimated regional annual operating cost for any other specified cycle for externally vented electric refrigerators and externally vented electric refrigerator-freezers shall be the product of the following three factors:

(i) The representative average-use cycle of 365 cycles per year,

(ii) The regional average per-cycle energy consumption for the specified cycle, in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart, and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(b) *Freezers.* (1) The estimated annual operating cost for freezers without an anti-sweat heater switch shall be the product of the following three factors:

(i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated annual operating cost for freezers with an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cy-

cles per year, (ii) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated annual operating cost for an other specified cycle type for freezers shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the specified cycle type, determined according to 6.2 of appendix B1 of this subpart and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(4) The energy factor for freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be—

(i) For freezers not having an anti-sweat heater switch, the quotient of (A) the adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart, divided by (B) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to or 6.2 of appendix B1 of this subpart, the resulting quotient then being rounded off to the second decimal place, and

(ii) For freezers having an anti-sweat heater switch, the quotient of (A) the adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart, divided by (B) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to or 6.2 of appendix B1 of this subpart, the resulting quotient then being

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rounded off to the second decimal place.

(5) The annual energy use of all freezers equals the representative average-use cycle of 365 cycles per year times the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart.

(6) Other useful measures of energy consumption for freezers shall be those measures of energy consumption for freezers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix B1 of this subpart.

(c) *Dishwashers.* (1) The Estimated Annual Operating Cost (EAOC) for dishwashers must be rounded to the nearest dollar per year and is defined as follows:

(i) When cold water (50 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

$$EAOC = (D_e \times S) + (D_e \times N \times (M - (E_D/2))).$$

(B) For dishwashers not having a truncated normal cycle,

$$EAOC = (D_e \times S) + (D_e \times N \times M)$$

Where,

D_e = the representative average unit cost of electrical energy, in dollars per kilowatt-hour, as provided by the Secretary,

S = the annual standby electrical energy in kilowatt-hours per year and determined according to section 5.6 of Appendix C to this subpart,

N = the representative average dishwasher use of 215 cycles per year,

M = the machine electrical energy consumption per-cycle for the normal cycle as defined in section 1.6 of Appendix C to this subpart, in kilowatt-hours and determined according to section 5.1 of Appendix C to this subpart,

E_D = the drying energy consumption defined as energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle and determined according to section 5.2 of appendix C to this subpart.

(ii) When electrically-heated water (120 °F or 140 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

$$EAOC = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_e \times N \times W)$$

(B) For dishwashers not having a truncated normal cycle,

$$EAOC = (D_e \times S) + (D_e \times N \times M) + (D_e \times N \times W)$$

Where,

D_e , S , N , M , and E_D , are defined in paragraph (c)(1)(i) of this section, and

W = the total water energy consumption per cycle for the normal cycle as defined in section 1.6 of Appendix C to this subpart, in kilowatt-hours per cycle and determined according to section 5.4 of Appendix C to this subpart.

(iii) When gas-heated or oil-heated water is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

$$EAOC_g = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_g \times N \times W_g)$$

(B) For dishwashers not having a truncated normal cycle,

(B) For dishwashers not having a truncated normal cycle,

$$EAOC_g = (D_e \times S) + (D_e \times N \times M) + (D_g \times N \times W_g)$$

Where,

D_e , S , N , M , and E_D are defined in paragraph (c)(1)(i) of this section,

D_g = the representative average unit cost of gas or oil, as appropriate, in dollars per Btu, as provided by the Secretary, and

W_g = the total water energy consumption per cycle for the normal cycle as defined in section 1.6 of appendix C to this subpart, in Btu's per cycle and determined according to section 5.5 of appendix C to this subpart.

(2) The energy factor for dishwashers, EF, expressed in cycles per kilowatt-hour is defined as follows:

(i) When cold water (50 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

$$EF = 1/(M - (E_D/2))$$

(B) For dishwashers not having a truncated normal cycle,

$$EF = 1/M$$

Where,

M , and E_D are defined in paragraph (c)(1)(i) of this section.

(ii) When electrically-heated water (120 °F or 140 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

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$$EF = 1/(M - (E_D/2) + W)$$

(B) For dishwashers not having a truncated normal cycle,

$$EF = 1/(M + W)$$

Where,

M, and E_D are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(3) The estimated annual energy use, EAEU, expressed in kilowatt-hours per year is defined as follows:

(i) For dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

$$EAEU = (M - (E_D/2) + W) \times N + S$$

Where,

M, E_D , N and S are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(ii) For dishwashers not having a truncated normal cycle,

$$EAEU = (M + W) \times N + S$$

Where,

M, N and S are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(4) Other useful measures of energy consumption for dishwashers are those which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix C to this subpart.

(d) *Clothes dryers.* (1) The estimated annual operating cost for clothes dryers shall be—

(i) For an electric clothes dryer, the product of the following three factors: (A) The representative average-use cycle of 416 cycles per year, (B) the total per-cycle energy consumption in kilowatt-hours per-cycle, determined according to 4.1 of appendix D to this subpart, and (C) the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) For a gas clothes dryer, the product of the representative average-use cycle of 416 cycles per year times the sum of (A) the product of the gas dryer electric per-cycle energy consumption in kilowatt-hours per cycle, determined according to 4.2 of appendix D to

this subpart, times the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary plus (B) the product of the total gas dryer gas energy consumption per cycle, in Btu's per cycle, determined according to 4.5 of appendix D of this subpart, times the representative average unit cost in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy factor, expressed in pounds of clothes per kilowatt-hour, for clothes dryers shall be either the quotient of a 3-pound bone-dry test load for compact dryers, as defined by 2.6.1 of appendix D to this subpart or the quotient of a 7 pound bone-dry test load for standard dryers, as defined by 2.6.2 of appendix D to this subpart, as applicable, divided by the clothes dryer energy consumption per cycle, as determined according to 4.1 for electric clothes dryers and 4.6 for gas clothes dryers of appendix D to this subpart, the resulting quotient then being rounded off to the nearest hundredth (.01).

(3) Other useful measures of energy consumption for clothes dryers shall be those measures of energy consumption for clothes dryers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix D to this subpart.

(e) *Water Heaters.* (1) The estimated annual operating cost for water heaters shall be—

(i) For a gas or oil water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of gas or oil, as appropriate, in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(ii) For an electric water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, divided by 3412 Btu per kilowatt-hour, the resulting quotient then

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being rounded off to the nearest dollar per year.

(2) The energy factor for the water heaters shall be—

(i) For a gas or oil water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(ii) For an electric water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(3) Other useful measures of energy consumption for water heaters shall be those measures of energy consumption for water heaters which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix E of this subpart.

(4) The alternative uniform test method for measuring the energy consumption of untested water heaters shall be that set forth in section 7.0 of appendix E of this subpart.

(f) *Room air conditioners.* (1) The estimated annual operating cost for room air conditioners, expressed in dollars per year, shall be determined by multiplying the following three factors: (i) Electrical input power in kilowatts as determined in accordance with 4.2 of appendix F to this subpart, (ii) The representative average-use cycle of 750 hours of compressor operation per year, and (iii) A representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy efficiency ratio for room air conditioners, expressed in Btu's per watt-hour, shall be the quotient of: (i) The cooling capacity in Btu's per hour as determined in accordance with 4.1 of appendix F to this subpart divided by: (ii) The electrical input power in watts as determined in accordance with 4.2 of appendix F to this subpart the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

(3) The average annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be determined by multiplying together the following two factors: (i) Electrical input power in kilowatts as

determined in accordance with 4.2 of appendix F to this subpart, and (ii) A representative average use cycle of 750 hours of compressor operation per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(4) Other useful measures of energy consumption for room air conditioners shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix F to this subpart.

(g) *Unvented home heating equipment.*

(1) The estimated annual operating cost for primary electric heaters, shall be the product of: (i) The average annual electric energy consumption in kilowatt-hours per year, determined according to section 3.1 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated regional annual operating cost for primary electric heaters, shall be the product of: (i) The regional annual electric energy consumption in kilowatt-hours per year for primary heaters determined according to section 3.2 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated operating cost per million Btu output shall be—

(i) For primary and supplementary electric heaters and unvented gas and oil heaters without an auxiliary electric system, the product of: (A) One million; and (B) the representative unit cost in dollars per Btu for natural gas, propane, or oil, as provided pursuant to section 323(b)(2) of the Act as appropriate, or the quotient of the representative unit cost in dollars per kilowatt-hour, as provided pursuant to section 323(b)(2) of the Act, divided by 3,412 Btu per kilowatt hour, the resulting product then being rounded off to the nearest 0.01 dollar per million Btu output; and

(ii) For unvented gas and oil heaters with an auxiliary electric system, the product of: (A) The quotient of one million divided by the rated output in Btu's per hour as determined in 3.4 of appendix G of this subpart; and (B) the sum of: (1) The product of the maximum fuel input in Btu's per hour as determined in 2.2. of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (2) the product of the maximum auxiliary electric power in kilowatts as determined in 2.1 of appendix G of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) The rated output for unvented heaters is the rated output as determined according to either sections 3.3 or 3.4 of appendix G of this subpart, as appropriate, with the result being rounded to the nearest 100 Btu per hour.

(5) Other useful measures of energy consumption for unvented home heating equipment shall be those measures of energy consumption for unvented home heating equipment which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix G of this subpart.

(h) *Television sets.* (1) The estimated average annual operating cost for television sets shall be the product of:

(i) The average annual energy consumed by the television set in kilowatt-hours per year, determined according to 3.0 of appendix H of this subpart, and

(ii) The representative average unit cost of energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The receiver energy efficiency factor for television sets shall be:

(i) For color television sets, the product of the estimated minimum power requirement (.130 kilowatts) and the average annual hours of use (2,200 hr/yr.), divided by the average annual en-

ergy consumed by the television set in kilowatt-hours per year, determined according to 3.0 of appendix H to this subpart. The resultant is then multiplied by 100 and expressed as a percent.

(ii) For monochrome television sets, the product of the estimated minimum power requirement (.040 kilowatts) and the average annual hours of use (2,200 hr/yr.), divided by the average annual energy consumed by the television set in kilowatt-hours per year determined according to 3.0 of appendix H of this subpart. The result is then multiplied by 100 and expressed as a percent.

(3) Other useful measures of energy consumption for television sets shall be those measures of energy consumption for television sets which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix H of this subpart.

(i) *Kitchen ranges and ovens.* (1) The estimated annual operating cost for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be the sum of the following products: (i) The total annual electrical energy consumption for any electrical energy usage, in kilowatt-hours (kWh's) per year, times the representative average unit cost for electricity, in dollars per kWh, as provided pursuant to section 323(b)(2) of the Act; plus (ii) the total annual gas energy consumption for any natural gas usage, in British thermal units (Btu's) per year, times the representative average unit cost for natural gas, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act; plus (iii) the total annual gas energy consumption for any propane usage, in Btu's per year, times the representative average unit cost for propane, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act. The total annual energy consumption for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be as determined according to 4.3, 4.2.2, 4.1.2, and 4.4.3, respectively, of appendix I to this subpart. The estimated annual operating cost shall be rounded off to the nearest dollar per year, except for microwave

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ovens, for which the estimated annual operating cost shall be rounded off to the nearest one-quarter of a dollar per year.

(2) The cooking efficiency for conventional cooking tops, conventional ovens, and microwave ovens shall be the ratio of the cooking energy output for the test to the cooking energy input for the test, as determined according to 4.2.1, 4.1.3, and 4.4.4, respectively, of appendix I to this subpart. The final cooking efficiency values shall be rounded off to three significant digits.

(3) [Reserved]

(4) The energy factor for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be the ratio of the annual useful cooking energy output to the total annual energy input, as determined according to 4.3, 4.2.3, 4.1.4, 4.4.5, respectively, of Appendix I to this subpart. The final energy factor values shall be rounded off to three significant digits.

(5) There shall be two estimated annual operating costs, two cooking efficiencies, and two energy factors for convertible cooking appliances—(i) an estimated annual operating cost, a cooking efficiency and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with natural gas; and (ii) an estimated annual operating cost, a cooking efficiency and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with LP-gas.

(6) The estimated annual operating cost for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraph (i)(1) of this section using the total annual gas energy consumption for natural gas times the representative average unit cost for natural gas.

(7) The estimated annual operating cost for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraph (i)(1) of this section using

the representative average unit cost for propane times the total annual energy consumption of the test gas, either propane or natural gas.

(8) The cooking efficiency for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraph (i)(2) of this section when the appliance is tested with natural gas.

(9) The cooking efficiency for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraph (i)(2) of this section, when the appliance is tested with either natural gas or propane.

(10) The energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with natural gas.

(11) The energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with either natural gas or propane.

(12) Other useful measures of energy consumption for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens and microwave/conventional ranges shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix I to this subpart.

(j) *Clothes washers.* (1) The estimated annual operating cost for automatic and semi-automatic clothes washers shall be—

(i) When electrically heated water is used, the product of the following three factors:

(A) The representative average-use of 392 cycles per year,

(B) The total per-cycle energy consumption in kilowatt-hours per cycle determined according to 4.1.6 of appendix J before appendix J1 becomes mandatory and 4.1.7 of appendix J1 when

appendix J1 becomes mandatory, (see the note at the beginning of appendix J1), and

(C) The representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) When gas-heated or oil-heated water is used, the product of: the representative average-use of 392 cycles per year and the sum of both:

(A) The product of the per-cycle machine electrical energy consumption in kilowatt-hours per cycle, determined according to 4.1.5 of appendix J before the date that appendix J1 to the subpart becomes mandatory or 4.1.6 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory, and the representative average unit cost in dollars per kilowatt-hours as provided by the Secretary, and

(B) The product of the per-cycle water energy consumption for gas-heated or oil-heated water in BTU per cycle, determined according to 4.1.4 of appendix J before the date that appendix J1 becomes mandatory or 4.1.4 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory, and the representative average unit cost in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2)(i) The energy factor for automatic and semi-automatic clothes washers is determined in accordance with 4.5 of appendix J before the date that appendix J1 becomes mandatory or 4.5 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory. The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hours.

(ii) The modified energy factor for automatic and semi-automatic clothes washers is determined in accordance with 4.4 of appendix J before the date that appendix J1 becomes mandatory or 4.4 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory. The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hours.

(3) Other useful measures of energy consumption for automatic or semi-

automatic clothes washers shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix J before the date that appendix J1 becomes mandatory or appendix J1 upon the date that appendix J1 to this subpart becomes mandatory. In addition, the annual water consumption of a clothes washer can be determined by the product of:

(A) The representative average-use of 392 cycles per year, and

(B) The total weighted per-cycle water consumption in gallons per cycle determined according to 4.3.2 of appendix J before the date that appendix J1 becomes mandatory or 4.2.2 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory. The water consumption factor can be determined in accordance with 4.3.3 of appendix J before the date that appendix J1 becomes mandatory or 4.2.3 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory. The remaining moisture content can be determined in accordance with 3.3 of appendix J before the date that appendix J1 becomes mandatory or 3.8 of appendix J1 upon the date that appendix J1 to this subpart becomes mandatory.

(k)-(l) [Reserved]

(m) *Central Air Conditioners.* (1) The estimated annual operating cost for cooling-only units and air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (Test A) measured at the highest compressor speed, as described in section 3.1 of appendix M to this subpart, divided by the seasonal energy efficiency ratio, in Btu's per watt-hour, determined from section 5.1 of appendix M to this subpart; (B) the representative average use cycle for cooling of 1,000 hours per year; (C) a conversion factor of 0.001 kilowatt per watt; and (D) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant

to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year;

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the standardized design heating requirement, in Btu's per hour, nearest to the capacity measured in the high temperature test, determined in sections 5.2 and 6.2.6 of appendix M to this subpart, divided by the heating seasonal performance factor, in Btu's per watt-hour, calculated for heating region IV corresponding to the above mentioned standardized design heating requirement determined from section 5.2 of appendix M to this subpart; (B) the representative average use cycle for heating of 2,080 hours per year; (C) the adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system; (D) a conversion factor of 0.001 kilowatt per watt; and (E) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year; or

(iii) For air-source heat pumps which provide both heating and cooling, the estimated annual operating cost is the sum of the quantity determined in paragraph (m)(1)(i) of this section added to the quantity determined in paragraph (m)(1)(ii) of this section.

(2) The estimated regional annual operating cost for cooling-only units and for air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated regional annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (Test A) measured at the highest compressor speed, as described in section 3.1 of appendix M to this subpart, divided by the seasonal energy efficiency ratio, in Btu's per watt-hour, determined from

section 5.1 of appendix M to this subpart; (B) the estimated number of regional cooling load hours per year determined from section 6.1.3 of appendix M to this subpart; (C) a conversion factor of 0.001 kilowatts per watt; and (D) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year;

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated regional annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the standardized design heating requirement, in Btu's per hour, nearest to the capacity measured in the high temperature test (Test A), determined in sections 5.2 and 6.2.6 of appendix M to this subpart, divided by the heating seasonal performance factor, in Btu's per watt-hour, calculated for the appropriate region of interest and corresponding to the above mentioned standardized design heating requirement determined from section 5.2 of appendix M to this subpart; (B) the estimated number of regional heating load hours per year determined from section 6.2.5 of appendix M to this subpart; (C) the adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system; (D) a conversion factor of 0.001 kilowatts per watt; and (E) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year; or

(iii) For air-source heat pumps which provide both heating and cooling, the estimated regional annual operating cost is the sum of the quantity determined in paragraph (m)(3)(i) of this section added to the quantity determined in paragraph (m)(3)(ii) of this section.

(3) The measure(s) of efficiency for cooling-only units and air-source heat pumps shall be one or more of the following:

(i) The seasonal energy efficiency ratio for cooling-only units and air-source heat pumps which provide cooling shall be the seasonal energy efficiency ratio, in Btu's per watt-hour, determined according to section 5.1 of appendix M to this subpart, rounded off to the nearest 0.05.

(ii) The heating seasonal performance factors for air-source heat pumps shall be the heating seasonal performance factors, in Btu's per watt-hour, determined according to section 5.2 of appendix M to this subpart for each applicable standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(iii) The annual performance factors for air-source heat pumps which provide heating and cooling, shall be the annual performance factors, in Btu's per watt-hour, determined according to section 5.3 of appendix M to this subpart for each standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(4) Other useful measures of energy consumption for central air conditioners shall be those measures of energy consumption which the Secretary of Energy determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix M to this subpart.

(5) After September 12, 1988, 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 § 430.23(m)(4) as approved by the Assistant Secretary for Conservation and Renewable Energy in accordance with § 430.23(m)(5).

(n) *Furnaces.* (1) The estimated annual operating cost for furnaces is the sum of: (i) The product of the average annual fuel energy consumption, in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 10.2.2 or 10.3 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the average annual auxiliary

electric energy consumption in kilowatt-hours per year determined according to section 10.2.3 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year. (For furnaces which operate with variable inputs, an estimated annual operating cost is to be calculated for each degree of oversizing specified in section 10 of appendix N of this subpart.)

(2) The annual fuel utilization efficiency for furnaces, expressed in percent, is the ratio of annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the furnace determined according to section 10.1 of appendix N of this subpart for gas and oil furnaces and determined in accordance with section 11.1 of American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 103-1993 for electric furnaces.

(3) The estimated regional annual operating cost for furnaces is the sum of: (i) The product of the regional annual fuel energy consumption in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 10.5.1 or 10.5.3 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the regional annual auxiliary electrical energy consumption in kilowatt-hours per year, determined according to section 10.5.2 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(4) The energy factor for furnaces, expressed in percent, is the ratio of annual fuel output of useful energy delivered to the heated space to the total annual energy input to the furnace determined according to section 10.4 of appendix N of this subpart.

(5) Other useful measures of energy consumption for furnaces shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix N of this subpart.

(o) *Vented home heating equipment.*

(1) The annual fuel utilization efficiency for vented home heating equipment, expressed in percent, which is the ratio of the annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the vented heater, shall be determined either according to section 4.1.17 of appendix O of this subpart for vented heaters without either manual controls or thermal stack dampers; according to section 4.2.6 of appendix O of this subpart for vented heaters equipped with manual controls; or according to section 4.3.7 of appendix O of this subpart for vented heaters equipped with thermal stack dampers.

(2) The estimated annual operating cost for vented home heating equipment is the sum of: (i) The product of the average annual fuel energy consumption, in Btu's per year for natural gas, propane, or oil fueled vented home heating equipment, determined according to section 4.6.2 of appendix O of this subpart, and the representative average unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus (ii) The product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 4.6.3 of appendix O of this subpart, and the representative average unit cost in dollars per kilowatt-hours as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(3) The estimated operating cost per million Btu output for gas or oil vented home heating equipment with an auxiliary electric system shall be the product of: (A) The quotient of one million Btu divided by the sum of: (1) The product of the maximum fuel input in Btu's per hour as determined in 3.1.1 or 3.1.2 of appendix O of this subpart times the annual fuel utilization efficiency in

percent as determined in 4.1.17, 4.2.6, or 4.3.7 of this appendix as appropriate divided by 100, plus (2) the product of the maximum electric power in watts as determined in 3.1.3 of appendix O of this subpart times the quantity 3.412; and (B) of the sum of: (1) the product of the maximum fuel input in Btu's per hour as determined in 3.1.1 of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus (2) the product of the maximum auxiliary electric power in kilowatts as determined in 3.1.3 of appendix O of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) Other useful measures of energy consumption for vented home heating equipment shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix O of this subpart.

(p) *Pool heaters.* (1) The estimated annual operating cost for pool heaters is the sum of:

(i) The product of the average annual fuel energy consumption, in Btu's per year, of natural gas or oil fueled pool heaters, determined according to section 4.2 of appendix P of this subpart, and the representative average unit cost in dollars per Btu for natural gas or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus

(ii) The product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 4.3 of appendix P of this subpart, and the representative average unit cost in dollars per kilowatt-hours as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(2) The thermal efficiency of pool heaters, expressed as a percent, shall be determined in accordance with section 4 of appendix P to this subpart.

(q) *Fluorescent Lamp Ballasts.* (1) The Estimated Annual Energy Consumption (EAEC) for fluorescent lamp ballasts, expressed in kilowatt-hours per year, shall be the product of: (i) The input power in kilowatts as determined in accordance with section 3.3.1 of appendix Q to this subpart and (ii) the representative average use cycle of 1,000 hours per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(2) Ballast Efficacy Factor (BEF) shall be as determined in section 4.2 of appendix Q of this subpart.

(3) The Estimated Annual Operating Cost (EAOC) for fluorescent lamp ballasts, expressed in dollars per year, shall be the product of: (i) The representative average unit energy cost of electricity in dollars per kilowatt-hour as provided by the Secretary, (ii) the representative average use cycle of 1,000 hours per year, and (iii) the input power in kilowatts as determined in accordance with section 3.3.1 of appendix Q to this subpart, the resulting product then being rounded off to the nearest dollar per year.

(4) Other useful measures which may be applicable. [Reserved]

(r) *General Service Fluorescent Lamps and General Service Incandescent Lamps.*

(1) The estimated annual energy consumption for general service fluorescent lamps and incandescent reflector lamps, expressed in kilowatt-hours per year, shall be the product of the input power in kilowatts as determined in accordance with section 4 of Appendix R to this subpart and an average annual use specified by the manufacturer, with the resulting product rounded off to the nearest kilowatt-hour per year. Manufacturers must provide a clear and accurate description of the assumptions used for the estimated annual energy consumption.

(2) The lamp efficacy for general service fluorescent lamps shall be equal to the average lumen output divided by the average lamp wattage as determined in section 4 of Appendix R of this subpart, with the resulting quotient rounded off to the nearest lumen per watt.

(3) The lamp efficacy for incandescent reflector lamps shall be equal to the average lumen output divided by

the average lamp wattage as determined in section 4 of Appendix R of this subpart, with the resulting quotient rounded off to the nearest tenth of a lumen per watt.

(4) The color rendering index of a general service fluorescent lamp shall be tested and determined in accordance with section 4.5 of Appendix R of this subpart and rounded off to the nearest unit.

(s) *Faucets.* The maximum permissible water use allowed for lavatory faucets, lavatory replacement aerators, kitchen faucets, and kitchen replacement aerators, expressed in gallons and liters per minute (gpm and L/min), shall be measured in accordance to section 2(a) of Appendix S of this subpart. The maximum permissible water use allowed for metering faucets, expressed in gallons and liters per cycle (gal/cycle and L/cycle), shall be measured in accordance to section 2(a) of Appendix S of this subpart.

(t) *Showerheads.* The maximum permissible water use allowed for showerheads, expressed in gallons and liters per minute (gpm and L/min), shall be measured in accordance to section 2(b) of Appendix S of this subpart.

(u) *Water closets.* The maximum permissible water use allowed for water closets, expressed in gallons and liters per flush (gpf and Lpf), shall be measured in accordance to section 3(a) of Appendix T of this subpart.

(v) *Urinals.* The maximum permissible water use allowed for urinals, expressed in gallons and liters per flush (gpf and Lpf), shall be measured in accordance to section 3(b) of Appendix T of this subpart.

[42 FR 27898, June 1, 1977]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 430.23, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 430.24 Units to be tested.

When testing of a covered product is required to comply with section 323(c) of the Act, or to comply with rules prescribed under sections 324 or 325 of the Act, a sample shall be selected and tested comprised of units which are production units, or are representative of production units of the basic model