MKE's Notification 2011-263

Regulation on Energy Efficiency Labeling and Standards

23 Dec 2011

Ministry of Knowledge Economy

Korea Energy Management Corporation

MKE(Ministry of Knowledge Economy)'s Notification 2011-263

The revision notifies "Regulation on Energy Efficiency Labeling and Standards" (MKE's Notification 2011-263, 21 Nov. 2011) based on the Act Chapter 15 and others of Rational Energy Utilization Act of Korea.

23 Dec 2011
The minister of knowledge economy (hereinafter "MKE")

Regulation on Energy Efficiency Labeling and Standards

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Note :
MORE : Ministry of Resource and energy
MOTI : Ministry of Trade and Industry
MOCIE : Ministry of commerce, industry and energy

Chapter 1. The general

Article 1. (Purpose) The purpose of this regulation is to define the energy saving equipments and to regulate the monitoring program for the energy saving equipments by the rational energy utilization Act Chapter 15, 16, 24, 66, 68, and 69.

Article 2. (Scope) All related, target energy performance standard, target energy performance standard level, minimum energy performance standards and minimum energy performance level, energy efficiency, energy consumption, energy label, grade, test methods are defined in this regulation except the export products.

Article 3. (Definitions) For the purpose of this regulation the definitions apply ;

1. Appliances with energy efficiency label : Appliances which have the high market penetration and much energy consumption defined in Article 4 are adopted to save energy by the Minister of MKE
2. Energy Efficiency : Energy efficiency or Energy consumption which is measured as test procedures in this regulation by Independent testing laboratories or self-certify testing laboratories qualified
3. Minimum Energy Performance Standards (MEPS) : Minimum energy performance standard, maximum power consumption, maximum power, maximum standby power or maximum heat transfer coefficient which are established in this regulation to promote and expand the high energy efficiency appliances in the case that the low efficiency appliances can be limited to produce and sell.
4. Accomplishment ratio for MEPS : A ratio which measured energy efficiency as test procedure in this regulation divides by MEPS.
5. Energy Efficiency Level : The rating (1^{st} ~ 5^{th} level) is granted that energy efficiency is measured as test procedure in this regulation.
6. Model : Design or structure which many copies or reproduction are to be made by manufacturer or importer, and to report test results of each Model to KEMCO from manufacturer or importer. In case of window set and multi heat pump system, it may be reported by the model series.
7. Derivative Model : The model which has the same energy efficiency and the same energy efficiency level to the reported model but has different color, production date, and very slight change without performance difference. In

a case of 3 phase induction motor, it is accepted if the rated output is between the leveled value. But, in the case that electrical or mechanical redesign is adopted, manufacturers or importers shall report as a new model.

8. Independent testing laboratories : The Minister of MKE designates the testing laboratory as Independent testing laboratories.
9. Self-certify testing laboratories : The Minister of MKE designates the manufactures or importer who can be qualified with the requirements as self-certify testing laboratories.
10. High efficiency lamp : Fluorescent lamps, and Associated lamps obtain the 1st level of energy efficiency rating as according to this regulation. But Fluorescent lamps ballasts shall be met with TEPS(Target Energy Performance Standard).
11. Rated Thermal Efficiency for heating : Energy efficiency in household gas boiler is less than the heating thermal efficiency (hereinafter "Measured thermal efficiency for heating") measured by "The Liquefied petroleum Gas safety and business management law" Act Chapter 20, Article 4 or measured in the independent testing laboratory and shall be shown by manufacturers or importers.
12. Rated Thermal Efficiency for water heater : Energy efficiency in household gas water heater is less than the water heating thermal efficiency (hereinafter "Measured thermal efficiency for water heater") measured by "The Liquefied petroleum Gas safety and business management law" Act Chapter 20, Article 4 or measured in the independent testing laboratory and shall be shown by manufacturers or importers.
13. Standby power: Power consumption by machinery and tools, when connected to the external power supply, while not performing their primary functions or while awaiting instructions to provide full services.
14. High Efficient Transformer: Transformer which meets TEPS(Target Energy Performance Standard).
15. Premium(IE3) Three-phase Induction Motor : Three-phase induction motors, which the measured full-load efficiency through KS C IEC 60034-2-1 (KS C IEC 61972 included) measuring method, meet the premium efficiency standards set in [table 3].
16. Energy Frontier Standard: Standards of target consumption efficiency or target usage in ultra-efficient product standard, which the energy efficiency

is more than 30% higher than energy consumption efficiency level 1 standard. Adjust energy frontier standard upwards every three years.

Chapter 2. Scope, Items and Technical Standards

Article 4. (Scope, Items, and Standards) ① According to this Act Chapter 15, clause 1 and Chapter 7, clause 1, the scope, items, and technical standards are defined in followings (see Annex 1), and testing items, the number of testing samples, test standards, and the number of sample failed are defined in Annex 2.

1. Refrigerator
   - Household electric refrigerator and refrigerator-freezer of storage volume 1000L or less with the cooling system of less 500W electric power consumption by KS C IEC 62552
   - Monthly electric power consumption shall be measured by the test method of KS C IEC 62552, where is defined as followings ;
     - Monthly electric power consumption = Measured power consumption x 365/12

2. Freezer
   - Household electric freezer of storage volume 80L ~ 400L
   - Monthly electric power consumption shall be measured by the test method of KS C IEC 62552, where is defined as followings ;
     - Monthly electric power consumption = Measured power consumption x 365/12

3. Kimchi Refrigerator
   - Household electric refrigerating appliances of total storage volume 1000L or less, and *Kimchi* storage compartment is much than 50% of the whole storage volume with a function maturing which it will be able to take effect the foodstuffs of the *Kimchi* artificially, and with a compression type refrigerating machine and storage cabinet integrated in one body.
   - Monthly electric power consumption shall be measured by the test method of KS C 9321

4. Air-conditioner
   - Air-conditioners of rated cooling power consumption of not more than 7,500W and the rated cooling capacity of not more than 23,000W

- If it has heater, the rated power consumption of heater shall be not more than 5,000W.
- Exclude water cooling, duct-type, portable, multi-split type
- Cooling Energy Efficiency Ratio (hereinafter “EER) shall be measured by the test method of KS C 9306, which is obtained from the cooling capacity divided by the cooling power consumption.

5. Washing machine
   - By KS C 9608 washing machine in which the textiles are substantially immersed in the washing water, the mechanical action being produced by a device moving, which are defined the agitator washing machine, and impeller washing machine with the rated capacity of 2 kg ~ 20kg
   - But, washing only, spin extraction only and separated spin extraction are excluded.
   - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from energy consumption (Wh) divided by the rated capacity (kg) in a specified cycle.

6. Horizontal drum washing machine
   - Horizontal drum washing machine which is defined the household washing machine with the rated capacity of 2 kg ~ 20kg, and has the heater, spin extractor, and dryer.
   - But, non-detergent type is excluded, and the type with the heater is only available to boil or to dry is also excluded.
   - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from energy consumption (Wh) divided by the rated capacity (kg) in a specified cleaning cycle

7. Dishwasher
   - By Annex 1 a machine which washes rinses, and dries (when drying process is include) dishware, glassware, cutlery and, in some cases, cooking utensils by chemical, mechanical and/or electrical means with the rated capacity 20 person or less.
   - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from total energy efficiency ratio (EERt) multiplied

by electrical energy efficiency ratio (EERe) and water energy efficiency ratio (EERw).

8. Dish drier
   - A machine which only dries dishware, glassware, cutlery and, in some cases, cooking utensils by electrical means with the rated capacity 10 person or less after washing, and has the top or front door or sliding door.
   - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from energy consumption (Wh) for 20 minutes divided by TEPS(Target Energy Performance Standard).

9. Electrical Cooler and Heater for Drinking-Water Storage
   - By Annex 1 Electrical cooler and heater for drinking-water storage shall be designed the vapor-compressor cooler, heater, and water storage in a cabinet. (Water purifier is included) Rated cooling power consumption of not more than 500W and rated heating power consumptions of not more than 1000W.
   - Energy Efficiency shall be measured by the test method in Annex 1, which is defined as "comparative power consumption" obtained from P1(kWh), power consumption for 24 hours with no water discharge, divided by P3(kWh), power consumption for expected insulation performance.

10. Rice cooker
    - By Annex 1 household electric rice-cooker and rice-warmer with a rated capacity 20 person or less.
    - Power consumption per person shall be measured by the test method in Annex 1, which is obtained as
      - (Total power consumption (Wh) x 150) / the mass of rice (kg)

11. Vacuum cleaner
    - Vacuum cleaner of rated power consumption of 800W ~ 2,500W, and shall be moveable (dry only)

- Energy Efficiency (Suction power efficiency) shall be measured by the test method in KS C IEC 60312 which is obtained from maximum suction power rate divided by power consumption.

12. Electric Fan
    - By KS C 9301 household electric fan (desktop or stand) which has the diameter of wing of 20~41 cm and the axial single wing run by induction motor to be used in general (table, stand, etc) .
    - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from standard air flow divided by power consumption.

13. Air cleaner
    - By the scope of KS C 9314 the mechanical and combined air cleaner which has less 200W power consumption, and the single power 220V and 60Hz.
    - But, the type is used to collect dust, deodorize, and remove gas with water spray without filters and only industry use, and the internal type in building are excluded.
    - Energy Efficiency shall be measured by the test method in Annex 1, which is obtained from energy consumption (W) divided by the standard area (m^2).

14. Incandescent lamp
    - By KS C 7501 the white tungsten bulb at 220V of rated power consumption of 25~150W, which includes the colorless transparent bulb, the inner frosting bulb, the bulb coated with white, and the bulb coated with thin film.
    - Energy Efficiency (lm/W) shall be measured by the test method in KS C 7501, which is obtained from lumen divided by power consumption.

15. Fluorescent lamp
    - By KS C 7601 Fluorescent lamps which are the tubular type of rated power consumption of 20W, 28W, 32W, and 40W, the circular type of rated power consumption of 32W, and 40W, and the compact type of

rated power consumption of FPX 13W, FDX 26W, FPL 27W, FPL 32W, FPL 36W, FPL 45W, and FPL 55W

- By K 61195, K 61199 Fluorescent lamps which are the tubular type of rated power consumption of 20W, 32W, and 40W, the compact type of rated power consumption of FPL 36W, and the commercial used type (which is more than 7100K of color temperature, and can be used in the conventional lamp)
- Energy Efficiency (lm/W) shall be measured by the test method in KS C 7601, which is obtained from lumen divided by power consumption. But, FPL 32W, FPL 45W and FPL 55W shall be measured by the test method in "Safety Certification".

16. Fluorescent lamps ballast

- By KS C 8100 and KS C 8102 Fluorescent lamps ballasts which are the tubular type of rated power consumption of 20W, 28W, 32W, and 40W, the circular type of rated power consumption of 32W, and 40W, and the compact type of rated power consumption of FPX 13W, FDX 26W, FPL 27W, FPL32W, FPL 36W, FPL 45W, and FPL 55W, and fluorescent lamps ballasts for the use of sign which are the tubular type of rated power consumption of 20W, 32W, and 40W, and the compact type of rated power consumption of FPL 36W.
- Energy Efficiency (lm/W) shall be first measured with reference ballast, and then measured with test sample ballast regulated by KS C 7601 by the test method in KS C 8102. Two results shall be compared. But, FPL 32W, FPL 45W and FPL 55W shall be measured by the test method in "Safety Certification".

17. Associated ballast

- By KS C 7621 Associated ballasts which all components are in one, and any parts are not allowed to change, and the rated power consumption of 5 W~60W. But globe type is excluded.
- Energy Efficiency (lm/W) shall be measured by the test method in KS C 7621, which is obtained from lumen divided by power consumption.

18. 3 Phase Induction motor

- By Annex 1 3 Phase Induction motor shall be the rated output of 0.75kW ~ 200kW.
- Test method is defined in KS C IEC 60034-2-1, “Method for determining losses and efficiency 3 phase cage induction motor” as full load efficiency (%).

19. Household Gas Boiler
    - Gas hot water boilers under the displayed gas consumption of 69.5kW by KS B 8109 and KS B 8127, gas calories based on the total caloric value by KS B 8101.
    - Measuring method: Measured heat efficiency (%) according to the test method by KS B 8109 and KS B 8127.

20. Adapter·Charger
    - An adapter under 150W(nameplate output power) and a charger of input 20 W with Li-Ion Battery as a single voltage external power supply
    - Test method shall be measured by Annex 1 as running efficiency

21. Electric driven heat pump
    - Electric driven heat pump of rated cooling power consumption of not more than 7,500W and the rated cooling capacity of not more than 23,000W
    - If it has heater, the rated power consumption of heater shall be not more than 30,000W.
    - Exclude water cooling, duct-type, portable, multi-split type
    - Averaged Energy Efficiency Ratio (hereinafter “EER”) shall be measured by the test method of KS C 9306, which is obtained from CSPF(Cooling Seasonal Performance Factor) and HSPF(Heating Seasonal Performance Factor).

22. Commercial Refrigerator

    - Commercial electric refrigerator-freezer of storage volume 300L ~ 2000L with the cooling system of less 1000W electric power consumption by KS C IEC 62552. Exclude the freezer only, the showcase, the table type, and the specified type.

- Monthly electric power consumption shall be measured by the test method of KS C ISO 15502, where is defined as followings ;
  - Monthly electric power consumption = Measured power consumption x 365/12
  - No using wall partition

23. Gas water heater

- By KS B 8116 Gas water heater of rated gas consumption of 70.0 kW or less, and the total heat capacity is defined by KS B 8101
- Energy Efficiency (%) shall be measured by the test method in KS B 8116, which is heating thermal efficiency for water heater.

24. Transformer

- Transformer defined in KS C 4306, KS C 4311, KS C 4316, KS C 4317 and Annex 3
- Energy Efficiency (%) shall be measured by KS C 4306, KS C 4311, KS C 4316 and KS C 4317, which is efficiency (%) at a 50% load factor of fiducially reduced temperature.

25. Window set

- Window set defined in KS F 3117, which is used where contact with the outside of buildings and is sold as a combination of frame and glass with 1 ㎡ or more window area.
- Energy Efficiency (%) shall be measured by KS F 2278, which is heat transfer coefficient [W/(㎡.K], and measured by KS F 2292, which is air permeability.

26. Television set

- With a built-in digital tuner and more than 50cm and less than 180cm lengths of screen diagonal products sold only shall be applied.
- Energy Efficiency (%) shall be measured by KS C IEC 62087, which is "power consumption per $\sqrt{m^2}$ [W/ $\sqrt{m^2}$]" obtained from power consumption in operation mode [W] divided by square root of screen area [$\sqrt{m^2}$].

27. Electric Fan Heater

- By the Annex 2, Safety Certification Target electrical products from "Safety administration law for electrical appliance", it is limited to electric fan heater with the rated power consumption of 500W, less than 10kW.
- Measuring Method: Thermal efficiency and power consumption shall be measured by the test method in Annex 1.

28. Electric Stove

- By the Annex 2, Safety Certification Target electrical products from "Safety administration law for electrical appliance" Enforcement Rules, it is limited to electric stove with the rated power consumption of 500W, less than 10kW.
- Measuring Method: Standby power and power consumption should be measured by the test method in Annex 1.

29. Multi Heat Pump System (VRF)

- Electrical driven multi heatpump which has one indoor unit standard rated cooling capacity over 1kW less than 30kW, and outdoor unit standard rated cooling capacity in accordance with Annex 1 is over 20kW less than 70kW.
- The indoor unit that comes with a heating device, rated power consumption of heating device is limited to one indoor unit standard less than 30kW.
- Measuring Method: Cooling and heating efficiency, integrated cooling efficiency, heating efficiency, standard heating efficiency, and heating efficiency at cold climate zone shall be measured according to Annex 1.

30. Dehumidifier

- As a single-phase AC, and rated voltage of 220V, it's aim is to decrease the humidity of indoors, equipped with compression refrigerating system, blower fan, etc in a single cabinet, it's electric power consumption is shall be less than 1,000W.

- Measuring Method: Dehumidification efficiency ((rated dehumidification capacity(L)) ÷ (measured power consumption (W) ÷1000 x 24(h)) measured according to the measuring method followed by KS C 9317.

31. Electric pad
    - It shall be covered by Appendix 2 in Electric Appliances Safely Control Act
    - Size of over 3.3 ㎡, and rated power consumption of 230W≤ x≤ 1000W.
    - Measure standby power and power consumption according to Annex 1.

32. Electrically heated water mat
    - It shall be covered by Appendix 2 in Electric Appliances Safely Control Act
    - Size of over 3.3 ㎡, and rated power consumption of 230W≤x≤1000W.
    - Measure standby power and power consumption according to Annex 1.

33. Electrical heating board
    - It shall be covered by Appendix 2 in Electric Appliances Safely Control Act
    - Rated power consumption of 50W≤x≤2000W.
    - Measure standby power and power consumption according to Annex 1.

34. Electric bed
    - It shall be covered by Appendix 2 in Electric Appliances Safely Control Act
    - Rated power consumption of 230W≤x≤2000W.
    - Measure standby power and power consumption according to Annex 1. But excluding medical, household, and others with specific purposes.

35. Electric radiator

- It shall be covered by Appendix 2 in Electric Appliances Safely Control Act
- Rated power consumption of 500W≤x≤10000W.

- Dedicated equipment for the use of medical and households shall be excluded.
- Measure standby power and power consumption according to Annex 1.

② Standby power shall be measured by KS C IEC 62301.

Article 5. (Appliances with energy efficiency label) ① All appliances defined in this regulation shall be covered with MEPS and Energy Efficiency Rating standards. But, Fluorescent lamps ballast, 3 Phase Induction motor, Adapter·Charger, Transformer, Electric Fan Heater, Electric Stoves, electric pad, electrically heated water mat, electrical heating board, electric bed, and electric radiators are only covered with MEPS.

② MEPS and Energy Efficiency Rating standards are in Annex 3.

Chapter 3. Independent testing laboratories or Self-certify testing laboratories

Article 6. (Designate independent testing laboratories and Items) ①Efficiency Management Laboratory, as a recognized testing and conditioning agency in accordance with “National Standards Basic Law” Article 23 on the regulation or the measures applied from the regulation (including international measures), should be any of the following institutions.

1. Testing and Research Institution founded by the nation.
2. “Law for the Promotion of a research institution” a research institution under Article 2.
3. Institution recognized by Minister of Knowledge Economy for having equal or greater ability to test with research institution of No.1 and No.2.

② The one who wish to be designated as Efficiency Management Laboratory, are to be prepared with testing equipment and professional staff, and submit Efficiency Management Laboratory specified application in an enclosure No.8 format.

③ If there are specified application in accordance with Article 2, MKE(Ministry of Knowledge Economy) have the ability to get Authority Chairman to check on the information about the test ability secure.

④On the Efficiency Management Laboratory designated application, when it is appropriate after checking data from Section 1 to Section 3, MKE is to designate it as Efficient Management Laboratory. In this case, MKE is to notify designated data to designated applicant and the Authority Chairman.

⑤Independent Testing Laboratories and Items by Article 4 are designated in Annex 4.

⑥By paragraph ① KEMCO shall make and manage the listed testing laboratories, and publish the listed testing laboratories in KEMCO web site.

Article 7. (Designate the self-certify testing laboratories) ① A partner who wants to be designated as the self-certify testing laboratories can apply for the

Minister of MKE with Annex Form 1 if they can be qualified to test for any items by Annex 5.

② By paragraph ① the importer can apply the self-certify testing laboratories with Annex form 1 if they can be qualified with all requirements listed in Annex 5

③ Nevertheless paragraph ① and ②, the refrigerator importer can apply with the test result from the self-certify testing laboratories in local if they can be qualified with the following requirements

1. The self-certify testing laboratories shall be recognized by ILAC's MRA, and test with this regulations
2. The self-certify testing laboratories shall make a contract with the importer to provide the test results.

④ If there are cases of paragraph ② and ③, according to ① of Article 66, and ② of Article 33 the applicants shall pay all expense to confirm the contact between the manufacture and the self-certify testing laboratories.

⑤ Minister of MKE shall approve the self-certify testing laboratories within 30 days when they are qualified with requirements.

Article 8. (Cancel the self-certify testing laboratories) ① The minister of MKE can cancel the a self-certify testing laboratory to designate or suspend a business within 6 months with following reasons. But, 1 or 2 reason shall be canceled to designate.

1. Who is designated in improper way
2. Who is on business during suspending business
3. Who is delaying or rejecting a test without a proper reason.
4. Who is violated to a test method of Article 4.
5. Who is not qualified with the requirements of testing laboratory

② The minister of MKE shall cancel the a self-certify testing laboratory to designate with following 1 or 2 reason, and cancel a designation or suspend a business within 6 months with following 3 or 4 reason.

1. Who is designated in improper way
2. Who is on business during suspending business
3. Who is violated to a test method of Article 4.
4. Who is not qualified with required test facilities and man power in Annex 5

③ The minister of MKE can monitor the independent testing laboratory and the self-certify testing laboratory through the president of KEMCO and the government officials. When they request to monitor, the independent testing laboratory and the self-certify testing laboratory shall support them.

④ Paragraph ① and ② shall be taken measures by appliances with energy efficiency label.

⑤ The president of KEMCO can ask the minister of MKE to take measures of paragraph ① and ② against the independent testing laboratory and the self-certify testing laboratory

Chapter 4. Issue a test report from independent testing laboratories or Self-certify testing laboratories

Article 9. (Issue a test report) ① Independent testing laboratories and self-certify testing laboratories can issue a test report.

② Independent testing laboratory shall not reject to test for appliances with energy efficiency label from applicant, and shall test prior a sample applied by the president of KEMCO. But, the case that Independent testing laboratory may not test in proper reason and reports it to the Minister of MKE is acceptable.

③ The test report of household gas boiler or gas water heater shall follow Article 4 of Act Chapter 21, “The Liquefied petroleum Gas safety and business management law” or shall be issued by the independent testing laboratory.

④ Efficiency Management Laboratory may issue test report after international travel test on the imported appliances with energy efficiency label from abroad.

Article 10. (A test report) ① A test report for each items shall show following results and the mark when it is issued.

1. Refrigerator
   Monthly power consumption, Storage Volume of fresh compartment, Storage Volume of freezer compartment, Adjusted volume, Auto defrost function, dispenser, the length of the actual sealing perimeter of the homebar door of fresh compartment, the length of the actual sealing perimeter of the homebar door of freezer compartment, any records for KS C ISO 15502 requirements, MEPS, Power consumption per 1 hour, CO2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level
2. Freezer
   Monthly power consumption, Storage Volume of freezer compartment, Adjusted Volume, MEPS, Power consumption per 1 hour, CO2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

3. Kimchi Refrigerator

   Monthly power consumption, Storage Volume of Kim-chi preserving compartment, Storage Volume of freezer compartment, Storage Volume of other compartments, Storage volume of Kim-chi preserving container, Adjusted volume, the length of the actual sealing perimeter of the homebar door of Kim-chi preserving compartment, MEPS, the number of Kim-chi preserving compartment, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

4. Air-conditioner (Cooling Only)

   Cooling seasonal performance factor, Monthly electric power consumption for Cooling period, Rated Cooling Capacity, Cooling standard capacity, Cooling standard electric power consumption, Standby power, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Monthly energy cost, Energy Efficiency Level

5. Washing machine

   Power Consumption per 1 kg, Water extraction ratio, Rinsing Index, Rated Washing Capacity, Power Consumption during a complete cycle, Washing hour per a complete cycle, Water consumption during a complete cycle, Water consumption per 1 kg during a complete cycle, Standby power, CO_2 emission per a cycle, Annual power consumption, Annual energy cost, Energy Efficiency Level

6. Horizontal drum washing machine

   Power Consumption per 1 kg, Washing efficiency index, Water extraction ratio, Rated Washing Capacity, Power Consumption during a complete cycle, Washing hour per a complete cycle, Water Consumption during a complete cycle, Water consumption per 1 kg during a complete cycle, Standby power, CO_2 emission per a cycle, Annual power consumption, Annual energy cost, Energy Efficiency Level

7. Dishwasher

   Washing performance, Monthly electric power consumption, Power Consumption during a complete cycle, Washing hour per a complete cycle, Monthly Water Consumption, Water Consumption during a complete cycle, Rated Washing Capacity, Standby power, CO_2 emission per a cycle, Annual power consumption, Annual energy cost, Energy Efficiency Level

8. Dish drier

   Power consumption for 20 minutes drying process, Rated Capacity, Drying performance, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

9. Electrical Cooler and Heater for Drinking-Water Storage

   Comparative power consumption, Capacity, Power consumption per 1 L, Daily power consumption, Monthly power consumption, Surface of cool water storage (m^3), Surface of hot water storage(m^3), Capacity of cool-water storage tank, Capacity of hot-water storage tank, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

10. Rice cooker

    Power consumption per a person, Rated Power Input, Type, Total power consumption (Warming and Cooking) per 1 cycle, Warming and Cooking time per 1 cycle, Maximum cooking capacity, Standby power, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency level

11. Vacuum cleaner

    Suction Power Efficiency, Measured Power Input, Maximum Suction Power, dust emission, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

12. Electric Fan

    Energy Efficiency Ratio, Power consumption, Standard Air flowrate, Maximum air velocity, Standby power, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

13. Air cleaner

    Power consumption per $1m^2$, Measured power consumption, Standard room size, Deordorization efficiency, Standby power, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

14. Incandescent lamps

Energy Efficiency Ratio, Luminous flux, Rated power consumption, lifetime, Power consumption per 1 hour, CO_2 emission per 1 hour, Energy Efficiency Level

15. Fluorescent lamps

    Energy Efficiency Ratio, Luminous flux, Rated power consumption, color of luminous source, Power consumption per 1 hour, CO_2 emission per 1 hour, Energy Efficiency Level

16. Fluorescent lamps ballasts

    Compared Energy Efficiency Ratio, Efficiency level (general/high efficiency), Luminous flux, Power input(In a case of high frequency lamps ballast, it shall be power output), Efficiency of luminous flux for reference ballast, Efficiency of luminous flux for tested ballast

17. Associated ballasts

    Efficiency of luminous flux, Power input, color of luminous source, Luminous flux, the endurance of on-off cycle, Power consumption per 1 hour, CO_2 emission per 1 hour, Energy Efficiency Level

18. 3 phase induction motor

    Full load efficiency, Efficiency level (IE2/IE3), Type, Rated output power, Number of Pole, Rated voltage, Rated ampere, Minimum efficiency in samples, Number of tested samples, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost

19. Household Gas Boiler

    Measured thermal efficiency, Type, Gas consumption, Heating capacity, Standby power, Energy Efficiency Level

20. Adapter·Charger

    Running efficiency, Classification, the rated ouput, Measured input, Standby power

21. Electric driven heatpump

    Energy Efficiency Ratio, Cooling seasonal performance factor, Heating seasonal performance factor, Rated Cooling Capacity, Cooling Standard Capacity, Heating Standard Capacity, Cooling standard electric power consumption, Heating standard electric power consumption, Cooling season energy consumption, Heating season energy consumption, make-up heater, Power consumption per 1 hour, CO_2 emission per 1 hour, Annual power consumption, Annual energy cost, and Energy Efficiency Level

22. Commercial refrigerator

Monthly power consumption, Storage Volume of fresh compartment, Storage Volume of freezer compartment, Auto defrost function, Adjusted volume, any records for KS C ISO 15502 requirements, MEPS, Power consumption per 1 hour, CO2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

23. Gas water heater

    Measured thermal efficiency for water heater, Gas consumption, Standby power, Energy Efficiency Level

24. Transformer

    Efficiency (at a 50% load factor), Efficiency level (general/ high efficiency), Load loss, No-load loss, Wire wound resistance, Type, Insulation material, Primary and secondary voltage, Number of phase, Capacity

25. Window set

    Heat transfer coefficient, Air permeability(Amount of air flow, level), Frame material, Glass, Energy Efficiency Level

26. Television set

    Power consumption per 1 $\sqrt{m^2}$, Display method, length of screen diagonal, Screen aspect ratio (length and width), Screen area, Square root of screen area, Power consumption in operation mode, Standby power, Power consumption per 1 hour, CO2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy Efficiency Level

27. Electric Fan Heater

    Heating efficiency, Heating capacity, Power consumption, Power consumption per 1 hour, CO2 emission per 1 hour, Monthly power consumption, Monthly energy cost(for family use/general use)

28. Electric Stove

    Standby power, Power consumption, Power consumption per 1 hour, CO2 emission per 1 hour, Monthly power consumption, Monthly energy cost(for family use/general use)

29. Multi Heat Pump System

    Cooling/heating efficiency, Integrated cooling efficiency, Heating efficiency, Standard heating efficiency, Cold climate area heating efficiency, Rated cooling capacity, Rated heating capacity, Part load cooling capacity, Part load cooling capacity power consumption, Standard heating capacity, Standard heating power consumption, Cold climate area heating capacity, Cold climate area heating power consumption, make-up heater capacity, Cooling capacity (indoor unit), Cooling power consumption (indoor unit), Rated voltage, Power consumption per 1 hour, CO2 emission per 1 hour, Energy efficiency level.

30. Dehumidifier

    Dehumidification efficiency, Measured power consumption, Rated dehumidification capacity, Standby power, Power consumption per 1 hour, CO2 emission per 1 hour, Annual power consumption, Annual energy cost, Energy efficiency level.

31. Electric pad

    Standby power, power consumption, power consumption per 1hour, CO2 emission per 1hour, monthly power consumption, monthly energy cost.

32. Electrically heated water mat

    Standby power, power consumption, power consumption per 1hour, CO2 emission per 1hour, monthly power consumption, and monthly energy cost.

33. Electrical heating board

    Standby power, power consumption per 10㎡, power consumption per 1hour per 10 ㎡, CO2 emission per 1hour per 10 ㎡, monthly power consumption per 10㎡, and monthly energy cost per 10㎡.

34. Electric bed

    Standby power, power consumption, power consumption per 1hour, CO2 emission per 1hour, monthly power consumption, and monthly energy cost

35. Electric radiator

    Standby power, power consumption, power consumption per 1hour, CO2 emission per 1hour, monthly power consumption, and monthly energy cost(household/normal)

② By paragraph ① A test report shall be reported to the president of KEMCO with a comment when any test result is not satisfied with MEPS(5 samples for 3 phase induction motors), “it is not allowed to produce or sell a model which are not satisfied with MEPS by Article 2, Act Chapter 16 and when it violates, it can be fined for 20,000,000 KRW or less”.

③ By paragraph ① the test report shall show “non-passed” when test results are not satisfied with standards in Annex 2.

④ When a test report is issued by ② and ③, a test report shall show “Pass or non-passed for MEPS” in remarks.

⑤ When a test report is issued by ①, a test report shall show “it is required to report to KEMCO within 60 days after issued date of the test report” in remarks.

⑥ When a test report of a testing sample which the president of KEMCO asks to measure is issued, the test report shall be reported with testing items for monitoring program, energy efficiency label or marks and pictures in Annex 8 besides the requirements from ① to ⑥.

Article 11. (Test items) Deleted

Article 12. (Record) ① By Article 6 and Article 7 the testing laboratories shall record Model name, EK certificate number or KS certificate number, and etc in plate of test model, and all test results in Annex 2 in a test report.

② A test report shall show the mean value of all test results for MEPS, energy efficiency level or energy efficiency. Except of “Number of non-passed samples” in Annex 2, all samples shall be passed.

③ The end of round off the place of decimal of value for measured data, energy efficiency, and energy efficiency level in a test report is in Annex 6.

Article 13. (Report) ① Manufacture or importer shall report a test report (Internet available) in Article 9 and 10 to the president of KEMCO within 60 days after shipped date of products in case of derivative model when a test report is issued. In this case, the president of KEMCO can release the test report on the internet.

② By paragraph ① a test report shall be a original or a copy to be approved, and a figure of tested sample shall be attached. In case of a report by internet, a original or a copy to be approved can be used by scanning.

③ When the same model is reported repeatedly, the last reported model is validate. If energy efficiency improves, it shall show the proper reason in detail.

Article 14. (Maintain a test report and submit) Independent test laboratory and self-certify testing laboratory shall maintain a listed test report with Annex Form 2, and shall report a listed test report and test reports to the president of KEMCO 25th of every month.

Chapter 5. Energy Efficiency Mark for Manufacturer (Importer) and etc.

Article 15. (liability to represent and verification of declaration for energy efficiency and energy efficiency level) ① Manufacturer and importer shall mark energy efficiency measured in self-certify testing laboratory or independent attesting laboratories by each model. The energy efficiency and energy efficiency level can be marked lower than the measured, and the rated thermal efficiency (MEPS) of household gas boiler shall be marked.

② By paragraph ① a manufacturer of window sets is a person who has responsibility for and obligation to quality control by model management for window sets by KS F 3117, and model management is to directly manufacture products or to lay guidelines on manufacture and quality control with the purpose of distribution of products of the same performance in multiple location.

③ Manufacturer and importer shall report the changed model, and derivative model to the president of KEMCO with Annex Form 4(available www.kemco.or.kr), and they can mark energy efficiency and energy efficiency level

④ According to ② Manufacturer and importer shall report the model canceled to import or stopped producing with Annex 7 to the president of KEMCO.

Article 16. (Mark) ① By Article 15 manufacturers and importer shall represent energy efficiency, Accomplishment ratio for MEPS, energy efficiency level with Annex 7 on product by paragraph ② and ③.

② By paragraph ① label shall include the followings

1. Refrigerator
   Monthly power consumption, Volume, CO2 emission per 1 hour, Annual energy cost, Energy Efficiency Level
2. Freezer

Monthly power consumption, Storage Volume of freezer compartment, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

3. Kimchi Refrigerator

   Monthly power consumption, Volume, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

4. Air-conditioner

   Energy Efficiency Ratio, Cooling Capacity, CO_2 emission per 1 hour, Monthly energy cost, Energy Efficiency Level

5. Washing machine

   Power Consumption per 1 kg, Duration per a cycle, CO_2 emission per a cycle, Annual energy cost, Energy Efficiency Level

6. Horizontal drum washing machine

   Power Consumption per 1 kg, Duration per a cycle, CO_2 emission per a cycle, Annual energy cost, Energy Efficiency Level

7. Dishwasher

   Washing performance, Power consumption per a cycle, CO_2 emission per a cycle, Annual energy cost, Energy Efficiency Level

8. Dish drier

   Power consumption for 20 minutes drying process, Drying performance, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

9. Electrical Cooler and Heater for Drinking-Water Storage

   Comparative power consumption, Capacity, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

10. Rice cooker

    Power consumption per a person, Total power consumption (Warming and Cooking) per 1 cycle, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency level

11. Vacuum cleaner

    Suction Power Efficiency, Dust emission, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

12. Electric Fan

    Energy Efficiency Ratio, Standard Air flowrate, CO_2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

13. Air cleaner

    Power consumption per $1m^2$, Standard room size, Annual energy cost, CO_2 emission per 1 hour, Energy Efficiency Level

14. Incandescent lamps

    Energy Efficiency Ratio, Rated power consumption, CO2 emission per 1 hour, Energy Efficiency Level

15. Fluorescent lamps

    Energy Efficiency Ratio, Rated power consumption, CO2 emission per 1 hour, Energy Efficiency Level

16. Fluorescent lamps ballasts

    Compared Energy Efficiency Ratio, MEPS

17. Associated ballasts

    Efficiency of luminous flux, Power input, CO2 emission per 1 hour, Energy Efficiency Level

18. 3 phase induction motor

    Full load efficiency, Type, Rated output power, Number of Pole, CO2 emission per 1 hour, Annual energy cost

19. Household Gas Boiler

    Measured thermal efficiency, Heating capacity, Energy Efficiency Level

20. Adapter·Charger

    MEPS

21. Electric driven heatpump

    Energy Efficiency Ratio, the rated cooling capacity/rated heating capacity, CO2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

22. Commercial refrigerator

    Monthly power consumption, Volume, CO2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

23. Gas water heater

    Measured thermal efficiency for water heater, Gas consumption, Energy Efficiency Level

24. Transformer

    Efficiency (at a 50% load factor), Primary and secondary voltage, Number of phase, Capacity

25. Window set

    Heat transfer coefficient, Air permeability (Amount of air flow, level), Frame material, Glass, Energy Efficiency Level

26. Television set

Power consumption per 1 $\sqrt{m^2}$, Power consumption in operation mode, CO2 emission per 1 hour, Annual energy cost, Energy Efficiency Level

27. Electric Fan Heater

    Power consumption, CO2 emission per 1 hour, Monthly energy cost.

28. Electric Stove

    Power consumption, CO2 emission per 1 hour, Monthly energy cost.

29. Multi Heat Pump System

    Cooling/heating efficiency, Rated cooling capacity/rated heating capacity, Cold climate area heating capacity (-15 ℃), CO2 emission per 1 hour, Energy Efficiency Level.

30. Dehumidifier

    Dehumidification efficiency, Rated dehumidification capacity, CO2 emission per 1 hour, and Annual energy cost.

31. Electric pad

    Power consumption, CO2 emission per 1hour, monthly energy cost

32. Electrically heated water mat

    Power consumption, CO2 emission per 1hour, monthly energy cost

33. Electrical heating board

    Power consumption per 10 ㎡, CO2 emission per 1hour per 10 ㎡, monthly energy cost per 10 ㎡

34. Electric bed

    Power consumption, CO2 emission per 1hour, monthly energy cost

35. Electric radiator

    Power consumption, CO2 emission per 1hour, monthly energy cost

③ By paragraph ① label shall be properly adhered to stated spot.

1. Refrigerators

   the front

2. Freezers

   the front

3. Kimchi refrigerators

the front

4. Air-conditioner

   the front or the side (only in case that it not possible to adhere the label on the front)

5. Washing machine

   the front or the top

6. Horizontal drum washing machine

   the front or the top

7. Dish washers

   the front

8. Dish drier

   the front or the side

9. Electrical Cooler and Heater for Drinking-Water Storage

   the front or the side(Only in case of small products under 60 cm high which is difficult to adhere the label on the front.

10. Rice cookers

    the front or the top

11. Vacuum cleaners

    the front or the top

12. Electric fans

    The stand or the supporter

13. Air cleaner

    the front

14. Incandescent lamps

    The cover

15. Fluorescent lamps

    The single cover or group cover

16. Fluorescent lamps ballasts

    the top or the side (only in case that it not possible to adhere the label on the top)

17. Associated ballasts

    The single cover or group cover

18. 3 phase induction motor

    the front

19. Household gas boilers

    the front

20. Adapter-Charger
 the front or the top
21. Electric driven heatpump
 the front
22. Commercial refrigerator
 the front
23. Gas water heater
 the front
24. Transformer
 The front
25. Window set
 The front
26. Television set
 The front
27. Electric fan heater
 The front
28. Electric Stove
 The Front
29. Multi heat pump system
 The front of outside unit
30. Dehumidifier
 The front
31. Electric pad
 The top
32. Electrically heated water mat
 The top
33. Electrical heating board
 The top
34. Electric bed
 The top
35. Electric radiator
 The front

④ By paragraph ① the time to represent is that the date of production is for manufacture, and the date of customs clearance is for importer, only just in case that the product needs assemble after customer’s place, it can be adhered after final assembling. Also, energy efficiency is that the date of production is for manufacture, and the date of customs clearance is for importer.

⑤Advertisement shall include energy efficiency or energy efficiency level when manufacturer, importer and seller advertise their product through the medium mentioned as follows

1. Daily newspaper, special version of daily newspaper, and the magazine issued a month according to Article 12 “Law of the registration of periodical publications”
2. Brochure or catalogue

Article 17. (Report) Manufacturers or importer shall report yearly to the president of KEMCO regarding previous year's the sales record of import & producing with Annex Form 3 by the end of January.

Chapter 6. Monitoring Program

Article 18. (Monitoring Program, etc) ① The president of KEMCO is able to conduct factory (warehouse) inspection, and product-testing for manufacturers, importer and sellers as monitoring program. In case of factory (warehouse) inspection is only allowed when a sample is difficult to get in the market.

② According to paragraph ① the monitoring program is indicated with each case as follows

1. To check the conducting of liability to representation according to Article 15
2. To check the identifying energy efficiency or energy efficiency level with the result of monitoring program
3. To check including energy efficiency or energy efficiency level on advertising according to paragraph ④, Article 16
4. To check producing, import and sale of product that does not meet MEPS
5. in cases that MKE requests

③ By paragraph ① the product testing implies to identify energy efficiency and energy efficiency level on the label with measured result of random sample in independent testing laboratory for monitoring program.

④ By paragraph ③ the product testing shall be followed by testing items and tolerance in Annex 8. If only at least one item is not appropriate, action is necessary according to Article 19.

⑤ It is possible to adopt the test results from other regulation, for instance “Safety Certification” or others. Only the testing is accepted that testing laboratory, testing items and the number of sample are followed by this regulation.

⑥ The president of KEMCO can test with ①, Article 18 when he is requested to check test with ④, Article 18.2

Article 18.2 (Stakeholders participate in Monitoring Program) ① Manufactures, importers, dealers, and any persons involved in EELSP (hereinafter “Stakeholders”) can request for check test with his own expenses.

② The test shall be done with Annex 8, if the test result is met with any requirements of ①, Article 19, the stakeholders can require the follow-up conducting to the president of KEMCO with submission of test report within 60 days from the independent test lab issues the test report.

③ By paragraph ② the president of KEMCO shall do the follow-up conducting with Article 19

④ By paragraph ③ of Article 7 the self-certified test lab can test with Annex 8, if the test result is met with any requirements of ①, Article 19, the stakeholders can require the check test of ①, Article 18 to the president of KEMCO with submission of test report within 60 days.

Article 19. (Follow-up conducting by monitoring result and opinion hearing) ① By paragraph ② Article 10, if any failures in checking test or ② of Article 18.2 the president of KEMCO shall give the opportunity to state the opinion to a manufacturer or importer and stakeholder before taking proper action within 30 days. Provided that there is no opinion to refute it regards as consent.

1. In case that the result of testing sample is under MEPS
2. In case that the energy efficiency level of testing sample is under energy efficiency level on the product.
3. In case that the test result is not met with tolerance in Annex 8
4. In case that the added model has any parts to influence the performance of basic model.
5. In case that label is represented without proper testing of energy efficiency and energy efficiency level according to Article 15.
6. In case of the mark of energy efficiency level or energy efficiency that is higher than designated level on test report

② The paragraph and 1 paragraph 5 shall be reviewed with the test report issued by by independent testing laboratory.
③ In cases of paragraph 2 ~6 of ① are illegal representation.
④ By paragraph ① in the case that the tested model is not complied with the technical standard in monitoring program, the president of KEMCO shall hear the partner's opinion first by Article 20 before they request the minister of MKE. And, if manufacturer or importer's proper reason is accept by KEMCO, they can test a sample selected by KEMCO in independent testing laboratory once. All expenses shall be charged by manufacturer or importer.

⑤ By paragraph ④ if the test result is met with any requirements of ①, the president of KEMCO shall request proper action to the minister of MKE within 15 days from a test report issues.

Article 19.2 (Correction by monitoring result) By paragraph ④ of article 16 the minister of MKE can order the correction to stakeholders within 90 days.

Article 20. (Maintenance and analysis of statistics) The president of KEMCO shall maintain and analyze all data from testing laboratories, and apply statistics to upgrade MEPS or energy efficiency level.

Article 21. (Establishment of an inside regulation) ① The president of KEMCO can establish the inside regulation to accomplish this regulation efficiently.

② By paragraph ① the president of KEMCO shall submit and report an inside regulation to MKE when they make it newly or change it.

Addenda (*MORE 1992-71,* ***17 August, 1992)***

Article 1. (Enforcement date) This regulation shall enter into force after the date of its promulgation.

Article 2. (The date to represent level, etc) A seller who produces or imports appliances with energy efficiency label shall mark the level on product manufactured or imported by Annex 3 after the date of 1st September, 1992 (1st October, 1992 for lighting equipments, 1st January 1993 for air-conditioner) in accordance with Article 3.y label shall mark the level on product manufactured or imported by Annex 3 after the dat④ Article 8. In case that refrigerator and lights which is note 3. It is also applied to put an adverti the level through extra testing or when testing is not completed, manufacturer or importer requests forbearance to the president of KEMCO with evidence for requested the testing.

Addenda (MOCIE 1993-25, 1 June, 1993)

Article 1. (Enforcement date) This regulation shall enter into force after 1st of March, 1993.

Article 2. (Amendment of name) In MORE Notification 92-91 otification e)t of name)to force after 1s which is note 3.3.Minister of MORE changes to the Minister of MOCIE.

Addenda (MOCIE 1993-130, 7 January, 1994)

Article 1. (Enforcement date) This regulation shall enter into force after 1st of February, 1994.

Article 2. (The date to represent grade, etc) A seller who produces or imports Fluorescent lamps ballasts shall represent the level on product manufactured or imported by Annex 3 after 1st of July, 1994 in accordance with Article 3.ctured or imported by Annex 3 after 1ied to put an adverti the level through extra testin③ Article 7.

Addenda (MOTI 1995-125, 29 December, 1995)

Article 1. (Enforcement date) This regulation shall enter into force after 1st of June, 1996.

Article 2. (Amendment of name) In MOCIE Notification 1993-130 OCIE Notification 1993-130me)nto forndards and Programgram0mMinister of MOCIE changes to the Minister of MOTI.

Article 3. (The date to represent level, etc) ① A seller who produces or imports appliances with energy efficiency label shall represent the level on product manufactured or imported by Annex 2 and Annex 3 after 1st of January, 1996 (1st of April, 1996 for Refrigerator with non-CFC refrigerant and foam, and 1st of September, 1996 for air-conditioner with non-CFC refrigerant) in accordance with Article 3.el on product manufactured or non-CFC refrigerant and foam can represent the level before enforcement date by Annex 2 and Annex 3.
② of September, 1996 for air-conditioner with non-CFC refrigerant) in accordance with A③ Article 7.

Article 4 (Interim Measure concerning marking of energy efficiency level, etc.)
The previous energy efficiency level standard in Annex 2 and the representation of level in Annex 3 as well as is able to accept to use after force this regulation within 3months.

Article 5 (Interim Measure Concerning reporting of energy efficiency level, etc.)
Despite of Article 8 the test report issued before enforcement date of this regulation is acceptable in accordance with previous regulation. Only testing result that is issued after 25th of September, 1995 for refrigerator is to accept in accordance with IAA is regulation is acceptable in accordance with previous regulatin of household electric appliances" which is amended.

Addenda (MOTI 1996-393, 18 November, 1996)

Article 1 (Enforcement date) This regulation shall enter into force after its promulgate.

Article 2on shall enter into force after its ① A seller who produces or imports air-conditioner with cooling capacity 9,000 kcal/h ~ 15,000kcal/h represent the level on product manufactured or imported by Annex 2 and Annex 3 after 1st of September, 1997 in accordance with Article 3.i
② of September, 1997 in accordance with Article 3.ith cooling capacity 9,000 kcal/h ~ 1③ Article 7.

Addenda7(MOCIE 1999-24, 8 March, 1999)

Article 1 (Enforcement date) This regulation shall enter into force after 1st of July, 1999.

Article 2 (Interim Measure) The result that achieved before 30th of June, 1999 is inured in accordance with this regulation.

Article 3 (Energy efficiency and energy efficiency level testing) A seller who produces or imports appliances with energy efficiency label is able to test for energy efficiency and energy efficiency level before force this regulation in accordance with Article 17.

Article 4 (Time to test and publish standard for washing machine, etc) The date for testing of model in market, energy efficiency standard as well as the date for notification of energy efficiency standard, and representation of energy efficiency level as well as application of MEPS are as follows.

1. Model in market : until 30th of September, 1999
2. Notification of energy efficiency standard and the representation energy efficiency level : January 2000
3. Representation of energy efficiency level : From 1st of July, 2000
4. Application of MEPS : From 1st of January, 2001

Addenda (MOCIE 2000-101, 23 September, 2000)

Article 1 (Enforcement date) This regulation shall enter into force after 1st of January, 2001. Only household gas boiler shall enter into force after 1st of August, 2001.

Article 2 (Interim Measure) The result that achieved before 31st of December, 2000 is inured in accordance with this regulation.

Article 3 (Energy efficiency and energy efficiency level testing) A seller who produces or imports appliances with energy efficiency label is able to test for energy efficiency and energy efficiency level before force this regulation in accordance with Article 15.

Article 4 (The date to represent level, etc) ① The date for testing of model in market, representation of energy efficiency level test for energy efficiency and energy efficiency level bef

1. Model in market : until 31th of December, 2000
2. Representation of energy efficiency level : From 1st of January, 2001
3. Application of MEPS : From 1st of January, 2001

② In case that refrigerator and air-conditioner providing that IAA's Notification "Program on representing energy efficiency and energy consumption of household electric appliances" (hereinafter "Energy efficiency program") is abrogated before this regulation enters into force, items, scope, and technical standards (for only air-conditioner) in Article 4, and Annex 5 in Article 16 (only for refrigerator and air-conditioner) from the date "Energy efficiency program" is abrogated to the date this act enters into force are as follows.

1. Refrigerator
   - Household electric refrigerator and refrigerator-freezer of storage volume 1000ℓ or less with the cooling system of less 500W electric power consumption by KS C 9305
   - Monthly electric power consumption shall be measured by the test method of KS C 9305

2. Air-conditioner
    A. From the date of IAA “Energy efficiency program” is abrogated to 30th of September, 2000
        - Air-conditioners of rated cooling power consumption of not more than 7,500W and rate cooling capacity of not more than 17,500W
        - If it has heater, the rated power consumption shall be not more than 5,000W.
        - Exclude water cooling, duct-type, portable, multi-split type
        - Cooling Energy Efficiency Ratio (CEER) shall be measured by the test method of KS C 9306, which is obtained from the cooling capacity divided by the cooling power consumption.
    B. From 1st October, 2000 to 31st of December, 2000
        - followed by paragraph ② Article 4

3. Contents on Energy efficiency or Energy efficiency level
    Deleted ents on Energy efficiency or Energy efficiency lev

Article 5 (foreshadow new appliances with energy efficiency label etc) Electrical cooler and heater for drinking-water storage, Dish washers, gas water heater, ballast for PL, and ballast for HID can be designated as new product for appliances with energy efficiency label, those are able to be registered as a appliance with energy efficiency label after discussing with related organizations.

Addenda (MOCIE 2002-20, 16 February, 2002)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. Only dish washer and electrical cooler and heater for drinking-water storage shall enter into force after 1st of July, 2002.

Article 2 (Interim Measure) The result that achieved by previous regulation is inured in accordance with this regulation.

Article 3 (Energy efficiency and energy efficiency level testing) Dish washer and electrical cooler and heater for drinking-water storage are able to test for energy efficiency and energy efficiency level before force this regulation.

Article 4 (Time to adjust and apply MEPS, etc) ① MEPS and effective date of refrigerator, air-conditioner, Incandescent lamps, Fluorescent lamps, Fluorescent lamps ballasts, Associated ballasts, Household Gas Boiler are as follows

1. Refrigerator

A. MEPS (Minimum Energy Performance Standard)

(unit :kWh/month)

Items	MEPS
Refrigerator only	P ≤ 0.037AV+16.75
Refrigerator-freezer whose compensated cubic volume is less than 500 liter	P ≤ 0.025AV+29.45
Refrigerator-freezer whose compensated cubic volume is no less than 500 liter	P ≤ 0.043AV+16.19

B. Effective date of MEPS : From 1st of January, 2004

2. Air-conditioner

A. MEPS (Minimum Energy Performance Standard)

(unit : W/W)

Type		MEPS (W/W)
Window type room air conditioner		2.88
Split type	RCC < 4.0 kW	3.37
	4.0 kW ≤ RCC < 10.0 kW	2.97
	10.0 kW ≤ RCC < 17.5 kW	2.76

Remark) Rated Cooling Capacity (RCC)

B. Effective date : From 1st of January, 2004

3. Incandescent lamps

A. MEPS (Minimum Energy Performance Standard)

(unit : lm/W)

Type	Rated Power	MEPS
110V	30W	10.2
	60W	13.0
	100W	14.3
220V	30W	8.0
	60W	11.0
	100W	12.7

B. Effective date : From 1st of January, 2003

4. Fluorescent lamps

A. MEPS (Minimum Energy Performance Standard)

(unit : lm/W)

Type		MEPS
Tubular	20W	58.0
	40W	80.0
	32W	86.0
Circular	32W	58.0
	40W	64.0

B. Effective date of MEPS : From 1st of January, 2004

5. Fluorescent lamps ballast

A. MEPS (Minimum Energy Performance Standard)

Type		MEPS
Tubular	20W 40W 32W	0.85 1.00 0.98
Circular	32W 40W	0.98 0.98

B. Effective date of MEPS : From 1st of January, 2004

6. Associated ballast

A. MEPS (Minimum Energy Performance Standard)

(unit : lm/W)

Type	Rated Power (W)	MEPS
Basic	RP < 10	45.0
	10 ≤ RP ≤ 15	50.0
	15 < RP ≤ 20	58.0
	RP>20	60.0

B. Effective date of MEPS : From 1st of January, 2003

7. Household Gas Boiler

A. MEPS (Minimum Energy Performance Standard)

(unit : %)

Type	MEPS
Household Gas Boiler	80.0

B. Effective date of MEPS : From 1st of January, 2003

② Refrigerator, air-conditioner, and household gas boiler shall not mark energy efficiency level after effective date of MEPS in paragraph ①.

Article 5 (foreshadow new appliances with energy efficiency label etc) Kimchi refrigerator, rice cooker, compact type fluorescent lamps can be designated as new product for appliances with energy efficiency label, those are able to be registered as a appliance with energy efficiency label after discussing with related organizations.

Addenda (MOCIE 2003-40, 14 May, 2003)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. Only rice cooker and compact type fluorescent lamps shall enter into force after 1st of January, 2004, and Kimchi refrigerator shall enter into force after 1st of October, 2004.

Article 2 (Energy efficiency and energy efficiency level testing) Kimchi refrigerator, rice cooker and compact type fluorescent lamps are able to test for energy efficiency and energy efficiency level in Article 17 before force this regulation.

Article 3 (Interim measure concerning energy efficiency test) The result that achieved with the previous regulation is inured in accordance with this regulation. Only Kimchi refrigerator tested in refrigerator test method shall be tested for energy efficiency until 30th of September, 2004.

Article 4 (Interim measure concerning energy efficiency of household gas boiler) ① The manufacturer shall report the nominal thermal efficiency of household gas boiler which has been achieved with the previous regulation to the president of KEMCO to 31st of May, 2003 by Article 3 and 15.

② For household gas boiler energy efficiency level in the previous regulation and in this regulation can be simultaneously used to 31st of May, 2003.

Addenda (MOCIE 2003-88, 30 December, 2003)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. Only washing machine shall enter into force after 1st of July, 2004, and freezer and vacuum cleaner shall enter into force after 1st of October, 2004.

Article 2 (Energy efficiency and energy efficiency level testing) Freezer and vacuum cleaner are able to test for energy efficiency and energy efficiency level in Article 17 before force this regulation.

Article 3 (Interim measure concerning energy efficiency test) The result that achieved with the previous regulation is inured in accordance with this regulation.

Article 4 (Interim measure concerning the self-certify testing laboratory) A self-certify testing laboratory for washing machine designated with the previous regulation shall apply to designate with Annex 2 to 31st of March, 2004 by Article 7.

Addenda (MOCIE 2004-37, 30 March, 2004)

Article 1 (Enforcement date) This regulation shall enter into force after 1st of April, 2004.

Article 2 (Interim measure) Nevertheless Article 6 the result that achieved with the previous regulation is inured in accordance with this regulation.

Addenda (MOCIE 2005-50, 6 May, 2005)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. Only horizontal drum washing machine and electric fan shall enter into force after 1st of January, 2006.

Article 2 (Energy efficiency and energy efficiency level testing) A seller who produces or imports horizontal drum washing machine and electric fan in Article 15 is able to test for energy efficiency and energy efficiency level before force this regulation in accordance with Article 17.

Article 3 (The date to represent level, etc) Horizontal drum washing machine and electric fan are able to test for energy efficiency and energy efficiency level in Article 17 before force this regulation.

Article 4 (Adjustment of energy efficiency standards, etc) MEPS of tubular 40W Fluorescent lamps ballasts and TEPS and energy efficiency level of Associated ballasts are upgraded as follows.

1. Fluorescent lamps ballast

A. MEPS (Minimum Energy Performance Standard)

Type		MEPS
Tubular	40W	1.18

B. Effective date of MEPS : From 1st of January, 2006

2. Associated ballast

A. TEPS (Target Energy Performance Standard)

(unit : lm/W)

Type	Rated Power (W)	TEPS To 31st of December, 2007
Basic	RP < 10	52.0
	10 ≤ RP ≤ 15	58.0
	15 < RP ≤ 20	67.0
	RP>20	69.0

B. Energy Efficiency Level

R	Level
R ≤ 1.00	1
1.00 < R≤ 1.04	2
1.04 < R≤ 1.08	3
1.08 < R≤ 1.12	4
1.12 < R≤ 1.16	5

C. Effective date : From 1st of January, 2006

Addenda (MOCIE 2006-26, 13 March, 2006)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. Only Dish drier shall enter into force after 1st of January, 2007.

Article 2 (Interim measure concerning energy efficiency test) The result that achieved with the previous regulation is inured in accordance with this regulation. Washing machine, and dishwasher which are already tested before regulation shall be tested additionally for standby power test to be 1st level from 1st January , 2007.

Article 3 (Energy efficiency and energy efficiency level testing) A seller who produces or imports dish drier is able to test for energy efficiency and energy efficiency level before force this regulation in accordance with Article 17.

Article 4 (The date to represent level, etc) Dish drier is able to test for energy efficiency and energy efficiency level in Article 17 before force this regulation.

Article 5 (Adjustment of energy efficiency standards, etc) MEPS and energy efficiency level of washing machine and energy efficiency level of dishwasher are upgraded as follows.

1. Washing machine

A. MEPS

(unit : Wh/kg)

Type	MEPS
Washing Machine	23.0

B. Energy Efficiency Level

R	Standby power (Off mode)	Level
$R \leq 14.5$	≤ 1.0 W	1
$R \leq 14.5$	-	2
$14.5 < R \leq 17.0$	-	3

$17.0 < R \leq 20.0$	-	4
$20.0 < R \leq 23.0$	-	5

C. Effective date of MEPS : From 1st of January, 2007

2. Dishwasher

A. Energy Efficiency Level

1) Rated Capacity ≤ 6

R	Standby power (Off mode)	Level
$20.00 < R$	≤ 1.0 W	1
$20.00 < R$	-	2
$16.00 < R \leq 20.00$	-	3
$12.00 < R \leq 16.00$	-	4
$8.00 < R \leq 12.00$	-	5

2) Rated Capacity > 6

R	Standby power (Off mode)	Level
$25.00 < R$	≤ 1.0 W	1
$25.00 < R$	-	2
$20.00 < R \leq 25.00$	-	3
$15.00 < R \leq 20.00$	-	4
$10.00 < R \leq 12.00$	-	5

C. Effective date of MEPS : From 1st of January, 2007

Addenda (MOCIE 2007-70, 25 May, 2007)

Article 1 (Enforcement date) ① This regulation shall enter into force after promulgate. Air cleaner, refrigerator, air-conditioner, and rice cooker shall enter into force after 1st of January, 2008, 3 phase induction motor of the rated output of more than 37kW and of not more than 200kW shall enter into force after 1st of July, 2007, and 3 phase induction motor of the rated output of not less than 0.75kW and of not more than 37kW shall enter into force after 1st of January, 2010.

② New energy efficiency label in Annex 5 shall enter into force after 1st of January, 2008. If manufactures and importers have old energy efficiency label in stock after 1st of January, 2008, they can use them.

③ In Annex 7 the allowed monthly power consumption of refrigerator, Freezer, Kimchi-refrigerator shall be within 115% to the rated monthly power consumption, and the allowed EER of air-conditioner shall be more than 90% of the rated EER until 31st of December, 2007.

Article 2 (Interim measure concerning energy efficiency test) ① The result that achieved with the previous regulation is inured in accordance with this regulation. Rice cooker which is already tested before regulation shall be tested additionally for standby power test to be 1st level from 1st January , 2008.

② A 3 phase induction motor certified in “The regulation for expanding the high-efficiency Equipments” by 31 December 2009 is also accepted for this regulation.

Article 3 (Cancellation of registration) The manufacture or importer shall report the model canceled to import or stopped producing with Annex 7 to the president of KEMCO.

Addenda (MOCIE 2007-149, 26 December, 2007)

Article 1 (Enforcement date) ① This regulation shall enter into force after 1st of January, 2008. Only refrigerator shall enter into force with followings.

1. MOCIE 2006-26(13 March 2006) will cover to 29 April 2008 except Article 10, Annex 3, 4, 6, 7 and, paragraph ① of Article 1, Addenda of MOCIE 2007-70(25 May 2007)
2. The enforcement date of refrigerator in Annex 5 and paragraph ② of Article 1, Addenda of MOCIE 2007-70(25 May 2007) would be changed to 30 April 2008.
3. Article 4, 10, and Annex 3, 4, 6, 7 of this regulation shall enter into force after 30st of April, 2008. Manufactures or importer of refrigerator shall declare a new energy efficiency label as according to KS C ISO 15502 to 29 April 2008.

② The enforcement date of air cleaner in paragraph ① of Article 1, Addenda of MOCIE 2007-70(25 May 2007) would be changed to 1 July 2008.

Addenda (MKE 2008-99, 31 July 2008)

Article 1 (Enforcement date) ① This regulation shall enter into force after 28 August 2008. Only the extended scopes of Adapter·Charger, Electric driven heatpump, Kim-chi refrigerator, Air-conditioner, Washing machine, Horizontal drum washing machine, Dish washer, Electrical Cooler and Heater for Drinking-Water Storage, Vacuum cleaner, Electric fan, Incandescent lamps, Fluorescent lamps, Fluorescent lamps ballast shall enter into force after 1st of January, 2009.

② Independent test laboratory in Annex 4 shall enter into force after the day the Ministry of MKE designates or the regulation is designated.

Article 2 (Interim measure concerning self-certify testing laboratory) Self-certify testing laboratory who was achieved with article 7 of the previous regulation is inured in accordance with this regulation.

Article 3 (Interim measure concerning energy efficiency test) ① The result that achieved with the previous regulation is inured in accordance with this regulation. Only Electric cooler and heater for drinking water storage shall be tested for energy efficiency with a new test method until 31st of December 2008. Horizontal drum washing machine, Electric fan shall be tested for standby power in order to get 1st grade of energy efficiency level from 1st of January, 2009, and

Associated ballast shall be tested for the endurance of on-off in order to get 1st grade of energy efficiency level from 1st of January, 2009.

② The registered Model of Adapter and Charger for Mobile phone for ”Standby program” is inured in accordance with this regulation.

Article 4 (Relation with other regulation) Any parts of this regulation used in other laws shall be accepted.

Addenda (MKE 2009-26, 10 February 2009)

Article 1 (Enforcement date) ① This regulation shall enter into force after promulgate. But, Article 16, ④ and Annex 1 (Adapter and Charger) shall enter into force after 1st of January, 2009. By Article 10, 16, Annex 2, 6, and 7 Refrigerator, Kim-chi refrigerator, Washing machine, Horizontal drum washing machine, dish drier, vacuum cleaner, electric fan, air cleaner, Incandescent lamps, associated lamps, and adapter-charger shall be entered into force after 1st of July, 2009 for new production, and freezer, air-conditioner, dish washer, Electric cooler and heater for drinking water storage, rice cooker, Fluorescent lamps, Fluorescent lamps ballast, 3 phase induction motor shall be entered into force after 1st of January, 2010.

② Article 9, ③ shall enter into force until 31st of December, 2009.

Article 2 (Interim measure concerning Standby power) Adapter or charger for mobile phone endorsed by the Ministry of MKE until 31 December 2008 according to Article 12 of “Standby power program (MKE 2008-116, 28 August 2008)” shall be endorsed with self-certified from 1st January 2009.

Addenda (MKE 2009-158, 30 July 2009)

Article 1 (Enforcement date) ① This regulation shall enter into force after promulgate. But, commercial refrigerator, freezer, air-conditioner, dish washer, Electric cooler and heater for drinking water storage, rice cooker, , rice cooker, Fluorescent lamps, Fluorescent lamps ballast, household gas boiler, electric driven heatpump shall be entered into force after 1st of January, 2010, and for 8 poles of 3 phase induction motor the rated output of 37kW~110kW shall be entered into force after 1st of January, 2010, and the rated output of 0.75kW~37kW shall be entered into force after 1st of January, 2011. For energy efficiency level label Article 10, 16, Annex 2, Annex 6, and Annex 7 are considering to revise currently, and washing machine, horizontal drum washing machine, and dishwasher will be effective after 1st July 2009.

Article 2 (Interim measure concerning energy efficiency test) ① The result that achieved with the previous regulation is inured in accordance with this regulation. Only freezer, and rice cooker shall be tested for energy efficiency with a new test method until 31st of December 2009. Air-conditioner, and Household gas boiler shall be tested for standby power in order to get 1st grade of energy efficiency level from 1st of January, 2010.

Addenda (MKE 2009-304, 11 December 2009)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate.

Addenda (MKE 2009-317, 28 December 2009)

Article 1 (Enforcement date) This regulation shall enter into force after promulgate. But, Article 10, Article 16, Annex 2, and Annex 6 shall be entered into force after 1st of July, 2010.

Addenda (MKE 2010-124, 6 June 2010)

Article 1 (Enforcement date) ① This regulation shall enter into force after promulgate. But, gas water heater, refrigerator, kimchi refrigerator, horizontal drum washing machine, dish drier, air cleaner shall be entered into force after 1st of January, 2011, and for incandescent lamp the rated output of 70W~150W shall be entered into force after 1st of January, 2012, and the rated output of 25W~70W shall be entered into force after 1st of January, 2014.

Article 2 (Interim measure concerning energy efficiency test) ① The result that achieved with the previous regulation is inured in accordance with this regulation. Only kimchi refrigerator shall be tested for energy efficiency with a new test method until 31^{st} of December 2010. Dish drier shall be tested for standby power in order to get 1^{st} grade of energy efficiency level from 1^{st} of January, 2011.

Addenda (MOCIE 2011-81, 6 May, 2011)

Article 1 (Enforcement date) ① This regulation shall enter into force after promulgate. But, electric cooler and heater for drinking water storage and 3 phase induction motor shall enter into force after 1^{st} of January, 2012 and transformer, window set and television set shall enter into force after 1^{st} of July, 2012.
② In accordance with amendment of KS C 9306 (31^{st} of December, 2010) air-conditioner and electric driven heatpump shall enter into force after 1^{st} of July, 2012, and apply previous KS C 9306 until 30^{th} of June, 2012.
Article 2 (Interim measure concerning energy efficiency test) ① The result that achieved with the previous regulation is inured in accordance with this regulation. Only electric cooler and heater for drinking water storage shall be tested for energy efficiency with a new test method until 31^{st} of December 2011. Air-conditioner and electric driven heatpump shall be tested with a new KS C 9306 test method until 30^{th} of June, 2012.
② For window set certified in "The regulation for expanding the high-efficiency equipments" as of 30th of June, 2012, window set which is in article 4, paragraph 1, subparagraph No. 25 shall be deemed to be measured in accordance with this regulation.
③ For transformer certified in "The regulation for expanding the high-efficiency equipments" as of 30th of June, 2012, transformer with a test report submitted, which records efficiency at a 50% load factor of fiducially reduced temperature shall be deemed to be measured in accordance with this regulation.

Addenda (MKE 2011-241, 21 November, 2011)

Article 1 (Enforcement date) ① This regulation shall take effect from the date notified. Changes to range of scope, measuring method, MEPS(Minimum Energy Performance Standard), Energy efficiency Level, or label on the electric fan heater and electric stove carries out from 2011.12.15, multi heat pump system from 2012.4.1, 3 phase induction motor from 2012.4.1, dehumidifier from 2012.7.1, electric refrigerator from 2012.12.1.
② Changes to measuring method, MEPS, Energy efficiency Level or the label on the air-conditioner, electric driven heatpump according to KS C 9306 (2011.7.6), carries out from 2012.12.1, and until 2012.11.30 apply previous KS C 9306.

Article 2 (Interim measures on consumption efficiency measures) ① Products which received consumption efficiency measurements in accordance with previous regulation, are deemed to have measurements in accordance with this regulation. 3 phase induction motors which received succession on the measurement (KS C 4202) in accordance with “Regulation on high efficiency energy equipment promotion” before this regulation are to be measured again with KS C IEC 60034-2-1 until 2012.12.31.
② The air-conditioner, electric diven heatpump which received consumption efficiency measurement before this regulation, according to changed KS C 9306 measuring method, are to be measured again until 2012.11.30.

Addenda (MKE 2011-263, 23 December, 2011)

Article 1 (Effective date) This regulation shall be effective from the date of notification. Electric pad, electrically heated water mat, electrical heating board, electric bed, and electric radiator shall be effective from 2011. 12. 27.

< Annex 1> Test procedures for appliances with a energy efficiency label (Article 4)

1. Washing machine

- Power consumption per 1 kg shall be measured by the test method in KS C 9608, which is obtained from energy consumption (Wh) divided by the rated capacity (kg) in a specified cycle. [Power consumption per 1 kg : Wh/kg/1 cycle at standard cycle]

1. Instrumentation and method

A. Instrumentation

1) Thermometer

① Accuracy shall be within ± 0.5℃ or minimum measuring unit shall be 1℃ or less.

② Install one thermometer in cold water line.

2) Electric energy

① Power meter: Minimum measuring unit shall be 1 Wh or less, and measuring error shall be within 1% of measuring value.

② Voltmeter: Measuring error shall be within 1% of measuring value.

3) Water volume

① Minimum measuring unit shall be 0.2 ℓ /min or less and measuring error shall be within 2% or less of measuring value.

② Install one thermometer in cold water line.

4) Water-pressure

① Minimum measuring unit shall be 5 kPa or less and measuring error shall be within 5% or less of measuring value.

② Install one thermometer in cold water line.

5) Load scale : Minimum measuring unit shall be within 1g.

B. Test condition

1) Ambient temperature: 15℃~30℃

2) Load : "Annex 1" of KS C 9608.

3) Water temperature : At standard water volume the water temperature shall be ambient water temperature to supply at start, and recorded temperature in a test report.

4) Measurements of water volume : "Annex 2" of KS C 9608.

5) Program time and test number

① Program time and test number shall be followed to “8. Test in KS C 9608".

② Only, in monitoring program the energy consumption shall be not more than 115% of the rated value.

6) Mean performance value : Water extraction ratio, and rinsing index shall be get to average for 4 times.

7) Specified program : It is defined as one washing cycle, one water spin extraction cycle, and two rinsing cycle. (Only, in case of automatic type and full automatic type, the manufacturer indicates the specified program.)

2. Performance requirements

- As long as there is no special standard, the results tested by KS C 9608 shall be met as follows.

A. Water extraction ratio shall be not less than 45%.

B. Rinsing ratio shall be not less than 1.00.

C. Repeatability : All test results for 4 times shall be within 10% of mean value.

3. Energy consumption test

- Energy consumption test shall be conducted at the rated washing load and water volume at 220V±2%, and 60Hz±1% in a standard cycle. The value of 3 tests shall be averaged.
- Only, Washing machine with the electric heater is not included in energy consumption test.

2. Horizontal drum washing machine

1. Scope

- Horizontal drum washing machine which are defined the household washing machine with the rated capacity of 2~20kg, and has the heater, spin extractor, and dryer.
- But, non-detergent type is excluded, and the type which has the heater is only available to boil and dry is also exclude.
- Energy Efficiency shall be measured by the test method in Annex 8, which is obtained from energy consumption (Wh) divided by the rated capacity (kg) in a specified cleaning cycle (Water temperature 40℃)

2. Reference

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS C IEC 60456 Clothes washing machines for households use – Methods for measuring the performance

KS C 9608 Electric washing machines

3. Definitions

For the purposes of this standard, the following terms and definitions apply, and others apply KS C IEC 60456 and KS C 9608.

a) Horizontal drum washing machine

Washing machine in which the textiles are placed in a horizontal drum and partially immersed in the washing water, the mechanical action being produced by rotation of the drum about its axis, the movement being either conditions or periodically reversed.

b) Rated washing capacity

Maximum mass of dry textiles which the manufacturer declares can be treated in a specific program.

c) Water volume

Maximum water volume which the manufacturer declares can be treated in a specific program.

d) Base load

Textile load without strips of standardized soiling by KS C IEC 60456.

e) Test load

Base load plus strips of standardized soiling by KS C IEC 60456.

f) Test strip

Test load for performance test by KS C IEC 60456 .

g) Detergent

By KS C IEC 60456 a cleaning agent in powder, granular or liquid form, manufactured for use in household electric washing machine to aid in removal of soiling by chemical means.

h) General conditions

General conditions refer to basis condition that shall be kept while testing and shall be maintained that ambient temperature is 20±5℃, room humidity is 60±20%, water supply is 15±2℃, electrical supply is 220V±2%, and frequency is 60Hz±1% throughout the test. General condition shall be reported.

4. Test

4.1 Test condition

4.1.1 General

Test sample shall be offered with manual, and it must be inspected certainly that acts rightly before measurement.

4.1.2 Installation

Test sample shall be installed according to manufacturer's direction, and ambient temperature shall be measured when it begins to measure.

4.1.3 Electric supply

The supply voltage shall be maintained at the rated voltage 220V ± 2% throughout the test. The supply frequency shall be maintained at the rated frequency 60 Hz±1%.

4.1.4 Water supply

A water hardness ($CaCO_3$) of 80 ㎎/ℓ or less shall be used for all program. The temperature of the supply water shall be 15±2℃ for cold water, and the dynamic pressure of the water supply at each water inlet shall be maintained at 240±50kPa throughout the test.

4.1.5 Detergent

Detergent shall be used by KS C IEC 60546, and the amount of detergent shall be determinate in accordance as follows.

The amount of detergent : 54g + 16g × Rated washing capacity (kg)

4.1.6 Base load and test strips

Base load and test strips shall be used for prescribed by KS C IEC 60456 and number of the test load for rated washing capacity (kg) is given in [Table 1]. If the test load is not specified in [Table 1], the number of sheet and pillowcase are loaded at lower level and the rest load needed is loaded with hand-towels.

[Table 1] Test load for rated washing capacity.

Capacity load	Rated capacity(kg)																							
	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
test strips	12	11	11	10	10	9	9	8	8	8	8	8	8	7	7	6	6	5	5	4	4	3	3	2
hand-towels	46	46	46	46	46	41	37	31	26	26	23	23	23	23	23	23	18	18	14	14	11	11	9	6
pillowcases	44	40	36	34	30	28	26	30	28	24	22	18	14	12	10	8	8	6	6	4	3	4	3	2
sheets	6	6	6	5	5	5	5	3	3	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1

[Table 2] Loading order of test load for rated washing capacity

load order	Items	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
1	pillowcase	3	3	3	3	3	3	3	5	4	4	3	2	1	1	1	1	1	1	1	1				
2	hand-towel	4	4	4	4	4	4	4	6	5	5	4	4	4	4	4	4	3	3	2~4	2~5	3			
3	hand-towel+ test strip	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
4	pillowcase	4	4	4	4	4	4	4	5	5	4	4	4	3	3	2	2	2					1	1	1
5	hand-towel+ test strip	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1			
6	Sheet	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
7	hand-towel+ test strip								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	pillowcase	4	4	4	4	4	4	4	5	5	4	4	3	3	2	2	1	1	2	2	1	1	1		
9	hand-towel	1~4	1~4	1~4	1~4	1~4	1~4	1~4	1~6	1~4	1~4	1~4	1~4	1~4	1~4	1~4	1~5	0~3	0~4				2~4	2~3	2~3
10	hand-towel+ test strip	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1					
11	Sheet	1	1	1	1	1	1	1	1	1	1	1	1	1									1	1	1
12	hand-towel+ test strip	1	1	1	1	1	1	1	1	1	1	1	1	1									1	1	1
13	hand-towel	1~3	1~3	1~3	1~3	1~3	1~3	1~3	1~5	1~4	1~4	1~3	1~3	1~3	1~4	1~4	1~4	0~3	0~3				2~4	3	1
14	pillowcase	4	4	4	4	4	4	4	5	5	4	4	3	3	2	2	1	1	2	2	1	1	1	1	
15	hand-towel+ test strip	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
16	Sheet	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
17	hand-towel+ test strip	1	1	1					1	1	1	1	1	1	1	1	1	1				1			
18	pillowcase	4	4	4	4	4	4	4	5	5	4	4	4	3	3	2	2	2				1	1	1	1
19	hand-towel+ test strip	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
20	hand-towel	4	4	4	4	4	4	4	6	5	5	4	4	4	4	4	4	3	3	2~5	2~5	1~4			
21	pillowcase	6	5	4	4	4	4	4	5	4	4	3	2	1	1	1	1	1	1	1	1				
22	hand towel	4	4	4	4	4	3	2~5																	
23	hand-towel+ test strip																								
24	pillowcase	4	4	3	3	2																			
25	hand-towel+ test strip	1	1	1	1	1	1	1																	
26	Sheet	1	1	1	1	1	1	1																	
27	hand-towel+ test strip	1	1	1	1	1	1	1																	
28	pillowcase	4	3	3	2	1	2	1																	
29	hand-towel	1~4	1~4	1~4	1~4	1~5	0~4																		
30	hand-towel+ test strip																								
31	Sheet	1	1	1																					
32	hand-towel+ test strip	1	1	1	1	1	1	1																	
33	hand-towel	1~3	1~3	1~3	1~4	1~4	0~3																		
34	pillowcase	4	3	3	2	1	2	1																	
35	hand-towel+ test strip	1																							
36	Sheet	1	1	1	1	1	1	1																	
37	hand-towel+ test strip																								
38	pillowcase	4	4	3	3	2																			
39	hand-towel+ test strip	1	1	1	1	1	1	1																	
40	hand cover	4	4	4	4	4	3	2~5																	
41	pillowcase	3	2	1	1	1	1	1																	

4.2 Instrumentation

4.2.1 Thermometer

Accuracy shall be within ± 0.5℃ or minimum measuring unit shall be 1℃ or less.

4.2.2 Electric energy

① Power meter: Minimum measuring unit shall be 1 Wh or less, and measuring error shall be within 1% of measuring value.

② Voltmeter: Measuring error shall be within 1% of measuring value.

4.2.3 Water volume

Minimum measuring unit shall be 0.2 ℓ/min or less and measuring error shall be within 2% or less of measuring value.

4.2.4 Water-pressure

Minimum measuring unit shall be 5 KPa or less and measuring error shall be within 5% or less of measuring value.

4.2.5 Load scale : Minimum measuring unit shall be within 1g.

4.2.6 Optical reflectance or photocolorimeter

It shall measure the range of the surface reflectance of 400~600nm , and measurements aperture shall be 20 nm or less. Also, it shall have the self-calibration function.

4.3 Performance Test

There are washing performance test, spin extraction test, energy consumption test, and water consumption test.

4.3.1 Washing performance

a) Washing performance test is attended under 4.1 Test condition.

b) There is the test load in [Table 1] and loading order in [Table 2].

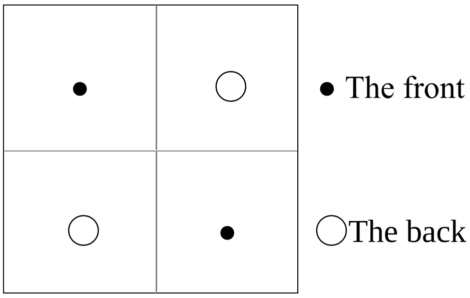
c) The test load shall be evenly spread in washing machine.

d) The test sample should be tested at specified program by the water temperature of 40℃, and in case that it can not set by 40℃, a program the manufacturer indicates is to be used, and shall be the nearest 40℃ . Other conditions follow with the manufacturer's instructions.

e) Reference washing machine in KS C IEC 60456 shall be tested with test load of 5 ㎏ and at COTTON 40℃ program, at the same time the test sample shall be tested.

f) After the completion of the washing program, all test strips are dried by ironing using a method which avoids surface "shine"(i.e. ironed between two pieces of fabric, or with an ironing appliance or press).

g) The reflectance measurements are carried out with a minimum of four layers of the same washed soiled type specimen as backing for the specimen being measured. Every washed specimen is measured twice on both sides, at the positions indicated in [Figure1]. The average value of the four readings is reported as the value for that soiled test specimen.



[Figure 1] Indication of positions for measuring soiled test specimens

h) The following calculation is carried out for each type of soiled test specimen.

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Where

x_i is the average of the individual readings for each soiled test specimen;

n in the number of test strips in the wash.

The sum of the soiling values in each wash, C, for each wash the four soiling types are calculated as follows:

$$C = \sum \bar{x}$$

The average sum of the soiling values for each of the four soiling types for all cycles C.

$$\bar{C} = \frac{\sum_{1}^{k} C}{k}$$

k is the number of cycles.

i) Ratio, q, between the washing machine under test, $C_{test,}$ and the reference washing machine, C_{ref} is calculated as follows :

$$q = \frac{\bar{C}_{test}}{\bar{C}_{ref}}$$

j) The washing performance shall be more than 0.60 of washing efficiency index.

4.3.2 Spin extraction test

a) Spin extraction test is attended with washing performance test by 4.3.1. at the same time.

b) Water extraction ratio (S) is calculated as follows.

$$S(\%) = \frac{M}{M_r} \times 100$$

M is the conditioned mass of the base load (exclude test strips)

M_r is the mass of the base load after extraction (exclude test strips)

c) The spin extraction performance shall be more than 0.40 of water extraction ratio.

4.3.3 Power consumption test

a) Power consumption is determined during typical operations of washing, rinsing and spin extraction in "4.3.1 Washing performance" condition for a program the manufacturer specified. Electrical energy (E_e) is accumulated for a complete cycle, and expressed in kWh.

b) Power consumption is expressed in kWh to two decimal places.

c) Correction factor

If the inlet temperature of the cold water deviates from 15℃, the cold water energy correction factor shall be determined using the following formula:

$$E_c = \frac{Q_C \times (t_c - 15)}{860}$$

Where,

E_c is the cold water energy correction in kWh during a complete test

t_c is the measured inlet temperature of the cold water in degree Celsius, 13~17℃

Q_c is the volume of the cold water used during the prewash and main wash only, in ℓ

d) The total energy consumption (E_t) is calculated as follows;

$$E_t = E_e + E_c$$

4.3.4 Water consumption test

a) Water consumption is determined during typical operations of washing, rinsing and spin extraction in "4.3.1 Washing performance" condition for a program the manufacturer specified. Water consumption is accumulated for a complete cycle, and expressed in ℓ.

b) Water consumption is expressed to the nearest integer.

5. Calculation of Energy Efficiency

a) It shall be recorded test result in [Table 3].

[Table 3] Record of performance test of electric drum washing machine

Test sample	Number of Test	Washing efficiency index	Water extraction ratio [%]	Dried Load weight [kg]	Load weight after Spin extraction [kg]	Energy consumption [kWh]	Water consumption [ℓ]
1	1						
	2						
	3						
	Average						
2	1						
	2						
	3						
	Average						
Average							

b) The test sample is 2 units per model and is tested 3 times each unit.
c) Energy efficiency level index is as follows

$$R \text{ (Energy efficiency level index)} = \frac{\text{Electric Power Consumption during a complete cycle [Wh]}}{\text{Rated washing capacity [kg]}}$$

6 .Marking and marking method

Marking includes at least the next items and should be placed at backside or side of each product that consumer is apt to see. However, if marking items in energy efficiency label duplicates in KS standard level and others certificates, it can be excepted.

a) Model Name
b) Rated washing capacity
c) Rated voltage (V)
d) Power consumption (kWh)
e) Manufacturer or the code

f) Dimension and weight

g) Address and telephone number for A/S

3. Dish washer

1. Scope

- A machine which washes rinses, and dries (when drying process is include) dishware, glassware, cutlery and, in some cases, cooking utensils by chemical, mechanical and/or electrical means with the rated capacity 20 person or less.

Remark : The units and numerical values given in ( ) in this standard are in accordance with the previous standard and are appended for reference.

2. Reference

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS C 1505 Integrating-averaging sound level meters
KS M 5000 Testing method for organic coatings and their related materials
KS H 2114 Instant coffee
KS L 1002 Bone china table ware
KS L 9202 Bone porcelain and bowl of soup
KS H 3005 Milk
KS H 2170 Method of test of kimchi
KS H 2169 Kimchi
KS H 2002 Margarine
KS G 2103 Artists water color brushes
KS C IEC 60436 Methods for measuring the performance of electric Dishwasher
IEC 60436 Methods for measuring the performance of electric Dishwasher
EN 50242 Electric dishwashers for household use - Test methods for measuring the performance
DIN 44 990 Elektrische Geschirrspülmaschinen für den Hausgebrauch

AS/NZS 2007.1 Performance of household electrical appliances – Dishwashers ; Part 1 Energy consumption and performance
AHAM DW-1, A 197.5 Household Dishwashers
CAN/CSA-C373 Energy consumption test methods for household Dishwashers
US DOE CFR 430 Appendix C Test Procedure of household dishwashers
IEC 59A/96/DC Technical Committee N^{o} 59 Performance of household electrical appliances Subcommittee 59A : Electric dishwashers

3. Definitions

For the purposes of this standard, the following terms and definitions apply,

a) Dishwasher
A machine which washes, rises and dries (when drying process is included) dishware, glassware, cutlery and, in some cases, cooking utensils by chemical, mechanical and/or electrical means.

b) Rated dishwasher capacity
The rated dishwasher capacity is the number of place settings together with the serving pieces such as less than 4 persons, 6, 8, 10, 12, and more than 14 (see [Table 3] and [Table 4]) stated by the manufacturer when the dishwasher is loaded in accordance with the manufacturer`s instructions.

c) Total water supply volume
Total water supply volume is accumulated for a complete cycle, and expressed in ℓ.

d) Water supply and water supply volume
Water supply is come from outer to wash and rinse, and volume is quantity for one supply.

e) Temperature of supply water
To improve washing performance the temperature reaches being heated by heating appliances or others methods.

f) Cycle

The sequence of event occurring in the dishwasher during the washing, rinsing and drying process (Where the latter is included). The test shall be with the standard mode (Auto or default setting mode for shipping), if there is no standard mode, it shall be operated with a similar mode. A complete cycle does not include a preserving mode after drying mode.

g) Dispenser

1) Automatic

A device activated automatically which injects or dispenses detergent, rinse agent, etc., one to more times into the dishwasher at predetermined intervals throughout the dishwasher cycle.

2) Non – automatic

A device, usually a fixed cup or cavity on the dishwasher door, cover or dish rack, which deposits previously measured amount of detergent, rise agent, etc, into the dishwasher at the is closed, or requires water circulation to flush the detergent from the dispenser.

h) Water softener

A device which reduces the hardness of water

i) Cutlery basket

Container for holding cutlery in the dishwasher.

j) Rack

Support for holding dishware and glassware in the dishwasher.

k) Cutlet

Implements used in eating : knives, forks and spoons.

l) General conditions

General conditions refer to basis condition that shall be kept while testing and shall be maintained that ambient temperature is 20℃±2, room humidity is 65±5%, water supply is 15±2℃, electrical supply is 220V ±1%, and frequency is 60Hz±1% throughout the test. General condition shall be reported.

m) Soil material

A material makes dishware, glassware, and cutlery dirty in order to evaluate washing performance.

n) Test load

Soiled dishware, glassware, and cutlery for evaluating washing performance

o) Detergent

A cleaning agent in powder, granular or liquid form, manufactured for use in household electric dishwashers to aid in the removal of food soils by chemical means.

p) Rinse agent

A chemical agent sometimes added to the last rinsing water to improve the drying effect and reduce water marks.

q) Water supply pressure

Water pressure is supplied from outer.

r) Standard program

A program is that the manufacturer specified for performance test.

s) Standby Power

Power consumption without any operations when a unit has been plugged in t o a live power line.

4. Test conditions

4.1 General

The dishwasher manufacturer`s instructions regarding installation and use of the dishwasher should be followed. These instructions are those provided with the dishwasher in the form of instruction pages and/or user information booklets. Before commencing measurements, the dishwasher shall be checked to ensure that it is operating properly. This standard provides reliability for comparative testing when tests are conducted in the same laboratory, at one time, using the same operators.

4.2 Installation

The dishwasher shall be installed in accordance with the manufacturer`s instructions and shall be at ambient temperature at the start of each measurement.

4.3 Electrical supply

a) Frequency : 60 Hz±1%.

b) Voltage : 1 phase, 220V ± 1%

4.4 Cycle

The test shall be with the standard mode (Auto or default setting mode for shipping), if there is no standard mode, it shall be operated with a similar mode.

4.5 Ambient conditions

Temperature shall be 20 ± 2℃ with a relative humidity of 65± 5% .

4.6 Water supply

a) Temperature

1) 60 ± 2℃. (Machines designed for hot water supply only)

If the manufacturer recommends a lower temperature, it may be used so long as it noted in the report.

2) 15 ± 2℃. (Machines designed for cold water supply only)

For a single series of tests and while determining time and energy consumption for machines with water heaters, the tolerance should be maintained at ± 2℃ for the cold water supply.

3) Measurement at both temperatures is recommended for machines designed to use both the hot and cold water supply only in those countries where both conditions are common.

b) Pressure

The pressure shall be 240± 20kPa

c) Hardness

Dishwashers with water softeners are tested using a water hardness 1.5 mmol/ℓ (Ca+Mg) only. Dishwashers without water softeners are tested at manufacturer’s recommended water hardness.

4.7 Detergent

The standard test detergent A or B described in [Table 1] is to be used. The quantity shall be as recommended by the manufacturer. If no recommendation is given use :

a) 2.0g/l place setting for rated dishwasher capacity of 10 or more

b) 2.5g/l place setting for rated dishwasher capacity of 10 less

For ant other water hardnesses, the concentration of detergent to be used should be proportional to the water hardness using the above values. Detergent should be stored in a waterproof bag in quantities of no more than 1 kg in a cool atmosphere ; it should be used within three months.

[Table 1] Standard detergent ingredient

Ingredient		Parts by weight (%)
A	Thermphos NW	24.0
	Plurafac LF 403	1.0
	Sodium Dichlorisocyanurate	2.3
	Sodium Carbonate	10.7
	Sodium Metasilicate	25.0
	Sodium Metasilicate Pentahydrate	37.0
B	Trisocdium Citrate Dihydrate	30.0
	Sokalan CP5 Compound(50% Active Substance)	12.0
	Plurafac LF 403	2.0
	Sodium Disilicate	25.0
	Sodium Carbonate	23.0
	Sodium Perborate Monohydrate	5.0
	TAED	2.0
	Amylase	0.5
	Protease	0.5

4.8 Rinse agent

One of the standard rinse agents is to be used in [Table 2]. If the dishwasher is equipped with an automatic dispenser which is not adjustable, the quantity added is determined by this device. For machines with as adjustable automatic dispenser, the quantity used shall be as recommended by the manufacturer. In the absence of such an indication, 0.3mℓ/ ℓ will be added. For machines without automatic dispenser, the rinse agent shall be added manually when so recommended by the manufacturer and in accordance with his instructions.

[Table 2] Standard rinse agent ingredient

Ingredient	Formula “Ⅳ”(neutral)
Plurafac LF 221	15.0
Cumene Sulfonate(40% Soln.)	11.5
Citric Acid(Anhydrous)	-
Deionized water	73.5
Viscosity[mpas]	11.0
pH(1% in Water)	6.3

5. Performance

There are followings ;

a) Washing performance

b) Drying performance

c) Energy consumption : Electric and water

There are 3 performances

a) Washing and drying performance
b) Washing Capacity
c) Energy consumption : Electric and water

These are so important and dependent that they should be reported together for consumer information.

5.1 Washing performance

The value shall be more than 94% of the rated value when tested with method 6.3

5.2 Electric power consumption

The value shall be not more than 110% of the rated value when tested with method 6.3.

5.3 Standby power consumption

Standby power consumption measured according to KS C IEC 62301 shall be not more than the rated value for 1st energy efficiency level, and other levels are not applicable to standby power consumption.

5.4 Water consumption

The value shall be not more than 110% of the rated value when tested with method 6.3.

5.5 Drying performance

The value shall be more than 90% of the rated value when tested with method 6.5.

5.6 Acoustic noise

The value shall be not more than 60 dB of the rated value when tested with metho

6. Test method

6.1 General

The dishwasher manufacturer`s instructions regarding installation and use of the dishwasher should be followed. These instructions are those provided with the dishwasher in the form of instruction pages and/or user information booklets. Before commencing measurements, the dishwasher shall be checked to ensure that it is operating properly.

6.2 Test procedures and test conditions

a) 1 Step : The dishwasher shall be operated at least for two complete cycles using a clean dish load and without detergent and rinse agent. There shall be no interrupt cycle during running.

b) 2 Step : Test 6.3 washing performance test and 6.4 energy consumption test.

c) 3 Step : Test 6.5 drying performance test

d) 4 Step : Measure Standby power test

6.3 Washing performance test

6.3.1 General

This describes to evaluate washing performance for the soiled tablewares, and it shall be tested twice with two samples per a model. The test load used in this test is according to [Table 3] and [Figure 1], and soiled materials for washing performance are prepared in 6.3.3. The test procedure and condition are prepared in 6.3.4.

6.3.2 Standard place setting and serving pieces for test load

a) Requirement

The tableware should be glossy without any crack or scratch. To prepare the tableware (whether they are new or not) for the test, they should be completely cleaned with hot and clean water, and dried before the test. Putting papers or the like between them, the tableware should be prevented from a scratch.

b) Standard place setting and serving pieces

One place setting shall consist of the pieces shown [Table 3]. The shapes and the sizes of the rice bowl and the soup bowl should be prepared based on [Table 2 convex shape], [Table 3 square shape] in KS L 9202. The others are based on IEC 60436 [Table 3]. The standard tableware should be evenness on the surface and white china. Spoons, chopsticks, and teaspoons should be stainless according to [Table 3].

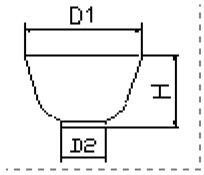
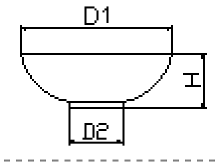
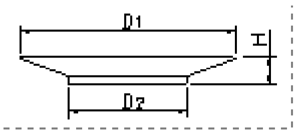
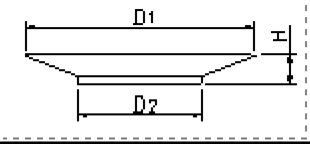
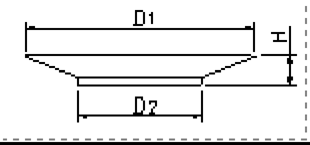
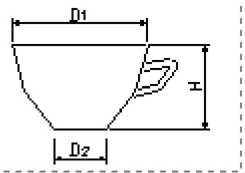
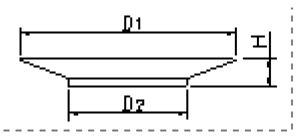
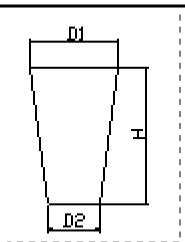
c) Test load

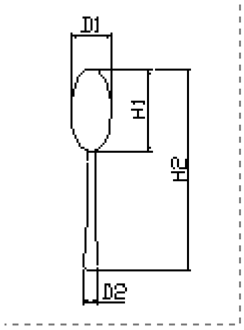
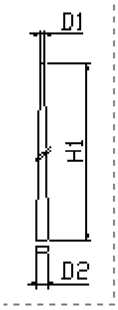
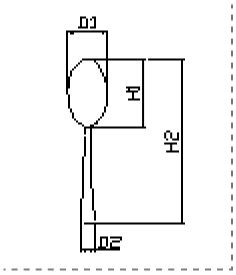
It means the amount based on [Table 5], which washing capacity, the sizes and shapes are based on [Table 3]. Rated washing capacity is based on Korean traditional cooking.

[Table 3] Shape and kind of tableware

Item	Dimension(㎜)
Rice bowl	120~70 × 60
Soup bowl	150~85 × 50
Dessert dish	Diameter 160
Dinner plate	Diameter 220
Oval platter	Diameter 265
Coffee cup	Diameter 90
Saucer	Diameter 145
Glass	Diameter 65, Capacity 250 ㎖
Spoon	[Figure 1] reference
Chopsticks	[Figure 1] reference
Teaspoon	[Figure 1] reference

[Figure 1] Shape and kind of tableware

Classification		Divisions of dimensions	Dimensions (㎜)
Rice bowl		D1 D2 H	120±10 70±5 60±5
Soup bowl		D1 D2 H	150±10 85±10 50±5
Dessert dish		D1 D2 H	160±10 - 20±5
Dinner plate		D1 D2 H	220±10 - 25±5
Oval platter		D1 D2 H	265±10 - 30±5
Coffee cup		D1 D2 H	90±10 - 60±5
Saucer		D1 D2 H	145±10 - 20±5
Glass		D1 D2 H Capacity	65±10 - 110±10 250㎖

Spoon		D1 D2 H1 H2	40±5 10±2 60±5 200±10
Chopsticks		D1 D2 H1	3.5±1 6.5±1 205±10
Teaspoon		D1 D2 H1 H2	20±2 7±2 40±5 135±5

[Table 4] Tableware of the test load by one person.

No.	Item	Number of pieces	Remarks
1	Rice bowl	1	[Figure 1] reference
2	Soup bowl	1	
3	Dessert dish	1	
4	Dinner plate	0.5	
5	Oval platter	[Table 5] reference	
6	Coffee cup	0.5	
7	Saucer	0.5	
8	Glass	0.5	
9	Spoon	1	
10	Chopsticks	1	
11	Teaspoon	0.5	

[Table 5] Test load

Division	4 person below	6 person	8 person	10 person	12 person	14 person above
Rice bowl	4	6	8	10	12	14
Soup bowl	4	6	8	10	12	14
Dessert dish	4	6	8	10	12	14
Dinner plate	2	3	4	5	6	7
Oval platter	1	2	3	3	4	5
Coffee cup	2	3	4	5	6	7
Saucer	2	3	4	5	6	7
Glass	2	3	4	5	6	7
Spoon	4	6	8	10	12	14
Chopsticks	4	6	8	10	12	14
Teaspoon	2	3	4	5	6	7
Total	31	47	63	78	94	110

6.3.3 Soiling agents

All soiling agents should be prepared newly for all the test, and soiling agents shall be satisfied the following

a) Rice

1) The rice is the superlative quality (Do not past six months after polished)

2) Cooking condition : ratio of rice and water shall be by 1:1.1

3) Way to make steamed rice are following two ways.

(a) Rice kettle

(1) Pour enough water to rice and mix quickly. And throw away water, rub strongly and wash out three or four orders until water becomes clean.

(2) Pour enough water and, extract moisture in wicker basket after 30 minutes in the summer and hours in the winter.

(3) Put rice and water in rice cooker, begin to boil with intermediate fire, and reduce by weak fire for 4~5 minutes to not overflow.

(4) After 15 minutes with the very weak fire and boil with the strong fire for 5 seconds to remove water of remainder before put out the fire.

(5) Remain for 10～15 minute with the lid covering and mix well.

(b) Electric rice cooker

(1) The same procedure with rice kettle

(2) Cook according to manufacturer's instructions.

4) Grain of steamed rice used in test : it shall be used within 8 hour after cooking. Only, 24 hours must not pass in electric rice cooker.

b) Egg yolk

1) Use standard top-grade eggs within effective use period weighing 50~65g which have been stored in a refrigerator.

2) Upon removal from the refrigerator 1 hour before use.

3) At least break 3 eggs shells and separate the yolks from the whites.

4) Place the yolks in a suitable container and stir well with a fork.

c) Margarine

1) Use only low fat household margarine with less 60% fat.

2) Store in a refrigerator before use.

3) Use margarine within effective use period.

d) Kimchi

1) Kimchi shall be satisfied with KS H 2169.

2) Fermentation shall not be considered.

3) Use 0.3g cayenne after filtering with standard screen of KS A 5101(Mesh 10, screen size 1.4~1.7㎜, and 0.3g).

e) Milk

1) Homogeneous liquid milk with an 1.5~2.0% fat.

2) Store in a refrigerator before use.

3) Use margarine within effective use period.

f) Coffee

1) Freeze-drying instant coffee shall be satisfied with KS H 2114-1998.

2) Put 70㎖ water that boils at 90℃ higher, mix 1.8g instant coffee, 5.8g sugar, and 4.4g primer well.

3) Instant coffee, sugar and primer shall be store in a refrigerator.

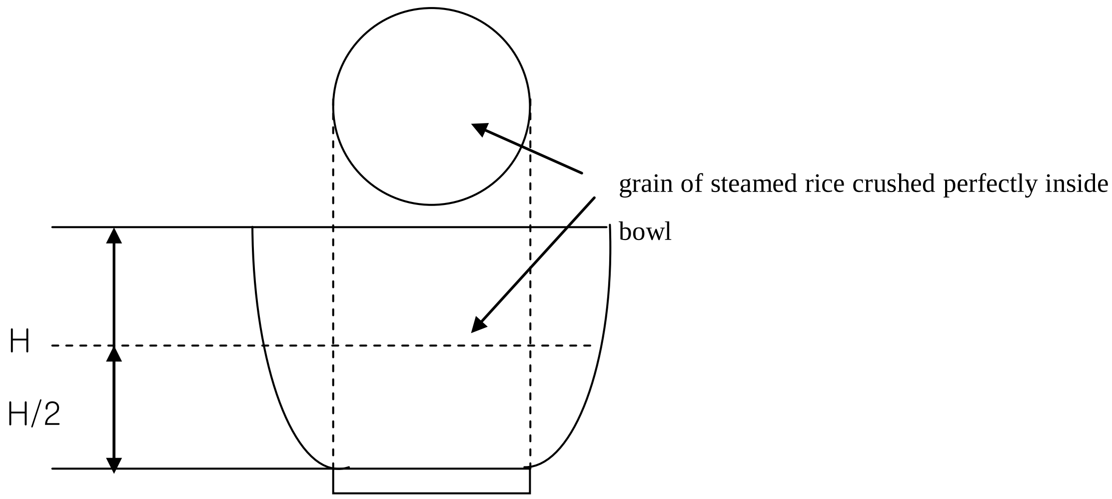
4) Use Instant coffee, sugar and primer within effective use period.

6.3.4 Preparation and application

6.3.4.1 Soiling

a) Grain of steamed rice

1) For rice bowl grain of steamed rice 20 crushed perfectly inside bowl is left at ambient temperature more than 2 hours.

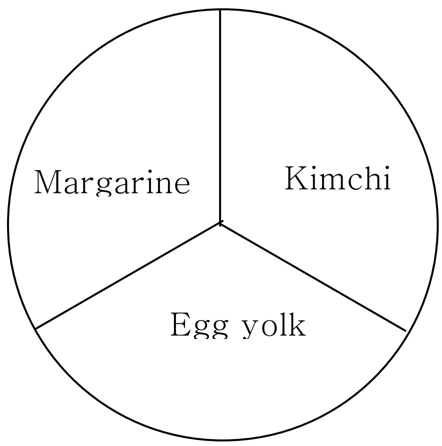


[Figure 2] Position of grain of steamed rice in rice bowl

b) Egg yolk

1) Use a pastry brush (KS G 2103, writing brush No. 28) to smear 3g of egg yolk per plate evenly over the top surface of each oval and dinner plate and dessert dish so as to cover a sector of the sunken surface equal to one-third of its area (see [Figure 3]).

2) Each plate shall be left more than 2 hours at ambient temperature (laboratory temperature) after staining egg yolk evenly.



[Figure 3] Application position of soiled plate

c) Margarine

1) After left at ambient temperature, use a pastry brush to smear 1.5g of margarine per plate evenly over the top surface of each oval and dinner plate and dessert dish so as to cover a sector of the sunken surface equal to one-third of its area.

2) Use a pastry brush to smear 1.5g of margarine per soup bowl evenly over the top surface of soup bowl.

3) All plates and soup bowls shall be left more than 2 hours at ambient temperature (laboratory temperature) after staining margarine evenly.

d) Kimchi

1) Use a pastry brush (KS G 2103, writing brush No. 28) to smear kimchi juice per plate evenly over the top surface of each oval and dinner plate and dessert dish so as to cover a sector of the sunken surface equal to one-third of its area (see [Figure 3]).

2) Provide 0.3g cayenne equally on oval and dinner plate and dessert dish dessert plate.

3) Each plate shall be left more than 2 hours at ambient temperature (laboratory temperature) after provide kimchi juice and cayenne.

e) Milk

1) After shake enough milk kept in a refrigerator (more than 30 seconds), 10㎖ of milk shall be removed after soiling all insides glass (250㎖)

2) Leave more than 2 hours at ambient temperature (laboratory temperature).

f) Coffee

1) 70㎖ of coffee shall be removed from coffee cup after soiling all insides coffee cup (250㎖)

2) Leave more than 2 hours at ambient temperature (laboratory temperature).

3) 10㎖ of coffee shall be removed from saucer after soiling the top surface of saucer, and leave more than 2 hours at ambient temperature (laboratory temperature).

6.3.4.2 Loading

Load the dishwasher in accordance with the manufacturer`s recommendations without stacking the dishware or nesting the cutlery. Only, without the manufacturer`s recommendations arrange well without stacking the dishware or nesting the cutlery. Also, the arrangement of tableware shall be at equal position for each test.

6.3.4.3 Operating

a) The dishwasher shall be operated at least for two complete cycles using a clean dish load and without detergent and rinse agent at program specified by the manufacturer. The amount of detergent and rinse agent shall be specified by the manufacturer.

b) After above operating, operate the dishwasher through one complete cycle with load twice.

c) The test sample is 2 units.

6.3.5 Washing performance

Washing performance shall be evaluated at a standard mode or similar mode specified by the manufacturer.

6.3.6 Evaluation

a) At the completion of the cycle, carefully remove one piece of the ware at a time and inspect all surfaces visually for any soil. Each piece shall be examined visually in all well-lighted area using diffused light giving an intensity of 1000 to 1500lx measured at the work area where the evaluation is to be made.

b) It is suggested that the observation of each piece shall be limited to about 10s.

c) Rating Value is according to the rating system in [Table 6].

[Table 6] Evaluation point for washing Performance

Number of soiled particle	Total soiled area ㎟	Point
n=0	A=0	5
0<n≤4	0<A≤4	4
4<n≤10	4<A≤20	3
10<n	20<A≤50	2
N/A	50<A≤200	1
N/A	200<A	0

[Table 7] Evaluation table for washing Performance

No (z)	Soiling Agent	Tableware	Number of Tableware (n_z)	Point a_b number of tableware, b point						Total point $C_z = \sum_{b=0}^{5} a_b \times b$
				5	4	3	2	1	0	
1	Boiled rice	Rice bowl								
2	Margarine	Soup bowl								
3	Kimchi Margarine Egg yolk	Dessert dish								
4	Kimchi Margarine Egg yolk	Dinner plate								
5	Kimchi Margarine Egg yolk	Oval plate								
6	Coffee	Coffee cop								
7	Coffee	Saucer								
8	Milk	Glass								
	Total tableware number N =									$\sum C_z =$
Remark :					Test number :					

d) Assessment of washing performance index

After each piece has been judged according to the above rating system, the total value of the scores assigned is divided by the maximum possible score (the total pieces used in the washing measurement multiplied by two). The quotient obtained with following formula is the "washing performance index" for the washing measurement.

$$C_{T,i} = \frac{1}{5N} \sum_{z=1}^{Nn} C_z \times 100$$

Washing performance index is expressed to one decimal places from the maximum of 100% to minimum of 0%.

6.4 Energy consumption test

a) Power consumption test (kW)

1) Power consumption is determined with tablewares in clause 6.3 at rated voltage and frequency after power consumption becomes stable, and expressed in kW.

2) Power consumption is expressed in kW to two decimal places.

b) Power quantity consumption test (kWh)

1) Power consumption is determined during operations of washing performance test in clause 6.3 condition for a program the manufacturer specified. Electrical energy (E_e) is accumulated for a complete cycle, and expressed in kWh.

2) Power consumption is expressed in kWh to two decimal places.

3) Correction factor

(a) If the inlet temperature of the cold water deviates from 15℃, the cold water energy correction factor shall be determined using the following formula:

$$E_c = \frac{Q_C \times (t_c - 15)}{860}$$

Where,

E_c is the cold water energy correction in kWh during a complete test

t_c is the measured inlet temperature of the cold water in degree Celsius, 13~17℃

Q_c is the volume of the cold water used during the prewash and main wash only, in ℓ

(b) If the inlet temperature of the hot water is supplied, the hot water energy correction factor shall be determined using the following formula:

$$E_h = \frac{Q_h \times (t_h - 15)}{860}$$

Where,

E_h is the hot water energy correction in kWh during a complete test
t_c is the measured inlet temperature of the hot water in degree Celsius
Q_h is the volume of the hot water used during the prewash and main wash only, in ℓ

4) The total energy consumption (E_t) is calculated as follows;

$$E_t = E_e + E_c + E_h$$

c) Water consumption test

1) Water consumption is determined during operations of washing performance test in clause 6.3 for a program the manufacturer specified. Water consumption is accumulated for a complete cycle, and expressed in ℓ.

b) Water consumption is expressed in kWh to one decimal places.

d) Length of cycle

1) Length of cycle is determined during operations of washing performance test in clause 6.3 for a program the manufacturer specified, and is measured for a complete cycle, and expressed in minute, and second.

6.5 Drying performance test

a) The drying performance test may be made in conjunction with the washing performance test or it may be made independently from the washing measurement. If it is made in conjunction with the wash measurement, the drying measurement is made before the washing performance measurement, 30min after the completion of the cycle. If the test sample has plural number of dish racks, the evaluation should be done from the lower dish rack to higher.

b) If drying performance is measured independently, the drying measurement is made 30min after the completion of the cycle.

c) The test load shall consist of the same number and type of place setting and serving pieces as are used to measure washing performance (see clause 6.3).

d) Evaluation

1) After 30min, the dishware shall removed one piece at a time, beginning with

pieces in the lower dish rack if possible as follows.

2) Drying effect is evaluated by visual inspection and judged to be “dry”, “intermediate” or “wet”.

3) “Dry” is defined as an article being completely free of moisture. In this case, the article will be given a score of 2. “Intermediate” is defined as an article having one or two drops of water, or one wet streak (run). In this case, the article will be given a score of 1. “Wet” is defined as an article having more than two drops of water or on trop and one streak or two streaks or water in glass or cup cavity. In this case, the article will be given a score of 0.

4) It is suggested that the average time to examine an individual piece should not exceed 3s. The total evaluation time for handing any evaluation should not exceed 8 sec per each dish. (include all procedures, take-out, inspection, evaluation, put-down, and record)

[Table 8] Evaluation point for drying performance

Grade	Test point	Dry of tableware
Dry	2	When there is no entirely drop or moisture
Intermediate	1	When there is one or two drops of water, or one wet streak.
Wet	0	When there is more than two drops of water or on trop and one streak or two streaks or water in glass or cup cavity

[Table 9] Evaluation table for drying performance

Number z	Tableware	Number of Tableware, n_z	Tableware point a_c tableware, C point			Total point
			2	1	0	$D_z = \sum_{c=0}^{2} a_c \times c$
1	Rice bowl					
2	Soup bowl					
3	Dessert dish					
4	Dinner plate					
5	Oval plate					
6	Coffee cup					
7	Saucer					
8	Glass					
9	Spoon					

10	Chopsticks					
11	Tee spoon					
	Total tableware number N=					$\sum D_z =$
Remark :		Test number :				

5) Assessment of drying performance index

After each piece has been judged according to the above rating system, the total value of the scores assigned is divided by the maximum possible score (the total pieces used in the washing measurement multiplied by two). The quotient obtained with following formula is the "drying performance index" for the drying measurement.

$$C_{T,i} = \frac{1}{2N} \sum_{z=1}^{Nn} D_z \times 100$$

Drying performance index is expressed to one decimal places from the maximum of 100% to minimum of 0%.

6) Only, a tableware contacts with dish rack or is placed in lower column of dish rack with filled water can be excepted for assessment.

e) Product with nature convection drying shall be conducted manufacturer's recommendation.

6.6 Data to be recorded in the test report

A following data shall be recorded after test.

a) Program at test
b) Test condition : Power source, condition of laboratory, water supply, rated washing capacity
c) Detergent and rinse agent
d) Measured power consumption, correction factor of cold water, correction

factor of hot water (applicable if using hot water), total power consumption
e) Water consumption
f) Number of tableware
g) Washing performance index
h) Drying performance index
i) Length of cycle (wash and dry)

7. Tolerance of test result

a) Washing performance index shall be not less than 94% of the rated value of manufacturer.
b) Drying performance index shall be not less than 90% of the rated value of manufacturer.
c) Power consumption shall be not more than 110% of the rated value of manufacturer.
d) Water consumption shall be not more than 110% of the rated value of manufacturer.
e) Length of cycle shall be not more than 110% of the rated value of manufacturer.

8. Calculation of energy efficiency

a) Test results shall be recorded as follows.

<table>
<tr><th rowspan="2">Test sample</th><th rowspan="2">Number of test</th><th rowspan="2">Noise (dB)</th><th rowspan="2">Washing performance index (%)</th><th rowspan="2">Drying performance index (%)</th><th colspan="2">Water consumption (ℓ)</th><th colspan="4">Power consumption (kWh)</th></tr>
<tr><th>Hot water</th><th>Cold water</th><th>E_c</th><th>E_h</th><th>E_e</th><th>E_t</th></tr>
<tr><td rowspan="3">1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Average</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Average</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Average</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

b) The test sample is 2 units per model.

c) Mean value of washing performance index shall be more than 80.0%, and drying performance shall be more than 50.0%.

d) Monthly power consumption

1) Monthly power consumption

$$PMEC = \frac{E_t \times 365}{12} \qquad \text{(kWh/month)}$$

PMEC : Monthly power consumption (kWh/month), one decimal place

E_t : Total power consumption (kWh), two decimal place

12 : month/year

2) Monthly water consumption

$$PMWC = \frac{Q_c \times 365}{12} \qquad (\ell\text{/month})$$

PMWC : Monthly water consumption (ℓ/month), one decimal place

Q_c : Total water consumption (ℓ), one decimal place

12 : month/year

f) Calculation of energy efficiency index

Test sample	Noise (dB)	Washing performance index (%)	Drying performance index (%)	Monthly water consumption PMWC(ℓ/month)	Monthly power consumption PMEC(kWh/month)
1					
2					
Average	P/N	P/N	P/N		

*Remarks : Ｐ-Pass, **N**-Non Pass

1) Electrical energy efficiency ratio

$$EER_e = \frac{RC \times 10}{PMEC}, \quad \text{two decimal places}$$

Where,

RC : Rated washing capacity

2) Water energy efficiency ratio

$$EER_w = \frac{RC \times 10}{PMWC}, \quad \text{two decimal places}$$

Where,

RC : Rated washing capacity

3) Total Energy Efficiency ratio

$$EER_t = EER_e \times EER_w, \quad \text{two decimal places}$$

9 .Marking

9.1 Marking and marking method

Marking includes at least the next items and should be placed at backside or side of each product that consumer is apt to see. However, if marking items in energy efficiency label duplicates in KS standard level and others certificates, it can be excepted.

a) Model Name
b) Rated washing capacity
c) Monthly water consumption (PMWC, ℓ/month)
d) Monthly power consumption (PMEC, kWh/month)
e) Washing performance index (%)
f) Drying performance index (%)
g) Program at test
h) Water consumption (ℓ)
i) Power consumption (kWh)
j) Test laboratory
k) Length of cycle (minute)
l) Detergent (g)
m) Rinse agent (㎖)
n) Manufacturer or the code
o) Producing date or producing number
p) Address and telephone number for A/S

9.2 Caution on use and installation

When dishwasher is installed and used, in case of special caution, it shall be marked on product or manual.

4. Dish drier

1. Scope

- A machine which only dries dishware, glassware, cutlery and, in some cases, cooking utensils by electrical means with the rated capacity 10 person or less after washing, and has the top or front door or sliding door.

Remark : The units and numerical values given in ( ) in this standard are in accordance with the previous standard and are appended for reference.

2. Reference

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS C IEC 60335-1 Safety of household and similar electrical appliances－Part 1 ︰ General requirements
KS C IEC 60335-2-5 Household and similar electrical appliances－Safety－Part 2-5 ︰ Particular requirements for dishwashers
KS C IEC 60704-2-3 Household and similar electrical appliances－Test code for the determination of airborne acoustical noise－Part 2－3 ︰ Particular requirements for dishwashers
KS C IEC 60436 Methods for measuring the performance of electric Dishwasher
KS L 9202 Bone porcelain and bowl of soup

3. Definitions

For the purposes of this standard, the following terms and definitions apply,

a) Dish drier
A machine which only dries dishware, glassware, cutlery and, in some cases, cooking utensils by electrical means.

b) Rated capacity

The rated capacity is the number of place settings together with the serving pieces (see [Table 2]) stated by the manufacturer when the dish drier is loaded in accordance with the manufacturer`s instructions.

c) Top or front door type

A dish drier has the top or front open door which can open less 1/6 of storage compartment.

d) Sliding door type

A dish drier has the sliding open door which can open more than 50% of storage compartment.

e) Power consumption

Electric power consumption shall be measured for 20 minutes drying process.

f) Test load

Dishware, glassware, and cutlery for evaluating drying performance

4. Test Conditions

4.1 General conditions

The dish drier manufacturer`s instructions regarding installation and use of the dish drier should be followed. These instructions are those provided with the dish drier in the form of instruction pages and/or user information booklets. Before commencing measurements, the dish drier shall be checked to ensure that it is operating properly. This standard provides reliability for comparative testing when tests are conducted in the same laboratory, at one time, using the same operators.

4.2 Installation

The dish drier shall be installed in accordance with the manufacturer`s instructions and shall be at ambient temperature at the start of each measurement.

4.3 Electrical supply

a) Frequency : rated frequency ±1%.
b) Voltage : rated voltage ± 2%

4.4 Ambient conditions
Temperature shall be 20 ± 2℃ with a relative humidity of 45%~65% .

5. Performance

There are as follows ;

a) Power consumption : Electric
b) Drying performance

5.1 Electric power consumption
The value shall be not more than 110% of the rated value when tested with method 6.3.

5.2 Drying performance
The value shall be more than 90% of the rated value when tested with method 6.4.

6. Test method
6.1 General
The dish drier manufacturer`s instructions regarding installation and use of the dish drier should be followed. These instructions are those provided with the dish drier in the form of instruction pages and/or user information booklets. Before commencing measurements, the dish drier shall be checked to ensure that it is operating properly.

6.2 Test procedures and test conditions
a) 1 Step : Before test all load and sample shall be maintained at clean and dry conditions.
b) 2 Step : Conduct 6.3 power consumption test.
c) 3 Step : Conduct 6.4 drying performance test

6.3 Power consumption test

a) Power consumption is determined with tablewares in clause 6.4 at rated voltage and frequency for 20 minutes after 5 minute of all tableware loading, and expressed in Wh. All loads shall be put in water (20 ± 2℃) for 5 minutes, and loaded.
b) Power consumption is expressed in Wh to two decimal places.
c) Each sample shall be tested twice with the same procedure.
d) The test sample is 2 units per model.

6.4 Drying performance test
6.4.1 General

This describes to evaluate drying performance for the tablewares, and it shall be tested twice with two samples per a model. The test load used in this test is according to [Table 1] and [Figure 1].

6.4.2 Standard place setting and serving pieces for test load
a) Requirement
The tableware should be glossy without any crack or scratch. To prepare the tableware (whether they are new or not) for the test, they should be completely cleaned with hot and clean water, and dried before the test. Putting papers or the like between them, the tableware should be prevented from a scratch.

b) Standard place setting and serving pieces
One place setting shall consist of the pieces shown [Table 1]. The shapes and the sizes of the rice bowl and the soup bowl should be prepared based on [Table 2 convex shape], [Table 3 square shape] in KS L 9202. The others are based on IEC 60436 [Table 1]. The standard tableware should be evenness on the surface and white china. Spoons, chopsticks, and teaspoons should be stainless according to [Table 1].

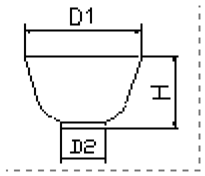
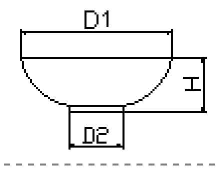
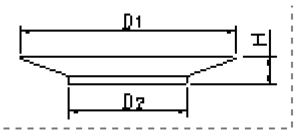
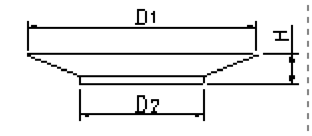
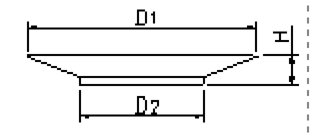
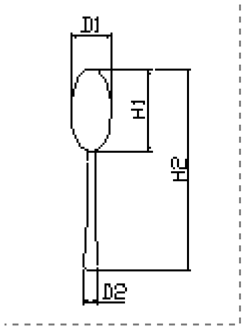
c) Test load
It means the amount based on [Table 3], which the rated capacity, the sizes and shapes are based on [Table 1].

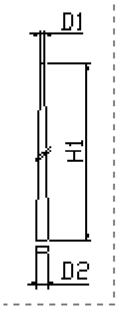
[Table 1] Shape and kind of tableware

Item	Dimension(㎜)

Rice bowl	120~0 × 60
Soup bowl	150~85 × 50
Dessert dish	Diameter 160
Dinner plate	Diameter 220
Oval platter	Diameter 265
Spoon	[Figure 1] reference
Chopsticks	[Figure 1] reference

[Figure 1] Shape and kind of tableware

Classification		Divisions of dimensions	Dimensions (㎜)
Rice bowl		D1 D2 H	120±10 70±5 60±5
Soup bowl		D1 D2 H	150±10 85±10 50±5
Dessert dish		D1 D2 H	160±10 - 20±5
Dinner plate		D1 D2 H	220±10 - 25±5
Oval platter		D1 D2 H	265±10 - 30±5
Spoon		D1 D2 H1 H2	40±5 10±2 60±5 200±10

Chopsticks	 	D1 D2 H1	3.5±1 6.5±1 205±10

[Table 2] Tableware of the test load by one person.

No.	Item	Number of pieces	Remarks
1	Rice bowl	1	
2	Soup bowl	1	
3	Dessert dish	1	
4	Dinner plate	0.5	
5	Oval platter	RC ≤ 4 person : 1 RC = 6 person : 2 6 < RC ≤ 10 : 3	[Figure 1] reference
9	Spoon	1	
10	Chopsticks	1	

[Table 3] Test Load

Category	Rice bowl	Soup bowl	Dessert dish	Dinner plate	Oval platter	Spoon	Chopsticks	Total
More than 8 persons	4	4	4	2	1	4	4	23
6~7 persons	2	2	2	1	1	2	2	12
Less than	1	1	1	1	1	1	1	7

5 persons

d) Loading

Test Load in [Table 3] shall be loaded the dish drier in accordance with the manufacturer`s recommendations without stacking the dishware. Also, the arrangement of tableware shall be at equal position for each test.

6.4.3 Drying performance

a) Evaluation of drying performance shall be conducted with unplugged 30 minutes later when power consumption test has been done.

b) Evaluation

1) After 30min, the dishware shall removed one piece at a time, beginning with pieces in the lower dish rack if possible as follows.

2) Drying effect is evaluated by visual inspection and judged to be “dry”, “intermediate” or “wet”.

3) “Dry” is defined as an article being completely free of moisture. In this case, the article will be given a score of 2. “Intermediate” is defined as an article having one or two drops of water, or one wet streak (run). In this case, the article will be given a score of 1. “Wet” is defined as an article having more than two drops of water or on trop and one streak or two streaks. In this case, the article will be given a score of 0.

4) It is suggested that the average time to examine an individual piece should not exceed 3s. The total evaluation time for handing any evaluation should not exceed 70 sec for all. (include all procedures, take-out, inspection, evaluation, put-down, and record)

5) Scores shall be recorded in [Table 5]. Drying performance index is expressed to one decimal places from the maximum of 100% to minimum of 0%.

6) Only, a tableware contacts with dish rack or is placed in lower column of dish rack with filled water can be excepted for assessment.

[Table 4] Evaluation point for drying performance

Grade	Test point	Dry of tableware
Dry	2	When there is no entirely drop or moisture
Intermediate	1	When there is one or two drops of water, or one wet streak.
Wet	0	When there is more than two drops of water or on trop and one streak or two streaks.

[Table 5] Evaluation table for drying performance

Tableware	Number of Tableware,	Tableware point a_c tableware, C point	Total point

	n_z	2	1	0	$D_z = \sum_{c=0}^{2} a_c \times c$
Rice bowl					
Soup bowl					
Dessert dish					
Dinner plate					
Oval plate					
Spoon & Chopsticks					
Total tableware number	N =				$\sum D_z =$
Drying performance = (Total points/(Number of Load x 2))x100 = %					Time : s

7. Tolerance of test result

a) Drying performance index shall be not less than 90% of the rated value of manufacturer.
b) Power consumption shall be not more than 110% of the rated value of manufacturer.

8. Calculation of energy efficiency

a) Test results shall be recorded as follows.

Sample	Test Number	Power consumption (Wh)	Drying Performance (%)
1	1		
	2		
	Average		
2	1		
	2		
	Average		
Average			(P/N)

[Remark] : P-Pass, N-Non-Pass

b) The test sample is 2 units per model.

c) Mean value of drying performance shall be more than 60.0%.

9 .Marking

9.1 Marking and marking method

Marking includes at least the next items and should be placed at backside or side of each product that consumer is apt to see. However, if marking items in energy efficiency label duplicates in KS standard level and others certificates, it can be excepted.

a) Model Name
b) Rated capacity (person)
c) Rated power consumption (W)
d) Manufacturer or the code
e) Producing date or producing number
f) Address and telephone number for A/S

9.2 Caution on use and installation

When dish drier is installed and used, in case of special caution, it shall be marked on product or manual.

5. Electrical Cooler and Heater for Drinking-Water Storage

1. Scope

This standard covers that electrical cooler and heater for drinking-water storage (hereinafter “ECHDS”) shall be designed the vapor-compressor cooler, heater, and water storage in a cabinet. (Water purifier is included) Rated cooling power consumption of not more than 500W and rated heating power consumptions of not more than 1000W. The rated input voltage is DC 220V and the rated frequency is 60Hz for the device. The followings are exclusives.

a) Cold water only
b) Hot water only
c) Water purifier only
d) Cold water and water purifier only
e) Hot water and water purifier only
f) For automobile, vessel, and aircraft
g) For hot water or cold water vending machine
h) For a soft drink supplier as a vending machine
i) Using the electric thermal conduction semiconductor (N-P Module)
j) For only industry or commercial business with more than one cold or hot water discharge valve
k) For using in the open air
l) For using other power sources (e.g.: gas, petroleum, solar heat etc)

Remark : The units and numerical values given in ( ) in this standard are in accordance with the previous standard and are appended for reference.

2. Reference

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS A 0006 Standard atmospheric conditions for testing

KS A 5002 Statistical interpretation of data－Part 1：Statistical presentation of data
KS A 0078 Humidity－Measurement methods
KS A 0511 Temperature measurement-General requirement
KS A 0801 General rules for determination of thermal efficiency
KS B 6365 Testing of refrigerant compressors
KS C 8308 Thermostats
KS C 8336 Automatic control for thermostat
KS C 9315 Drinking-water coolers
KS C 9803 Electric storage tank water heaters
KS C 9804 Electric-water heaters
IEC 60335-1 Household and similar electrical appliances safety. Part 1: General requirements
IEC 60335-2-15 Particular requirements for appliances for heating liquids
IEC 60335-2-21 Particular requirements for storage water heaters
IEC 60335-2-34 Particular requirements for motor-compressors
IEC 60335-2-35 Particular requirements for instantaneous water heaters
IEC 60335-2-75 Particular requirements for commercial dispensing appliances and vending machines
IEC 60379 Methods for measuring the performance of electric storage Water-Heaters for household purposes
Industrial Advancement Administration (the abbreviation is IAA)'s notification No. 95-375: Guide of administration according as consumption power and efficiency labeling by electric households appliances.

3. Definitions

For the purpose of this standard, the following definitions shall apply

a) General condition
ECHDS is operated under 5.1 General test condition with the rated voltage of 220V, and the rated frequency of 60Hz, by the general usage introduced by the manufacturer.

b) Steady condition

While ECHDS is being operated continuously under 5.1 General test condition, the mean temperature of each part shall be fluctuated within 1℃ or less per 2 hours in condition which temperature of each part of testing samples remain constant.

c) Compressor

A machine driven by electric motor or electromagnetic (hereafter referred to as “electric motor”), which mechanically compresses the vaporized refrigerant form the cooler to a high pressure and high temperature. Acting it continuously and repeatedly, the machine should cool the refrigerant by the evaporative of latent heat.

d) Electric thermal conduction semiconductor

When different two kinds of N-P type of electric thermal conduction semiconductor element or joining metal are supplied with electric current, it can be seen phenomenon that temperature goes down or rises by both ends of joining point. Namely, it is to use phenomenon of endothermic or exothermic reaction, which mechanically compresses the vaporized refrigerant form the cooler to a high pressure and high temperature. Acting it continuously and repeatedly, the device should cool the refrigerant by the evaporative of latent heat.

e) Cooler

A heat exchanger in which the liquid refrigerant is vaporized at low pressure by absorbing heat from the medium to refrigerate the storage cabinet.

f) Pre-cooler

It is in advance cooling and heating appliances which wastewater from ECHDS is used to supply drinking water.

g) Electric heater

It is a device to heat water of the storage tank directly or indirectly with Ni -Cr or Fe-Cr resistance as an electric heating element.

h) Automatic temperature control device

It is a device that keeps the temperature of water in storage at a certain value by detecting surface temperature of storage in case of chilled and hot water etc., while ECHDS is operated under general condition by clause a). (various and fixed temperature type)

i) Reducing valve

This valve is installed in the middle of water supply pipe that regulates the water pressure below required. At the same time, it prevents a back-ward flow of the water.

j) Relief valve

When water pressure occurs over required pressure at storage tank or water supply pipe, it automatically releases pressure of a storage tank for safety. It maintains the pressure below 0.1MPa (water head of 10m) at inside of tank.

k) The total volume of storage tank

This is a value that means the effective volume of tank that can store water in the hot and cold water tank, it must be expressed in ℓ separately for hot and cold water tank as the defined at (7). Summation of both volume is called the total volume of storage tank.

l) Measurement of the total volume of storage tank

First, fill water in the hot and cold water storage tank, and then measure the water flow from drain with precision electronic balance or measuring cylinder. It shall be within ±2% of the rated value. Here, assuming that specific gravity of water is 1.

m) Power consumption of electric motor

When ECHD is operated at (a) general condition and (b) steady condition, power consumption of electric motor shall be sum of power consumed by electric motor, which is directly related to the cooling such as compressor and ventilating fan.

n) Power consumption of heater

When ECHD is operated at (a) general condition and (b) steady condition, power consumption of heater shall be sum of power consumed by heater.

o) Monthly electric power consumption

When ECHD is operated at sub-clause 1) of 5.2 a), monthly electric power consumption is determined by 2) of 5.2 a), it shall be not more than 110% of rated value (kWh) of manufacturer.

p) Electric power consumption per 1L

Electric power consumption per 1L is calculated by 5.2. d) as ratio between electric energy consumed to cool or heat to setting temperature and thermal energy absorbed by water after filling cold and hot water storage tank of ECHWD with water.

4. Classification

ECHDS is classified as following according to water supplying way, water discharging way, and heat exchanging ways.

4.1 Water supply

a) Pressure type

A water supply pipe of ECHDS directly connects the water pipe of source, which is a kind of method that stores and supplies drinking water by water pressure.

b) Water storage tank type

A water supply pipe of ECHDS connects a water storage tank, which is a kind of method that stores and supplies drinking water by gravity.

4.2 Water discharge

a) Inlet valve control

Drinking water is discharged to control the inlet valve of ECHDS.

b) Outlet valve control

Drinking water is discharged to control the outlet valve of ECHDS.

4.3 Heat exchanger

a) Storage water

It has the water storage tank to do heating and cooling water in tank with insulation, where water is stored at specified temperature with automatic temperature control device.

1) Direct cooling method and direct heating method
To Cool and heat directly water that is stored in storage tank, cooling coil and electric heater are inserted in storage tank directly.

2) Indirect cooling method and indirect heating method
To Cool and heat directly water that is stored in storage tank, cooling coil and electric heater are wrapped outside storage tank.

b) Instant cooling and heating
It has no water storage tank to do heating and cooling, supply water is flowed in ECHWD from supply pipe. While it passes heat exchanger which is not insulated, momentarily water is cooled or heated at specified temperature with automatic temperature control device and reducing valve.

5. Energy efficiency test

5.1 General test condition
a) The installation of ECHWD in environmental chamber is as follows;
1) Test sample shall be installed on a flat floor surface horizontally and stably as manufacturer's instruction.
2) Test sample shall be installed far from the wall or the other sample more than 50 cm in order to not to be influenced from the others.

b) During the test, test sample shall stay until the inlet temperature becomes 25±0.5℃. And the test condition is that the ambient temperature of 25±1℃ and relative humidity of 75±5%.
1) In case of the ambient temperature fluctuates on test, the ambient temperature is determined by averaging the maximum temperature and minimum temperature. At this time, the deviation of the average temperature in the chamber shall be not more than ±3℃.

c) With setting control of temperature at the state of delivery of goods from a warehouse, test sample shall be operating for the 24 hours continuously with the rated voltage of 220V and the rated frequency of 60Hz.
1) Except the rapid load fluctuate of the start and stop of ECHWD, the rated voltage and the rated frequency shall be operated not more than ±1%.
2) ECHWD with optional ice-making function shall be tested by not selecting ice-making function except for the case that selecting ice-making function seems to get favorable results.
3) ECHWD with optional power-saving function is as follows;
a) No select power-saving function in case of ECHWD which saves a power by stopping cold or hot water operation for a certain period of time or controlling the temperature.
b) ECHWD which saves power by stopping sub-function regardless of cold or hot water function shall be tested by selecting power-saving function. For example, saving-power function by controlling brightness of display lamp

d) The measuring points which measure temperature of cold and hot water discharge to determine water temperature of cooler and heater for drinking-water storage shall be measured by keeping close to cold and hot water discharge valve if possible.

e) The number of test samples is 2 units.

f) The average value shall be taken after testing twice for each sample.
g) A test report shall be issued for each test units, namely 2 test reports for each models shall be issued.
h) Averaging value of monthly electric power consumption in a test report shall be marked on the product. Also, energy efficiency level shall be marked.

5.2 Tests

a) Monthly power consumption (kWh/month)
1) Until each part of test sample is stable, it is operated. After stable, measure electric power consumption for 24 hour. (measure the value to 2 places of decimals) The measured value is called as "P1"(kWh).

2) Measurement and calculation of water temperature of cold and hot water storage tank

(a) Calculation of "Tcm", minimum temperature of cold water storage tank, shall be test method of 5.1 d), which adds -0.7℃ at the minimum temperature of cold water discharge measured right after disconnecting a temperature controlling device of cooling water.

(b) Calculation of "Thm", maximum temperature of hot water storage tank, shall be test method of 5.1 d), which adds 1.3℃ at the maximum temperature of hot water discharge measured right after disconnecting a temperature controlling device of hot water.

3) Power consumption by cold and hot water discharge is called as "P2" and calculate as following equation.

$P2 = P2c + P2h$ (kWh)

Where, P2c is power consumption by cold water discharge [kWh]

P2h is power consumption by hot water discharge [kWh]

(a) Calculate P2c as following equation.

$P2c = Qc \times \triangle Tc \div 860 \div 0.7$ [kWh]

Here, Qc is volume of cold water storage tank [L]

△Tc is Tcm minus ambient temperature (25℃) [℃]

860 is a constant which quantity of heat(kcal/h) are converted into power consumption

0.7 is efficiency of cooler

(b) Calculate P2h as following equation.

$P2h = Qh \times \triangle Th \div 860$ [kWh]

Here, Qh is volume of hot water storage tank [L]

△Th is Thm minus ambient temperature (25℃) [℃]

860 is a constant which quantity of heat(kcal/h) are converted into power consumption

4) Calculate daily power consumption, “Pd”, as following equation. (Calculate to 3 places of decimals)

$Pd = P1 + P2$

5) Calculate monthly power consumption, “Pm”, as following equation. (Calculate to 3 places of decimals)

$Pm = Pd \times 365 \div 12$ [kWh/Month]

6) Calculate annual power consumption, “Py”, as following equation. (Calculate to 3 places of decimals)

$$Py = Pd \times 365 \text{ [kWh/Year]}$$

b) Measurement of the effective volume of a cold water storage tank and a hot water storage tank(ℓ)

1) After all tests, if there is no the independent cold water storage tank, eliminate the water supply tank and measure the effective volume for cold water storage tank (the base of a cooling water separator). If there is the independent cold water storage tank or hot water storage tank, measure the effective volume for storage tank. (the measured unit is ℓ and it is expressed to 2 places of decimals)

c) Expected power consumption of ECHDS for 24 hours is called as "P3". Calculate P3 as following equation.

P3 = P3c + P3h [kWh]

Where, P3c is expected power consumption for cold water [kWh]

P3h is expected power consumption for hot water [kWh]

1) Calculate P3c as following equation.

$$P3c = K \times Qc \times r \times \frac{\Delta T_C}{D} \times 24 \div 860 \div 0.7 [kWh]$$

Where, K is expected thermal conductivity of insulation 0.05[W/(m·℃)]

Qc is volume of cold water storage tank [L]

r is a constant which volume is converted into surface area. Value of Table 1 shall be applied

△Tc is Tcm minus ambient temperature [℃]

D is expected thickness of insulation 0.02[m]

24 is 24 hours

860 is a constant which quantity of heat(kcal/h) are converted into power consumption

0.7 is efficiency of cooler

2) Calculate P3h as following equation.

$$P3h = K \times Qh \times r \times \frac{\Delta Th}{D} \times 24 \div 860 [kWh]$$

Where, K is expected thermal conductivity of insulation 0.05[W/(m·℃)]

Qh is volume of hot water storage tank [L] r is a constant which volume is converted into surface area. Value of Table 1 shall be applied

△Th is Thm minus ambient temperature [℃]

D is expected thickness of insulation 0.02[m]

24 is 24 hours

860 is a constant which quantity of heat(kcal/h) are converted into power consumption

[Table 1]　r by volume of storage

Volume of storage tank (L)	r
≤ 1	0.065
1 < L ≤ 1.4	0.057
1.4 < L ≤ 1.8	0.052
1.8< L ≤ 2.3	0.048
2.3< L ≤ 3.0	0.044
3.0 < L ≤ 4.0	0.040
4.0 < L ≤ 6.0	0.035
6.0 < L ≤ 8.0	0.030
8.0 < L ≤ 10.0	0.027
10 <	0.024

d) Calculate power consumption per 1L as following equation.

Power consumption per 1L = $\frac{Pd}{0.5 \times Qc + Qh}$

Where, a constant 0.5 is 0.35, ratio of temperature difference of cold and hot water, divided by 0.7, efficiency of cooler

Qc is volume of cold water tank

Qh is volume of hot water tank

e) Calculation of energy efficiency index "R"

1) Calculation of energy efficiency index (R) is defined as follows;

$$R(Energyefficiencyundex) = \frac{P1[kWh]}{P3[kWh]}$$

Where,

P1 is power consumption with no water discharge for 24 hours, P3 is power consumption for expected thermal performance, energy efficiency index (R) is calculated to 3 places of decimals.

6 . Naming and marking

6.1 Name

a) Electrical cooler and heater for drinking-water storage

b) Electrical cooler and heater for drinking-water storage (including purifier)

6.2 Marking and marking method

Marking includes at least the next items and should be placed at backside or side of each product that consumer is apt to see. However, if marking items in energy efficiency label duplicates in KS standard level and others certificates, it can be excepted.

a) Model Name

b) The total volume of storage tank (L) : ex) 16.0 L

- volume of cold water storage tank (L) : ex) 8.0 L
- volume of hot water storage tank (L) : ex) 8.0 L

c) The volume of purifier storage tank (L) : it is only applicable to model which has a purifier.

d) Monthly power consumption (kWh/month)

e) Daily power consumption (kWh/day)

f) Power consumption per 1L (kWh)

g) Power consumption for 1 hour (kWh)

h) CO_2 emission per 1 hour (g)

i) Annual power consumption (kWh)
j) Annual energy cost (Won)
k) energy efficiency level

6.3 Caution on use and installation

When ECHDS is installed and used, in case of special caution, it shall be marked on product or manual.

6. Rice cooker

1. Scope

This standard covers household electric rice-cooker and rice-warmer with a rated voltage 220V, and less than a rated power consumption of 2kW.

It does not apply to the testing and rating of :

a) over 20 persons
b) Warmer only
c) other energy sources

2. Normative reference

   The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS A 0006 Standard atmospheric conditions for testing
KS A 5002 Statistical interpretation of data－Part 1：Statistical presentation of data
KS A 0078 Humidity－Measurement methods
KS A 0511 Temperature measurement-general requirement
KS A 0801 General rules for determination of thermal efficiency
KS C 9310 Electric rice－Cookers
KS C 9312 Rice jars with electric thermal control
KS G 3602 Household pressure pans and pressure pots
KATS's regulation "Safety scheme for electric appliances"

3. Definitions

a) Electric Rice-cooker

   Appliance is that cooks rice with electric heat automatically, and can make warm.

b) Electric pressure Rice-cooker

   Appliance is that cooks rice with electric heat at over 0.5 kgf/cm^2

c) Maximum cooking capacity

Maximum Capacity is that can cook at one time

d) Cooking capacity for one person : rice 150g is for one person
e) Plate Heating : Plate with electric heater
f) Rotary type
   To cook or be warm using mechanical timer or ON/OFF .
g) Micro-process method
   To cook or be warm using MICOM automatically.
h) Induction Heating
   Magnetic flux generated by high frequency current in coils generates eddy current in the surface of the inner pan. Eddy current loss changes to the Heat source for inner pan
i) Main Body
   All except top cover and inner pan
j) Inner pan
   It is put rice and water
k) Whole body
   All included, main body, top cover, and inner pan

4. Classification

Rice cookers are classified as following according to heating ways.

4.1 Heating method

a) Plate Heating
b) Induction Heating

4.2 Pressure method

a) Pressure type
b) Non-pressure type

5. Test

5.1 Test instruments

a) Thermometer : Accuracy ±0.5^{o}C, and minimum scale 0.1^{o}C or less
b) Powermeter : Accuracy ±1% at measuring data, and minimum scale 0.1Wh or less
c) Weight Scale : minimum scale 0.1g or less
d) Water contained measuring equipment : minimum scale 0.1% or less

5.2 Test condition

a) Ambient Condition

20±2.0°C, and 45~75%

b) Rice

1) rice plant is `presumptions'.

2) The water contained in polished rice shall be between 12-14%.

c) Cooking Water

1) Distilled water or more than 2 hours of the settled service water.

2) Water volume shall be followed by manufacture's instruction.

3) Water temperature : 20±2.0°C at initial condition

4) Measuring : Use a weight scale to be round off to decimals points, and keep dry in inner pan.

d) Electrical supply

The rated voltage shall be single phase AC 220V±1%, 60Hz±1%.

5.3 Test method and test times

a) Before cooking rice shall be washed 3 times. Also, once the washing rice does within 1 minute.

b) Test precondition is required within 1 minute from washing rice to cooking.

c) Before starting a test the temperature of inner pan and heater shall be 20±2℃.

d) If there is on/off switch, a switch shall turn off.

e) The power consumption is almost stabilizes in the test from cooking commencement to cooking end. (Pressure type measured by polished rice pressure course and non-pressure type measured by a normal cooking course.) When the test of power consumption, quantity of rice shall be the appropriate values given in Table 1. Round off the number to decimal places.

f) The power consumption per 1 hour at warm condition shall conform to the followings.

1) After measuring cooking power consumption, immediately it starts keeping warm.

2) It shall measure a power consumption at warming for 24 hours, and calculate power consumption per 1 hour, but if it complete before 24 hours,

it shall be measured and calculated by duration.

g) Cooking power consumption and warming power consumption per 1 hour shall be measured 2 times respectively, and they shall be averaged. Only the average value of 2 measurements is placed more than 2% error, another test need to average, total 3 measurements is needed.

h) Test sample is two per model.

[Table 1] The mass of rice of maximum cooking capacity

Max. cooking capacity (MCC)	mass of rice
1 person (0.18L) ≤ MCC < 3 persons (0.54L)	150g
3 persons (0.54L) ≤ MCC < 5 persons (0.90L)	300g
5 persons (0.90L) ≤ MCC < 7 persons (1.26L)	450g
7 persons (1.26L) ≤ MCC < 9 persons (1.62L)	600g
9 persons (1.62L) ≤ MCC < 11 persons (1.98L)	750g
11 persons (1.98L) ≤ MCC < 13 persons (2.34L)	900g
13 persons (2.34L) ≤ MCC < 15 persons (2.70L)	1,050g
15 persons (2.70L) ≤ MCC < 17 persons (3.06L)	1,200g
17 persons (3.06L) ≤ MCC < 19 persons (3.42L)	1,350g
19 persons (3.42L) ≤ MCC < 21 persons (3.60L)	1,500g

6. Total power consumption per a cycle (Cooking and warming)

$$E_1=E_C+E_I\times 6$$

Where,
E_1 : Total power consumption per a cycle (Cooking and warming) [Wh]
E_C : cooking mode power consumption [Wh]
E_I : warming mode power consumption [Wh]

7. Power consumption per a person

$$E_T=E_1\times 150/M$$

Where,
E_T : power consumption per a person [Wh/person]

E_1 : Total power consumption per a cycle (Cooking and warming) [Wh]
M : weigh of rice at cooking [g]

8. Naming and Marking

8.2 Naming

Naming is as follows, but only, Induction heating calls as 'IH' .

Example 1. 10 capacities of electric rice-cooker (1.8L)
Example 1. 10 capacities of electric pressure rice-cooker (1.8L)
Example 1. 10 capacities of IH rice-cooker (1.8L)
Example 1. 10 capacities of IH electric pressure rice-cooker (1.8L)

8.2 Marking and marking method

Marking includes at least the next items and should be placed at backside or side of each product that consumer is apt to see. However, if marking items in energy efficiency label duplicates in KS standard level and others certificates, it can be excepted.

a) Model
b) Classification
c) Rated Voltage(V)
d) Rated power consumption(W) and current(A) (warming and cooking)
e) Maximum cooking capacity
f) Operating pressure of pressure regulator (only electric pressure rice cooker)
g) Manufacturer or the code
h) Size and weight
i) Address and telephone number for A/S

7. Vacuum Cleaner

1. Scope

Vacuum cleaner of rated power consumption of 800W ~ 2,500W, and shall be moveable (dry only)

2. Normative reference and definitions

The definitions for terms and normative reference used in this standard are as follows KS C IEC 60312 and KS C 9101. Only Energy Efficiency means Suction power efficiency.

3. Test

3.1 Energy Efficiency Test

Energy Efficiency (Suction power efficiency) shall be measured by the test method in KS C IEC 9101, which is obtained from maximum suction power rate divided by power consumption.

Energy Efficiency (%) = maximum suction power rate[W]/Measured energy consumption[W]

3.2 Dust emission Test

According to test method of KS C IEC 60312, it shall be measured the averaged dust emission when the specified reference dust passes through the sample at maximum operating. The test result shall be following. (dust emission shall be measured with two decimal)

[Table 1] Dust emission

(unit: mg/m^3)

≤0.01	≤0.05	≤0.10	≤0.20	larger than 0.20

3.3 Test Data

All results shall be filled out in a following table.

[Table 2] Data sheet

<table>
<tr><td rowspan="2"></td><td rowspan="2">Mean</td><td colspan="2">Sample 1</td><td colspan="2">Sample 2</td></tr>
<tr><td>1st test</td><td>2nd test</td><td>1st test</td><td>2nd test</td></tr>
<tr><td rowspan="2">Measured energy consumption [W]</td><td rowspan="2"></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">maximum suction power rate[W]/</td><td rowspan="2"></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Energy Efficiency (%)</td><td rowspan="2"></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Dust emission (mg/ m^3)</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
</table>

8. Electric Fan

1. Scope

By KS C 9301 household electric fan (desktop, stand, seat) which have the diameter of wing of 20~41 cm and the axial single wing run by induction motor.

2. Normative reference and definitions

The definitions for terms and normative reference used in this standard are as follows KS C 9301.

3. Test

3.1 Test condition

Test shall be achieved in ambient temperature 25±5℃, and other conditions follow KS C 9301.

3.2 Power consumption test

According to test method of KS C 9301, energy efficiency shall be calculated as follows after measured the maximum of air flow rate (standard air flow rate), the maximum of air velocity, and power consumption. Only, standard of air flow rate means the maximum of air flow rate at 25℃ of ambient temperature.

$$\text{Energy efficiency} = \frac{\text{Standard of air flow rate}[\mathrm{m}^3/\mathrm{min}]}{\text{Power consumption}[\mathrm{W}]}$$

$$\text{Standard of air flow rate} = \text{Maximum of air flow rate } [\mathrm{m}^3/\mathrm{min}] \times \sqrt{\frac{1.178}{\nu}}$$

$$\text{The specific gravity of air (Y)} = \frac{10332}{29.44\times(273+\text{Temperature at test}[℃])}$$

3.3 Data to be recorded in a test report

Test result shall be recorded as follows.

[Table 1] Data to be recorded in a test report

Sample	Number of test	Standard of air flow rate (m^3/min)	Maximum air velocity (m/min)	Power consumption (W)
1	1			
	2			
	Average			
2	1			
	2			
	Average			
Average				

9. Air cleaner

1. Scope

Mechanical air cleaner and combined air cleaners in scope of KS C 9314 are which the rated power consumption is less than 200W, a rated input voltage is single AC 220V, and a rated frequency is 60 Hz

Only, the followings are excluded ;

a) It is not used with filter, but the water spray uses for collecting dust, deodorizing and removing gas.
b) It is being used only in industrial use.
c) It is built-in the building.

2. Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS B 6336 Light scattering automatic particle counter
KS C 9314 Air cleaners
KACK-1998-01 Room air cleaners

3. Definitions

For the purposes of this standard, the following terms and definitions apply, and others apply KS C 9311.

a) Air cleaner
An electrical cord-connected appliances with fan with function of collecting dust, deodorizing and removing gas etc from air in order to purify the indoor air. There are three types of electrical, mechanical, and combined.

b) Electrical air cleaner

An air cleaning device which principally operates using the phenomenon of static electricity charge and catch dust particles. It consists of a dust collector, blower, and power supply, etc.

c) Mechanical air cleaner

An air cleaning device which uses a filter material to trap dust particles consists a dust collector, and blower etc.

d) Combined air cleaner

It is mixed with electrical and mechanical functions, it consists of a dust collector, fan, etc.

e) Dust collector

In the case of an electric air cleaner, an integrated unit consisting of an ionizer for electrically charging dust particles, a dust collecting unit for catching the dust particles and associated equipment. In the case of a mechanical cleaner, an integrated unit consisting of a filter material to trap dust particles and associated equipment.

f) Deodorization device

Deodorization device is to adsorb or decompose into the gas or smell, and is consisted of all in one body.

g) Power supply unit

A unit consisting of a power supply to provide electrical power to the dust collector, blower, etc. and a controller.

h) Rated airflow

The rate at which air flow through the air cleaner when it is operating at the rated frequency and voltage. In the case of air cleaner which has an airflow adjustment device it is the maximum airflow through the air cleaner.

4. Performance test

The performance test achieves particulate matter removal performance, deodorization performance, consumption power, standby power.

4.1 Test conditions

4.1.1 General condition

Air cleaner shall be provided with the manual, and be checked certainly whether it operates rightly before measuring.

4.1.2 Power supply

Rated frequency shall be controlled 60Hz±1% and rated voltage shall be controlled a single phase AC 220V±1%.

4.1.3 Environment condition

If there is no special regulation, the test carries out in place that keeps by ambient temperature 23±5℃, relative humidity 55±15%.

4.1.4 Operating condition

Air cleaner shall be operated with rated airflow without all additional functions. Only if manufacturer requires that turn on special function, air cleaner shall be operated with rated airflow with special functions.

4.2 Particulate matter removal performance test

4.2.1 Test particulate matter

Test particulate matter uses potassium chloride particle of solid polydisperse, it makes the solution of potassium chloride in distilled water to vaporize by a particle generator.

4.2.2 Particulate generator

Particulate generator shall be able to produce more than 10^7 particles per second when it vaporizes potassium chloride solution.

4.2.3 Processing of generated particulate

Particulate generator shall be designed to be dehydrated before potassium chloride particulate are entered to the test Chamber. Dried particles shall be neutralized with passing particle through neutralizer such as gamma radiation generator or corona discharge ionization device etc.

4.2.4 Evaluation of particulate diameter

Particulate diameter shall be 0.3 ㎛.

4.2.5 Particulate counter

Particulate counter shall have the same performance of light scattering automatic particle counter noted in KS B 6336 or higher performance. Particulate counter shall have a channel that can measure particulate concentration of 0.3 ㎛ diameters.

4.2.6 Test chamber

Test Chamber shall have a rectangular parallelepiped (regular hexahedron possibility) shape that has volume of 30±5m^3. Test chamber interior shall be manufactured with uninterruptible power panel, HEPA filter unit that can do to remove dust and air-conditioning equipments that can control air temperature and humidity in chamber. Mixing fan shall be installed so that test particulate may distribute homogeneous concentration in test chamber in early time.

4.2.7 Background particulate concentration

Background particulate concentration of test chamber shall be not more than 3×10^5 EA/ m^3 for a particle of 0.3 ㎛ diameter.

4.2.8 Air tightness

Air tightness of test chamber shall be met to have more than 80% of initial concentration for particulate of diameter 0.3 ㎛ after 20 minutes passage. The measuring procedure shall be followed with 4.2.12.

4.2.9 Test particulate concentration

When it is measured, initial particulate concentration shall be 10^8 ～10^{10} EA/ m^3 in test chamber.

4.2.10 Placement of air cleaner

Placement of air cleaner shall be followed with the instruction provided by manufactures. If the instruction is not provided, it shall be followed with subsequent conditions, and be careful that the outlet of air cleaner shall not head for the sampling probe of particulate counter.

a) Desktop type and desktop/wall hung combined type shall be adjoined in wall, placed on a table of 70 cm height.
b) Floor standing type shall be placed on bottom of wall.

c) Wall hung type shall be placed on the wall of 180 cm height.

4.2.11 Particulate sampling

Sampling for particle concentration measurement is in the center of test chamber for 1 point measurement of 120 cm height from the bottom, and sampling probe shall be fixed tightly against indoor air flow. During the test, sampling tube which connects sampling probe and particulate counter shall be used as the material which makes less the particulate loss in tube by static electricity.

4.2.12 Natural decay measurement

a) Using the chamber HEPA filter, allow the test chamber air to clean until the background particulate matter for particles in the size of 0.3㎛ to the size of 4.2.7 reaches a level of less than 4.2.7. Simultaneously operate the environmental control devices until the room conditions (temperature and RH as indicated in 4.1.3) are specified.
b) When an acceptable test chamber background level is achieved (as indicated in 4.2.7, and 4.1.3) record the background concentration, turn off the chamber HEFA filter and environmental control devices.
c) Particulate generator in 4.2.3 produces particle, and test particulate may distribute homogeneous concentration in test chamber with mixing fan.
d) When test particulate in test chamber reaches a level of 4.2.9, turn off the particulate generator and mixing fan.
e) Two minutes after turning off mixing fan, begin to acquire the particulate concentration. This test point is the initial chamber concentration (t=0).
f) Acquire particle concentration data at one-minute intervals for 20 minutes after the initial concentration measurement, and finish the test.

4.2.13 Decay measurement by air cleaner operating

a) Using the chamber HEPA filter, allow the test chamber air to clean until the background particulate matter for particles in the size of 0.3㎛ to the size of 4.2.7 reaches a level of less than 4.2.7. Simultaneously operate the environmental control devices until the room conditions (temperature and RH as indicated in 4.1.3) are specified.
b) When an acceptable test chamber background level is achieved (as indicated in 4.2.7, and 4.1.3) record the background concentration, turn off the

chamber HEFA filter and environmental control devices.

c) Particulate generator in 4.2.3 produces particle, and test particulate may distribute homogeneous concentration in test chamber with mixing fan.
d) When test particulate in test chamber reaches a level of 4.2.9, turn off the particulate generator and mixing fan.
e) After check to turn off the mixing fan, operate air cleaner with the rated airflow.
f) Two minutes after turning off mixing fan, begin to acquire the particulate concentration. This test point is the initial chamber concentration (t=0).
g) Acquire particle concentration data at one-minute intervals for 20 minutes after the initial concentration measurement, and finish the test.
h) Turn off air cleaner and finish test.

4.2.14 Calculation of particulate matter removal performance

Particulate matter removal performance of air cleaner is calculated as follows;

$$CP = \frac{V}{t}\left(\ln\frac{C_{ci}}{C_{cf}} - \ln\frac{C_{ni}}{C_{nf}} \right)$$

CP : Particulate matter removal performance (m^3/min)
V : Volume of test chamber (m^3)
T : measurement time (min)
C_{ci} : particle concentration at initial point (t = 0) with operating air cleaner (EA/cm^2)
C_{ni} : particle concentration at initial point (t = 0) with natural decay (EA/cm^2)
C_{cf}: : particle concentration at ending point (t minutes) with operating air cleaner (EA/cm^2)
C_{nf} : particle concentration at ending point (t = 0) with natural decay(EA/cm^2)

4.2.15 Calculation of standard room size

Standard room size is defined that the concentration after air cleaner operates for 10 minutes reaches a half of initial concentration with natural ventilation once in an hour. The height of indoor room shall be 2.4m. Standard room size is calculated as follows;

$A=7.9\times CP$

A: Standard room size (m^2)
CP: Particulate matter removal performance (m^3/min)
4.3 Measurement test of deodorization efficiency
4.3.1 Test gases are the followings

A) Ammonia (NH_3)
b) Acetaldehyde (CH_3CHO)
c) Acetate (CH_3COOH)

4.3.2 Test chamber
Test Chamber shall have volume of $4.0\pm0.1m^3$ with air tightness. Air cleaner shall be installed in the center of test chamber, the desktop type shall be placed on the height of 75cm from bottom. The mixing fan shall be installed in test chamber to mix air flow homogenously.

4.3.3 Device to supply gas
Device to supply gas from gas tank or gas generator can supply a specified amount gas when it is mixed and diluted for test chamber.

4.3.4 Gas measuring instrument
Gas measuring instrument are followed or higher ;

A) Ammonia : Gasteckis product No.3La/No.3L(proper product)
b) Acetaldehyde : Gasteck's product No.92L(proper product)
c) Acetate : Gasteck's product No.81L(proper product)

4.3.5 Measurement condition
a) Test gas charges the specified amount minutely by needle valve.
b) When charging test gas, air cleaner shall be turned off.
c) Air cleaner shall be turned off-on without opening test chamber.
d) Mixing fan operates continuously, but suspends at air cleaner operating.

4.3.6 Measurement of the initial gas concentration
Initial gas concentration shall be measured after charging the specified amount

and 2 - 5 minute passes. Initial concentration of each the test gas is by 10ppm±10%.

4.3.7 Measurement of operating gas concentration

a) It shall be operated air cleaner with rated airflow for 30 minutes.

b) After turning off air cleaner, and measure concentration of residual gas.

4.3.8 Calculation of deodorization efficiency

a) The removal rate of each pollution i gas is calculated as follows;

$$\eta_i = 1 - \frac{C_{i,30}}{C_{i,0}} \times 100$$

$C_{i,30}$: Concentration of i gas after operating 30 minutes (ppm)

$C_{i,0}$: Concentration of i gas at initial (ppm)

b) Deodorization efficiency of air cleaner is calculated as follows;

$$\eta_T = \frac{\eta_1 + 2\eta_2 + \eta_3}{4}$$

η_t : Deodorization efficiency(%)

η_1: The removal rate of ammonia (%)

η_2: The removal rate of acetaldehyde (%)

η_3: The removal rate of acetate (%)

4.4 Power consumption test

a) When measuring, temperature of test chamber shall be maintained 21±3℃.

b) After 30 operating with the rated air flow, it shall be measured at 10 minutes intervals for 3 times, and if the initial measurement and final measurement are within 5% of measuring power consumption, total 3 measurements shall be averaged.

c) Above measurements are 2 times, and be averaged.

d) In case of exceed of 5% of measuring value, power consumption is calculated that the integral power consumption for 10 minute is divided by 10 minutes.

10. Fluorescent lamp

1. Scope
   - By KS C 7601 Fluorescent lamps which are the tubular type of rated power consumption of 20W, 28W, 32W, and 40W, the circular type of rated power consumption of 32W, and 40W, and the compact type of rated power consumption of FPX 13W, FDX 26W, FPL 27W, FPL32W, FPL 36W, FPL 36W, FPL 45W, and FPL 55W
   - By K 61195, K 61199 Fluorescent lamps which are the tubular type of rated power consumption of 20W and 32W, the compact type of rated power consumption of FPL 36W, and the commercial used type (which is more than 7100K of color temperature, and can be used in the conventional lamp)

2. Testing Items for

   2.1 Color temperature : More than 7100 K

   2.2 Initial Readings

<table>
<tr><th rowspan="2">Type</th><th rowspan="2">Size</th><th rowspan="2">Rated Power

W</th><th rowspan="2">Rated input Voltage

V</th><th rowspan="2">Initial Input Voltage

V</th><th rowspan="2">Lamp power

W</th><th colspan="3">Initial Readings</th></tr>
<tr><th>Lamp Ampere
A</th><th>Lamp Voltage (reference)
V</th><th>Lumen

lm</th></tr>
<tr><td>FL 20</td><td rowspan="4">20</td><td rowspan="2">20</td><td rowspan="4">100</td><td rowspan="4">94</td><td rowspan="2">19.0</td><td rowspan="2">0.360±0.040</td><td rowspan="2">58</td><td rowspan="4">1200</td></tr>
<tr><td>FL 20S</td></tr>
<tr><td>FL 20S/18</td><td rowspan="2">18</td><td rowspan="2">18.0</td><td rowspan="2">0.350±0.040</td><td rowspan="2">59</td></tr>
<tr><td>FL 20SS/18</td></tr>
<tr><td>FLR 32SS</td><td>32</td><td>32</td><td>300</td><td>270</td><td>32</td><td>0.265±0.030</td><td>137</td><td>2680</td></tr>
<tr><td>FHF 32SS</td><td>32</td><td>32</td><td>256</td><td>240</td><td>32</td><td>0.255±0.030</td><td>128</td><td>2860</td></tr>
<tr><td>FL 40</td><td rowspan="4">40</td><td rowspan="2">40</td><td rowspan="4">200</td><td rowspan="4">180</td><td rowspan="2">39.5</td><td rowspan="2">0.420±0.040</td><td rowspan="2">106</td><td rowspan="4">3050</td></tr>
<tr><td>FL 40S</td></tr>
<tr><td>FL 40S/37</td><td>37</td><td>37.0</td><td>0.410±0.040</td><td>108</td></tr>
<tr><td>FL 40SS/36</td><td>36</td><td>36.0</td><td>0.430±0.040</td><td>103</td></tr>
<tr><td>FPL 36</td><td>36</td><td>36</td><td>200</td><td>180</td><td>36.0</td><td>0.435±0.040</td><td>102</td><td>2590</td></tr>
</table>

   2.3 Mark

   Ex) FHF 32SS SIGN, FL 20SS/18 SIGN

11. Fluorescent lamps ballast

1. Scope
   By KS C 8100 and KS C 8102 Fluorescent lamps ballasts which are the tubular type of rated power consumption of 20W, 28W, 32W, and 40W, the circular type of rated power consumption of 32W, and 40W, and the compact type of rated power consumption of FPX 13W, FDX 26W, FPL 27W, FPL32W, FPL 36W, FPL 36W, FPL 45W, and FPL 55W, and the tubular type of rated power consumption of 20W, 32W, and 40W and the compact type of rated power consumption of FPL 36W for the commercial used type.

2. Registration for the commercial used type
   Registration for the commercial used type is the same procedure of the conventional fluorescent lamps ballasts, the manufactures shall register for the commercial used type.

3. Mark for in and out house
   IP Code shall be marked as KS C IEC 60529, and the initial start at low temperature shall be applied.

4. Testing Items for the commercial used type

   4.1 IPX 6 : Water flow rate 100ℓ/min

   4.2 Initial start at low temperature
   While a sample shall be placed at ambient temperature (20~27) and low temperature conditions for 2 hours, it shall be checked to light with 85% of the rated voltage and with increasing the rated voltage to 115%. It shall be lit within 10 seconds, and HID lamp shall be lit with 5 seconds. Only starter type lamps shall be lit with 3 times.

5. Mark
   Marking on products

12. 3 Phase induction motor

1. Scope

1.1 General

Under a normal test condition in <Annex 1> and at refrigerant temperature under 40^{o}C low voltage 3 phase cage induction motor under the rated voltage of 600V shall be satisfied with following requirements ;

- Type : Protector Type or Hermetic type
- Rated output : 0.75kW ≤ Rated output ≤ 200kW
- Number of pole :
  a) 2, 4, 6, and 8 : 0.75kW ~ 200kW
- Frame : General frame
- Speed : Constant
- Category : Foot mount or Plunge
- Torque : Design A or B in Annex

The scope is defined as category Ⅰ, and category Ⅱ in Annex 1, and as inverter-driven motor with continuous operating (fan, blower, pump). But, the efficiency test shall be at 60Hz.

1.2 Classification

3 phase induction motor divides into five categories as <Table 1>. Category I, and II shall be applied for MEPS.

< Category for MEPS >

1) Category I :

- The partly modified general electric motor which is satisfied with general requirements, and no influence in the performance or the efficiency.
- The general electric motor : A motor which is designed with the standard operating characteristic and the standard mechanical structure at normal operating condition.
  (Ex: Add a temperature sensor, expand a shaft, add a disk brake, and change a housing outside)

2) Category II :

- The special purpose electric motor which is satisfied with general requirements, and can be used in general.
- The special purpose electric motor : A motor which is designed with the standard operating characteristic and the standard mechanical structure at abnormal operating condition.

(Ex: the electric motor which has a half of specified output, a roller bearing electric motor, and anti-explosion motor)

< Exception for MEPS>

3) Category III :

- The special purpose electric motor which is satisfied with general requirements, but can not be used in general.

(Ex: close coupled pump motor)

4) Category IV :

- The special purpose electric motor which is satisfied with general requirements.
- The special purpose electric motor : Except the general electric motor and the special purpose electric motor a motor which is designed with the special operating characteristic and the special mechanical structure at abnormal operating condition.

(Ex: electric motor for thrust bearing)

5) Category V :

- The electric motor which is not satisfied with general requirements

(Ex: multi-speed electric motor)

<Classification>

Special specification		Category					Remark
		I	II	III	IV	V	
		MEPS		Except MEPS			
A. Electric specification							
1	Altitude	O					Not applied for needing Center height up
2	Ambient temperature	O					Not applied for needing Center height up
3	Multi-speed					O	Only one speed
4	Special lead line	O					
5	Special insulation	O					
6	Encapsulation				O		For special wire
7	High service factor	O					Not applied for needing Center height up
8	Space heater	O					
9	Star-Delta start	O					
10	Part winding start	O					
11	Limit to temperature increase	O					Not applied for needing Center height up
12	Protector for sensing temperature and ampere		O				
13	Thermostat/Thermostor	O					
14	Special voltage					O	By “The regulation of electrical equipments standard” only available for no more than 600V
15	Middle output		O				
16	Frequency	O					inverter-driven motor with continuous operating (fan, blower, pump)
17	Insulation for Tropical condition	O					
B. Mechanical Specification							
18	Special Balance	O					
19	Sensor for Bearing Temperature	O					
20	Special terminal	O					
21	Additional terminal	O					
22	Special painting/coating	O					
23	Drain	O					
24	Water-proof cover	O					
25	Earth terminal/hole						
26	Screen on ODP Enclosure	O					
27	Mounting	O					Bridge, stiff base,

	(F1, F2,W1~4,C1,C2)						eleastic base
C. Bearing							
28	Bearing Cap	O					
29	Roller Bearing		O				Test with using standard bearing
30	Shield Bearing	O					
31	Hermetic Bearing	O					Test with using standard bearing
32	Thrust Bearing				O		Special mechanical structure
33	Fixed Bearing	O					
34	Sleeve Bearing				O		Special mechanical structure
D. Special Bracket							
35	C face	O					
36	D flange	O					
E. Seal							
37	Contact seal	O					Including lip seal, taconite seal and slinger seal - test without seal
38	No Contact Seal	O					Including labyrinht seal - test without seal
F. Shaft							
39	Standard shaft	O					Including 편축, double, cylinder, tapered, single
40	Special material	O					
G. Fan							
41	Special material	O					
42	Low noise	O					
H. Others							
43	WASHDOWN	O					test without seal
44	Pump in a body (underwater pump)			O			Test with a special jig
45	Pump in a body (except underwater pump)		O				Test with a special jig
46	Gear motor in a body		O				Test with a special jig
47	SAW ARBOR				O		Special electric/mechanical design
48	TENV			O			
49	TEAO			O			
50	Fire extinguishing pump	O					
51	Operating at short time(S2)					O	Apply for continued operating
52	Brake motor in a body		O				Test with a special jig
53	Axial type motor				O		Special mechanical structure

2. Test conditions

Basically all products shall be met with MEPS at following normal conditions and abnormal conditions. But, it can not meet with MEPS as consumer uses at abnormal condition, the following plate shall be put on the product, “This product is not applied to MEPS because it uses at abnormal condition”

2.1 Steady-state

1) Ambient condition

① Ambient temperature : -15°C~ 40°C / 5°C ~ 40°C (with using refrigerant) Exception) All equipments have the sleeve bearing and commentator that minimum ambient temperature is 0°C .

② The place is not higher than the sea level 1000m.

③ It is installed at stable place.

④ The place where ventilation is not disturbed or used a supplementary cover.

2) Operating condition

① Driving a V-belt

② Driving a plate belt, chain, gear and coupling

2.2 Unsteady-state

1) Circumference environment

① flammability, explosiveness, polishing, or conductive dust

② Piling Dust may obstruct to ventilate

③ Chemistry gas, flammable or explosive gas

④ Radioactive rays

⑤ The air which included a salt steam or oil steam

⑥ The place where is very wet and very dry, radiant heat, the infection of vermin or the air which is profitable to mushroom growth.

⑦ Extra-ordinary impact, vibration or mechanical load from the outside

⑧ Unsteady axle direction to be added to a motor axle or strength of side direction

2) Operating condition

① Inductor : more than ±10% of rated voltage, and ±5% of rated frequency

② Separation of AC voltage is more than 10%

③ AC voltage is to be unbalanced more than 1%
④ The low noise level is necessary
⑤ Power system is not put to earth
⑥ Driving with more than the maximum speed
⑦ Driving at insufficient ventilation, hollows or slanted toward place

3) Outside stimulation
① Twist load
② Recursive overload
③ Backlash or electric damping
④ Frequent starting
⑤ In the state that electric power is supplied with persistently, applications are a stopping or a momentary rating

3. Torque characteristic

According to the torque characteristic, 3 phase induction motor divides into four types. <Figure 1> shows the comparison of the torque characteristic with slip of design A, B, C, D, and starting torque, stalling torque, and pull up torque of design A, B refer to value of <Table 1> (it indicate the standard value of a torque with percentage[%] for rating torque.)

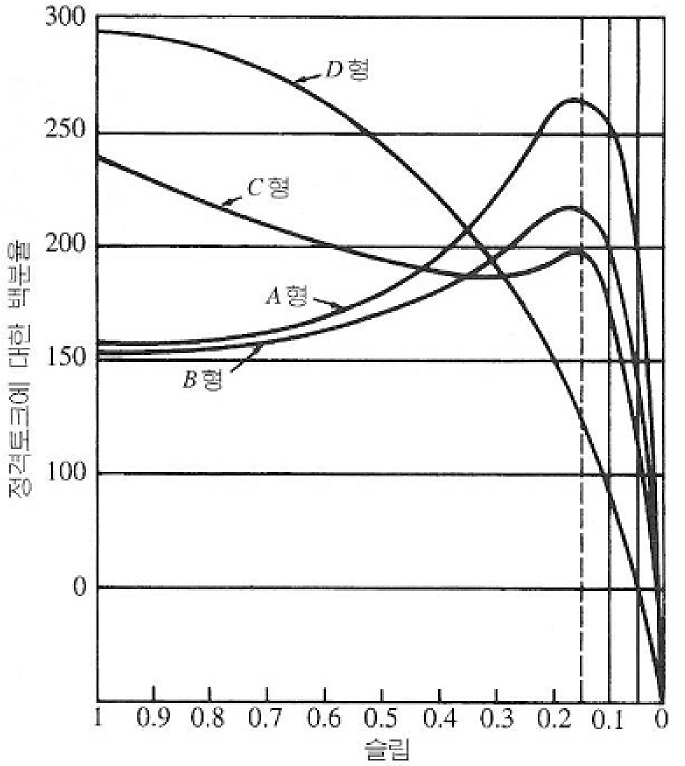
1) Design A
It is similar with B type, but a stalling torque is larger than B type. A field of application is restricted that starting current is high.

2) Design B
- The most general, and large application
- Application : a centrifugal pump, fan, Air blower, power train
- It becomes a standard when it compares the performance with other type

3) Design C
- larger starting torque, but smaller stalling torque with B type
- Application : piston type pump, vibration screen

4) Design D

- It is very large starting torque
- Application : punch press, elevator



<Figure 1> Torque characteristic of 3 phase induction motor

<Table 1> Torque characteristic of design A, B(KS C 4202)

Rating capacity	Rate torque vs. torque (%)											
	Starting torque				Stalling torque				Pull up torque			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
0.75 kW	180	190	170	150	200	200	180	170	120	130	120	110
1.5 kW	180	190	160	140	200	200	190	180	120	130	110	100
2.2 kW	170	180	160	140	200	200	190	180	110	120	110	100
3.7 kW	160	170	150	130	200	200	190	180	110	120	110	100
5.5	150	160	150	130	200	200	190	180	100	110	110	100

kW												
7.5 kW	150	160	150	130	200	200	180	170	100	110	110	100
11 kW	140	150	140	120	200	200	180	170	100	110	100	90
15 kW	140	150	140	120	200	200	180	170	100	110	100	90
18.5 kW	130	140	140	120	190	190	180	170	90	100	100	90
22 kW	130	140	140	120	190	190	180	170	90	100	100	90
30 kW	120	130	130	120	190	190	180	170	90	100	100	90
37 kW	120	130	130	120	190	190	180	170	90	100	100	90
45 kW	110	120	120	110	180	180	170	170	80	90	90	80
55 kW	110	120	120	110	180	180	170	170	80	90	90	80
75 kW	100	110	110	100	180	180	170	160	70	80	80	70
90 kW	100	110	110	100	180	180	170	160	70	80	80	70
110 kW	90	100	100	90	170	170	170	160	70	80	80	70
132 kW	90	100	100	90	170	170	170	160	70	80	80	70
160 kW	80	90	90	90	170	170	160	160	60	70	70	70
200 kW	80	90	90	90	170	170	160	160	60	70	70	70

4. Full load efficiency

Test method is defined in KS C IEC 60034-2-1, “Method for determining losses and efficiency 3 phase cage induction motor”. By KS C IEC 60034-2-1 the method for determining efficiency is determined in “8.2.2 sum of each loss”, the load loss is determined in “8.2.2.4.1 load loss measured by a load test” in the method for determining each loss , and the stray load loss (additional load loss) is determined in “8.2.2.5.1 a load test to measure rotary power”.

5. Test equipments

1) Transformer

According to KS C IEC 6044 it shall be 0.2 accuracy level.

2) Torque meter

According to KS C IEC 6044 it shall be ±0.2% of accuracy at maximum scale.

3) Frequency meter

According to KS C IEC 6044 it shall be ±0.1% of accuracy at maximum scale.

4) Speed meter

According to KS C IEC 6044 it shall be ± 1 min^{-1} accuracy level.

5) Thermometer

According to KS C IEC 6044 it shall be ± $1^{o}C$ accuracy level.

13. Adapter·Charger

1. Scope

- For using with mobile phone, notebook, speaker for computer, LCD monitor, printer, PDA, camcorder, digital camera, audio, DVD player, MP3, PMP, portable Cd player, set-top box, wire-wireless phone, modem, all AC-DC or AC-AC external power supply shall be included.
- An adapter under 150W(nameplate output power) and a charger of input 20 W with Li-Ion Battery as a single voltage external power supply.

2. Classification

1) Adapter

AC-Dc or AC-AC adapter is to supply electric power to the end product. It shall be met with both standards, running efficiency and maximum standby power (no-load mode).

2) Charger

It is to supply electric power to the end products such as battery or battery pack or charger for battery. It shall be met with both standards, running efficiency and maximum standby power (no-load mode).

3. Test method

3.1 Load conditions

Percentage of output ampere on Name plate	
Condition 1	100% ± 2%
Condition 2	75% ± 2%
Condition 3	50% ± 2%
Condition 4	25% ± 2%
Condition 5	0%

3.2 Running efficiency test

a) Running efficiency test shall be measured at conditions 1 ~ 5 continuously. If there is two or more output devices, two devices shall be measured. (Others shall be disconnected)

b) The test sample shall be running at least at 100% output for 30 minutes before running efficiency test.

c) To verify the stability of adapter AC input ampere shall be measured fro 5 minutes after warming up. If the measured value is within 5% of maximum, it can be determined to be stable, and then it can be recorded the measured after 5 minutes.

d) Running efficiency shall be calculated at specified conditions, which is obtained from effective output power of adapter divided by AC input power. Averaged efficiency shall be calculated arithmetically from conditions 1,2,3,4.

e)Adapter power consumption at 4 conditions (1,2,3,4) is that AC input power subtracts DC output power. Adapter power consumption at condition 5 is AC input power.

f)The Data sheet is followed ;

<Required data from measured or calculated>

Value	remarks
Effective output ampere(mA)	Measure at conditions 1~4
Effective output voltage (V)	
Effective output power(W)	
Effective input ampere (V)	Measure at conditions 1~5
Effective input power(W)	
THD	
W/VA	
Adapter Power consumption(W)	Calculate at conditions 1~4 Measure at conditions 5
Running efficiency	Calculate at conditions 1~4
Averaged Running efficiency	Average arithmetically at conditions 1~4

< Test report (example)>

Name plate	Input	Output
Voltage(V)	85-265	6
Ampere(mA)		500
Power(W)		2.8
Frequency(Hz)	60	

<Measured and calculated data at 220V, 60Hz (example) >

	No load	Effective power at on-mode				
Percentage of name plate	0%	25%	50%	75%	100%	Average
DC output ampere(mA)		125	250	374	500	
DC output voltage(V)		6.9	6.5	6.0	5.7	
DC output power(W)		0.86	1.62	2.27	2.83	

AC input voltage(V)	220	220	220	220	220	
AC input power(W)	0.25	1.35	2.25	3.12	3.91	
THD		271.0%	256.2%	246.6%	233.1%	251.7%
W/VA		0.35	0.36	0.37	0.39	0.37
AC input frequency(Hz)	60	60	60	60	60	60

Power consumption(W)	**0.25W**	0.49W	0.63W	0.85W	1.08W	
Running efficiency		63.7%	72.0%	72.8%	72.4%	**70.2%**

14. Electric driven heatpump

1. Scope

- Electric driven heatpump of rated cooling power consumption of not more than 7,500W and the rated cooling capacity of not more than 23,000W
- If it has heater, the rated power consumption of heater shall be not more than 30,000W.
- Exclude water cooling, duct-type, portable, multi-split type
- Averaged Energy Efficiency Ratio (hereinafter “EERa”) shall be measured by the test method of KS C 9306, which is obtained from CSPF(Cooling Seasonal Performance Factor) and HSPF(Heating Seasonal Performance Factor).

2. References

   The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one
   .

   KS C 9306 Air-conditioner

   KS C IEC 60335-2-34

   KS C IEC 60335-2-40

   AMCA standard 210 : 1985 laboratory Methods of Testing Fans for Rating

   ANSI/ASHRAE 16 Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners

3. Definitions

   For the purposes of this standard, the following terms and definitions apply, and others apply KS C 9306.

4. Test method of Energy efficiency

   Test method for Energy efficiency shall be followed with Annex 5 in KS C 9306-2010, and test results shall be recorded with a following table.

Items	Results	
	1	2
Cooling Standard Capacity(W)		
Cooling Standard power consumption (W)		
Cooling seasonal performance factor (CSPF)		
Cooling period total power consumption (kWh)		
Heating standard capacity (W)		
Heating standard power consumption(W)		
Heating period energy consumption efficiency (HSPF)		
Heating period total power consumption (kWh)		
Make-up heater capacity(W)		
Average EER(EERa)		
Energy Efficiency Level(R)		

Remark) 1. If minimum capacity is more than a half of the rated capacity, the intermediate capacity test can be omitted.

2. The rated heating capacity test shall be without make-up heater.

15. Television set

1. Scope

With a built-in digital tuner and more than 50cm and less than 180cm length of screen diagonal products sold only shall be applied.

2. References

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards shall be adopted new one.

KS C IEC 62087 Test method for power consumption of stereos, videos and related equipments

3. Definitions

For the purposes of this standard, the following terms and definitions apply.

a) Standard mode

Recommended mode in instruction manual to use at home

b) Additional function

Function which is not required to perform basic function of television. For example, video recording device (VCR, DVD), hard disk drive, radio receiver, memory card reader

c) Disconnected mode

Condition without connection to external power

4. Test equipments

a) Power supply device

Test shall be carried out in rated voltage and rated frequency of power supply. During test, voltage fluctuation shall be within ±2%. Frequency fluctuation and higher harmonic wave components shall be within ±2% and 5%.

b) Device to measure power

Wattmeter shall be used to measure. When measuring power consumption of over 0.5W, reliability shall be from 96% and uncertainty shall be less than 2%. When measuring power consumption of under 0.5W, reliability shall be from 95% and uncertainty shall be less than 0.01W. It shall have following resolution.

- ≥ 0.01W when measuring power consumption of under 10W
- ≥ 0.1W when measuring power consumption from 10W to 100W
- ≥ 1W when measuring power consumption of over 100W

5. Test method of power consumption in operation mode

5.1 General

5.1.1 Environment condition

The test carries out in place that keeps by ambient temperature 23±5℃.

5.1.2 Stabilization

TV shall be measured after stabilizing in power consumption. A minimum of 1 hour in passive standby mode or connectionless mode and then a minimum of 1 hour in operation mode shall run, and then the TV shall be measured. The test shall be completed within a maximum of 3 hours in operation mode. Related video signal shall be shown on screen for the whole period of operation mode. In case of TV which is known to stabilize within 1 hour, if the result shows within 2% of expected result, time will be shortened. Otherwise, the result shall be measured by using period of time defined in this paragraph.

5.1.3 Characteristic of satellites

If TV includes a satellite dish for LNB power supply, power shall be shut down during test period.

5.1.4 Plug in module

As long as a TV connected to built-in plug in module in advance is not shipped to a end-consumer, plug in module like conditional access module or POD (Point of deployment) module shall not be connected to TV during test period. Plug in module which is shipped with prior connection shall be connected to TV continuously during test period.

5.1.5 Additional function

Additional function which end-consumers can turn on or off power shall be switched off during test.

5.1.6 Specialized function

Specialized function which is undefined in this paragraph shall be maintained in condition of shipment to end-consumers by manufacturers

5.1.7 Power saving function

In case that there is power saving function related to auto brightness control, it shall be measured by deactivating the function. If deactivation is impossible, it shall be measured by flashing light of 300 or more lux on illuminance sensor directly.

5.1.8 Image level adjustment

In case that there are contrast ratio, brightness and backlight of TV, the level shall be set as manufacturers adjust to supply it for end-consumers. To select setting mode at the first operating time, standard mode or equal mode shall be selected. In case that there is no standard mode or equal mode, first mode on whole screen menu shall be selected. Mode used for test shall be registered in a report.

5.1.9 Video screen aspect ratio

TV shall be in the mode which active area of video incoming signal is possible to cover whole screen.

5.1.10 Sound level adjustment

A volume control shall be adjusted to the level where it is possible to hear sound output, and output shall be 50mW at a speaker terminal to ensure audible sound output.

5.2 Test method

a) TV and DVD player shall be connected to HDMI port and power of TV shall be connected to test equipment. TV without HDMI port shall be connected to component or composite.

b) By 5.1.2 TV shall be stabilized in passive standby mode and then make the operation. At this time, in case of need for setting at the first time of operation after shipment, method of 5.1.8 shall be carried out.

c) After setting up the TV by 5.1, method of 5.1.2 shall be carried out to stabilize in operation mode by playing an hour-long broadcast content with 60Hz vertical scan frequency in the appendix DVD of KS C IEC 62087.

d) Average power consumption per 1 hour (W) shall be calculated by playing an hour-long broadcast content after stabilizing. Standby power shall be measured by test method of KS C IEC 62301.

e) Test shall measure twice per testing sample in the same way, and the samples shall be 2 as per model.

6. Calculation of power consumption

a) Test results shall be recorded as follows.

Items	Average	Testing sample 1		Testing sample 2	
Power consumption in operation mode (W)		1st	2nd	1st	2nd

<table>
<tr><td rowspan="3">Standby power (W)</td><td rowspan="3">Energy efficiency level index</td><td>1st</td><td>2nd</td><td>1st</td><td>2nd</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
</table>

b) Energy efficiency level index (R) shall be calculated as follows.

$$R(\text{Energy efficiency level index}) = \frac{\text{Power consumption in operation mode [W]}}{\text{Square root of screen area}[\sqrt{m^2}]}$$

16. Electric Fan Heater

1. Scope

Of 『Electric Appliances Safety Control Act』 enforcement regulations [table 2] safety certification target electrical appliances, fan heater with the total rating power consumption of 500W<x<10kW

Do not apply for:

1. Heating and cooling equipment (Dual)
2. Heating element is not heating air directly
3. Heater installed inside the building construction
4. Central heating system
5. Heater accessed to air duct
6. Curtain which includes wallpaper, carpet, or flexible heating element
7. Thermal Storage heater

2. References

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

Electric Appliances Safely Control Act
KS C IEC 60675 Residential direct heating indoor heater
KS C 9306 Air conditioner

3. Definition

The following are the definitions of words used in this standard, and words other than the following acts on Electric Appliances Safely Control Act, KS C IEC 60675, KS C 9306.

a) Electric Fan Heater
   Electric heater using fan to accelerate flow of air
b) Electric stove

Electric heater with the radiant heat as a main (as the temperature of heating element is high), and heating element seen from the outside of electric heater.

c) Combined Product

Products having functions of both electric fan heater and electric stove, is regarded as electric stove when testing its performance.

d) Residential and Normal

By the rating power consumption standard of products, classify products under 3kW to residential, and products over 3kW to normal.

e) Standard Conditions

- Standard conditions which needs to be kept when testing electric fan heater
- According to KS C 9306, define indoor dry bulb temperature as (20 ±0.5)℃, indoor wet bulb temperature as (15±0.5℃ (*At indoor dry bulb temperature of 20℃, relative humidity: 59±4%R.H.), supply voltage as 380V±2% or 220V±2%, rated frequency as 60Hz±1%

- Standard conditions measured during the test should be recorded

4. Test Method

- Test at the standard condition and electric fan heater measures heating capacity, power consumption, and heating efficiency.
- Electric fan heater heating efficiency is measured by KS C 9306.
- Electric fan heater heating efficiency, when there are option functions other than the main heating function, measure without this function.

4.1 Record of test result

Record test results by the following table.

Classification	Result	
	1	2
Heating capacity (W)		
Power consumption (W)		
Heating efficiency (W/W)		

Satisfaction on minimum consumption efficiency		

17. Electric stove

1. Scope

Electric stove with the total rating power consumption of 500W<x<10kW

Do not apply for:

1. Heating and cooling equipment (Dual)
2. Heating element is not heating air directly
3. Heater installed inside the building construction
4. Central heating system
5. Heater accessed to air duct
6. Curtain which includes wallpaper, carpet, or flexible heating element
7. Thermal storage heater

2. Reference

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

Electric Appliances Safely Control Act
KS C IEC 60675 Residential direct heating indoor heater
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a) Electric Fan Heater

   Electric heater using fan to accelerate flow of air

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c) Combined Product

   Products having functions of both electric fan heater and electric stove, is regarded as electric stove when testing its performance.

d) Residential and Normal

By the rating power consumption standard of products, classify products under 3kW to residential, and products over 3kW to normal.

e) Standard Conditions

- Standard conditions which needs to be kept when testing electric fan heater
- According to KS C 9306, define indoor dry bulb temperature as (20 ±0.5)℃, indoor wet bulb temperature as (15±0.5℃ (*At indoor dry bulb temperature of 20℃, relative humidity: 59±4%R.H.), supply voltage as 380V±2% or 220V±2%, rated frequency as 60Hz±1%.

- Standard conditions measured during the test should be recorded

4. Test Method

- Test at the standard condition and heating capacity, power consumption, and heating efficiency shall be measured when it is stablized.
- Electric stove's heating efficiency, when there are option functions other than the main heating function, measure without this function.
- Standby power shall be measured by KS C IEC 62301

4.1 Record of test result

Record results by the following table

Classification	Results	
	1	2
Standby power (W)		
Power consumption (W)		
Satisfaction on standby power		

18. Multi heat pump system (Variable Refrigerant Flow System)

1. Scope

a. General

This standard covers matched variable refrigerant flow Multi-Split Heat Pumps using distributed refrigerant technology with cooling and heating capacities. Each indoor unit is designed to condition a single zone. This standard applies to variable refrigerant flow multi-split systems consisting of the following matched components: a) an outdoor unit with single or multiple compressors or variable capacity compressor or with a variable speed drive; b) indoor unit(s) that have a coil, air movement device intended for single zone air distribution, and a temperature sensing control; and c) a zone temperature control device.

The following is not included.

a) Cooling only or heating only unit
b) Products using refrigerant of CFCs and HCFCs type
c) Movable unit having condenser duct
d) Separate component not made up as perfect refrigeration system
e) Absorptive type equipment for refrigeration cycle
f) Purpose of car air conditioning
g) Multi heat pump system applying heat source other than air
h) Heat pump system of all-in-one or air conditioner type
i) Heat pump unit of water source method
j) Others applying to a~h for special use

b. Registered Models

This standard covers matched registered Models using distributed refrigerant technology with cooling and heating capacities for outdoor units from 20kW to 70kW in single outdoor unit or combined unit with 2 more single units. which is connected to 2 more indoor units. But, if a combined outdoor unit can’t be separated, it shall be considered as a single outdoor unit.

2. Reference

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

KS B ISO 15042 Multi air conditioner and performance test method of heat pump

KS C 9306 Air conditioner

KS M 2128 Refrigerating machine oil

KS B ISO 5167 Flow measurement using differential pressure device inserted in a circular pipe of full state

KS M ISO 5221 Regulation on air flow measurement at the air-conditioning ducts and air distribution

KS M 5000 Test method for paints and related materials

KS C IEC 60335-1 Stability of household and similar electrical equipment- Chapter 1: General requirements

KS C IEC 60335-2-40 Stability of household and similar electrical equipment- Chapter 2- Chapter 40: Air conditioners and dehumidifiers, and individual requirements of heat pumps

AHRI 1230 Performance Rating of Variable Refrigerant Flow(VRF) Multi-Split Air-Conditioning and Heat Pump Equipment

3. Definition

The main terms used in this standard are defined as follows:

a) Multi heat pump system (Variable Refrigerant Flow System)

One or more factory-made assemblies designed to be used as permanently installed equipment to take heat from a heat source and deliver it to the conditioned space when heating is desired. It may be constructed to remove heat from the conditioned space and discharge it to a heat sink if cooling and dehumidification are desired from the same equipment. It normally includes multiple indoor conditioning coils, compressor(s), and outdoor coil(s). Such equipment may be provided in more than one assembly, the separated assemblies of which are intended to be used together. The equipment may also provide the functions of cleaning, circulating and humidifying the air.

b) Cooling Capacity

The Amount of heat which can be removed (per hour) from the conditioned space in a defined interval of time in (W)

c) Heating Capacity

The Amount of heat which can be added (per hour) to the conditioned space in a defined interval of time in (W)

d) Coefficient of Performance (COP)

A ratio of the heating capacity and the power input when operating multi heat pump system at a given temperature-humidity conditions.

e) Energy Efficiency Ratio (EER)

As coefficient of performance when operating multi heat pump system at a cooling condition, the cooling capacity divided by effective power consumption.

f) Integrated Cooling Efficiency (IEER: Integrated Energy Efficiency Ratio)

A single number that is a cooling part-load efficiency figure of merit calculated per the method described in the following formula:

IEER= (0.020 x A) + (0.617 x B) + (0.238 x C) + (0.125 x D)

Where

A= EER at 100% net capacity under standard condition

B= EER at net capacity of entire 75%

C= EER at net capacity of entire 50%

D= EER at net capacity of entire 25%

g) Heating Efficiency (COP: Coefficient of Performance at Heating)

As ratio of heating capacity of such models and heating power consumption back then, heating capacity divided by effective power consumption as performance coefficient when operating multi-heat pump system with heating conditions. Mean value of standard heating efficiency (COP1), and cold climate area heating efficiency (COP2).

$$\mathrm{COP}\,(\text{Heating COP}) = \frac{\mathrm{COP1} + \mathrm{COP2}}{2}$$

h) Heating and Cooling Efficiency (EERa)

The arithmetic mean of heating efficiency (COP) and integrated cooling efficiency (IEER) of such models

$$\mathrm{EERa}(\text{Heating and Cooling Effciency}) = \frac{\mathrm{IEER} + \mathrm{COP}}{2}$$

i) Degradation Coefficient (C_D)

The measure of the efficiency loss due to the on/off cycling of the complete system.

j) Effective Power Consumption

Average electrical power input to the equipment expressed in watts [W] and obtained from

① Power input for operation of the compressor

② Power input to electric heating devices used only for defrosting

③ Power input to all control and safety devices of the equipment

④ Power input to factory installed condensate pumps

4. Type and Structure

The types of multi heat pump system is being classified as the following based on the system, condenser cooling system, indoor unit's air-discharge system, and indoor unit's install system.

4.1 Type

a) Classification by multi-heat pump system types

①Basic multi-heat pump system

②Heat recovery multi-heat pump system

b) Classification by condenser cooling types

①Air-cooled system

②Water-cooled system

c) Classification by air discharge types of indoor unit

①Duct connection type system

②Non-duct type system

d) Classification by installation type of indoor unit

① Floor standing type system

② Ceiling fixed type system

③ Wall fixed type system

④ Mixed type system

4.2 Structure

Structure general of multi-heat pump system shall comply with 22 of KS C IEC 60335-2-40

5. Performance Test

5.1 General

a) Measure performance of capacity and power consumption of target system in accordance with the procedures and conditions stated in this standard.

b) Measure cooling and heating capacity in the stated conditions, by net value, including occurring heat due to the fan drive and influence by heater

c) By using active power being supplied to the system, and cooling and heating capacity in the stated condition, calculate energy efficiency of heat pump to be tested.

5.2 Performance Requirements

a) When testing by operating conditions at cooling and heating testing, it should be over 92% of rated cooling and heating capacity, under 110% of rated power consumption, and over 90% of rated heating and cooling efficiency. Capacity under heating cold climate condition should be over 83% of cooling capacity while over 92% of cold climate heating capacity.
b) Other performance testing requirements follow cooling and heating performance requirements based on the criteria of KS B ISO 15042 (Performance testing method of multi air conditioner and heat pump)

5.3 Combination conditions between outdoor unit and indoor unit

When multi-heat pump system is installed by being assembled with outdoor unit and indoor unit, the following points should be considered.

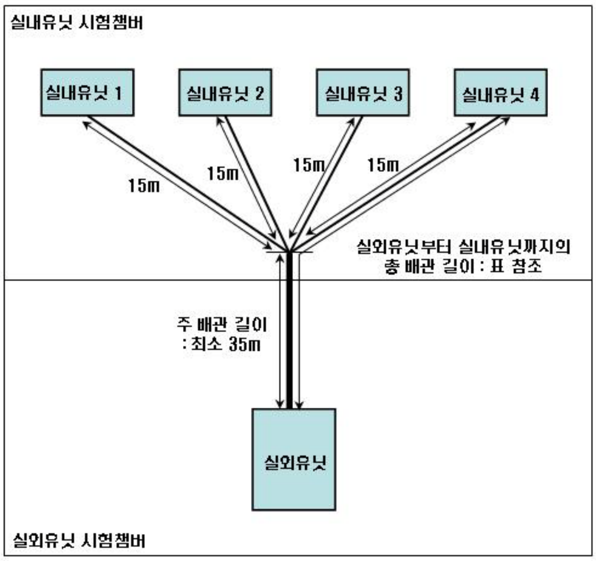
a) The horizontal equivalence length of refrigerant pipe shall follow the table below
b) Of individual components, tubes attached to the components should not be removed.
c) Of connection of refrigerant pipe, length of vertical pipe is limited to within 4m.

d) The capacity ratio when combining outdoor unit and indoor unit, the total capacity of single outdoor unit compared to outdoor units is limited to 100~110%

e) Indoor unit can be classified to non-duct type, duct connection type in accordance with air discharge method, and be classified to ceiling type, wall fixed type, floor standing type depending on the installation location. When tested in combination with the outdoor unit, it is tested with only non-duct type.

[Table 1] The minimum horizontal equivalence length of refrigerant pipe connection

Indoor Unit	Pipe requirement for tested combination Installation
Non-duct type	50m



[Figure 1] Test Room Layout

5.4 Performance Test

a) Test Conditions follows the integrated cooling efficiency (IEER) test condition of [Table 2], and the calculation is same as 5.4.1

b) Heating test follows heating operation test standard condition, cold climate area condition of [Table 2], and be tested by following procedure of KS B ISO 15042 (Performance test methods of multi air conditioner and heat pump). Especially products that operate at cold climate operation with built-in heater, test by running the heater.

[Table 2] Temperature and humidity condition for cooling and heating test

Test conditions		Indoor air condition		Outdoor air condition	
		Dry-bulb temperature	Wet-bulb temperature	Dry-bulb temperature	Wet-bulb temperature
Cooling	Cooling standard	27℃	19℃	35℃	24℃
	Integrated cooling efficiency (IEER)	27℃	19℃	Varies depending on the load by [Table3]	Varies depending on the load by [Table3]
Heating	Heating standard	20℃	15℃	7℃	6℃
	Cold climate area	20℃	15℃	-15℃	-

[Table 3] IEER Part Load Test Condition

Test condition	Indoor and outdoor air temperature and airflow condition
Indoor Return air dry bulb Return air wet bulb Indoor airflow	 27℃ 19℃ Remark 1

Condenser Condenser inlet dry bulb temperature (OATD) Condenser fan capacity	About %load>44.4%, About OATD= (0.30 x %load + 5.0) ℃ %load≤44.4%, OATD= 18.3℃ Remark 2
Condenser Condenser inlet wet bulb temperature (OATW)	About %load>36.6%, About OATW= (0.19 x %load + 4.4) ℃ %load≤36.6%, OATW= 11.6℃
Remaek : 1 Fixed indoor fan airflow must be maintained constant at full load airflow. Fan speed of device which controls fan of separate steps, should be adjusted as stated in the control device. 2 Condenser airflow should be adjusted according to the requirements of head pressure control device.	

5.4.1 Integrated Cooling Efficiency (IEER)

IEER should be calculated by using measurement data and the following formula about applied system on this standard.

IEER = (0.020 x A) + (0.617 x B) + (0.238 x C) + (0.125 x D)

Where
A= EER at 100% net capacity under standard condition

B= EER at net capacity of entire 75%

C= EER at net capacity of entire 50%

D= EER at net capacity of entire 25%

a) IEER rating requires system efficiency determined at 100%, 75%, 50%, 25% load (Net capacity) with the conditions stated in table 3.
b) If the device cannot be operated at 75%, 50%, or 25% load point due to capacity control logic, by showing completed EER VS %load to

connect the real performance point, EER at 75%, 50%, or 25% is determined by using the linear portion.

c) Linear interpolation is used to determine EER with 75%, 50%, or 25% net capacity, and extrapolation of the data is not allowed. Although it is possible to make the device to reach a point of 75%, it is impossible to reach a point of 50% and 25%, therefore make further tests at 25% loading atmosphere by loading to step 1.

d) If the indoor unit of the system has the ability to automatically adjust air flow, external static pressure must be maintained constant as full load rating point as stated in table 3, but the airflow shall be adjusted to maintain the device leaving dry bulb air temperature measured at the full load rating point.

e) If the device cannot be made with 75%, 50%, or 25% load, after operating device with minimum stage no-load state under condenser condition, should be adjusting efficiency to fit the cycle performance by using the following formula. Although degradation calculation is compulsory as it is possible for this device to make less than 30.6%, as step 1 already goes in the progress at the lowest atmosphere, further tests in not needed at 25% loading point. Then, by using this data the standard loading point can be calculated.

$$EER = \frac{LF \times \text{Net Capacity}}{L_F \times [C_D \times (P_C + P_{CF})] + P_{IF} + P_{CT}}$$

Where,

Net capacity= Measured net capacity at minimum no-load point of machine operating with any part load rating condition, excluding fan heat at indoor measurement capacity (W).

Pc= Compressor power at minimum no-load point of machine operating with any part load rating conditions (W).

P_{CF}= Compressor fan power of when it corresponds to minimum no-load point of machine operating with any part load rating conditions (W).

P_{IF}= Indoor fan motor power at fan speed for capacity of minimum stage (W)

P_{CT}= Control circuit power and auxiliary load (W)

C_D= Performance degradation coefficient in accordance with compressor operation of capacity of less than minimum stage capacity.

$$C_D = (-0.13 \times LF) + 1.13$$

Where,

LF= Load factor at the required load point, and use the following equation.

$$LF = \frac{[\%Load/100] \times \text{net capacity at full laod system}}{\text{Net capacity at part load system}}$$

Where,

%load= standard rating point, 75%, 50%, 25%

5.4.2 Integrated Cooling Efficiency (IEER) Calculation example

A. Device which controls the proportional capacity, operates at 75%, 50%, and 25% rating point, with fixed rate indoor fan, is assumed to have capacity measured as follows.

Stage	Air	Actual %load	Net capacity	Compressor (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER
	℃	(Net capacity)	W	W	W	W	W	W/W
4	35.0	100	33,625	8,707	650	1,050	100	3.20
3	27.5	75	25,219	5,928	650	1,050	100	3.26
2	20.0	50	16,813	3,740	650	1,050	100	3.03
1	18.3	25	8,406	2,080	650	1,050	100	2.17

By using the measured performance, IEER can be calculated as following.

IEER= (0.020 x 3.20) + (0.617 x 3.26) + (0.238 x 3.03) + (0.125 x 2.17) = 3.07

B. Device equipped with a single compressor having fixed speed indoor fan, is assumed to have measured capacity as follows.

Stage	Air	Actual %load	Net capacity	Compressor (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER
	℃	(Net capacity)	W	W	W	W	W	W/W
1	35.0	100	33,625	8,707	650	1,050	100	3.20
1	27.5	104.8	35,247	7,623	650	1,050	100	3.74
1	20.0	108.6	36,522	6,653	650	1,050	100	4.32
1	18.3	109.1	36,698	6,450	650	1,050	100	4.45

Tests were carried out by operating the compressor at specified air temperature to fit to 75%, 50%, and 25%.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER	C_D	LF
	℃	Net capacity	W	W	W	W	W	W/W		
1	35.0	100.0	33,625	8,707	650	1,050	100	3.20		
1	27.5	104.8	35,247	7,623	650	1,050	100	3.74		
		75.0						3.46	1.037	0.715
1	20.0	108.6	36,522	6,653	650	1,050	100	4.32		
		50.0						3.54	1.070	0.460
1	18.3	109.1	36,698	6,450	650	1,050	100	4.45		
		25.0						2.86	1.100	0.229

Calculate load factor (LF) and C_D coefficient, then calculate adjusted performance to fit to 75%, 50%, and 25% point, and then calculate IEER.

Formula below is the case on the 50% point C_D calculation:

LF = 0.460

C_D= (-0.13 x 0.460) + 1.13 = 1.070

EER 50%= $\frac{0.460 \times 36{,}522}{0.460 \times (1.070 \times (6{,}653 + 650)) + 1{,}050 + 100}$ = 3.54

IEER= (0.020 x 3.20)+(0.617 x 3.46)+(0.238 x 3.54)+(0.125 x 2.86)=3.40

C. Two Refrigeration circuits which each has a single compressor and device which has two-step capacity with a fixed speed indoor fan, is assumed to have measured capacity as follows.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER
	(℃)	(Net capacity)	W	W	W	W	W	W/W
2	35.0	100	33,625	8,707	650	1,050	100	3.20
1	21.7	55.5	18,669	3,450	325	1,050	100	3.79
1	20.0	55.9	18,767	3,425	325	1,050	100	3.83
1	18.3	56.1	18,875	3,250	325	1,050	100	3.99

Proceed further testing at the 50% and 25% load atmosphere.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER	C_D	LF
	(℃)	(Net capacity)	W	W	W	W	W	W/W		
2	35.0	100.0	33,625	8,707	650	1,050	100	3.20		
1	21.7	55.5	18,669	3,450	325	1,050	100	3.79		
		75.0						3.53		
1	20.0	55.9	18,787	3,425	325	1,050	100	3.83		
		50.0						3.69	1.014	0.895
1	18.3	56.1	18,875	3,250	325	1,050	100	3.99		
		25.0						2.94	1.072	0.445

Calculate load factor (LF) and C_D coefficient, then calculate adjusted performance to fit to 75%, 50%, and 25% point, and then calculate IEER.

IEER= (0.020 x 3.20)+(0.617 x 3.53)+(0.238 x 3.69)+(0.125 x 2.94)= 3.49

D. Three Refrigeration circuits which each has a single compressor and device which has three-step capacity with a fixed speed indoor fan, is assumed to have measured capacity as follows.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_F)	Control (P_{CT})	EER
	(℃)	(Net capacity)	W	W	W	W	W	Btu/W
3	35.0	100.0	33,625	8,707	650	1,050	100	3.20
2	26.4	71.3	23,986	5,125	433	1,050	100	3.58
1	18.3	38.3	12,890	2,250	217	1,050	100	3.56

Stage 1 operates with 38.3%capacity, but as atmospheric condition is 18.3℃, as the test points becomes the same at 25% load atmospheric condition, does not require other tests. Interpolations for 75% and 50% points are needed and calculate IEER by using degradation factor for 25% point.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_F)	Control (P_{CT})	EER	C_D	LF
	(℃)	(Net capacity)	W	W	W	W	W	W/W	NA	NA
3	35.0	100.0	33,625	17,414	1,300	1,050	100	3.20	NA	NA
2	26.4	71.3	23,986	4,950	433	1,050	100	3.58	NA	NA
		75.0						3.61	NA	NA
2	26.4	71.3	81,841	4,950	433	1,050	100	3.67	NA	NA
1	18.3	38.3	43,980	2,250	217	1,050	100	3.56	NA	NA
		50.0						3.68	NA	NA
1	18.3	38.3	12,890	2,250	217	1,050	100	3.56	NA	NA
		25.0						2.97	1.045	0.652

IEER= (0.02 x 3.20)+(0.617 x 3.61)+(0.238 x 3.68)+(0.125 x 2.97)= 3.54

B. Device with the 5 stage capacity and variable speed indoor fan, is assumed to have measured capacity as follows.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER
	(℃)	(Net capacity)	W	W	W	W	W	W/W
5	35.0	100.0	67,250	17,414	1,300	2,100	200	3.20
4	29.5	81.7	54,941	11,444	1,300	1,229	150	3.89
3	23.3	61.0	41,050	6,350	1,300	575	150	4.90
2	20.9	52.9	35,570	6,762	650	374	150	4.48
1	18.3	30.6	20,578	2,139	650	85	150	6.80

Does not require additional testing at 25% load point. Then, standard load point can be calculated by using this data.

Stage	Air	Actual %load	Net capacity	Cmpr (P_C)	Cond (P_{CF})	Indoor (P_{IF})	Control (P_{CT})	EER	C_D	LF
	(℃)	(Net capacity)	W	W	W	W	W	W/W		
5	35.0	100.0	67,250	17,414	1,300	2,100	200	3.20		
4	29.5	81.7	54,941	11,444	1,300	1,229	150	3.89		
3	23.3	61.0	41,050	6,350	1,300	575	150	4.90		
		75.0						4.22		
2	20.9	52.9	35,570	6,762	650	374	150	4.48		
1	18.3	30.6	20,578	2,139	650	85	150	6.80		
		50.0						4.78		
		25.0						6.55	1.024	0.817

Blank space equals NA.

And by using it, IEER can be calculated.

IEER= (0.02 x 3.20)+(0.617 x 4.22)+(0.238 x 4.78)+(0.125 x 6.55)= 4.62

19. Dehumidifier

1. Scope

This standard uses rated voltage 220V as single-phase AC, its purpose is to lower the humidity in the room, and as it equips compression chiller, blower into one cabinet, regulates on electric dehumidifiers of below power consumption of 1,000W.

2. Reference

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

KS C 9317 Electric dehumidifier

3. Definition

Definition of terms used in this standard follows KS C 9317.

4. Test

4.1 Test conditions

Test conditions follow 9.1 of KS C 9317. 2 test samples per model.

4.2 Dehumidifying capacity test

Dehumidifying capacity test follows 9.4 of KS C 9317.

4.3 Power consumption test

Power consumption test follows 9.5 of KS C 9317.

4.4 Dehumidification efficiency

Dehumidification efficiency of dehumidifiers is calculated as following equation.

$$\text{Dehumidification efficiency} = \frac{\text{Rated dehumidifying capacity (L)}}{\text{Measured power consumption(W)} \div 1000 \times 24\text{(h)}}$$

4.5 Records of test results

The test results are recorded as the following table.

[Table] Dehumidifier Performance Test scorecard

Samples	Rated dehumidifying capacity (L)	Measured power consumption (W)	Standby power (W)	Dehumidification efficiency (L/kWh)
1				
2				
Average				

20. Electric pad

1. Scope

   It shall be covered by Appendix 2 in Electric Appliances Safely Control Act, and for size of over 3.3 ㎡, and rated power consumption of 230W≤x≤1000W.

2. Reference

   The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

   KS C 9220 Electric pad
   KS C IEC 60335-2-17 Safety of households and similar electrical appliances.
   Part 2-17: Individual requirements of blankets, pads, and heaters with similar flexibilities.

3. Definitions

   Definition of terms other than the following follows Electrical Appliances Safely Control Act, KS C9220, KS C IEC 60335-2-17

   a) Electric pad

      With internal heat transfer device, used to heat up the body

   b) Controller

      Device to control and change temperature by opening or closing electrical circuit

   c) Decks

      Used to put equipment flat on the top when measuring power consumption and standby power, and is made of plywood with the thickness of (20±2)mm. Plywood has to be located at least 300mm from the floor and the size of the bottom has to be wider than the entire area of insulating sheet.

d) Insulating sheet

Has to be a size that can cover at least 100mm more from the outskirt of equipment heating area, and properties are as follows.

- Material: Open cell polyether
- Density: (30~33)kg/m^3

e) Standard conditions

Basic conditions which must be maintained while testing electric pad, temperature needs to be (20.0±1.0)℃, relative humidity needs to be (50±10)%, measured standard conditions while testing must be kept recorded

4. Test method

Lay 72mm thickness insulation sheet over the deck and put the test sample which had been left for over 2hours on top of it. Turn the power on and test setting the temperature of the controller to the maximum, operate continuously for 8hours, measure the total power consumption, and calculate the average power consumption. For the 2 test samples in total, test once per equipment, and if there are option functions other than the main heating function, test without this function. Standby power measurement follows KS C IEC 62301. Test results are recorded in the following table.

Type	Test result	
	1	2
8hours power consumption(Wh)		

Power consumption(W)		
Standby power(W)		
Standby power (Fail/Pass)		

21. Electrically heated water mat

1. Scope

It shall be covered by Appendix 2 in Electric Appliances Safely Control Act, and for size of over 3.3 ㎡, and rated power consumption of 230W≤x≤1000W.

2. Reference

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

K 10018 Stability of household and similar electrical equipment-Individual requirements of electrically heated water mat and hot water bed

3. Definition

Definition of terms other than the following follows Electrical Appliances Safely Control Act, K 10018

a) Electrically heated water mat

Equipment circulating hot water through the hose inside the flexible mattress

b) Hot water regulator

Device which has ability to control temperature by heating the water and circulate that hot water through hose in the bed or mattress

c) Decks

Used to put equipment flat on the top when measuring power consumption and standby power, and is made of plywood with the thickness of (20±2)mm. Plywood has to be located at least 300mm from the floor and the size of the bottom has to be wider than the entire area of insulating sheet.

d) Insulating sheet

Has to be a size that can cover at least 100mm more from the outskirt of equipment heating area, and properties are as follows.

- Material: Open cell polyether
- Density: (30~33)kg/㎥

e) Standard conditions

Basic conditions which must be maintained while testing electrically heated water mat, temperature needs to be (20.0±1.0)℃, relative humidity needs to be (50±10)%, measured standard conditions while testing must be kept recorded.

4. Test method

Lay 72mm thickness insulation sheet over the deck and put the test sample which had been left for over 2hours on top of it. Fill with water with the temperature of (20.0±1.0) ℃ to the maximum level marked on the bucket and hose of the equipment. Turn the power on and test setting the temperature of the controller to the maximum, operate continuously for 8hours, measure the total power consumption, and calculate the average power consumption. For the 2 test samples in total, test once per equipment, and if there are option functions other than the main heating function, test without this function. Standby power measurement follows KS C IEC 62301. Test results are recorded in the following table.

Type	Test result	
	1	2
8hours power		

consumption(Wh)		
Power consumption(W)		
Standby power(W)		
Standby power (Fail/Pass)		

22. Electrical heating board

1. Scope

It shall be covered by Appendix 2 in Electric Appliances Safely Control Act, and for rated power consumption of 50W≤x≤2000W.

2. Reference

The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

K 60335-2-30 Stability of household and similar electrical equipment- Chapter 2-30: Individual requirements of indoor heaters.

3. Definition

Definition of terms other than the following follows Electrical Appliances Safely Control Act, K 60335-2-30

a) Electrical heating board

Heating equipment for the purpose of floor heating by having heating device inside the hard structure

b) Controller

Device to control and change temperature by opening or closing electrical circuit

c) Floor

Used to put equipment flat on the top when measuring power consumption and standby power, and is made of plywood with the thickness of (20±2)mm. Plywood has to be located at least 300mm from the floor and the size of the bottom has to be wider than the entire area of insulating sheet.

d) Insulating sheet

Has to be a size that can cover at least 100mm more from the outskirt of equipment heating area, and properties are as follows.

- Material: Open cell polyether
- Density: (30~33)kg/㎥

e) Standard conditions

Basic conditions which must be maintained while testing electrically heating board, temperature needs to be (20.0 ± 1.0) ℃, relative humidity needs to be (50±10)%, measured standard conditions while testing must be kept recorded.

4. Test method

Lay 72mm thickness insulation sheet over the deck and put the test sample which had been left for over 2hours on top of it. Turn the power on and test setting the temperature of the controller to the maximum, operate continuously for 12hours, measure the total power consumption, and calculate corresponding average power consumption of 10m2 sample size proportionately. For the 2 test samples in total, test once per equipment, and if there are option functions other than the main heating function, test without this function. Standby power measurement follows KS C IEC 62301. Test results are recorded in the following table.

Type	Test result	
	1	2
12hours power consumption per 10㎡ (Wh)		
Power consumption per 10㎡ (W)		
Standby power(W)		
Standby power (Fail/Pass)		

23. Electric bed

1. Scope

   It shall be covered by Appendix 2 in Electric Appliances Safely Control Act, and for rated power consumption of 230W≤x≤2000W, but

   excluding dedicated equipments with specific purposes other than

   medical and residential.

2. Reference

   The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

   KS C 9322 Ondol(Korean floor heating system) type electric bed
   K 10004 Stability of household and similar electrical equipment-Individual requirements of electric bed and similar equipments

3. Definition

   Definition of terms other than the following follows Electrical Appliances Safely Control Act, KS C 9322, K 10004

   a) Electric bed

      With the floor plate for use during sleep as a main material, heat transfer device that generates heat. As it is combined with bed frame supporting it, it is a device used at indoors for heating up the body.

   b) Controller

      Device to control and change temperature by opening or closing electrical circuit

   c) Fancy mattress

      Consists of heating plate, slabs manufactured and processed to flatten the surface, and other inorganic materials

   d) Decks

Used to put equipment flat on the top when measuring power consumption and standby power of bed with the type of base plate on the bottom of mattress facing the floor or bed with detachable bed frame, and is made of plywood with the thickness of (20±2)mm. Plywood has to be located at least 300mm from the floor and the size of the bottom has to be wider than the entire area of insulating sheet.

e) Insulating sheet

Has to be a size that can cover at least 100mm more from the outskirt of equipment heating area, and properties are as follows:

- Material: Open cell polyether
- Density: (30~33)kg/㎥

f) Standard conditions

Basic conditions which must be maintained while testing electric bed, temperature needs to be (20.0±1.0)℃, relative humidity needs to be (50±10)%, measured standard conditions while testing must be kept recorded

4. Test method

Leave equipment for over 8hours under standard conditions, and cover with 36mm thick insulation sheet. It is alright to remove detachable bed frames, at this time put the sample on top of the deck. Turn the power on and test setting the temperature of the controller to the maximum, operate continuously for 8hours, measure the total power consumption, and calculate the average power consumption. For the 2 test samples on total, test once per equipment, and if there are option functions other than the main heating function, test without this function. Standby power measurement follows KS C IEC 62301. Test results are recorded in the following table.

Type	Test result	
	1	2
8hours power consumption(Wh)		
Power consumption(W)		
Standby power(W)		
Standby power (Fial/Pass)		

24. Electric radiator

1. Scope

   It shall be covered by Appendix 2 in Electric Appliances Safely Control Act, and for rated power consumption of 500W≤x≤10000W.

   Do not apply for:

   a) Heating and cooling equipment (Dual)
   b) Heating element not heating air directly
   c) Heater installed inside the building construction
   d) Central heating system
   e) Heater accessed to air duct
   f) Curtain which includes wallpaper, carpet, or flexible heating element
   g) Thermal storage heater

2. Reference

   The following standard forms part of the standard by being quoted to this standard. These references apply the latest version.

   Electrical Appliances Safely Control Act

   KS C IEC 60675 Residential directly heating type indoor heater

   KS C 9306 Air conditioner

3. Definition

   Definition of terms other than the following follows Electrical Appliances Safely Control Act, KS C IEC 60675, KS C 9306

   a) Electric radiator

      Heating radiators that heats air with filled liquid inside the unit as heating medium

b) Electric fan heater

   Accelerating the flow of air through the fan

c) Combined type product

   Product having both electric fan heater and electric radiator function is considered as electric radiator during the performance test

d) Household and normal

   By the rated power consumption standard of products, below 3kW is classified as household, over 3kW is classified as normal

e) Standard conditions

   Basic conditions which must be maintained while testing electric radiator, indoor dry-bulb temperature is defined as (20±0.5)℃, indoor wet-bulb temperature as (15±0.5) ℃ (At indoor dry-bulb temperature of 20℃, relative humidity: (59±4)%R.H.), supply voltage as 380V±2% or 220V±2%, rated frequency as 60Hz±1%, and measured standard conditions while testing must be kept recorded

4. Test method

   Test within the standard condition and measure power consumption and standby power of electric radiator. Leave for over 2hours within the standard condition, turn the power on and test setting the temperature of the controller to the maximum, operate continuously for 8hours, measure the total power consumption, and calculate average power consumption. If there are option functions other than the main heating function, test without this function. Standby power measurement follows KS C IEC 62301.

4.1 Record of test results

Test results are recorded in the following table.

Type	Test result

	1	2
8hours power consumption(Wh)		
Power consumption(W)		
Standby power(W)		
Standby power (Fail/Pass)		

<Annex 2> Testing Items, requirements, CO2 emission, Annual energy cost for energy efficiency level or energy efficiency (Article 4, Article 12 ① and ②, Article 16 ②)

Products	No. of sample to test	No. of Failed sample to accept	Testing items	Requirements and CO2 emission standards
1. Refrigerator	2	0	Monthly power consumption	-
			Storage volume of fresh compartment	-
			Storage volume of freezer compartment	-
			Auto defrost function	-
			Adjusted volume	-
			Dispenser	-
			the length of the actual sealing perimeter of the homebar door of fresh compartment	-
			the length of the actual sealing perimeter of the homebar door of freezer compartment	-
			any records for KS C ISO 15502 requirements	-
			MEPS	-
			Power consumption per an hour (Wh)	-
			CO2 emission per an hour	Wh x 0.425
			Annual power consumption	kWh x 12
			Annual energy cost	kWh x 160
			Energy Efficiency level	-
2. Freezer	2	0	Monthly power consumption	-
			Storage Volume of freezer compartment	-
			Adjusted Volume	-
			MEPS	-
			Power consumption per an hour (Wh)	-
			CO2 emission per an hour	Wh x 0.425
			Annual power consumption	kWh x 12
			Annual energy cost	kWh x 160
			Energy Efficiency Level	-
3. Kimchi Refrigerator	2	0	Monthly power consumption	-
			Storage volume of Kimchi preserving compartment	-
			Storage Volume of freezer compartment	-
			Storage Volume of other compartments	-
			Storage volume of Kimchi preserving container	-
			Adjusted Volume	-
			MEPS	-
			No. of Kimchi preserving container	-
			Power consumption per an hour (Wh)	-
			CO2 emission per an hour	Wh x 0.425
			Annual power consumption	kWh x 12
			Annual energy cost	kWh x 160
			Energy Efficiency Level	-

4. Air-conditioner	2	0	Cooling seasonal performance factor Cooling period monthly power consumption Rated cooling capacity Cooling standard capacity Cooling standard power consumption Standby power Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Monthly energy cost Energy Efficiency Level	- - - - - Remark 1) Wh x 0.425 kWh x 4 kWh x 160 -
5.Washing machine	2	0	Power consumption per 1kg Water extraction ratio Rinsing Index Rated Washing Capacity Electric Power Consumption per a cycle Duration per a cycle Standard capacity Standby power CO2 emission per a cycle Annual power consumption Annual energy cost Energy Efficiency Level	- ≥ 45% ≥ 1.00 - - - - - Wh x 0.425 kWh x 210 kWh x 160 -
6.Horizontal drum washing machine	2	0	Power consumption per 1kg Water extraction ratio Washing efficiency index Rated Washing Capacity Electric Power Consumption during a cycle Duration per a complete cycle Water Consumption during a cycle Standby power CO2 emission per a cycle Annual power consumption Annual energy cost Energy Efficiency Level	- ≥ 40% ≥ 0.60 - - - - - Wh x 0.425 kWh x 210 kWh x 160 -
7. Dishwasher	2	0	Washing performance Monthly electric power consumption Electric power consumption per a cycle Duration per a cycle Monthly Water Consumption Water Consumption per a cycle Rated Washing Capacity Standby power CO2 emission per a cycle Annual power consumption Annual energy cost Energy Efficiency Level	- - - - − − − − Wh x 0.425 kWh x 365 kWh x 160 -

8. Dish drier	2	0	Power consumption for 20 minutes drying Process (P20) Rated Drying capacity Drying performance Power consumption per an hour (Wh) Standby power CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency Level	- (person) ≥ 0.60 P20 x 3 - Wh x 0.425 kWh x 365 kWh x 160 -
9.Electrical Cooler and Heater for Drinking-Water Storage	2	0	Comparative power consumption Capacity Power consumption per 1 L Daily power consumption Monthly power consumption Capacity of cool-water storage tank Capacity of hot-water storage tank Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency Level	- - - - kWh×365÷12 - - kWh÷24 Wh x 0.425 kWh×365 kWh×160 -
10.Rice cooker	3	0	Power consumption per 1 person Power consumption Type Total power consumption (Warming and Cooking) per a complete cycle Duration per a complete cycle Maximum cooking capacity Standby power Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency level	- - - - Warming+Cooking time(6 hour) - - Remark 2) Wh x 0.425 kWh x 438 kWh x 160 -
11.Vacuum cleaner	2	0	Suction Power Efficiency Measured Power consumption (W) Maximum Suction Power Dust emission Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency Level	- - - - W x 1 hour Wh x 0.425 W x 21.6 x 0.333(h)x12x0.75 kWh x 160 -
12.Electric Fan	2	0	Energy Efficiency Ratio Measured Power consumption (W) Standard Air flow Maximum air velocity Standby power Power consumption per an hour (Wh)	- - - - - W x 1 hour

			CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency Level	Wh x 0.425 W x 655(h) kWh x 160 -
13.Air cleaner	2	0	Power consumption per 1m^2 Measured power consumption (W) Standard room size Deordorization efficiency Standby power Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency Level	- - - - - W x 1 hour Wh x 0.425 Wx 8,760(h)x0.3 kWh x 160 -
14.Incandescent lamps	20	2	Efficiency Luminous flux Power consumption (W) Lifetime Power consumption per an hour (Wh) CO2 emission per an hour Energy Efficiency Level	- ≥Rated Luminous flux × 93% (White 88%) ≤(Rated power＋0.5W)×104% ≥KS annex table×80% W x 1 hour Wh x 0.425 -
15.Fluorescent lamps	10	1	Efficiency Luminous flux Power consumption (W) Color Power consumption per an hour (Wh) CO2 emission per an hour Energy Efficiency Level	- ≥KS annex table×92% ≤KS Annex table ± (Power input ×0.05＋0.5) - W x 1 hour Wh x 0.425 -
16.Fluorescent lamps ballasts	2	0	Compared Energy Efficiency Ratio Efficiency level Luminous flux Power input Luminous flux Efficiency of luminous flux for reference ballast Efficiency of luminous flux for tested ballast Energy Efficiency Level	- Normal/High efficiency Tolerance of KS C 8100, 8102 “ - - - -
17.Associated ballasts	3	0	Efficiency of luminous flux Power input	≥KS rence Efficiency of luminous flux ≤Rated input ×

			Color Luminous flux The endurance of on-off Power consumption per an hour (Wh) CO2 emission per an hour Energy Efficiency Level	±15% - - - W x 1 hour Wh x 0.425 -
18.3 phase induction motor	5	-	Full load efficiency Efficiency level Type Rated output power The number of pole Rated voltage Rated ampere Minimum efficiency in tested samples No. of testing samples Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost	- IE2/IE3 - - - - - - - Remark 3) Wh x 0.425 Wh×4,906÷1000 kWh×77
19.Household Gas Boiler	2	0	Measured thermal efficiency for heating Type Gas consumption Heating capacity (condensing capacity) Standby power Energy Efficiency Level	- - - - - -
20. Adapter·Charger	3	0	Running efficiency Classification the rated output Measured input Standby	- - - - ≤ 105%
21.Electric driven heatpump	2	0	Energy Efficiency Ratio Cooling seasonal performance Factor Heating seasonal performance Factor rated cooling capacity rated heating capacity Standard cooling capacity Standard Heating capacity cooling standard power consumption heating standard power consumption cooling period total power consumption heating period total power consumption make-up heater power consumption per 1hour CO2 emission per 1hour Annual power consumption Annual energy cost Energy Efficiency Level	- - - - - - - - - 941hours(h) 2849hours(h) - Remark 4) (Wh)x 0.425 Remark 5) kWh x 160 –
22.Commercial Refrigerator	2	0	Monthly power consumption Storage volume of fresh compartment Storage volume of freezer compartment Auto defrost function Adjusted volume	- - - - -

			any records for KS C ISO 15502 requirements MEPS Power consumption per an hour (Wh) CO2 emission per an hour Annual power consumption Annual energy cost Energy Efficiency level	- - - Wh x 0.425 kWh x 12 kWh x 160 -
23. Gas Water heater	2	0	Measured thermal efficiency Gas consumption Standby power Energy Efficiency level	- - - -
24. Transformer	1	0	Efficiency Efficiency level Load loss No-load loss Wire wound resistance Type Insulation material (Case of dry) Primary and secondary voltage Number of phase Capacity	Load factor of 50% Normal/high efficiency - - - Oil-immersed /Dry A, B, F etc. - - -
25. Window set	2	0	Heat transfer coefficient Air permeability(Amount of air flow, level) Energy Efficiency Level Frame material Glass	- - - - -
26. TV set	3	0	Power consumption per 1 $\sqrt{m^2}$ Display method Length of screen diagonal Screen aspect ratio (length and width), Screen area Square root of screen area Power consumption in operation mode Standby power Power consumption per 1 hour CO2 emission per 1 hour Annual power consumption Annual energy cost Energy Efficiency Level	- - - - - - - - W×1 hour Wh×0.425 W×2,190hrs kWh×160 -
27.Electric fan heater	2	0	Heating efficiency Heating capacity Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - - W x 1hour Wh x 0.425 W x 8hrs x 30days -Residential: kWh x 160 x 2.4 -Normal:

				kWh x 113
28.Electric stove	2	0	Standby power Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - W x 1hour Wh x 0.425 W x 8hrs x 30days -Residential: kWh x 160 x 2.4 -Normal: kWh x 113
29.Multi electric heat pump system	1	0	Cooling/heating efficiency (EERa) Integrated cooling efficiency (IEER) Heating efficiency (COP) Standard heating efficiency (COP1) Cold climate area heating efficiency (COP2) Rated cooling capacity Rated heating capacity Part load cooling capacity Part load cooling power consumption Standard heating capacity Standard heating power consumption Cold climate area heating capacity Cold climate area heating power consumption Make-up heater Cooling capacity(indoor unit) Cooling power consumption(indoor unit) Rated voltage Power consumption per 1hour CO2 emission per 1hour Consumption efficiency level	- - - - - - - 100%, 75%, 50%, 25% 100%, 75%, 50%, 25% - - - - - - - - W x 1hour Wh x 0.425 -
30.Defumidifier	2	0	Dehumidification efficiency Measured power consumption Rated dehumidification capacity Standby power Power consumption per 1hour CO2 emission per 1hour Annual power consumption Annual energy cost Consumption efficiency level	- - - - W x 1hour Wh x 0.425 W x 512 kWh x 160 -
31.Electric pad	2	0	Standby power Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - W x 1hour Wh x 0.425 W x 8hrs x 30days kWh x 160 x 2.4

32.Electrically heated water mat	2	0	Standby power Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - W x 1hour Wh x 0.425 W x 8hrs x 30days kWh x 160 x 2.4
33.Electrical heating board	2	0	Standby power Power consumption per 10㎡ Power consumption per 1hour per 10㎡ CO2 emission per 1hour per 10㎡ Monthly power consumption per 10㎡ Monthly energy cost per 10㎡	- W converted in 10㎡ standard W x 1hour per 10㎡ Wh x 0.425 per 10㎡ W x 12hrs x 30days per 10㎡ kWh x 113 per 10㎡
34.Electric bed	2	0	Standby power Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - W x 1hour Wh x 0.425 W x 8hrs x 30days kWh x 160 x 2.4
35.Electric radiator	2	0	Standby power Power consumption Power consumption per 1hour CO2 emission per 1hour Monthly power consumption Monthly energy cost	- - W x 1hour Wh x 0.425 W x 8hrs x 30days -Household: kWh x 160 x 2.4 General: kWh x 113

Remark) 1. For all cases $\frac{monthly \quad power \quad consumption(kWh) \times 4months \times 1000}{941(hours)}$

(Fixed capacity type, 2 stage compressor type, variable capacity type)

(ex: where Monthly power consumption 388.1kWh, $\frac{388.1(kWh)\times4\times1000}{941}$ = 1,650Wh)

2. CO2 emission conversion: 1Wh=0.425g

3. "Power consumption per 1 hour" or "Power consumption per a cycle" in Wh unit

4. "CO2 emission per 1 hour" or "Power consumption per a cycle" conversion in g unit, Calculate "Power consumption per 1hour (Wh)" or "Power consumption per a cycle (Wh)" first, and then calculate "Power consumption per 1 hour × 0.425" or "Power consumption per a cycle × 0.425"

5. Annual energy cost or monthly energy cost conversion factor, 1kWh = 160won (3phase induction motor 1kWh=77won, electric fan heater, electric stove, electric pad, electrically heated water mat, electrical heating board, electric bed, and electric radiator applies the above unit)

6. “Annual power consumption” or “monthly power consumption” in kWh unit

7. “Annual energy cost” or “monthly energy cost” conversion factor in won unit, calculate annual power consumption (kWh) or monthly power consumption (kWh) first, “Annual power consumption x 160 Won (3 Phase induction motor, 1kWh x 77 Won)” or “monthly power consumption x 160won (electric fan heater, electric stove, electric pad, electrically heated water mat, electrical heating board, electric bed, and electric radiator). It shall round off the 3rd place of decimal of the value.

8. Fluorescent lamps ballasts efficiency level:
- Normal: Fluorescent lamps ballasts of over [table3] minimum consumption efficiency standard, below standard consumption efficiency.
- High efficiency: 3phase induction motor of over [table3] standard consumption efficiency

9. 3phase induction motor efficiency level:
- IE2: 3phase induction motor of over [table3] minimum consumption efficiency standard, below premium efficiency standard.
- IE3: 3phase induction motor of over [table3] premium efficiency standard.

10. Transformer efficiency level:
-Normal: Transformer of over [table3] minimum consumption efficiency standard, below standard consumption efficiency.
-High efficiency: Transformer of over [table3] standard consumption efficiency.

11. Cooling/heating power consumption of multi-heat pump system is average of cooling power consumption and heating power consumption, and calculated as follows.
- P cooling/heating power consumption= (P cooling power consumption + P heating power consumption)/2
- P cooling power consumption= Power consumption when measuring integrated cooling efficiency (IEER) =(0.02 x P 100% load)+(0.617 x P 75%load)+(0.238 x P 50% load)+(0.125 x P 25% load)
- P heating power consumption= (P standard + cold climate area)/2

<Annex 3> Energy Efficiency Standards and Energy Efficiency Level (Article 5 ②)

1. Refrigerator

1.1 MEPS (Minimum Energy Performance Standard)

Items	MEPS From 1st of January 2013
Refrigerator only	$P \leq 0.037AV+16.75$
Refrigerator-freezer whose compensated cubic volume is less than 500 L	$P \leq 0.025AV+29.45$
Refrigerator-freezer whose compensated cubic volume is no less than 500 L, less than 1000L without ice-dispenser or homebar door	$P \leq 0.043AV+16.19$
Refrigerator-freezer whose compensated cubic volume is no less than 500 L, less than 1000L with ice-dispenser or homebar door	$P \leq 0.043AV+16.19$ +2.6 (through-the-door ice dispenser) +0.022 (the length of the actual sealing perimeter of the homebar door of fresh compartment, cm) +0.036 (the length of the actual sealing perimeter of the homebar door of freezer compartment, cm)
Refrigerator-freezer whose compensated cubic volume is no less than 1000L, without ice-dispenser or homebar door	$P\leq0.021AV+33.25$
Refrigerator-freezer whose compensated cubic volume is no less than 1000L, with ice-dispenser or homebar door	$P \leq 0.021AV+33.25$ +2.6 (through-the-door ice dispenser) +0.022 (the length of the actual sealing perimeter of the homebar door of fresh compartment, cm) +0.036 (the length of the actual sealing perimeter of the homebar door of freezer compartment, cm)

Remark)

1. AV = compensated cubic volume = ∑{{cubic volume of the each compartment} × K × F }

   1) K value in the refrigerator only is 1
   2) K value in refrigerator-freezer is

$$K\ (\text{compensation coefficient}) = \frac{T_1 - T_C}{T_1 - T_2}$$

Where
T_1=ambient temperature in testing(25℃)
T_2=averaging indoor temperature of the fresh compartment(5℃)

   3) F = 1.2 if it is auto defrost, otherwise F=1.0
2. P = Maximum power consumption (kWh/month)
3. 220V is priority if both voltages, 110V and 220V can be applied
4. To determine MEPS it shall round off the 2nd place of decimal of the value in accordance with KS Q 5002.

1.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{MEPS [kWh/month]}}{\text{Measured monthly power consumption [kWh/month]}}$$

B. Energy Efficiency Level

1) Refrigerator and Freezer-refrigerator with adjusted Volume less than 500 liter

R	Level
1.60 ≤ R	1
1.45 ≤ R < 1.60	2
1.30 ≤ R < 1.45	3
1.15 ≤ R < 1.30	4
1.00 ≤ R < 1.15	5

2) Freezer-refrigerator with adjusted Volume no less than 500 L, less than 1000L

R	Level
1.90 ≤ R	1
1.75 ≤ R < 1.90	2
1.60 ≤ R < 1.75	3
1.45 ≤ R < 1.60	4
1.00 ≤ R < 1.45	5

3) Freezer-refrigerator with adjusted Volume no less than 1000 L

R	Level
2.20≤R	1
1.95≤R<2.20	2
1.70≤R<1.95	3
1.45≤R<1.70	4
1.00≤R<1.45	5

1.3 Energy frontier standard

Classification	R	Monthly power consumption
Refrigerator and Freezer-refrigerator with adjusted Volume less than 500 L	2.10≤R	Below 25.0kWh
Freezer-refrigerator with adjusted Volume no less than 500L, less than 1000L	2.50≤R	Below 25.0kWh
Freezer-refrigerator with adjusted Volume no less than 1000L	2.90≤R	Below 25.0kWh

2. Freezer

2.1 MEPS (Minimum Energy Performance Standard)

Item	**MEPS**
구　　분	From 1st of January, 2010
Freezer	$P \leq 0.028AV+32.40$

Remark)

1. AV = compensated cubic volume = ∑{{cubic volume of the each compartment} × K × F }

$$K \text{ (compensation coefficient)} = \frac{T_1 - T_C}{T_1 - T_2}$$

Where
T_1=ambient temperature in testing(25℃)
T_2=averaging indoor temperature of the fresh compartment(5℃)
F = 1.2 if it is auto defrost, otherwise F=1.0

2. P = Maximum power consumption (kWh/month)
3. 220V is priority if both voltages, 110V and 220V can be applied
4. To determine MEPS it shall round off the 2nd place of decimal of the value in accordance with KS Q 5002.

2.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R\text{(Energy Efficiency Level Index)} = \frac{\text{MEPS [kWh/month]}}{\text{Measured monthly power consumption [kWh/month]}}$$

B. Energy Efficiency Level

R	Level
$2.20 \leq R$	1
$1.90 \leq R < 2.20$	2
$1.60 \leq R < 1.90$	3
$1.30 \leq R < 1.60$	4
$1.00 \leq R < 1.30$	5

3. Kimchi Refrigerator

3.1 MEPS (Minimum Energy Performance Standard) and effective date

Item	**MEPS**
구 분	From 1st of January 2011
Kimchi Refrigerator whose compensated cubic volume is no less than 200 L with 2 or less Kim-chi preserving compartment	P ≤ 0.026AV+25.00
Kimchi Refrigerator whose compensated cubic volume is no less than 200 L with 3 or more Kim-chi preserving compartment	P ≤ 0.040AV+27.00+0.022 ×the length of the actual sealing perimeter of the homebar door of freezer compartment (cm)

Remark)

1. AV = compensated cubic volume = {cubic volume of the each room} × K × F(Auto defrost function)

1) For a freezer and kimchi storage

$$K \text{ (compensation coefficient)} = \frac{T1-Tc}{T1-T2}$$

Where

T_1=ambient temperature in testing(25℃)

T_2=average temperature of kimchi storage (0℃)

T_f=average temperature of each room (℃)

2) For other room

$$K= \quad 1$$

Where

T_1=ambient temperature in testing(25℃)

T_2=averaging indoor temperature of the fresh compartment(0℃)

T_r=averaging indoor temperature of the kimchi compartment(℃)

3) F = 1.1 if it is auto defrost, otherwise F=1.0. The defrost shall be more than one during 48 hours.

4) Measure the average temperature of each room in factory conditions. In the case where the average temperature of kimchi storage exceeds 0.5℃, change the temperature condition and test by lowering the average temperature of kimchi storage to under 0.5℃.

2. P = Maximum power consumption (kWh/month)
3. 220V is priority if both voltages, 110V and 220V can be applied
4. To determine MEPS it shall round off the 2nd place of decimal of the value in accordance with KS Q 5002.

3.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Measured monthly power consumption [kWh/month]}}{\text{MEPS [kWh/month]}}$$

B. Energy Efficiency Level

R	Level
2.20 ≤ R	1
1.90 ≤ R < 2.20	2
1.60 ≤ R < 1.90	3
1.30 ≤ R < 1.60	4
1.00 ≤ R < 1.30	5

4. Air-conditioner

4.1 MEPS (Minimum Energy Performance Standard)

(unit : W/W)

Type		MEPS (EER) Effective date : From 1st of January, 2004
Window and Unitary Room air conditioner		2.88
Split type	RCC < 4.0 kW	3.37
	4.0 kW ≤ RCC < 10.0 kW	2.97
	10.0 kW ≤ RCC < 17.5 kW	2.76
	17.5 kW ≤ RCC < 23.0 kW	2.63

Remark) Rated Cooling Capacity (RCC)

4.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$EER = \frac{\text{Measured Cooling Capacity [W]}}{\text{Measured Power consumption [W]}}$$

For a fixed capacity type CEER(Cooling Energy efficiency ratio) shall be used according to KS C 9306, and for a variable capacity and 2 and more compressors type and a inverter driven compressor type CSPF(Cooling Seasonal Performance Factor)) shall be used according to KS C 9306.

Standby power shall be tested in power-off with using remote controller, if a remote controller is not provided, it shall be tested in power-off in a tested sample.

B. Energy Efficiency Level

1) Window room type and unitary type

R	Standby power (Off mode power consumption)	Level
3.94 ≤ R	≤ 1.0 W	1
3.94 ≤ R	N/A	2
3.55 ≤ R < 3.94	N/A	3
3.20 ≤ R < 3.55	N/A	4

2.88 ≤ R < 3.20	N/A	5

2) Window room type and unitary type with network function

R	Standby power	Level
3.94 ≤ R	≤ 1.0 W (off mode) ≤ 3.0 W (active standby mode)	1
3.94 ≤ R	N/A	2
3.55 ≤ R < 3.94	N/A	3
3.20 ≤ R < 3.55	N/A	4
2.88 ≤ R < 3.20	N/A	5

3) Split type, RCC < 4.0 kW

R	Standby power (Off mode power consumption)	Level
4.36 ≤ R	≤ 1.0 W	1
4.36 ≤ R	N/A	2
4.00 ≤ R < 4.36	N/A	3
3.67 ≤ R < 4.00	N/A	4
3.37 ≤ R < 3.67	N/A	5

4) Split type, RCC < 4.0 kW with network function

R	Standby power	Level
4.36 ≤ R	≤ 1.0 W (off mode) ≤ 3.0 W (active standby mode)	1
4.36 ≤ R	N/A	2
4.00 ≤ R < 4.36	N/A	3
3.67 ≤ R < 4.00	N/A	4

3.37 ≤ R < 3.67	N/A	5

5) Split type, 4.0 kW ≤ RCC < 10.0 kW

R	Standby power (Off mode power consumption)	Level
4.40 ≤ R	≤ 1.0 W	1
4.40 ≤ R	N/A	2
3.86 ≤ R < 4.40	N/A	3
3.39 ≤ R < 3.86	N/A	4
2.97 ≤ R < 3.39	N/A	5

6) Split type, 4.0 kW ≤ RCC < 10.0 kW with network function

R	Standby power	Level
4.40 ≤ R	≤ 1.0 W (off mode) ≤ 3.0 W (active standby mode)	1
4.40 ≤ R	N/A	2
3.86 ≤ R < 4.40	N/A	3
3.39 ≤ R < 3.86	N/A	4
2.97 ≤ R < 3.39	N/A	5

7) Split type, 10.0 kW ≤ RCC < 17.5 kW

R	Standby power (Off mode power consumption)	Level
4.62 ≤ R	≤ 1.0 W	1
4.62 ≤ R	N/A	2
3.89 ≤ R < 4.62	N/A	3
3.28 ≤ R < 3.89	N/A	4

2.76 ≤ R < 3.28	N/A	5

8) Split type, 10.0 kW ≤ RCC < 17.5 kW with network function

R	Standby power	Level
4.62 ≤ R	≤ 1.0 W (off mode) ≤ 3.0 W (active standby mode)	1
4.62 ≤ R	N/A	2
3.89 ≤ R < 4.62	N/A	3
3.28 ≤ R < 3.89	N/A	4
2.76 ≤ R < 3.28	N/A	5

9) Split type, 17.5 kW ≤ RCC < 23.0 kW

R	Standby power (Off mode power consumption)	Level
4.11 ≤ R	≤ 1.0 W	1
4.11 ≤ R	N/A	2
3.54 ≤ R < 4.11	N/A	3
3.05 ≤ R < 3.54	N/A	4
2.63 ≤ R < 3.05	N/A	5

10) Split type, 17.5 kW ≤ RCC < 23.0 kW with network function

R	Standby power	Level
4.11 ≤ R	≤ 1.0 W (off mode) ≤ 3.0 W (active standby mode)	1
4.11 ≤ R	N/A	2
3.54 ≤ R < 4.11	N/A	3
3.05 ≤ R < 3.54	N/A	4
2.63 ≤ R < 3.05	N/A	5

C. Definitions

Without network function

With network function :
It has a network function in a body, which is enable to exchange data between a body and external network, or between indoor unit and outdoor unit by wire or wireless. If it is get to 1st level, standby power shall be less than 3 W for active standby mode, and 1W for off mode.

Off mode : The power state when the product is switched off or auto off.

Active standby mode :
When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals. In addition, it can also be activated into other power modes by receiving external signals or when it is receiving minimum level of data from service providers.

4.3 Energy frontier standard

(Unit: W/W)

Classification		R	Standby power
Single type		5.91≤R	≤1.0W (passive standby mode) ≤2.0W (active standby mode)
Separable type	Rated cooling capacity of less than 4kW	6.54≤R	≤1.0W (passive standby mode) ≤2.0W (active standby mode)
	Rated cooling capacity of more than 4kW, less than 10kW	6.60≤R	≤1.0W (passive standby mode) ≤2.0W (active standby mode)
	Rated cooling capacity of more than 10kW, less than 17.5kW	6.93≤R	≤1.0W (passive standby mode)

			≤2.0W (active standby mode)
	Rated cooling capacity of more than 17.5kW, less than 23kW	6.17≤R	≤1.0W (passive standby mode) ≤2.0W (active standby mode)

5. Washing machine

5.1 MEPS (Minimum Energy Performance Standard)

(unit : Wh/kg)

Type	MEPS
	From 1st of January, 2007
Washing Machine	23.0

5.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

Electric Power Consumption during a complete cycle [Wh] per Rated Washing Capacity [Standard program] and standby power.

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Electric Power Consumption during a complete cycle [Wh]}}{\text{Rated Washing Capacity [kg]}}$$

Standby power shall be tested in off-mode, which means a tested sample shall be in power-off manually or automatically.

B. Energy Efficiency Level

1) Without network function

R	Standby power (Off mode power consumption)	Water consumption per 1 cycle-1 kg	Level
R ≤ 12.0	≤ 0.5 W	≤15.0 liter/kg	1

$R \leq 14.5$	N/A	N/A	2
$14.5 < R \leq 17.0$	N/A	N/A	3
$17.0 < R \leq 20.0$	N/A	N/A	4
$20.0 < R \leq 23.0$	N/A	N/A	5

2) With network function

R	Standby power	Water consumption per 1 cycle-1 kg	Level
$R \le 12.0$	$\le$ 0.5 W (off mode) $\le$ 2.0 W (active standby mode)	$\le$15.0 liter/kg	1
$R \le 14.5$	N/A	N/A	2
$14.5 < R \le 17.0$	N/A	N/A	3
$17.0 < R \le 20.0$	N/A	N/A	4
$20.0 < R \le 23.0$	N/A	N/A	5

C. Definitions

Without network function

With network function :
It has a network function in a body, which is enable to exchange data between a body and external network by wire or wireless. If it is get to 1st level, standby power shall be less than 2.0 W for active standby mode, and 0.5W for off mode, in addition water consumption shall be no more than 15.0 liter/kg.

Off mode : The power state when the product is switched off or auto off.

Active standby mode :
When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals. In addition, it can also be activated into other power modes by receiving external signals or when it is receiving minimum level of data from service providers.

6. Horizontal drum washing machine
6.1 MEPS (Minimum Energy Performance Standard)

(unit : Wh/kg)

Type	MEPS
	From 1st of January, 2011
2kg≤The rated washing capacity≤8kg	82
8kg≤The rated washing capacity≤13kg	80
13kg≤The rated washing capacity≤20kg	78

6.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

Electric Power Consumption during a complete cycle [Wh] per Rated Washing Capacity [Water temperature 40℃]

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Electric Power Consumption during a complete cycle [Wh]}}{\text{Rated Washing Capacity [kg]}}$$

Standby power shall be tested in off-mode, which means a tested sample shall be in power-off manually or automatically.

B. Energy Efficiency Level

1) 2kg≤The rated washing capacity≤8kg without network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤42	≤ 0.5 W	≤12.0 liter/kg	0.99≥	1
R ≤ 52	N/A	N/A	0.90≥	2
52 < R ≤ 62	N/A	N/A	0.90≥	3
62< R ≤ 72	N/A	N/A	0.90≥	4

72< R ≤ 82	N/A	N/A	0.90≥	5

2) 2kg≤The rated washing capacity≤8kg with network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤42	≤ 0.5 W (off mode) ≤ 2.0 W (active mode)	≤12.0 liter/kg	0.99≥	1
R ≤ 52	N/A	N/A	0.90≥	2
52 < R ≤ 62	N/A	N/A	0.90≥	3
62< R ≤ 72	N/A	N/A	0.90≥	4
72< R ≤ 82	N/A	N/A	0.90≥	5

3) 8kg≤The rated washing capacity≤13kg without network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤40	≤ 0.5 W	≤12.0 liter/kg	0.99≥	1
R ≤ 50	N/A	N/A	0.90≥	2
50 < R ≤ 60	N/A	N/A	0.90≥	3
60< R ≤ 70	N/A	N/A	0.90≥	4
70< R ≤ 80	N/A	N/A	0.90≥	5

4) 8kg≤The rated washing capacity≤13kg with network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤40	≤ 0.5 W (off mode) ≤ 2.0 W (active mode)	≤12.0 liter/kg	0.99≥	1
R ≤ 50	N/A	N/A	0.90≥	2

50 < R ≤ 60	N/A	N/A	0.90≥	3
60< R ≤ 70	N/A	N/A	0.90≥	4
70< R ≤ 80	N/A	N/A	0.90≥	5

5) 13kg≤The rated washing capacity≤20kg without network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤38	≤ 0.5 W	≤12.0 liter/kg	0.99≥	1
R ≤ 48	N/A	N/A	0.90≥	2
48 < R ≤ 58	N/A	N/A	0.90≥	3
58< R ≤ 68	N/A	N/A	0.90≥	4
68< R ≤ 78	N/A	N/A	0.90≥	5

6) 13kg≤The rated washing capacity≤20kg with network function

R	Standby power (off mode)	Water consumption per 1 cycle-1 kg	Washing efficiency index	Level
R ≤38	≤ 0.5 W (off mode) ≤ 2.0 W (active mode)	≤12.0 liter/kg	0.99≥	1
R ≤ 48	N/A	N/A	0.90≥	2
48 < R ≤ 58	N/A	N/A	0.90≥	3
58< R ≤ 68	N/A	N/A	0.90≥	4
68< R ≤ 78	N/A	N/A	0.90≥	5

C. Definitions

Without network function

With network function :

It has a network function in a body, which is enable to exchange data between a body and external network by wire or wireless. If it is get to 1st level, standby power shall be less than 2.0 W for active standby mode, and 0.5W for off mode, in addition water consumption shall be no more than 12.0 liter/kg.

Off mode : The power state when the product is switched off or auto off.

Active standby mode :
When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals. In addition, it can also be activated into other power modes by receiving external signals or when it is receiving minimum level of data from service providers.

6.3 Energy frontier standard

(Unit : Wh/kg)

Classification	R	Standby power	Washing water usage per 1kg	Washing index
Standard washing capacity 2.0kg<x<8.0kg	R≦25	≦0.5W(off mode) ≦2.0W (active standby mode)	Below 8.4L/kg	Over 1.00
Standard washing capacity 8.0kg<x<13.0kg	R≦24	≦0.5W(off mode) ≦2.0W (active standby mode)	Below 8.4L/kg	Over 1.00
Standard washing capacity 13.0kg<x<20.0kg	R≦23	≦0.5W(off mode) ≦2.0W (active standby mode)	Below 8.4L/kg	Over 1.00

7. Dishwasher

7.1 MEPS (Minimum Energy Performance Standard)

(unit : kWh/ ℓ)

Type	MEPS
	From 1st of January, 2010
Rated Capacity ≤ 6	5.00
Rated Capacity > 6	10.00

7.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

R(Energy Efficiency Level Index) =	Electric Energy Efficiency Ratio(EERe) x Water Energy Efficiency Ratio(EERw)

Standby power shall be tested in off-mode, which means a tested sample shall be in power-off manually or automatically.

B. Energy Efficiency Level

1) Rated Capacity ≤ 6 without network function

R	Standby power (Off mode power consumption)	Level
50.00 < R	≤ 1.0 W	1
50.00 < R	N/A	2
35.00 < R ≤ 50.00	N/A	3
20.00 < R ≤ 35.00	N/A	4
5.00 < R ≤ 20.00	N/A	5

2) Rated Capacity ≤ 6 with network function

R	Standby power	Level
50.00 < R	≤ 1.0 W(off mode) ≤ 3.0 W(active standby mode)	1
50.00 < R	N/A	2
35.00 < R ≤ 50.00	N/A	3
20.00 < R ≤ 35.00	N/A	4

5.00 < R ≤ 20.00	N/A	5

3) Rated Capacity > 6 without network function

R	Standby power (Off mode power consumption)	Level
70.00 < R	≤ 1.0 W	1
70.00 < R	N/A	2
50.00 < R ≤ 70.00	N/A	3
30.00 < R ≤ 50.00	N/A	4
10.00 < R ≤ 30.00	N/A	5

4) Rated Capacity > 6 with network function

R	Standby power	Level
70.00 < R	≤ 1.0 W(off mode) ≤ 3.0 W(active standby mode)	1
70.00 < R	N/A	2
50.00 < R ≤ 70.00	N/A	3
30.00 < R ≤ 50.00	N/A	4
10.00 < R ≤ 30.00	N/A	5

C. Definitions

Without network function

With network function :
It has a network function in a body, which is enable to exchange data between a body and external network by wire or wireless. If it is get to 1st level, R shall be met wit above tables and standby power shall be less than 3 W for active standby mode, and 1W for off mode.

Off mode : The power state when the product is switched off or auto off.

Active standby mode :
When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals. In addition, it can also be activated into other power modes by receiving external signals or when it is receiving minimum level of data from service providers.

8. Dish drier

8.1. Energy Efficiency Standards, TEPS, Effective date of MEPS

(unit : Wh/20 min)

Type	MEPS From 1st of January, 2011	Standard Power consumption (TEPS)
Top or Front Door Type	2.9N+68.15	2N+47
Sliding Door Type	3.625N+89.9	2.5N+62

Remark) N = Rated capacity

8.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index : Energy Efficiency shall be measured by the test method, which is obtained from energy consumption (Wh) for 20 minutes drying process divided by TEPS(Target Energy Performance Standard).

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Electric Power Consumption for 20 minutes drying process [Wh]}}{\text{TEPS}}$$

B. Energy Efficiency Level

R	Standby power	Level
$R \leq 0.50$	$\leq$ 1.0 W(off mode)	1
$R \leq 1.15$	N/A	2
$1.15 < R \leq 1.25$	N/A	3
$1.25 < R \leq 1.35$	N/A	4
$1.35 < R \leq 1.45$	N/A	5

C. Definition

Off mode : The power state when the product is switched off or auto off.

9. Electrical Cooler and Heater for Drinking-Water Storage

9.1. MEPS (Minimum Energy Performance Standard)

(unit : kWh/ kWh)

Type	MEPS
	From 1st of January, 2012
Electrical Cooler and Heater for Drinking-Water Storage	2.5

9.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

Energy Efficiency shall be defined as comparative power consumption obtained from power consumption with no water discharge for 24 hours [P1 (kWh)] divided by power consumption for expected thermal performance [P3 (kWh)].

$$R(\text{Energy Efficiency Level Index}) = \frac{P1\ (kWh)}{P3\ (kWh)}$$

Where,
P1 : power consumption with no water discharge for 24 hours P3: power consumption for expected thermal performance

B. Energy Efficiency Level Standard

R	Level
$R \leq 1.0$	1
$1.0 < R \leq 1.3$	2
$1.3 < R \leq 1.6$	3
$1.6 < R \leq 2.0$	4
$2.0 < R$ 2.5	5

10. Rice Cooker

10.1 MEPS and Effective date of MEPS

(unit : Wh/person)

Type	MEPS From 1st January 2010	Standard Power consumption (TEPS)
Maximum Cooking Capacity N< 6(1.08L)	P ≤ -13.9N+258.5	P ≤ -10.0N+186
Maximum Cooking Capacity 6(1.08L)≤N≤10(1.80L)	P ≤ -6.95N+216.8	P ≤ -5.0N+156
Maximum Cooking Capacity 10(1.80L)≤N≤20(3.60L)	P ≤ -5.56N+202.9	P ≤ -4N+146

Remark) 1. N = Maximum cooking capacity

10.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{power consumption per a person(Wh/person)}}{\text{TEPS(Wh/person)}}$$

B. Energy Efficiency Level

R	Standby power	Level
R<1.00	≤ 1.0 W(off mode) ≤ 3.0 W(active standby mode)	1
R<1.00	N/A	2
1.00 ≤ R ≤ 1.13	N/A	3
1.13 ≤ R ≤ 1.26	N/A	4
1.26 ≤ R ≤ 1.39	N/A	5

C. Definitions

No-load mode : Rice is not loading in inner pan.

11. Vacuum Cleaner

11.1. Energy Efficiency Standards, Date to accomplish TEPS, Effective date of MEPS

(unit : %)

Type	MEPS From 1st of October, 2004	TEPS
Vacuum Cleaner	17.8	37.0

11.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Measured Suction Power Efficiency}}{\text{TEPS}}$$

B. Energy Efficiency Level

R	Level
1.00 < R	1
0.87 < R ≤ 1.00	2
0.74 < R ≤ 0.87	3
0.61 < R ≤ 0.74	4
0.48 < R ≤ 0.61	5

12. Electric Fan

12.1. TEPS (Target Energy Performance Standard) and date to accomplish

Item	MEPS	**TEPS**
	From 1st of January, 2009	
Electric Fan	P ≤ 0.0193A+0.0972	P ≤ 0.0425A+0.2125

Remark)
1. A = Diameter of Wing (cm)
2. P = MEPS or TEPS
3. 220V is priority if both voltages, 110V and 220V can be applied
4. To determine TEPS it shall round off the 2nd place of decimal of the value in accordance with KS Q 5002.

12.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$\text{R(Energy Efficiency Level Index)} = \frac{\text{TEPS}}{\text{Measured Energy Efficiency}}$$

Where,

$$\text{Energy Efficiency (\%)} = \frac{SAF\ [m^3/\text{min}]}{MeasuredPower\ \ [W]}$$

$$\text{SAF} = \text{Maximum Air Flow}\ \ [m^3/\text{min}] \times \sqrt{\frac{1.178}{\gamma}}$$

$$\text{Specific gravity}(\gamma) = \frac{10332}{29.44 \times (273 + AmbientTemperature[°C])}$$

SAF : Standard Air flow

B. Energy Efficiency Level

R	Standby power (passive standby mode)	Level
R ≤ 1.00	≤ 1.0 W	1
R ≤ 1.00	N/A	2
1.00 < R ≤ 1.40	N/A	3
1.40 < R ≤ 1.80	N/A	4
1.80 < R ≤2.20	N/A	5

C. Definitions

Passive standby mode : Passive standby power mode: When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals.

13. Air cleaner

13.1.MEPS

(unit : W/m^2)

Type	MEPS
	From 1st of January, 2011
All	2.5

Remark) $26.4m^2$ = 8 pyung

13.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{Measured Power consumption[W]}}{\text{Standard room size}[m^2]}$$

Standby power shall be tested in power-off with using remote controller, if a remote controller is not provided, it shall be tested in power-off in a tested sample.

B. Energy Efficiency Level

1) Standard room size < $26.4m^2$

R	Standby power (Standby mode power consumption)	Level
$R \leq 0.5$	≤ 1.0 W	1
$R \leq 1.0$	N/A	2
$1.0 < R \leq 1.5$	N/A	3
$1.5 < R \leq 2.0$	N/A	4
$2.0 < R \leq 2.5$	N/A	5

C. Definitions

Passive standby mode : Passive standby power mode: When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals.

14. Incandescent lamps

14.1. Energy Efficiency Standards, TEPS, Effective date of MEPS

(unit : lm/W)

Type	MEPS		TEPS	
	From 1st of January, 2012	From 1st of January, 2014	From 1st of January, 2012	From 1st of January, 2014
25W ≤ P <40W	8.3	20.0	10.9	26.4
40W ≤ P <70W	11.4	20.0	15.0	26.4
70W ≤ P ≤150W	20.0	20.0	26.4	26.4

14.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{TEPS[lm/W]}}{\text{Measured Power consumption[lm/W]}}$$

B. Energy Efficiency Level

R	Level
R ≤ 1.00	1
1.00 < R ≤ 1.08	2
1.08 < R ≤ 1.16	3
1.16 < R ≤ 1.24	4
1.24 < R ≤ 1.32	5

15. Fluorescent lamps

15.1 Energy Efficiency Standards

A. TEPS, MEPS, TEPS, and Effective date of MEPS

(unit : lm/W)

Type			TEPS	MEPS From 1st of January, 2010
Tubular (Starter type, Rapid Starter type, and HID type)	20W	EX-W EX-N EX-L	78.6	59.6
		EX-D and etc	75.9	57.5
	28W 32W	EX-W EX-N EX-L	97.0	77.6
		EX-D and etc	95.0	76.0
	40W	EX-W EX-N EX-L	102.5	82.0
		EX-D and tec	100.0	80.0
Circular type	32W	EX-W EX-N EX-L	69.6	60.0
		EX-D and etc	67.2	58.0
	40W	EX-W EX-N EX-L	76.5	66.0
		EX-D and etc	74.2	64.0
Compact type (With Starter, Without Starter)	FPX 13W FDX 26W	EX-W EX-N EX-L	66.2	53.0
		EX-D and etc	63.7	51.0
	FPL 27W	EX-W EX-N EX-L	73.7	59.0
		EX-D and etc	71.2	57.0
	FPL 32W FPL 36W FPL 45W FPL 55W	EX-W EX-N EX-L	85.0	68.0
		EX-D and etc	82.5	66.0

15.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{TEPS[lm/W]}}{\text{Measured Power consumption[lm/W]}}$$

B. Energy Efficiency Level

1) Tubular type (20W)

R	Level
R ≤ 1.00	1
1.00 < R ≤ 1.08	2
1.08 < R ≤ 1.16	3
1.16 < R ≤ 1.24	4
1.24 < R ≤ 1.32	5

2) Tubular type(28W, 32W, 40W), compact type(FPX 13W, FDX 26W, FPL 27W, FPL 32W, FPL 36W, FPL 45W, FPL 55W)

R	Level
R ≤ 1.00	1
1.00 < R ≤ 1.10	2
1.10 < R ≤ 1.15	3
1.15 < R ≤ 1.20	4
1.20 < R ≤ 1.25	5

3) Tubular type(32W, 40W)

R	Level
R ≤ 1.00	1
1.00 < R ≤ 1.04	2
1.04 < R ≤ 1.08	3
1.08 < R ≤ 1.12	4
1.12 < R ≤ 1.16	5

16. Fluorescent lamps ballast

16.1 Energy Efficiency Standards, Effective date of MEPS

Type		TEPS	MEPS (From 1st of January, 2009)
Tubular (Starter, Rapid Starter)	20W	1.07	0.97
	32W	1.09	1.07
	40W	1.21	1.18
Tubular (T5, HID)	28W	0.92	0.88
	32W	0.92	0.88
Circular	32W	1.09	1.07
	40W	1.09	1.07
Compact type (With Starter, Without Starter)	FPX 13W	0.97	0.85
	FDX 26W	1.05	0.90
	FPL 27W	1.05	0.90
	FPL 32W	0.90	0.88
	FPL 36W	1.07	0.90
	FPL 45W	0.90	0.88
	FPL 55W	0.90	0.88

17. Associated ballast

17.1 Energy Efficiency Standards, Date to accomplish TEPS, Effective date of MEPS

(unit : lm/W)

Type		TEPS	MEPS
		To 31st of December, 2012	From 1st of October, 2004
$5W \le P < 10W$	EX-W, EX-N, EX-L	53.0	46.1
	EX-D and etc	51.9	45.2
$10W \le P < 16W$	EX-W, EX-N, EX-L	58.9	51.3
	EX-D and etc	57.9	50.4
$16W \le P < 21W$	EX-W, EX-N, EX-L	66.9	58.2
	EX-D and etc	66.0	57.4
$21W \le P < 25W$	EX-W, EX-N, EX-L	69.0	60.0
	EX-D and etc	67.9	59.1
$25W \le P \le 60W$	EX-W, EX-N, EX-L	70.9	61.7
	EX-D and etc	70.0	60.9

17.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{TEPS[lm/W]}}{\text{Measured Power consumption[lm/W]}}$$

B. Energy Efficiency Level

R	The endurance of on-off	Level
R $\leq$ 1.00	More than 10,000 times	1
R $\leq$ 1.00	N/A	2
1.00 < R$\leq$ 1.05	N/A	3
1.05 < R$\leq$ 1.10	N/A	4
1.10 < R$\leq$ 1.15	N/A	5

18. 3 Phase induction motor

18.1 MEPS and requirement

A. MEPS

MEPS for 3 phase induction motor is a following table, and the requirement for MEPS is a table in B. Basically the number of testing samples is 5, but a Model which is only produced or sold not more than 4 in a year, all samples shall be satisfied with the requirements of B. When the rated output power is between 2 values in a below table, if the rated output power is not less than the average value between upper value and lower value, it shall be followed MEPS at upper value, otherwise it shall be followed MEPS at lower value.

Rated output power	MEPS(%)							
	Protector type				Hermetic type			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
0.75kW	75.5	82.5	80.0	74.0	75.5	82.5	80.0	74.0
1.5 kW	84.0	84.0	85.5	85.5	84.0	84.0	86.5	82.5
2.2 kW	84.0	86.5	86.5	86.5	85.5	87.5	87.5	84.0
3.7 kW	85.5	87.5	87.5	87.5	87.5	87.5	87.5	85.5
5.5 kW	87.5	88.5	88.5	88.5	88.5	89.5	89.5	85.5
7.5 kW	88.5	89.5	90.2	89.5	89.5	89.5	89.5	88.5
11 kW	89.5	91.0	90.2	89.5	90.2	91.0	90.2	88.5
15 kW	90.2	91.0	91.0	90.2	90.2	91.0	90.2	89.5
18.5 kW	91.0	91.7	91.7	90.2	91.0	92.4	91.7	89.5
22 kW	91.0	92.4	92.4	91.0	91.0	92.4	91.7	91.0
30 kW	91.7	93.0	93.0	91.0	91.7	93.0	93.0	91.0
37 kW	92.4	93.0	93.0	91.7	92.4	93.0	93.0	91.7
45 kW	93.0	93.6	93.6	92.4	93.0	93.6	93.6	91.7
55 kW	93.0	94.1	93.6	93.6	93.0	94.1	93.6	93.0
75 kW	93.0	94.1	94.1	93.6	93.6	94.5	94.1	93.0
90 kW	93.6	94.5	94.1	93.6	94.5	94.5	94.1	93.6
110 kW	93.6	95.0	94.5	93.6	94.5	95.0	95.0	93.6
132 kW	93.6	95.0	94.5	-	94.5	95.0	95.0	-
160 kW	94.5	95.0	94.5	-	95.0	95.0	95.0	-
200 kW	94.5	95.0	-	-	95.0	95.0	-	-

B. Premium efficiency standard

Premium efficiency standard of 3phase induction motor is shown in below table.

Rated output power	MEPS(%)							
	Protector type				Hermetic type			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
0.75kW	77.0	85.5	82.5	-	77.0	85.5	82.5	75.5

1.5 kW	85.5	86.5	87.5	-	85.5	86.5	88.5	84.0
2.2 kW	85.5	89.5	88.5	-	86.5	89.5	89.5	85.5
3.7 kW	86.5	89.5	89.5	-	88.5	89.5	89.5	86.5
5.5 kW	88.5	91.0	90.2	-	89.5	91.7	91.0	86.5
7.5 kW	89.5	91.7	91.7	-	90.2	91.7	91.0	89.5
11 kW	90.2	93.0	91.7	-	91.0	92.4	91.7	89.5
15 kW	91.0	93.0	92.4	-	91.0	93.0	91.7	90.2
18.5 kW	91.7	93.6	93.0	-	91.7	93.6	93.0	90.2
22 kW	91.7	94.1	93.6	-	91.7	93.6	93.0	91.7
30 kW	92.4	94.1	94.1	-	92.4	94.1	94.1	91.7
37 kW	93.0	94.5	94.1	-	93.0	94.5	94.1	92.4
45 kW	93.6	95.0	94.5	-	93.6	95.0	94.5	92.4
55 kW	93.6	95.0	94.5	-	93.6	95.4	94.5	93.6
75 kW	93.6	95.4	95.0	-	94.1	95.4	95.0	93.6
90 kW	94.1	95.4	95.0	-	95.0	95.4	95.0	94.1
110 kW	94.1	95.8	95.4	-	95.0	95.8	95.8	94.1
132 kW	94.5	95.8	95.4	-	95.4	95.8	95.8	94.5
160 kW	95.0	95.8	95.4	-	95.4	96.2	95.8	94.5
200 kW	95.0	95.8	95.4	-	95.8	96.2	95.8	94.5

C. Application for non-standard 3phase induction motor

When the rated output is between the regulated value in [Table 1] or [Table 2], if it is upper than or the middle, follow the lowest power consumption efficiency standard or premium efficiency standard of the upper high rated output, and if it is lower than the middle, follow the lowest power consumption efficiency standard or premium efficiency standard of the lower low rated output.

Products	The number of sample to test	No. of Failed sample to accept	Tested items	Allowed
3 phase induction motor	5 [1)]	-	Averaged full load efficiency ($\overline{X}$) Minimum efficiency in tested samples $X_{\min}$	$\overline{X} \geq \dfrac{100}{1+1.05\left(\dfrac{100}{RE}-1\right)}$ $X_{\min} \geq \dfrac{100}{1+1.15\left(\dfrac{100}{RE}-1\right)}$

Remark 1) Basically the number of testing samples is 5

D. Acceptance formula

For the acceptance of the lowest power consumption efficiency standard or premium efficiency standard, it must satisfy the acceptance formula of [Table 3]. At this time, the acceptance of the lowest power consumption efficiency standard or premium efficiency standard is tested by making the total sample number to 5. If manufacturer or importer wants, it can be tested with the total sample number of 4 or less (1~4), in this case the acceptance formula of [Table 3] must be excluded and all of each samples must satisfy the lowest power consumption efficiency standard or premium efficiency standard of [Table 2].

[Table 3] Acceptance formula

Classification	Total number of samples	Allowed number of failure	Inspection item	Tolerance
3 phase induction motor	5	-	Average full-load efficiency ($\bar{X}$)	$\bar{X} \geq 100/(1+1.05(\frac{100}{RE}-1))$ RE: Minimum consumption efficiency standard or premium efficiency standard
			Minimum of sample (X_{min})	$X_{min} \geq 100/(1+1.15(\frac{100}{RE}-1))$ RE: Minimum consumption efficiency standard or premium efficiency standard

서식 있음: 양쪽

서식 있음: 들여쓰기: 첫 줄: 0 글자

19. Household Gas Boiler

19.1 MEPS

(unit : %)

Type	MEPS Effective date of MEPS : From 1^{st} of January, 2013
Household Gas Boiler	80.0

19.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

R(Energy Efficiency Level Index) = Measured thermal efficiency for heating(%)

B. Energy Efficiency Level

R	Standby power (sleep mode)	Level
87.0% ≤ R	≤ 3.0W	1
85.0% ≤ R	N/A	2
83.0% ≤ R < 85.0%	N/A	3
81.5% ≤ R < 83.0%	N/A	4
80.0% ≤ R < 81.5%	N/A	5

C. Definitions

Sleep mode is defined as the reduced power state that the product is not running for a moment, and automatically goes back to run.

20. Adapter· Charger

20. 1 MEPS and effective date

A. Adapter (External power supply without charging)

<table>
<tr><td colspan="4">MEPS</td></tr>
<tr><td colspan="4">From 1 January 2009</td></tr>
<tr><td>Output power on name plate (P_{no})</td><td>Running Efficiency</td><td>Output power on name plate (P_{no})</td><td>Maximum Standby Power (Power consumption on No-Load Mode)</td></tr>
<tr><td>$0 < P_{no} \le 1W$</td><td>$\ge 0.49 \times P_{no}$</td><td rowspan="2">$0 < P_{no} < 10W$</td><td rowspan="2">$\le 0.5W$</td></tr>
<tr><td rowspan="2">$1W < P_{no} \le 49W$</td><td rowspan="2">$\ge [0.09 \times Ln(P_{no})] + 0.49$</td></tr>
<tr><td rowspan="2">$10W \le P_{no} \le 150W$</td><td rowspan="2">$\le 0.75W$</td></tr>
<tr><td>$49W < P_{no} \le 150W$</td><td>≥ 0.84</td></tr>
</table>

Remark) It shall be met with both requirements, running efficiency and maximum standby power.

B. Charger (External power supply with charging function to charge Li-Ion Battery)

<table>
<tr><td colspan="2">MEPS</td></tr>
<tr><td colspan="2">From 1 January 2009</td></tr>
<tr><td rowspan="2">Measured Input Power(P_{in})</td><td>Maximum Standby Power</td></tr>
<tr><td>Power consumption on No-Load Mode</td></tr>
<tr><td>$0 < P_{in} < 10W$</td><td>$\le 0.5W$</td></tr>
<tr><td>$10W \le P_{in} \le 20W$</td><td>$\le 0.75W$</td></tr>
</table>

C. Definitions

Running efficiency = Total effective output power (AC or DC)/Effective input power(AC)

No-Load Mode : Adapter and Charger disconnect to line voltage

21. Electric Driven Heatpump

21.1 MEPS

(unit : W/W)

Type		MEPS From 1 January 2009
Non-ducted and ducted unitary(Including window type)		2.00
Split type	RCC < 4kW	2.40
	4kW ≤ RCC < 10kW	2.20
	10kW ≤ RCC < 23.0kW	2.00

Remark) RCC is the rated cooling capacity

21.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R = \frac{\text{Cooling period energy consumption efficiency} + \text{Heating period energy consumption efficiency}}{2}$$

For CEER all types (Fixed Capacity Unit, Two (2) stage capacity units, and Variable capacity units) shall be applied to CSPF(Cooling Seasonal Performance Factor) in KS C 9306, and for HEER they shall be applied to HSPF(Heating Seasonal Performance Factor) in KS C 9306. If there is a make-up heater, it shall be operated in extra low temperature test.

Cooling and heating efficiency (EERa), which is the arithmetic mean of CSPF (Cooling Seasonal Performance Factor) and HSPF (Heating Seasonal Performance Factor), is to be the energy efficiency level index.

- CSPF (Cooling Seasonal Performance Factor): The cooling period energy consumption efficiency which is the ratio of the total cooling amount of cooling period of the year's model and the total power consumption of that cooling period.
- HSPF (Heating Seasonal Performance Factor) : The heating period energy consumption efficiency which is the ratio of the total heating amount of heating period and the total power consumption of that heating period.

B. Energy Efficiency Level

1) Non-ducted and ducted unitary (Including window type)

R	Level
3.50 ≤ R	1
3.20 ≤ R < 3.50	2
2.90 ≤ R < 3.20	3

$2.50 \le R < 2.90$	4
$2.00 \le R < 2.50$	5

2) Split type, RCC < 4kW

R	Level
$4.60 \le R$	1
$4.00 \le R < 4.60$	2
$3.50 \le R < 4.00$	3
$3.00 \le R < 3.50$	4
$2.40 \le R < 3.00$	5

3) Split type, 4kW ≤ RCC < 10kW

R	Level
$4.20 \le R$	1
$3.70 \le R < 4.20$	2
$3.20 \le R < 3.70$	3
$2.70 \le R < 3.20$	4
$2.20 \le R < 2.70$	5

4) Split type, 10kW ≤ RCC < 23.0kW

R	Level
$3.80 \le R$	1
$3.35 \le R < 3.80$	2
$2.90 \le R < 3.35$	3
$2.45 \le R < 2.90$	4
$2.00 \le R < 2.45$	5

22. Commercial Refrigerator

22.1 MEPS (Minimum Energy Performance Standard)

Items	MEPS From 1 January 2010
Refrigerator only	$P \leq 0.111AV+50.25$
Refrigerator-freezer	$P \leq 0.129AV+48.57$

Remark)

1. AV = compensated cubic volume = ∑{{cubic volume of the each compartment} × K × F }

   3) K value in the refrigerator only is 1
   4) K value in refrigerator-freezer is

$$K\ (\text{compensation coefficient}) = \frac{T_1 - T_C}{T_1 - T_2}$$

Where
T_1=ambient temperature in testing(25℃)
T_2=averaging indoor temperature of the fresh compartment(5℃)

   3) F = 1.2 if it is auto defrost, otherwise F=1.0
2. P = Maximum power consumption (kWh/month)
3. 220V is priority if both voltages, 110V and 220V can be applied
4. To determine MEPS it shall round off the 2nd place of decimal of the value in accordance with KS Q 5002.

22.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

$$R(\text{Energy Efficiency Level Index}) = \frac{\text{MEPS [kWh/month]}}{\text{Measured monthly power consumption [kWh/month]}}$$

A. Energy Efficiency Level

1) Refrigerator only

R	Level
$4.20 \leq R$	1

3.40 ≤ R < 4.20	2
2.60 ≤ R < 3.40	3
1.80 ≤ R < 2.60	4
1.00 ≤ R < 1.80	5

2) Refrigerator-Freezer

R	Level
3.40 ≤ R	1
2.80 ≤ R < 3.40	2
2.20 ≤ R < 2.80	3
1.60 ≤ R < 2.20	4
1.00 ≤ R < 1.60	5

23. Gas Water Heater

23.1 MEPS

(unit : %)

Type	MEPS Effective date of MEPS : From 1st of January, 2011
Gas Water Heater	73.0

23.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

R(Energy Efficiency Level Index) = Measured thermal efficiency for water heating(%)

For a instant gas water heater

$$\text{thermal efficiecny} = \frac{\text{Output}}{\text{Gas consumption}}$$
$$= \frac{M \times C \times (tw2 - tw1)}{V \times Q} \times \frac{101.3(273 + ta)}{(B + Pm - S) \times 273} \times 100$$

Where,
M : Mass of water, kg
C : Specific heat of Water, 4.19 kJ/kg K
tw2 : temperature at hot water, ℃
tw1 : temperature of supply water, ℃
Q : Total energy, kJ/m^3N
V : gas consumption, m^3
B : barometer, kPa
t_a : temperature at gas meter, ℃
Pm : pressure at gas meter, kPa
S : pressure at t_a

B. Energy Efficiency Level

R	Standby power (sleep mode)	Level
93.0% ≤ R	≤ 3.0W	1
88.0% ≤ R	N/A	2

83.0% ≤ R < 88.0%	N/A	3
78.0% ≤ R < 83.0%	N/A	4
73.0% ≤ R < 78.0%	N/A	5

C. Definitions

Sleep mode is defined as the reduced power state that the product is not running for a moment, and automatically goes back to run.

24. Transformer

24.1 TEPS and MEPS (at a 50% load factor)

24.1.1 Single bushing transformer

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS From 1st of July, 2012	TEPS
KS C 4306	13.2 kV/ 230 V	Single	10	98.3	98.7
			20	98.5	98.8
			30	98.7	98.9
			50	98.8	99.0
			75	98.8	99.1
			100	98.9	99.2

24.1.2 Dry transformer

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS From 1st of July, 2012	TEPS
KS C 4311	3.3 ~ 6.6 kV/ Low voltage	Single	50	97.7	98.7
			75	97.8	98.8
			100	98.0	98.9
			150	98.2	99.0
			200	98.4	99.0
			300	98.5	99.1
			400	98.6	99.2

			500	98.7	99.3
			600	98.7	99.3
			750	98.8	99.3
			1000	99.0	99.4
			1250	99.1	99.5
			1500	99.1	99.5
			2000	99.2	99.5
			2500	99.3	99.5
			3000	99.4	99.5

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
KS C 4311	3.3～6.6 kV/ Low voltage	3-phase	50	97.7	98.7
			75	97.8	98.8
			100	98.0	98.9
			150	98.2	99.0
			200	98.4	99.0
			300	98.5	99.1
			400	98.6	99.2
			500	98.7	99.3
			600	98.7	99.3
			750	98.8	99.3
			1000	98.9	99.4
			1250	99.0	99.5
			1500	99.0	99.5

			2000	99.1	99.5
			2500	99.2	99.5
			3000	99.3	99.5
	22.9 kV/ Low voltage	Single	50	97.6	98.7
			75	97.7	98.8
			100	97.9	98.8
			150	98.1	98.9
			200	98.3	99.0
			300	98.4	99.1
			400	98.5	99.2
			500	98.7	99.2
			600	98.7	99.3
			750	98.8	99.3
			1000	98.9	99.4
			1250	99.0	99.4
			1500	99.0	99.5
			2000	99.1	99.5
			2500	99.2	99.5
			3000	99.3	99.5

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
KS C 4311	22.9 kV/ Low voltage	3-phase	50	97.6	98.7
			75	97.7	98.8
			100	97.8	98.8

			150	98.0	98.9
			200	98.2	99.0
			300	98.4	99.1
			400	98.5	99.2
			500	98.7	99.2
			600	98.7	99.3
			750	98.8	99.3
			1000	98.9	99.4
			1250	98.9	99.4
			1500	99.0	99.5
			2000	99.1	99.5
			2500	99.2	99.5
			3000	99.2	99.5
Dry transformer	22.9 kV/ 3.3 ~ 6.6 kV	Single	50	97.6	98.7
			75	97.7	98.8
			100	97.8	98.8
			150	98.0	98.9
			200	98.2	99.0
			300	98.4	99.0
			400	98.5	99.1
			500	98.7	99.2
			600	98.7	99.3
			750	98.8	99.3
			1000	98.9	99.4
			1250	98.9	99.4
			1500	99.0	99.5

			2000	99.1	99.5
			2500	99.2	99.5
			3000	99.2	99.5

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
Dry transformer	22.9 kV/ 3.3 ~ 6.6 kV	3-phase	50	97.6	98.7
			75	97.7	98.8
			100	97.8	98.8
			150	98.0	98.9
			200	98.2	99.0
			300	98.4	99.0
			400	98.5	99.1
			500	98.7	99.2
			600	98.7	99.3
			750	98.8	99.3
			1000	98.9	99.4
			1250	98.9	99.4
			1500	99.0	99.5
			2000	99.1	99.5
			2500	99.2	99.5
			3000	99.2	99.5

24.1.3 Oil-immersed transformer

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
KS C 4316, KS C 4317	3.3 ~ 6.6 kV/ Low voltage	Single	100	98.4	99.0
			150	98.4	99.0
			200	98.4	99.0
			250	98.5	99.1
			300	98.5	99.1
			400	98.6	99.2
			500	98.6	99.2
			600	98.6	99.2
			750	98.7	99.3
			1000	98.8	99.3
			1250	98.8	99.4
			1500	98.9	99.4
			2000	99.0	99.4
			2500	99.0	99.4
			3000	99.1	99.4
		3-phase	100	98.0	99.0
			150	98.1	99.0
			200	98.2	99.0
			250	98.3	99.1
			300	98.4	99.1
			400	98.4	99.2

			500	98.5	99.2
			600	98.5	99.2
			750	98.6	99.3
			1000	98.7	99.3
			1250	98.8	99.4
			1500	98.8	99.4
			2000	98.9	99.4
			2500	99.0	99.4
			3000	99.1	99.4

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
KS C 4316, KS C 4317	22.9 kV/ Low voltage	Single	10	97.4	98.6
			15	97.7	98.6
			20	97.9	98.7
			30	98.1	98.8
			50	98.4	98.8
			75	98.6	98.9
			100	98.7	99.0
			150	98.4	99.0
			200	98.4	99.0
			250	98.5	99.1
			300	98.5	99.1
			400	98.6	99.2

			500	98.6	99.2
			600	98.6	99.2
			750	98.7	99.3
			1000	98.8	99.3
			1250	98.8	99.4
			1500	98.9	99.4
			2000	99.0	99.4
			2500	99.1	99.4
			3000	99.2	99.4
		3-phase	100	98.0	99.0
			150	98.1	99.0
			200	98.2	99.0
			250	98.3	99.1
			300	98.4	99.1
			400	98.4	99.1
			500	98.5	99.1
			600	98.5	99.2
			750	98.6	99.2
			1000	98.7	99.3
			1250	98.8	99.3
			1500	98.8	99.3
			2000	98.9	99.3
			2500	99.0	99.4
			3000	99.1	99.4

(unit : %)

Type	Primary voltage/ Secondary voltage	Number of phase	Capacity (kVA)	MEPS	TEPS
				From 1st of July, 2012	
KS C 4316, KS C 4317	22.9 kV/ 3.3～6.6 kV	Single	100	98.4	99.0
			150	98.5	99.0
			200	98.5	99.0
			250	98.6	99.1
			300	98.6	99.1
			400	98.7	99.2
			500	98.8	99.2
			600	98.8	99.2
			750	98.9	99.3
			1000	98.9	99.3
			1250	99.0	99.4
			1500	99.0	99.4
			2000	99.1	99.4
			2500	99.1	99.4
			3000	99.2	99.4
		3-phase	100	98.1	99.0
			150	98.2	99.0
			200	98.2	99.0
			250	98.3	99.1
			300	98.4	99.1
			400	98.5	99.2
			500	98.6	99.2
			600	98.6	99.2

			750	98.6	99.3
			1000	98.7	99.3
			1250	98.8	99.4
			1500	98.9	99.4
			2000	99.0	99.4
			2500	99.1	99.4
			3000	99.2	99.4

24.1.4 TEPS and MEPS for nonstandard transformer

In case that capacity of transformer is in the defined values of the table above, based on the standard number shall be rounded off to two decimal places after using interpolation.

For example, in case of 130kVA 22.9kV/440V 3-phase oil-immersed transformer

a) Linear interpolation shall be applied based on the defined capacity and standard (100kVA 98.0% and 150kVA 98.1%)

130kVA efficiency = 98%+(130-100)×(98.1-98.0)/(150-100)%

= 98.06

b) 98.06 shall be 98.1 by rounding off the result to two decimal places.

c) 98.1% shall be energy efficiency standard of the 130kVA transformer.

24.1.5 TEPS and MEPS for nonstandard transformer

Products had been using prior to the effective date, special transformer (multi-winding transformers with more than 3 windings etc.), primary and secondary low-voltage transformers and repaired transformers don't apply to MEPS and TEPS.

24.1.6 TEPS and MEPS for nonstandard transformer

Each standard of MEPS and TEPS does not apply to tolerances.

25. Window set

25.1 Maximum heat transfer coefficient Standard

(unit : W/(㎡.K))

Type	Maximum heat transfer coefficient Standard
	From 1st of July, 2012
KS F 3117 Window set KS F 2278 heat transfer coefficient under regulation	3.4

25.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

Heat transfer coefficient measured by KS F 2278 shall be energy efficiency level index.

R(Energy Efficiency Level Standards) = heat transfer coefficient (W/(㎡.K))

B. Energy Efficiency Level Standards

R	Air permeability	Level
R ≤ 1.0	1st level	1
1.0 < R ≤ 1.4	1st level	2
1.4 < R ≤ 2.1	More than 2nd level (1st level or 2nd level)	3
2.1 < R ≤ 2.8	N/A	4
2.8 < R ≤ 3,4	N/A	5

26. Television set

26.1. MEPS

(unit : W/$\sqrt{m^2}$)

Type	MEPS
	From 1st of July, 2012
50cm ≤ Length of screen diagonal ≤ 180cm	440

26.2 Energy Efficiency Level Standards

A. Energy Efficiency Level Index

Energy efficiency shall be defined as power consumption per $\sqrt{m^2}$ obtained from power consumption in operation mode [W] divided by square root of screen area [$\sqrt{m^2}$]

$$R(\text{Energy Efficiency Level Standards}) = \frac{\text{Power consumption in operation mode[W]}}{\text{Square root of screen area}[\sqrt{m^2}]}$$

B. Energy Efficiency Level Standards

1) Without network function

R	Standby power (Power consumption in passive standby power)	Level
R ≤ 130	≤1.0W	1
R ≤ 165	N/A	2
165 < R ≤ 205	N/A	3

205 < R ≤ 260	N/A	4
260 < R ≤ 440	N/A	5

2) With network function

R	Standby power	Level
R ≤ 130	≤1.0W(Passive standby power) ≤2.0W(Active standby power)	1
R ≤ 165	N/A	2
165 < R ≤ 205	N/A	3
205 < R ≤ 260	N/A	4
260 < R ≤ 440	N/A	5

C. Definitions

Without network function :

It does not have a network function.

With network function :

It has a network function in a body, which is enable to exchange data between a body and external network by wire or wireless. An appliance with an optional network function shall be regarded also. To get 1st level it shall be less than 2.0W in active standby mode other than power consumption per $1\sqrt{m^2}$. The appliance with an optional

network function shall be less than both 1.0W in passive standby mode other than power consumption per $1\sqrt{m^2}$ and 2.0W in active standby mode to get 1st level.

Passive standby mode :

When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals.

Active standby mode :

When an appliance is switched to off/standby and is not performing its primary functions while still connected to a power supply but can be activated by a remote control or other internal signals. In addition, it can also be activated into other power modes by receiving external signals or when it is receiving minimum level of data from service providers**.**

26.3 Energy frontier standard

(Unit: W/$\sqrt{m^2}$)

Type	R	Standby power (passive standby mode power consumption)	Operation mode power consumption
Screen diagonal length 50cm$<$x$<$180cm	R$\leq$91	$\leq$1.0W	$\leq$90.0W

27. Electric fan heater

27.1 Minimum energy performance standard

(Unit: W/W)

Type	Minimum energy performance standard
	From 1 Dec 2011
Heating efficiency	0.80

Heating efficiency (W/W) = Heating capacity of the year's model(W)/ Heating power consumption of the year's model(W)

28. Electric stove

28.1 Maximum standby power standard

(Unit: W)

Type	Maximum standby power standard
	From 1 Dec 2011
Standby power	5.0W

29. Multi-heat pump system

29.1 Minimum energy performance standard

Type	Minimum energy performance standard			
	From 1 Jan 2012			
	Cooling/heating efficiency (EERa)	Integrated cooling efficiency (IEER)	Heating efficiency (COP)	Cold climate are a heating efficiency (COP2)
Rated cooling capacity of 20kW<x<70kW	2.40	2.80	2.00	1.50

29.2 Consumption efficiency level granting criteria

a. Consumption efficiency level granting index

Consumption efficiency level granting index= Cooling/heating efficiency (EERa) which is the arithmetic mean of IEER(Integrated Energy Efficiency Ratio) when operated with cooling part load condition , and heating efficiency(COP: coefficient of performance) when operated with heating standard condition, heating cold climate area condition.

$$R = \frac{\text{Integrated cooling efficiency (IEER)} + \text{heating efficiency(COP)}}{2}$$

b. Consumption efficiency level granting criteria

R	Level
$3.50 \leq R$	1
$3.25 \leq R \leq 3.50$	2
$3.00 \leq R \leq 3.25$	3
$2.75 \leq R \leq 3.00$	4
$2.40 \leq R \leq 2.75$	5

30. Dehumidifier

30.1 Minimum energy performance standard

Type	Minimum energy performance standard
	From 1 Jan 2013
Dehumidifier	0.7

30.2 Consumption efficiency level granting criteria

a. Consumption efficiency level granting index
Consumption efficiency level granting index: Ratio of dehumidification efficiency correction factor and dehumidification efficiency (L/kWh) which is rated dehumidification capacity divided by measured power consumption (W)÷1000×24hours.

$$R = \frac{\text{Dehumidification efficiency of such models (L/kWh)}}{\text{Dehumidification efficiency correction factor}}$$

Dehumidification efficiency correction factor= 0.024 x [Dehumidifier rated dehumidification capacity (L)] + 1.06

b. Consumption efficiency level granting criteria

R	Standby power (off mode power consumption)	Level
1.25≤R	≤0.5W	1
1.10≤R	NA	2
0.95≤R<1.10	NA	3
0.80≤R<0.95	NA	4
0.70≤R≤0.80	NA	5

c. Off mode: Power turned off using power switch, or auto-off status.

R 0.5W 0.95 0.80

31. Electric pad

31.1 Maximum Standby Power Standard

(Unit: W)

Type	MEPS
	From 27th December, 2011
Standby Power	5.0W

32. Electrically heated water mat

32.1 Maximum Standby Power Standard

(Unit: W)

Type	MEPS
	From 27th December, 2011
Standby Power	5.0W

33. Electrical heating board

33.1 Maximum Standby Power Standard

(Unit: W)

Type	MEPS
	From 27th December, 2011
Standby Power	5.0W

34. Electric bed

34.1 Maximum Standby Power Standard

(Unit: W)

Type	MEPS
	From 27th December, 2011
Standby Power	5.0W

35. Electric radiator

35.1 Maximum Standby Power Standard

(Unit: W)

Type	MEPS
	From 27th December, 2011
Standby Power	5.0W

<Annex 4> Independent Testing Laboratory (Article 6 ①)

1. Testing items for independent testing laboratory

Items	Testing Laboratory
1. Refrigerator	KTL, KTC, KTR, KRAAC, Busan TP, Intertek
2. Freezer	KTL, KTC, KTR, KRAAC,, Busan TP, Intertek
3. Kimchi Refrigerator	KTL, KTC, KTR , KRAAC, Busan TP, Intertek
4. Air-conditioner	KTL, KRAAC, Busan TP, KTC, Intertek, KTR
5. Washing Machine	KTL, KATRI
6. Horizontal drum Washing machine	KTL, KATRI
7. Dishwasher	KTL
8. Dish drier	KTL
9. Electrical Cooler and Heater for Drinking-Water Storage	KTL, KTC, KTR
10. Rice cooker	KTL, , KTC, KTR Digital EMC Ltd.
11. Vacuum cleaner	KTL, KTC
12. Electric Fan	KTL, KTC, KTR
13. Air cleaner	KTL, KCL, KICM, Busan TP
14. Incandescent lamps	Kwangju-Chunnam SMBA, Chunbul SMBA KTL, KTC, KERI, KILT, , KTR
15. Fluorescent lamps	Kwangju-Chunnam SMBA, Chunbul SMBA KTL, KTC, KERI, KILT, , KTR
16. Fluorescent lamps ballasts	Kwangju-Chunnam SMBA, KTL, KTC, , KERI, KILT, , KTR
17. Associated ballasts	Kwangju-Chunnam SMBA, KTL, KTC, , KERI, KILT, , KTR
18. 3 phase induction motor	KERI, KTL, SBC, KTC, KETI
19. Household Gas Boiler	KGSC, KGPAA
20. Adapter Charger	KTL, KTR, , TTA, , KTC, Onetech, Digitalemc, Sktech, Stech, Intertek, KOSTEC
21. Electric Driven Heatpump	KTL, KRAAC, Busan TP, KTC
22. Commercial Refrigerator	KTL
23. Gas water heater	KGSC, KEAA
24. Transformer	KERI
25. Window set	KICT, KFPA, KIER, KCL, KOMERI
26. TV receiver	KTL, KTR, TTA,KOSTEC
27.Electric fan heater	KTL, KTC, KTR, KRAAC, Busan TP

28.Electric stove	KTL, KTC, KTR, KRAAC, Busan TP
29.Multi electric heat pump system	KTL, KTC, KRAAC, Busan TP
30.Dehumidifier	KTL, KTC, KTR, KRAAC, Busan TP
31.Electric pad	KTL, KTC, KTR, KRAAC, Busan TP
32.Electrically heated water mat	KTL, KTC, KTR, Busan TP
33.Electrical heating board	KTL, KTC, KTR, KRAAC, Busan TP
34.Electric bed	KTL, KTC, KTR, KRAAC, Busan TP
35.Electric radiator	KTL, KTC, KTR, KRAAC, Busan TP

Note : Testing laboratories in institutes accredited by "National Standard Law" Article 23 shall be designated by the Ministry of MKE.

Remark :

2. The scope of test items for "Regulation on energy efficiency label and standards" shall be accredited by "National Standard Law Article 23".
3. Kwangju-Chunnam SMBA : Kwangju-Chunnam Regional Small& Medium Business Administration
   Chunbul SMBA : Chunbuk Regional Small& Medium Business Administration
   KTL : Korea Testing Laboratory
   KETI : Korea Electric Testing Institute
   KERI : Korea Electrotechnology Research Institute
   KILT : Korea Institute of Lighting Technology
   KGSC : Korea Gas Safety Corporation
   KGPAA : Korea Gas & Petroleum Appliances Association
   ERI : EMC Research Institute
   SBC: Small Business Corporation
   Busan TP : Busan Techno Park
   KILT : Korea Institute of Lighting Technology
   KTC : Korea Testing Certification
   KTR : Korea Testing & Research Institute
   KRRAC : Korea Refrigeration & Air-Conditioning Assessment Center
   KCL : Korea Conformity Laboratories
   TTA : Telecommunications Technology Association
   KEAA : Korea Energy Appliance Industry Association
   KICT : Korea Institute of Construction Technology
   FILK : Fire Insures Laboratories of Korea

<Annex 5> Self-certify testing laboratory (Article 7 ①)

Items	Test Facilities and Man power
All items (except adapter-charger and television receiver)	Persons and facilities are qualified with “Korea Laboratory Accreditation Scheme, Article 35” by “National Standard Law Article 23”
Adapter-charger and television receiver	1. Test equipment (table below); 2. Man Power : They shall have moth than 1 person qualified as following requirements (table below)

1. Test equipment

Test Equipments	Max Measuring range	Accuracy	Resolution	No.
Stop watch or timer	-	±1%	-	More than 1
Thermometer	50℃	±2%		More than 1
Powermeter	≤1W 1W~2000W	±20mW ±3%	-0.01W for P≤ 10W -0.1W for10W<P≤100W -1W for100W<P≤1.5kW -10W for P>1.5kW	More than 1
Voltage meter	600V	±1.5%		More than 1
Frequency meter	3kHz	±0.2%		More than 1
AVR	-	±1.5%		More than 1

2. Man Power : They shall have moth than 1 person qualified as following requirements

	High school	Junior college	College or higher
Electric and Electronic test	3 year	2 year	1 year

Remark) Importer can apply to be self-certify testing laboratory with equipments and man power in oversea factory, but they shall be qualified with Article 66, ①, and Article 33, ②, 2),and any expense shall be paid by applicants.

<Annex 6> Rounding off the place of decimal of the value in a test report (Article 2 ③)

(Test report shall be determined by rounding off the place of decimal of the value in accordance with KS Q 5002.)

Products	Items to indicate	Unit	Round off the place of decimal of value
1. Refrigerator	1.Monthly power consumption	(kWh/Month)	Second (x.xx)
	2.Storage volume of fresh compartment	(L)	First (x.x)
	3.Storage volume of freezer compartment	(L)	First (x.x)
	4.Auto defrost function	-	-
	5.Adjusted volume	(L)	First (x.x)
	6.Dispenser	-	-
	7.the length of the actual sealing perimeter of the homebar door of fresh compartment	(cm)	First (x.x)
	8.the length of the actual sealing perimeter of the homebar door of freezer compartment	(cm)	First (x.x)
	9.any records for KS C ISO 15502 requirements MEPS	-	-
	10.Power consumption per an hour (Wh)	(kWh/Month)	Second (x.xx)
	11.CO2 emission per an hour	(Wh)	Integer(x.)
	12.Annual power consumption	(g/hour)	Integer(x.)
	13.Annual energy cost	(kWh)	First (x.x)
	14.Energy Efficiency level	(Won)	Integer(x.)
		-	-
2. Freezer	1.Monthly power consumption	(kWh/Month)	Second (x.xx)
	2.Storage Volume of freezer compartment	(L)	First (x.x)
	3.Adjusted Volume	(L)	First (x.x)
	4.MEPS	(kWh/Month)	Second (x.xx)
	5.Power consumption per an hour (Wh)	(Wh)	Integer(x.)
	6.CO2 emission per an hour	(g/hour)	Integer(x.)
	7.Annual power consumption	(kWh)	First (x.x)
	8.Annual energy cost	(Won)	Integer(x.)
	9.Energy Efficiency Level	-	-
3. Kimchi Refrigerator	1.Monthly power consumption	(kWh/Month)	Second (x.xx)
	2.Storage volume of Kimchi preserving compartment	(L)	First (x.x)
	3.Storage Volume of freezer compartment	(L)	First (x.x)
	4.Storage Volume of other compartments	(L)	First (x.x)
	5.Storage volume of Kimchi preserving container	(L)	First (x.x)
	6.Adjusted Volume	(L)	First (x.x)
	7.MEPS	(kWh/Month)	Second (x.xx)
	8.No. of Kimchi preserving container	−	Integer(x.)
	9.Power consumption per an hour (Wh)	(Wh)	Integer(x.)
	10.CO2 emission per an hour	(g/hour)	Integer(x.)
	11. Annual power consumption	(kWh)	First (x.x)
	12.Annual energy cost	(Won)	Integer(x.)
	13.Energy Efficiency Level	−	−

4. Air-conditioner	1.Cooling seasonal performance factor 2.Cooling period monthly power consumption 3.Rated Cooling Capacity 4.Cooling standard capacity 5.Cooling standard power consumption 6.Standby power 7.Power consumption per an hour (Wh) 8.CO2 emission per an hour 9. Annual power consumption 10.Monthly energy cost 11.Energy Efficiency Level	(W/W) (kWh/Month) (W) (W) (W) (W) (Wh) (g/hour) (kWh) (Won) -	Third (x.xxx) First (x.x) Integer (x.) Integer (x.) Integer (x.) First (x.x) Integer(x.) Integer(x.) First (x.x) Integer(x.) -
5.Washing machine	1.Power consumption per 1kg 2.Water extraction ratio 3.Rinsing Index 4.Rated Washing Capacity 5.Electric Power Consumption per a cycle 6.Duration per a cycle 7.Standard capacity 8.Standby power 9.CO2 emission per a cycle 10. Annual power consumption 11.Annual energy cost 12.Energy Efficiency Level	(Wh/kg) (%) - (kg) (Wh) (min) (ℓ) (W) (g/cycle) (kWh) (Won) -	First (x.x) First (x.x) Second (x.xx) Integer (x.) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer (x.) First (x.x) Integer(x.) -
6. Horizontal drum washing machine	1.Power consumption per 1kg 2.Water extraction ratio 3.Washing efficiency index 4.Rated Washing Capacity 5.Electric Power Consumption during a cycle 6.Duration per a cycle 7.Water Consumption during a cycle 8.Standby power 9.CO2 emission per a cycle 10. Annual power consumption 11.Annual energy cost 12.Energy Efficiency Level	(Wh/kg) (%) - (kg) (Wh) (min) (ℓ) (W) (g/cycle) (kWh) (Won) -	First (x.x) First (x.x) Second (x.xx) Integer (x.) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer (x.) First (x.x) Integer(x.) -
7. Dishwasher	1.Washing performance 2.Monthly electric power consumption 3.Electric power consumption per a cycle 4.Duration per a cycle 5.Monthly Water Consumption 6.Water Consumption per a cycle 7.Rated Washing Capacity 8.Standby power 9.CO2 emission per a cycle 10. Annual power consumption 11.Annual energy cost 12.Energy Efficiency Level	- (kWh/Month) (Wh) (min) (ℓ/ Month) (ℓ) (person) (W) (g/cycle) (kWh) (Won) -	Second (x.xx) First (x.x) First (x.x) Integer (x.) First (x.x) First (x.x) Integer (x.) First (x.x) Integer (x.) First (x.x) Integer(x.) -

8. Dish drier	1.Power consumption for 20 minutes drying 2.Rated Drying capacity 3.Drying performance 4.Power consumption per an hour (Wh) 5.CO2 emission per an hour 6. Annual power consumption 7.Annual energy cost 8.Energy Efficiency Level	(Wh/20min) (person) (%) (Wh) (g/hour) (kWh) (Won) -	First (x.x) Integer (x) Integer (x) Integer (x) Integer (x) First (x.x) Integer(x.) -
9. Electrical Cooler and Heater for Drinking-Water Storage	1. Comparative power consumption 2. Capacity 3.Power consumption per 1 L 4. Daily power consumption 5.Monthly power consumption 6.Capacity of cool-water storage tank 7.Capacity of hot-water storage tank 8.Power consumption per an hour (Wh) 9.CO2 emission per an hour 10. Annual power consumption 11. Annual energy cost 12.Energy Efficiency Level	(kWh/kWh) (L) (kWh/ L) (kWh/Day) (kWh/Month) (L) (L) (Wh) (g/hour) (kWh) (Won) -	Third (x.xxx) First(x.x) Second (x.xx) Second (x.xx) Second (x.xx) Second (x.xx) Second (x.xx) Integer (x) Second (x.xx) First(x.x) Integer (x)
10. Rice cooker	1.Power consumption per 1 person 2.Power consumption 3.Type 4.Total power consumption (Warming and Cooking) per a complete cycle 5.Duration per a complete cycle 6.Maximum cooking capacity 7.Standby power 8.Power consumption per an hour (Wh) 9.CO2 emission per an hour 10. Annual power consumption 11.Annual energy cost 12.Energy Efficiency level	(Wh/person) (W) - (Wh) (hour) (person) (W) (Wh) (g/hour) (kWh) (Won) -	First (x.x) First (x.x) - First (x.x) Second (x.xx) Integer (x.) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer(x.) -
11. Vacuum cleaner	1.Suction Power Efficiency 2.Measured Power consumption (W) 3.Maximum Suction Power 4.Dust emission 5.Power consumption per an hour (Wh) 6.CO2 emission per an hour 7. Annual power consumption 8.Annual energy cost 9.Energy Efficiency Level	(%) (W) (W) (mg/m^3) (Wh) (g/hour) (kWh) (Won) -	Second (x.xx) First (x.x) First (x.x) Second (x.xx) Integer (x.) Integer (x.) First (x.x) Integer(x.) -

12. Electric Fan	1.Energy Efficiency Ratio 2.Measured Power consumption (W) 3.Standard Air flow 4.Maximum air velocity 5.Standby power 6.Power consumption per an hour (Wh) 7.CO2 emission per an hour 8. Annual power consumption 9.Annual energy cost 10.Energy Efficiency Level	((m^3/min)/W) (W) (m^3/min) (m/min) (W) (Wh) (g/hour) (kWh) (Won) -	Second (x.xx) First (x.x) First (x.x) First (x.x) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer(x.) -
13. Air cleaner	1.Power consumption per 1m^2 2.Measured power consumption (W) 3.Standard room size 4.Deordorization efficiency 5.Standby power 6.Power consumption per an hour (Wh) 7.CO2 emission per an hour 8. Annual power consumption 9.Annual energy cost 10.Energy Efficiency Level	(W/ m^2) (W) (m^2) (%) (W) (Wh) (g/hour) (kWh) (Won) -	Second (x.xx) First (x.x) First (x.x) Integer (x.) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer(x.) -
14. Incandescent lamps	1.Efficiency 2.Luminous flux 3.Power consumption (W) 4.Lifetime 5.Power consumption per an hour (Wh) 6.CO2 emission per an hour 7.Energy Efficiency Level	(lm/W) (lm) (W) (hour) (Wh) (g/hour) -	Second (x.xx) Integer(x.) First (x.x) Integer(x.) Integer (x.) Integer (x.) -
15. Fluorescent lamps	1.Efficiency 2.Luminous flux 3.Power consumption (W) 4.Color 5.Power consumption per an hour (Wh) 6.CO2 emission per an hour 7.Energy Efficiency Level	(lm/W) (lm) (W) - (Wh) (g/hour) -	Second (x.xx) Integer(x.) First (x.x) - Integer (x.) Integer (x.) -
16. Fluorescent lamps ballasts	1.Compared Energy Efficiency Ratio 2. Efficiency level 3.Luminous flux 4.Power input 5.Efficiency of luminous flux for reference ballast 6.Efficiency of luminous flux for tested ballast	- - (lm) (W) (lm/W) (lm/W)	Third (x.xxx) - Integer(x.) First (x.x) Second (x.xx) Second (x.xx)
17. Associated ballasts	1.Efficiency of luminous flux 2.Power input 3.Color 4.Luminous flux 5.The endurance of on-off 6.Power consumption per an hour (Wh) 7.CO2 emission per an hour 8.Energy Efficiency Level	(lm/W) (lm) - (lm) No. (Wh) (g/hour) -	Second (x.xx) First(x.x) - Integer(x.) Integer(x.) Integer(x.) Integer(x.) -

18. 3 phase induction motor	1.Full load efficiency 2.Efficiency level 3.Type 4.Rated output power 5.The number of pole 6.Rated voltage 7.Rated ampere 8.Minimum efficiency in tested samples 9.No. of testing samples 10.Power consumption per an hour (Wh) 11.CO2 emission per an hour 12. Annual power consumption 13. Annual energy cost	(%) - - (kW) - (V) (A) (%) - (Wh) (g/hour) (kWh) (Won)	First (x.x) - - First (x.x) - First (x.x) First (x.x) First (x.x) - Integer(x.) Integer(x.) First (x.x) Integer(x.)
19. Household Gas Boiler	1.Measured thermal efficiency for heating 2.Type 3.Gas consumption 4.Heating capacity 5.Standby power 6.Energy Efficiency Level	(%) - (kW) (kW) (W) -	First (x.x) - First (x.x) First (x.x) First (x.x) -
20. Adapter Charger	1.Running efficiency 2.Classification 3.the rated output 4.Measured input 5.Standby power	(%) - (W) (W) (W)	First (x.x) - First (x.x) First (x.x) Second (x.xx)
21. Electric Driven Heatpump	1.Energy Efficiency Ratio 2.Cooling seasonal performance factor 3.Heating seasonal performance factor 4.rated cooling capacity 5.rated heating capacity 6.cooling standard capacity 7.heating standard capacity 8.cooling standard power consumption 9.heating standard power consumption 10.cooling period total power consumption 11.heating period total power consumption 12.make-up heater 13.power consumption per 1 hour 14.CO2 emission per 1hour 15.Annual power consumption 16.Annual energy cost 17.Energy Efficiency Level	(W/W) (W/W) (W/W) (W) (W) (W) (W) (W) (W) (kWh) (kWh) (W) (Wh) (g/hour) (kWh) (Won) -	Third (x.xxx) Third (x.xxx) Third (x.xxx) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) First (x.x) First (x.x) Integer (x.) Integer (x.) Integer (x.) First(x.x) Integer(x.) -
22.Commercial refrigerator	1.Monthly power consumption 2.Storage volume of fresh compartment 3.Storage volume of freezer compartment 4.Auto defrost function 5.Adjusted volume 6.any records for KS C ISO 15502 requirements 7.MEPS 8.Power consumption per an hour (Wh) 9.CO2 emission per an hour 10. Annual power consumption	(kWh/month) (ℓ) (ℓ) - (ℓ) - (kWh/month) (Wh) (g/hour) (kWh) (Won)	Second (x.xx) First (x.x) First (x.x) - First (x.x) - Second (x.xx) Integer (x.) Integer (x.) First (x.x) Integer (x.)

	11.Annual energy cost 12.Energy Efficiency level	-	-
23. Gas Water Heater	1.Measured thermal efficiency 2.Gas consumption 3.Standby power 4.Energy Efficiency level	(%) (kW) (W) -	First (x.x) First (x.x) First (x.x) First (x.x)
24. Transformer	1. Efficiency (load factor of 50%) 2.Efficiency level 3. Load loss 4. No-load loss 5. Wire wound resistance 6. Type (3 Oil-immersed /dry) 7. Insulating materials(Case of dry) 8. Primary and secondary voltage 9. Number of phase 10. Capacity	(%) - (W) (W) (Ω) - - (kV)/(V) - (kVA)	Second (x.xx) - First (x.x) First (x.x) - - - First (x.x) / Integer (x.) - Integer (x.)
25. Window set	1. Heat transfer coefficient 2. Air permeability (Amount of air flow, level) 3. Frame material 4. Glass 5. Energy Efficiency Level	((W/(㎡.K)) (㎥/h.㎡, level) - (㎜) -	Third (x.xxx) Second (x.xx) / Integer (x.) - Integer (x.) -
26.Television set	1. Power consumption per 1 $\sqrt{m^2}$ 2. Display method 3. Length of screen diagonal 4. Screen aspect ratio (length and width) 5. Screen area 6. Square root of screen area 7. Power consumption in operation mode 8. Standby power 9. Power consumption per1 hour 10. CO2 emission per 1 hour 11. Annual power consumption 12. Annual energy cost 13. Energy Efficiency Level	(W/ $\sqrt{m^2}$) - (cm) - ($\sqrt{m^2}$) (W) (W) (Wh) (g/hour) (kWh) (Won) -	First (x.x) - Integer (x.) - Fourth (x. xxxx) Fourth (x. xxxx) First (x.x) First (x.x) Integer (x.) Integer (x.) First (x.x) Integer (x.) -
27.Electric fan heater	1.Heating efficiency 2.Heating capacity 3.Power consumption 4.Power consumption per 1hour 5.CO2 emission per 1hour 6.Monthly power consumption 7.Monthly energy cost(Residential/Normal)	(W/W) (W) (W) (Wh) (g/hour) (kWh/month) (Won)	Third (x.xxx) Integer(x.) Integer(x.) Integer(x.) Integer(x.) First(x.x) Integer(x.)
28.Electric stove	1.Standby power 2.Power consumption 3.Power consumption per 1hour 4.CO2 emission per 1hour 5.Monthly power consumption 6.Monthly energy cost (Residential/normal)	(W) (W) (Wh) (g/hour) (kWh/month) (Won)	First(x.) Integer(x.) Integer(x.) Integer(x.) First(x.) Integer(x.)

29.Multi electric heat pump system	1.Cooling/heating efficiency (EERa) 2.Integrated cooling efficiency (IEER) 3.heating efficiency(COP) 4.Standard heating efficiency(COP1) 5.Cold climate area heating efficiency(COP2) 6.Rated cooling capacity 7.Rated heating capacity 8.Part load cooling capacity 9.Part load cooling power consumption 10.Standard heating capacity 11.Standard heating power consumption 12.Cold climate area heating capacity 13.Cold climate area heating power consumption 14.Make-up heater 15.Cooling capacity(indoor unit) 16.Cooling power consumption(indoor unit) 17.Rated voltage 18.Power consumption per 1hour 19.CO2 emission per 1hour 20.Consumption efficiency level	(W/W) (W/W) (W/W) (W/W) (W/W) (W) (W) (W) (W) (W) (W) (W) (W) (W) (W) (W) (V) (Wh) (g/hour) -	Third (x.xxx) Third (x.xxx) Third (x.xxx) Third (x.xxx) Third (x.xxx) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) Integer(x.) -
30.Dehumidifier	1.Dehumidification efficiency 2.Measured power consumption 3.Rated dehumidification capacity 4.Standby power 5.Power consumption per 1hour 6.CO2 emission per 1hour 7.Annual power consumption 8.Annual energy cost 9.Consumption efficiency level	(L/kWh) (W) (L) (W) (Wh) (g/hour) (kWh) (Won) -	Second (x.xx) First (x.x) First (x.x) First (x.x) Integer(x.) Integer(x.) First (x.x) Integer(x.) -
31.Electric pad	1.Standby power 2.Power consumption 3.Power consumption per 1 hour 4.CO2 emission per 1 hour 5.Monthly power consumption 6.Monthly energy cost	(W) (W) (Wh) (g/hour) (kWh/month) (Won)	First (x.x) Integer(x.) Integer(x.) Integer(x.) First(x.x) Integer(x.)
32.Electrically heated water mat	1.Standby power 2.Power consumption 3.Power consumption per 1 hour 4.CO2 emission per 1 hour 5.Monthly power consumption 6.Monthly energy cost	(W) (W) (Wh) (g/hour) (kWh/month) (Won)	First (x.x) Integer(x.) Integer(x.) Integer(x.) First(x.x) Integer(x.)
33.Electrical heating board	1.Standby power 2.Power consumption per 10㎡ 3.Power consumption per 1 hour per 10㎡ 4.CO2 emission per 1 hour per 10㎡ 5.Monthly power consumption per 10㎡ 6.Monthly energy cost per 10㎡	(W) (W) (Wh) (g/hour) (kWh/month) (Won)	First (x.x) Integer(x.) Integer(x.) Integer(x.) First(x.x) Integer(x.)
34.Electric bed	1.Standby power 2.Power consumption	(W) (W)	First (x.x) Integer(x.)

	3.Power consumption per 1 hour 4.CO2 emission per 1 hour 5.Monthly power consumption 6.Monthly energy cost	(Wh) (g/hour) (kWh/month) (Won)	Integer(x.) Integer(x.) First(x.x) Integer(x.)
35.Electric radiator	1.Standby power 2.Power consumption 3.Power consumption per 1 hour 4.CO2 emission per 1 hour 5.Monthly power consumption 6.Monthly energy cost (residential/normal)	(W) (W) (Wh) (g/hour) (kWh/month) (Won)	First (x.x) Integer(x.) Integer(x.) Integer(x.) First(x.x) Integer(x.)

Remark) Annual energy cost or monthly energy cost shall round off the 3nd place of decimal of the value. (ex. 75,000 won)

<Annex 7> Label Design for Energy Efficiency or Energy Efficiency Level (Article 16, ①)

1. **Label**

1. Refrigerator

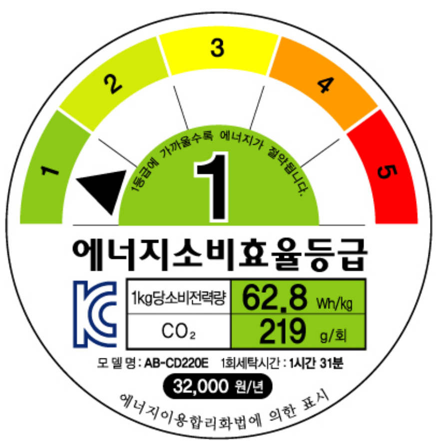
2. Freezer

3. Kimchi Refrigerator

4. Air conditioner

5. **Washing Machine**

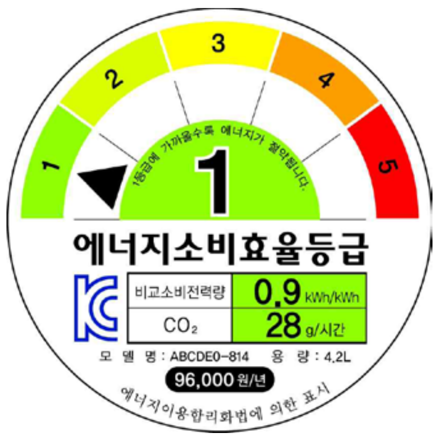
6. Horizontal drum washing machine



7. Dish Washer

8. Dish drier

9. Electrical Cooler and Heater for Drinking-Water Storage



10. Rice cooker

11. Vacuum cleaner

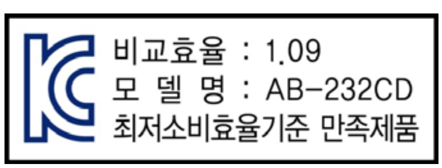
12. Electric Fan

13. Air cleaner

14. Incandescent lamps

15. Fluorescent lamps

16. Fluorescent lamps ballasts

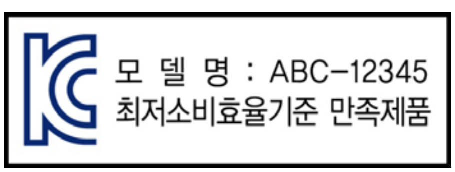


17. Associated ballasts

18. 3 Phase Induction motor

19. Household Gas Boiler

20. Adapter-Charger



21. Electric Driven Heatpump

22. Commercial Refrigerator

23. Gas water heater

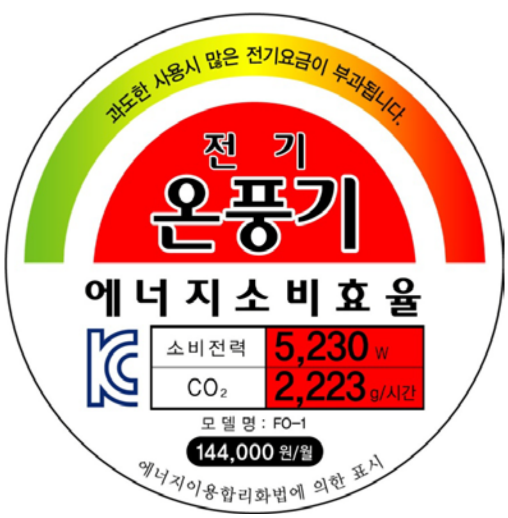
24. Transformer

25. Window set

26. Television set

27. Electric fan heater

<Rated power consumption below 3kW>



<Rated power consumption over 3kW>

28. Electric stove

<Rated power consumption below 3kW>

<Rated power consumption over 3kW>

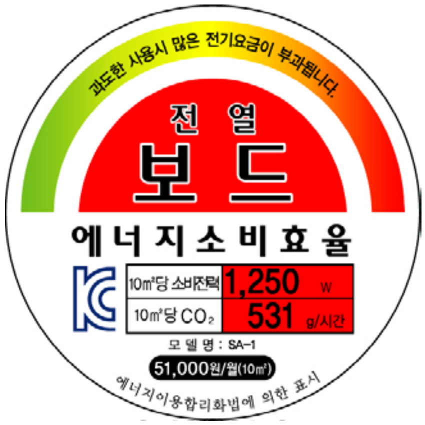
29. Multi-heat pump system

30. Dehumidifier

31. Electric pad

32.**Electrically heated water mat**

33. **Electrical heating board**



34. **Electrical bed**

35. Electrical radiator

<Rated power consumption below 3kW>

<Rated power consumption over 3kW>

Remark)

1. CO_2 : CO_2 emission per an hour or CO_2 emission per a cycle
2. Refrigerator : Total volume = Storage volume of fresh compartment + Storage volume of freezer compartment
3. Freezer : Total volume = Storage volume of freezer compartment
4. Kimchi Refrigerator : Total volume = Storage volume of Kimchi preserving compartment + Storage Volume of freezer compartment + Storage Volume of other compartments
5. Air-conditioner : Rated cooling capacity is basically a measured value which is guaranteed by a manufacturer or an importer.
6. Electrical Cooler and Heater for Drinking-Water Storage : Total capacity = Capacity of cool-water storage tank + Capacity of hot-water storage tank
7. Electric driven heatpump : Rated cooling capacity and rated heating capacity are basically measured value which is guaranteed by a manufacturer or an importer.
8. Commercial refrigerator : Total volume = Storage volume of fresh compartment + Storage volume of freezer compartment
9. Electric fan heater, electric stove: Rated power consumption below 3kW is for households, display electric costs of two normal types, and display on only normal types with rated power consumption of over 3kW.
10. Multi heat pump system: Rated cooling capacity is the cooling capacity proved by manufactures or importers based on the measures at 100% load condition from the cooling part load condition, rated heating capacity is the heating capacity proved by manufacturers or importers based on the measures of heating standard condition, and cold climate heating capacity is the heating capacity proved by manufacturers or importers based on the measures of heating cold climate condition.
11. Each manufacturer or importer should display “The stated energy cost labeling on the energy consumption efficiency level label or energy consumption efficiency label and the actual energy cost may vary based on the energy price fluctuations, such as the actual energy consumption by the consumer, energy usage time or electricity price hikes” by stating separately from the label.

2. Rounding off the place of decimal of the value in a label

(Label shall be determined by rounding off the place of decimal of the value in accordance with KS Q 5002.)

Products	Items to indicate	Unit	Round off the place of decimal of value
1. Refrigerator	1. Monthly power consumption 2. CO_2 3. Total Storage Volume 4. Annual Energy Cost	(kWh/Month) (g/hour) (L) (KR$/y)	First (x.) Integer (x.) Integer (x.) Integer (x.)
2. Freezer	1. Monthly power consumption 2. CO_2 3. Total Storage Volume 4. Annual Energy Cost	(kWh/Month) (g/hour) (L) (KR$/month)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
3. Kimchi Refrigerator	1. Monthly power consumption 2. CO_2 3. Total Storage Volume 4. Monthly Energy Cost	(kWh/Month) (g/hour) (L) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
4. Air-conditioner	1. Energy Efficiency Ratio (CEER) 2. CO_2 3. Rated Cooling Capacity 4. Monthly Energy Cost	(W/W) (g/hour) (W) (KR$/month)	Second (x.xx) Integer (x.) Integer (x.) Integer (x.)
5.Washing machine	1. Power consumption per 1kg 2. CO_2 3. Duration per a cycle 4. Annual Energy Cost	(Wh/kg) (g/cycle) (min) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
6. Horizontal drum washing machine	1. Power consumption per 1kg 2. CO_2 3. Duration per a cycle 4. Annual Energy Cost	(Wh/kg) (g/cycle) (min) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
7. Dishwasher	1. Washing performance 2. CO_2 3. Power Consumption per a cycle 4. Annual Energy Cost	- (g/cycle) (Wh) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
8. Dish drier	1. Power consumption for 20 minutes 2. CO_2 3. Rated drying capacity 4. Annual Energy Cost	(Wh/20min) (g/hour) (%) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
9. Electrical Cooler and Heater for Drinking-Water Storage	1. Comparative power consumption 2. CO_2 3. Total capacity 4. Annual energy cost	(kWh/kWh) (g/hour) (L)(Won/Year)	Second (x.xx)Integer (x.)First (x.x)Integer (x.)
10. Rice cooker	1. Power consumption per a person 2. CO_2 3. Power consumption per a cycle 4. Annual Energy Cost	(Wh/person) (g/hour) (Wh) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)

11. Vacuum cleaner	1. Suction Power Efficiency 2. CO2 3. Dust emission 4. Annual Energy Cost	(%) (g/hour) (mg/㎥) (KR$/y)	First (x.x) Integer (x.) Second (x.xx) Integer (x.)
12. Electric Fan	1. Energy Efficiency Ratio 2. CO2 3. Standard Air flow rate 4. Annual Energy Cost	((㎥/min)/W) (g/hour) (㎥/min) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
13. Air cleaner	1. Power consumption per $1m^2$ 2. CO2 3. Standard room size 4. Annual Energy Cost	(W/ m^2) (g/hour) (m^2) (KR$/y)	First (x.x) Integer (x.) First (x.x) Integer (x.)
14. Incandescent lamps	1. Energy Efficiency Ratio 2. CO2 3. Rated power consumption	(lm/W) (g/hour) (W)	First (x.x) Integer (x.) First (x.x)
15. Fluorescent lamps	1. Energy Efficiency Ratio 2. CO2 3. Rated power consumption	(lm/W) (g/hour) (W)	First (x.x) Integer (x.) First (x.x)
16. Fluorescent lamps ballasts	1. Compared Energy Efficiency level index	-	Second (x.xx)
17. Associated ballasts	1. Efficiency of luminous flux 2. CO2 3. Power input	(lm/W) (g/hour) (W)	First (x.x) Integer (x.) First (x.x)
18. 3 phase induction motor	1. Full load efficiency 2. CO2 3. Rated output power/the number of pole 4.Annual energy cost	(%) (g/hour) (kW/pole) Won/year-	First (x.x) Integer (x.) First (x.x)/Integer (x.) Integer (x.)
19. Household Gas Boiler	1. Rated thermal efficiency 2. Heating capacity	(%) (kW)	First (x.x) Second (x.xx)
20. Adapter-Charger	-	-	-
21. Electric driven heatpump	1.Energy Efficiency Ratio 2.CO2 3.Rated cooling capacity/rated heating capacity 4.Annual energy cost	(W/W) (g/hour) (W)/(W) (Won/year)	Second (x.xx) Integer (x.) Integer (x.)/Integer(x.) Integer (x.)
22. Commercial Refrigerator	1. Monthly power consumption 2. CO2 3. Total Storage Volume 4. Annual Energy Cost	(kWh/Month) (g/hour) (L) (KR$/y)	First (x.x) Integer (x.) Integer (x.) Integer (x.)
23. Gas water heater	1. Rated thermal efficiency 2. Gas consumption	(%) (kW)	First (x.x) First (x.x)
24. Transformer	1. Efficiency 2. Primary and secondary voltage - High secondary voltage - Low secondary voltage 3. Number of phase 4. Capacity	(%) (kV/kV) (kV/V) - (kVA)	First (x.x) First (x.x)/ First (x.x) First (x.x)/ Integer (x.) - Integer (x.)

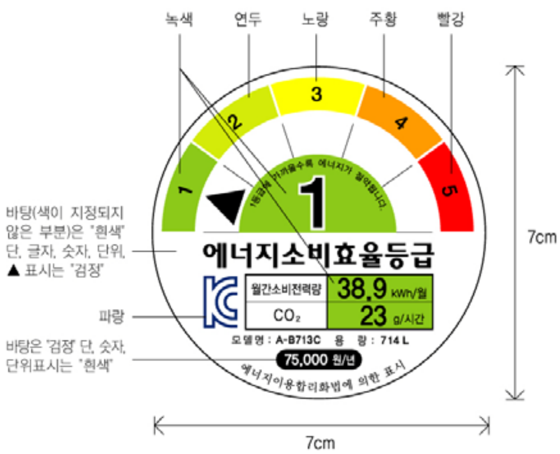
25. Window set	1. Heat transfer coefficient 2. Air permeability (Amount of air flow, level) 3. Glass	(W/(㎡.K)) (㎥/h. ㎡, level) -	Second (x.xx) Second (x.xx), Integer (x.) -
26. Television set	1. Power consumption per 1 √㎡ 2. CO2 3. Power consumption 4. Annual energy cost	(W/√㎡) (g/hour) (W) (Won/year)	First (x.x) Integer (x.) First (x.x) Integer (x.)
27.Electric fan heater	1.Power consumption 2.CO2 3.Monthly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
28.Electric stove	1.Power consumption 2.CO2 3.Monthly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
29.Multi electric heat pump system	1.Cooling/heating efficiency 2.CO2 3.Rated cooling capacity/Rated heating capacity 4.Cold climate area heating capacity(-15 ℃)	(W/W) (g/hour) (W)/(W) (W)	Second (x.xx) Integer (x.) Integer (x.) Integer (x.)
30.dehumidifier	1.Dehumidification efficiency 2.CO2 3.Rated dehumidification capacity 4.Annual energy cost	(L/kWh) (g/hour) (L) (Won/year)	Second (x.xx) Integer (x.) First (x.x) Integer (x.)
31.Electric pad	1.Power consumption 2.CO2 3.Montly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
32.Electrically heated water mat	1.Power consumption 2.CO2 3.Monthly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
33.Electrical heating board	1.Power consumption per10㎡ 2.CO2 per 10㎡ 3.Monthly energy cost (10㎡)	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
34.Electric bed	1.Power consumption 2.CO2 3.Monthly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)
35.Electric radiator	1.Power consumption 2.CO2 3.Monthly energy cost	(W) (g/hour) (Won/month)	Integer (x.) Integer (x.) Integer (x.)

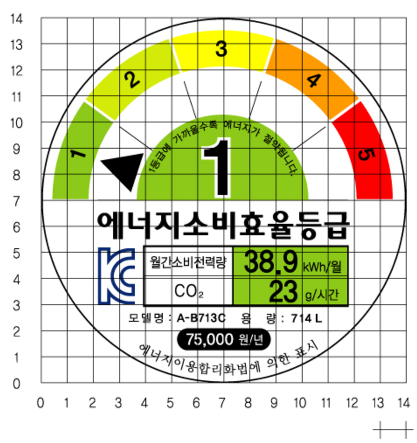
Remark) Annual energy cost or monthly energy cost shall be determined by rounding off the 3rd place of decimal of value. (ex. 75,000 KR$)

3. Design the energy efficiency label

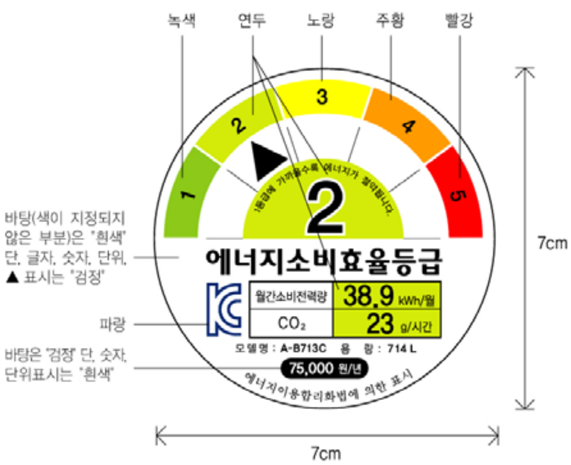
1) Label for Energy efficiency level

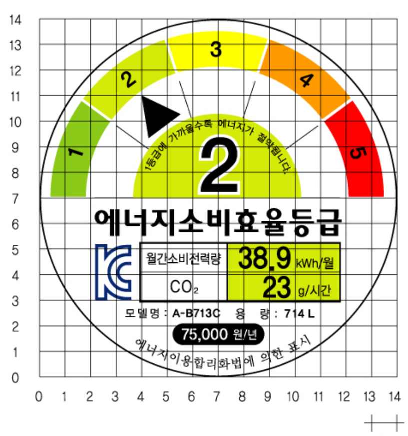
- 1st level (background color : green)



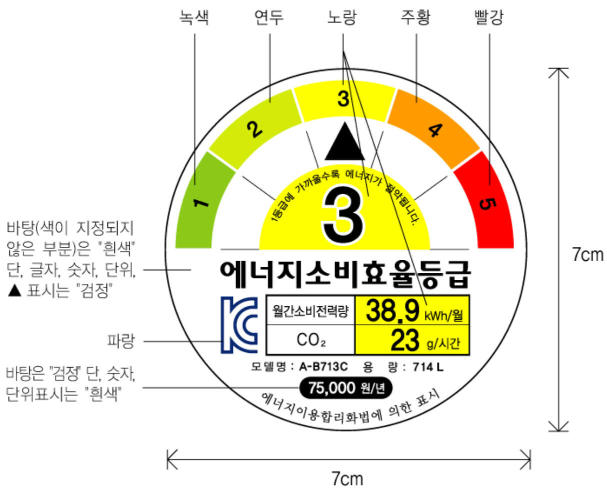


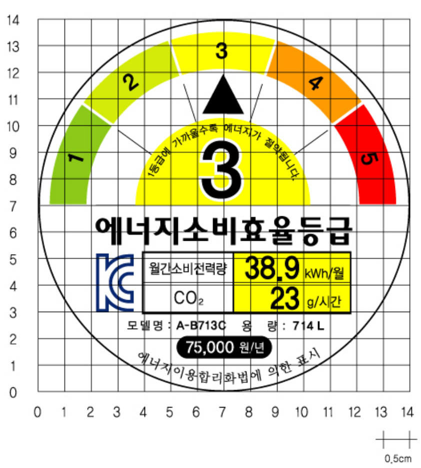
- 2nd level (background color : light green)



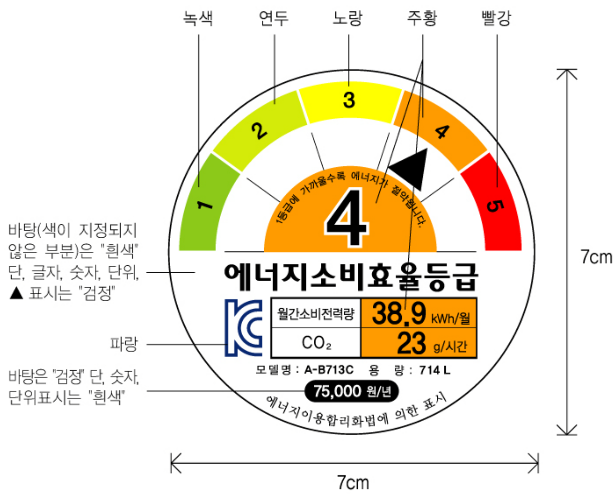


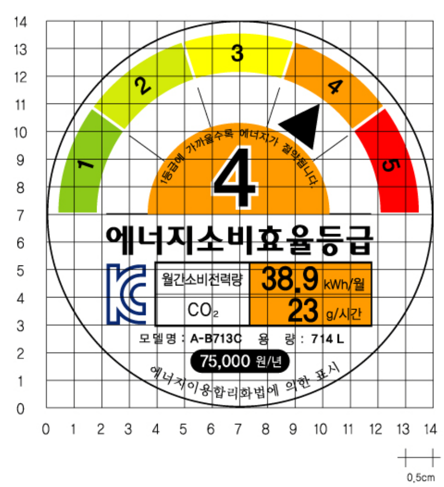
- -3rd level (background color : yellow)



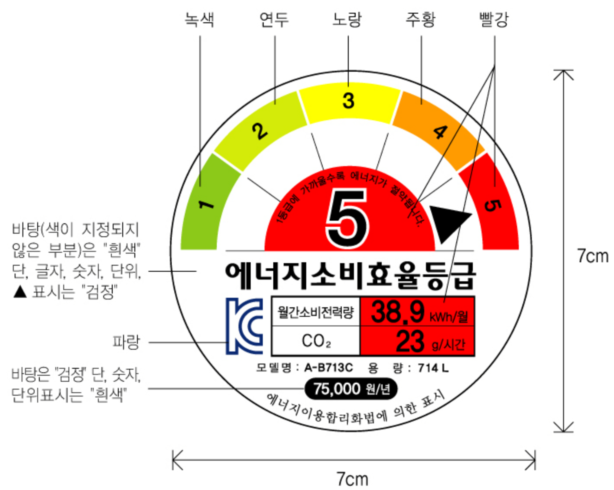


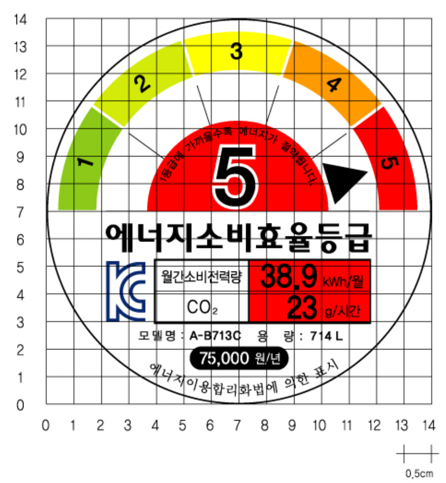
- 4th level (background color : Orange)





- 5th level (background color : Red)

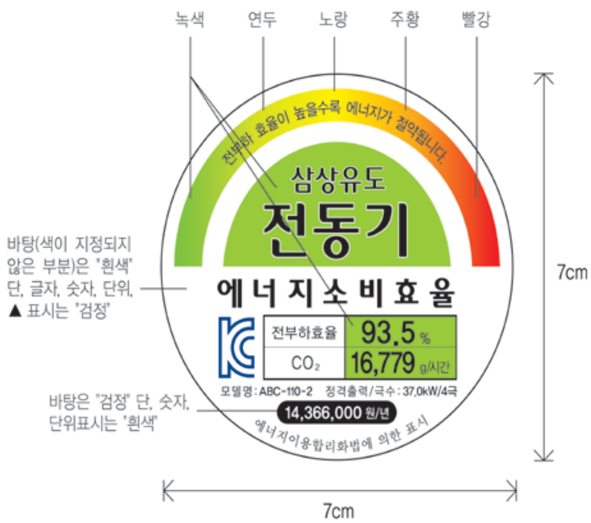




1) Energy Frontier (background color : Gold)

2) Label for Energy efficiency

A. 3 phase Induction motor



(Remark) For the energy consumption efficiency label, the background color for electric fan heater, electric stove, electric pad, electrically heated water mat, electrical heating board, electric bed, and electric radiator is to be red instead of green, and background color for fluorescent lamps ballasts, adapter charger is to be white.

B. Fluorescent lamps ballasts, Adapter-charger, Electric fan heater, and electric stove

C. Color

- The color of energy efficiency level label and energy efficiency label shall be in pantone color, but it can be used with 4 origin colors. Fluorescent lamps and adapter-charger can be in a single color.

- The color of energy efficiency level label

Color	Pantone color	4 origin colors
Green	Pantone Process 376C	C45%, Y100%
Light Green	Pantone Process 389C	C17% Y100%
Yellow	Pantone Process Yellow C	Y100%
Orange	Pantone Process 1375 C	M40% Y100%
Red	Pantone Process Warm Red C	M100% Y100%
Black	Pantone Process Black C	K100%
Blue	Pantone Process 288C	C100%, M80%, K30%

D. Size

- The size of energy efficiency level label shall be 7cm(length) x 7cm(height), but it can be adjusted with the location.

Size	Items
7cm(length) x 7cm(height)	Refrigerator, Freezer, Kimchi Refrigerator, Air-conditioner(except wall mount split type), Washing machine, Horizontal drum washing machine, Dishwasher, Electrical Cooler and Heater for Drinking-Water Storage(higher 60cm), 3 phase induction motor(larger than 37kW), Household Boiler, Electric driven heatpump(exclude wall mount split type), Commercial refrigerator, Transformer, electric fan heater (rated power consumption over 3kW), electric stove(rated power consumption over 3kW), multi heat pump system, electric pad, electrically heated water mat, electrical heating board, electric bed, electric radiator (rated power consumption over 3kW)
Adjusted with 75%~100%	Air-conditioner(only wall mount split type), Dish drier, Rice cooker, Vacuum cleaner, Electric fan, Air cleaner, Electrical Cooler and Heater for Drinking-Water Storage(lower 60cm), 3 phase induction motor(less than 37kW), Electric driven heatpump(only wall mount split type), Gas water heater, electric fan heater(rated power consumption below 3kW), electric stove(rated power consumption below 3kW), dehumidifier, electric radiator(rated power consumption below 3kW)
Free adjusted	Incandescent lamps, Fluorescent lamps, Fluorescent lamps ballasts, Associated ballasts, Adapter-charger, Window set, Television set

Remark) Fonts can be bigger when label is made smaller

<Annex 8> Testing Items and requirements for Monitoring Program (Article 18 ④)

Products	No. of sample to test	No. of Failed sample to accept	Testing items	Requirements
1. Refrigerator	2	0	Monthly power consumption Storage volume CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% Within ±3% or 1 L ≤ 110% ≤ 110% -
2. Freezer	2	0	Monthly power consumption Storage Volume CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% Within ±3% or 1 L ≤ 110% ≤ 110% -
3. Kimchi Refrigerator	2	0	Monthly power consumption Storage Volume CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% Within ±3% or 1 L ≤ 110% ≤ 110% -
4. Air-conditioner	2	0	Energy Efficiency Ratio (EER) Cooling Capacity CO_2 emission per an hour Monthly energy cost Energy Efficiency Level	≥ 92% ≥ 95% ≤ 110% ≤ 110% -
5.Washing machine	2	0	Power consumption per 1kg Water extraction ratio Rinsing Index Duration per a cycle CO_2 emission per a cycle Annual energy cost Energy Efficiency Level	≤ 110% ≥ 45% ≥ 1.00 ≤ 110% ≤ 110% ≤ 110% -
6.Horizontal drum washing machine	2	0	Power consumption per 1kg Washing efficiency index Water extraction ratio Duration per a cycle CO_2 emission per a cycle Annual energy cost Energy Efficiency Level	≤ 110% ≥ 40% ≥ 0.90(1st level : ≥ 0.99) ≤ 110% ≤ 110% ≤ 110% -
7. Dishwasher	2	0	Washing performance Electric power consumption per a cycle CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≥ 90% ≤ 110% ≤ 110% ≤ 110% -

8. Dish drier	2	0	Power consumption for 20 minutes drying Drying performance CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% ≥ 90% ≤ 110% ≤ 110% -
9.Electrical Cooler and Heater for Drinking-Water Storage	2	0	Comparative power consumption Capacity CO_2 emission per 1hour Annual energy cost Energy Efficiency Level	≤ 110% Within ±3% or 1 L ≤ 110%≤ 110% -
10. Rice cooker	2	0	Power consumption per 1 person Power consumption per a cycle CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% ≤ 110% ≤ 110% ≤ 110% -
11.Vacuum cleaner	2	0	Suction Power Efficiency Dust emission CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≥ 90% Not more than a registered value ≤ 110% ≤ 110% -
12.Electric Fan	2	0	Energy Efficiency Ratio Standard Air flow CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≥ 90% ≥ 90% ≤ 110% ≤ 110% -
13.Air cleaner	2	0	Power consumption per $1m^2$ Standard room size CO_2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% ≥ 90% ≤ 110% ≤ 110% -
14.Incandescent lamps	20	2	Efficiency Luminous flux Power consumption Lifetime CO_2 emission per an hour Energy Efficiency Level	≥ 93% ≥Rated Luminous flux ve93% (White 88%) ≤(Rated power＋0.5W)×104 % ≥ KS annex table × 80% - -

15.Fluorescent lamps	10	1	Efficiency Luminous flux Power input CO2 emission per an hour Energy Efficiency Level	≥ 92% ≥KS annex table× 92% ≤KS Annex table ± (Power input ×0.05 + 0.5) - -
16.Fluorescent lamps ballasts	2	0	Compared Energy Efficiency Luminous flux Power input	≥ 100% Tolerance of KS C 8100, 8102 "
17.Associated ballasts	3	0	Efficiency of luminous flux Power input CO2 emission per an hour Energy Efficiency Level	≥95% ≤Rated input × ±15% - -
18. 3 phase induction motor	5	-	Averaged full load efficiency ($\overline{X}$) Minimum efficiency in tested samples $X_{\min}$ Full load efficiency CO2 emission per an hour Annual energy cost	$\overline{X} \geq \frac{100}{1+1.05\left(\frac{100}{RE}-1\right)}$ $X_{\min} \geq \frac{100}{1+1.15\left(\frac{100}{RE}-1\right)}$ ≥ 100% ≤ 110% ≤ 110%
19.Household Gas Boiler	2	0	Measured thermal efficiency Heating capacity Energy Efficiency Level	≥ 100% ≥ 90% -
20. Adapter-Charger	3	0	Running efficiency Standby power	≥ MEPS ≤ Defined value
21. Electric driven heatpump	2	0	Energy Efficiency Ratio Rated cooling capacity/rated heating capacity CO2 emission per 1hour Annual energy cost Energy Efficiency Level	≥ 92% ≥ 95%/≥ 95% ≤ 110% ≤ 110% -
22. Commercial refrigerator	2	0	Monthly power consumption Storage volume CO2 emission per an hour Annual energy cost Energy Efficiency Level	≤ 110% Within ±3% or 1 L ≤ 110% ≤ 110% -
23. Gas water heater	2	0	Rated thermal efficiency Energy Efficiency Level	≥ 100% -
24. Transformer	1	0	Efficiency (at a 50% load factor)	≥ 100%

25. Window set	1	0	Heat transfer coefficient Air permeability (Amount of air flow, level) Glass Energy Efficiency Level	≥ 110% ≥ 110%, - - -
26. Television set	2	0	Power consumption per 1 √㎡ Power consumption in operation mode CO_2 emission per 1 hour Annual energy cost Energy Efficiency Level	≤ 110% ≤ 110% ≤ 110% ≤ 110% -
27. Electric fan heater	2	0	Heating efficiency Power consumption CO_2 emission per 1 hour Monthly energy cost	≥Lowest ≤ 110% ≤ 110% ≤ 110%
28. Electric stove	2	0	Standby power Power consumption CO_2 emission per 1 hour Monthly energy cost	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%
29. Multi electric heat pump system	1	0	Energy Efficiency Ratio CO_2 emission per 1hour Rated cooling capacity/rated heating capacity Cold climate area heating capacity(-15 ℃) Energy efficiency level	≥90% ≤ 110% ≥92%/≥92% ≥92% -
30. Dehumidifier	2	0	Dehumidification efficiency Rated dehumidification capacity CO_2 emission per 1hour Annual energy cost Energy efficiency level	≥92% ≥95% ≤ 110% ≤ 110% -
31.Electric pad	2	0	Standby power Power consumption CO_2 emission per 1 hour Monthly energy cost	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%
32.Electrically heated water mat	2	0	Standby power Power consumption CO_2 emission per 1 hour Monthly energy cost	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%
33.Electrical heating board	2	0	Standby power Power consumption per 10 ㎡ CO_2 emission per 1 hour per 10 ㎡ Monthly energy cost (10 ㎡)	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%
34. Electric bed	2	0	Standby power Power consumption CO_2 emission per 1 hour Monthly energy cost	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%
35. Electric radiator	2	0	Standby power Power consumption CO_2 emission per 1 hour Monthly energy cost	≤ Regulation value ≤ 110% ≤ 110% ≤ 110%

Remark)

1. The registered value means a value which is registered to KEMCO.
2. Requirements beyond the scope of Annex 3 shall be not allowed despite testing items with requirements. The 3 phase induction motor shall be applied to defined requirements.

(**Annex Form 1)**

<table>
<tr><td colspan="4">Application Form for the Self-Certify (Change)</td><td>Within 30 working days</td></tr>
<tr><td colspan="2">Applicant</td><td></td><td>CEO</td><td></td></tr>
<tr><td rowspan="2">Address</td><td>Head Office</td><td></td><td>Telephone
(E-mail)</td><td></td></tr>
<tr><td>Factory</td><td></td><td>Telephone
(E-mail)</td><td></td></tr>
<tr><td colspan="2">Product</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Registration</td><td>Corporation Registration No.</td><td></td><td>Day/Month/year</td><td></td></tr>
<tr><td>Category</td><td colspan="3"></td></tr>
<tr><td colspan="2">Test Facility</td><td colspan="3"></td></tr>
<tr><td colspan="2">Man Power</td><td colspan="3"></td></tr>
<tr><td colspan="2">Reason to change</td><td colspan="3"></td></tr>
<tr><td colspan="5">Applicant requests for self-certify testing Laboratory for the above products or to change according to “Regulation on Energy Efficiency Labeling and Standards”.

Day/ Month/ Year

Applicant (sign)

The Minister of MKE</td></tr>
<tr><td colspan="2">Attached</td><td colspan="3">1. List of facilities and figures
2. List of man power and the related documents
3.Any contracts to use facilities between an importer and oversea factory (if applicable)</td></tr>
</table>

(Annex Form 2)

Test Results

Testing Laboratory		Contact		Telephone	

Issued No.	Issued date	Manufacturer or Importer	Product	Model	Energy Efficiency	Energy Efficiency Level	Remark

Attached :Test report ( )

(Annex Form 3)

Report on production (import) and sale

Appli-cant	Corporation				
	Address	Head Office		Telephone Fax E-mail	
		Factory		Telephone Fax E-mail	
	CEO				

Applicant reports on the production (import) and sale for appliances with energy efficiency label according to "Regulation on Energy Efficiency Labeling and Standards".

Production (import) and sale

Test report No. (Testing Laboratory)	Product	Model	Energy Efficiency Level	( ) year			Plan ( ) year
				Unit	Production/ Import	Sale	Production/ Import

※ Please list product or model with downstream of energy efficiency level, and report exactly, because this shall be used only to analyze the energy-saving effect.

Day/ Month/ Year

Applicant (sign)

The president of KEMCO

■ Please report the end of every January.

(Annex Form 4)

Application Form to change or add the model name

Appli -cant	Corporation					
신 고 인	Address	Head Office			Telephone Fax E-mail	
신 고 인	소재지	Factory			Telephone Fax E-mail	
신 고 인	CEO					
Corporation Registration No.					Day/Month/Year	
Energy Efficiency	Product					
소 비 효 율	Specification					
소 비 효 율	Testing laboratory					
소 비 효 율	Test report No.				Day/Month/Year	
소 비 효 율	Energy Efficiency or Energy Efficiency Level					
Model	Model		before		After	
모 델	Use a origin Model		□ continue to use		□ stop using	
모 델	Reason to change or add					

Applicant requests to change or add the name of model according to "Regulation on Energy Efficiency Labeling and Standards".

Day/ Month/ Year

Applicant (sign)

The president of KEMCO

(Annex Form 5)

Application Form to register energy efficiency level through internet ID			
Applicant	① Corporation		
	② Department	☎	
	③ Contact	(Email) (ID No.)	
Product	④ Items	ID	Password
	☐ Refrigerator		
	☐ Freezer		
	☐ Kimchi Refrigerator		
	☐ Air-conditioner		
	☐ Washing machine		
	☐ Horizontal drum washing machine		
	☐ Dish washer		
	☐ Dish drier		
	☐ Electrical Cooler and Heater for Drinking-Water Storage		
	☐ Rice cooker		
	☐ Vacuum cleaner		
	☐ Electric Fan		
	☐ Air cleaner		
	☐ Incandescent lamps		
	☐ Fluorescent lamps		
	☐ Fluorescent lamps ballasts		
	☐ Associated ballasts		
	☐ 3 Phase Induction Motor		
	☐ Household Gas Boiler		
	☐ Adapter-Charger		
	☐ Electric driven heatpump		
	☐ Commercial refrigerator		
	☐ Gas water heater		
	☐ Transformer		
	☐ Window Set		
	☐ TV		
	☐ Electric fan heater		
	☐ Electric stove		
	☐ Multi electric heat pump system		
	☐ Dehumidifier		
	☐ Electric pad		
	☐ Electrically heated water mat		
	☐ Electrical heating board		

	☐ Electric bed		
	☐ Electric radiator		

Applicant reports to register energy efficiency level through internet ID according to "Regulation on Energy Efficiency Labeling and Standards", and all responsibility for registration are up to applicant.

Day/ Month/ Year

Applicant (sign)

The president of KEMCO

Attached : A proved documentation for contact person to work for applicant corporation

(Annex Form 6)

Application Form to change energy efficiency level through internet ID

Applicant	① Corporation				
제조업체	② Department	☎			
제조업체	③ Contact	(Email) (Security No.)			
Product	④ Items	Before		After	
	④ 품 목	ID	Password	ID	Password
	☐ Refrigerator				
	☐ Freezer				
	☐ Kimchi Refrigerator				
	☐ Air-conditioner				
	☐ Washing machine				
	☐ Horizontal drum washing machine				
	☐ Dish washer				
	☐ Dish drier				
	☐ Electrical Cooler and Heater for Drinking-Water Storage				
	☐ Rice cooker				
	☐ Vacuum cleaner				
	☐ Electric Fan				
	☐ Air cleaner				
	☐ Incandescent lamps				
	☐ Fluorescent lamps				
	☐ Fluorescent lamps ballasts				
	☐ Associated ballasts				
	☐ 3 Phase Induction Motor				
	□ Household Gas Boiler				
	□ Adapter-Charger				
	□ Electric driven heatpump				
	□ Commercial refrigerator				
	□ Gas water heater				
	□ Transformer				
	□ Window Set				
	□ TV				
	□Electric fan heater				

	□Electric stove				
	□Multi electric heat pump system				
	□Dehumidifier				
	□ Electric pad				
	□ Electrically heated water mat				
	□ Electrical heating board				
	□ Electric bed				
	□ Electric radiator				

Applicant reports to change energy efficiency level through internet ID according to “Regulation on Energy Efficiency Labeling and Standards”.

Day/ Month/ Year

Applicant (sign)

The president of KEMCO

Attached : A proved documentation for contact person to work for applicant corporation

(Annex Form 7)

<table>
<tr><td colspan="6">Cancellation form of Registration</td></tr>
<tr><td rowspan="4">Applicant</td><td colspan="2">Corporation</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Address</td><td>Headquarter</td><td></td><td>Tel
Fax
Email</td><td></td></tr>
<tr><td>Factory</td><td></td><td>Tel
Fax
Email</td><td></td></tr>
<tr><td colspan="2">CEO</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td colspan="5">Cancellation List</td></tr>
<tr><td>Product</td><td>Model</td><td>Date of registration</td><td>Energy Efficiency Level</td><td>Remark</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Applicant reports to cancel energy efficiency level according to “Regulation on Energy Efficiency Labeling and Standards”.

Day/ Month/ Year

Applicant (sign)

The president of KEMCO

(Annex Form 8)

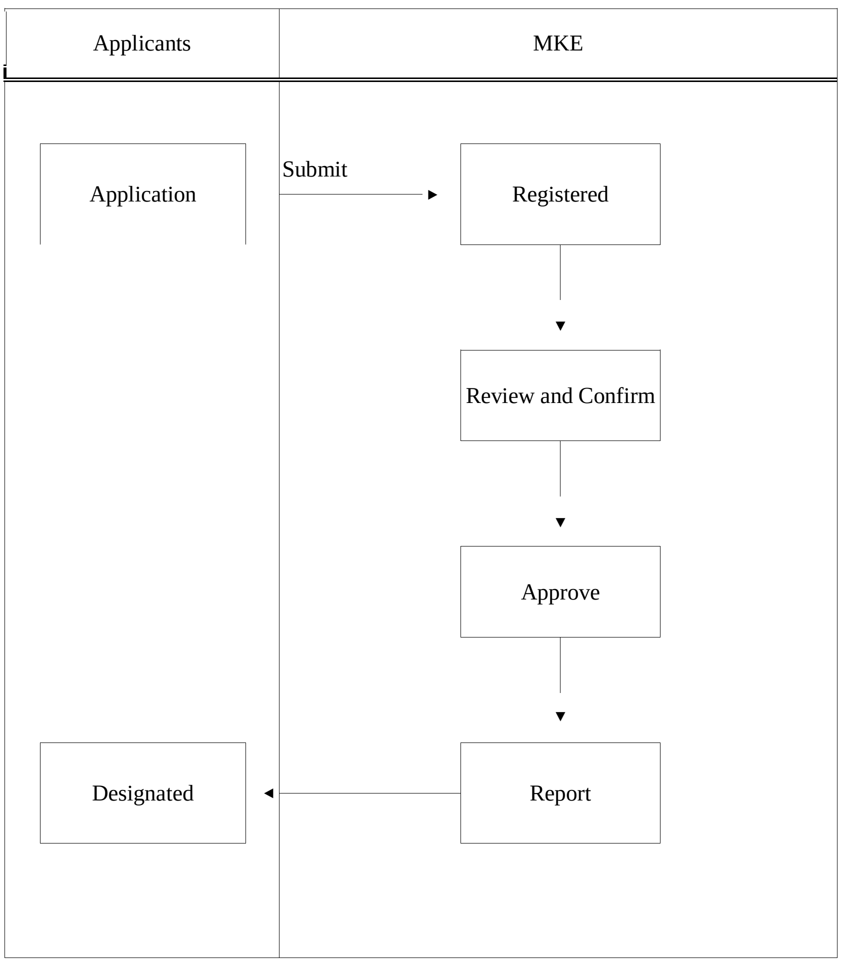
<table>
<tr><td colspan="4">Application Form for designated Testing Laboratory</td><td>Within 30 working days</td></tr>
<tr><td colspan="2">Applicant</td><td></td><td>CEO</td><td></td></tr>
<tr><td rowspan="2">Address</td><td>Head Office</td><td></td><td>Telephone
(E-mail)</td><td></td></tr>
<tr><td></td><td></td><td>Telephone
(E-mail)</td><td></td></tr>
<tr><td colspan="2">Corporation Registration No.</td><td colspan="3"></td></tr>
<tr><td colspan="2">Category</td><td colspan="3"></td></tr>
<tr><td colspan="5">Applicant requests for designated testing Laboratory for the above products or to change according to “Regulation on Energy Efficiency Labeling and Standards”.

Day/ Month/ Year

Applicant (sign)

The Minister of MKE</td></tr>
<tr><td>Attached</td><td colspan="4">1. List of facilities and figures
2. List of man power and the related documents
3.Any contracts to use facilities between an importer and oversea factory (if applicable)</td></tr>
</table>

Procedure


Applicants
MKE
Application
Submit
Registered
Review and Confirm
Approve
Designated
Report