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Replacing GB 21521-2008, GB 25956-2010

Minimum Allowable Values of Energy Efficiency and Energy Efficiency Grades for Copy Machines, Printers and Fax Machines

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Table of Contents

Foreword

Sub-article 4.2 of this Standard is compulsory; the other articles are voluntary.

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB 21521-2008, Minimum Allowable Values of Energy Efficiency and Energy Efficiency Grades for Copy Machines, and GB 25956-2010, Minimum Allowable Values of Energy Efficiency and Energy Grade for Printers and Fax Machines. Compared with GB 21521 and GB 25956-2010, the major changes are as follows:

-- it changes the application scope of the standards;

-- it improves the indexes and requirements for all energy efficiency grades of products;

-- it deletes “target minimum allowable values of energy efficiency” in GB 21521-2008, 3.4;

-- it modifies the power factors of additional functions in the former GB 21521-2008, Table 5;

-- it lists in Annex C and Annex D the calculation methods of the former GB 21521-2008, 4.2 and GB 25956-2010, 5.2.

This Standard was jointly proposed by the National Development and Reform Commission Resource Conservation and Environmental Protection Department and the Ministry of Industry and Information Technology Energy Saving and Comprehensive Utilization Department.

This Standard shall be under the jurisdiction of the National Standardization Technical Committee on Energy Base and Management (SAC/TC 20).

The drafting organizations of this Standard: China National Institute of Standardization, China National Office Equipment and Consumable Quality Supervision Testing Center, China National Computer Products Quality Supervising Test Centre, China CEPREI Laboratory, Sharp Office Equipment (Changshu) Co., Ltd., Canon (China) Co., Ltd., Ricoh (China) Investment Co., Ltd., Jiangsu Institute of Metrology, China HP Co., Ltd., Vkan Certification and Testing Co., Ltd., Samsung Electronics (Shandong) Digital Printers Co., Ltd., Konica Minolta (China) Investment Co., Ltd., Brother (China) Commercial Co., Ltd., Epson (China) Co., Ltd., National Supervision and Testing Centre of Energy Efficiency, Safety and Quality of Electric Appliances, Lexmark Information Technology (China) Co., Ltd., Fuji Xerox (China) Limited.

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Minimum Allowable Values of Energy Efficiency and Energy Efficiency Grades for Copy Machines, Printers and Fax Machines

1 Application Scope

This Standard specifies the energy efficiency grades, minimum allowable values of energy efficiency, energy conservation evaluating values, methods for test and calculation, inspection rules of general-purpose copy machines, printers, fax machines, multifunction devices (hereinafter referred to as products).

This Standard applies to products of standard size, which operates under the power supply of the power grid of 220 V, 50 Hz.

This Standard does not apply to the following products:

a) products only powered by data interfaces (such as USB, IEEE 1394 interface);

b) products having digital front-end (DFE);

c) products having an output speed greater than or equal to 70 pages/min;

d) dot matrix printers having printing needles more than 48.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to this Standard.

GB/T 16685-2008, *Information Technology – Office Equipment – Printing Devices Method for Measuring Throughput – Class 1 and Class 2 Printers*

GB/T 22372-2008, *Test Chart for Laser Printer*

ISO/IEC 28360:2012, *Information Technology – Office Equipment- Determination of Chemical Emission Rates from Electronic Equipment*

JB/T 6872, *Chart (A4) of Developer (Toner) Wastage for Electrostatics Copying Machines*

NOTE 1 For multifunction device with printing function, the printing speed is the output speed.

NOTE 2 For continuous feeding products, the output speed is the integral value of [16 × maximum medium width (in m) × maximum copying speed (in m/min)], in page(s)/min.

NOTE 3 For products only having colour printing, copying or faxing function, the output speed is the speed in the colour single-sided mode.

3.13

digital front-end

for a servo system integrating multiple functions, the system shall have at least 3 of the following functions: a) adaptation to multiple environments; b) electronic mail box; c) task queue management; d) product mode management (such as awakening products from the low power consumption mode); e) advanced graphical user interface; f) starting the interaction with other servers or client-side computers (such as scanning and mail sending function and polling remote mail box function); g) page postprocessing (such as size format resetting function before printing). The system can be connected with other computers or processing application programs as host and can work as the user interface of products.

3.14

minimum allowable values of energy efficiency for products

the maximum typical energy consumption or maximum operating mode power, standby power and maximum default delay to get into the sleep mode allowed by products under standard test conditions.

3.15

evaluating values of energy conservation for products

the maximum typical energy consumption or maximum operating mode power and standby power allowed by energy conservation products under standard test conditions.

4 Technical Requirements

4.1 Product energy efficiency grades

4.1.1 Product energy efficiency is classified into 3 grades, including grade 1 having the highest energy efficiency.

4.1.2 For the products of thermosensitive, dye sublimation, electronic imaging, solid ink and heat transfer printing technology and high-performance ink jet technology, their energy efficiency is graded in accordance with the typical energy consumption method.

test method specified in Annex A.

5.1.2 Carry out the test on the operation mode energy consumption, default delay time to get into the sleep mode and standby energy consumption of products in accordance with the test method specified in Annex B.

5.2 Calculation method

5.2.1 Calculate the typical energy consumption of products in accordance with the calculation method specified in Annex C.

5.2.2 Calculate the operation mode power, sum of power factors of additional functions and standby power of products in accordance with the calculation method specified in Annex D.

6 Inspection Rules

6.1 Exit-factory inspection

6.1.1 The maximum allowable values of energy efficiency shall be the item of exit-factory inspection of products.

6.1.2 The products whose maximum allowable values determined in test are not as specified in 4.2, are not allowed to leave the factory.

6.2 Type inspection

6.2.1 In any of the following circumstances, type inspection on the maximum allowable values of energy efficiency of products shall be carried out:

a) during the trial-manufacture of a new product;

b) when a change in product design, technology or materials used has significant effects on its performance;

c) when a quality technical supervision department requires it.

6.2.2 1 sample shall be taken per batch for type inspection.

6.2.3 When it is found through type inspection that the energy efficiency of products is not as specified in 4.2, then the batch of products are not accepted.

Annex A

(Normative)

Test Method for Typical Energy Consumption of Products

A.1 Test conditions

A.1.1 Environmental conditions

Measurements shall be performed under the conditions of temperature, humidity and air pressure within the following range:

-- environmental temperature: (23 ± 5)°C;

-- relative humidity: 10% ~ 80%;

-- atmospheric pressure: 86 kPa ~ 106 kPa.

A.1.2 Power supply

The alternating voltage of test power supply is 220 (1 ± 1%) V and the frequency 50 (1 ± 1%) Hz. For the devices to be tested of nominal power greater than 1.5 kW, the alternating voltage of test power supply is 220 (1 ± 4%) V.

The total harmonic distortion of test power supply is not greater than 3%. For the devices to be tested of nominal power greater than 1.5 kW, the total harmonic distortion of test power supply is not greater than 5%.

A.2 Test apparatus

When a power meter is used to measure the active power not greater than 10 W, the resolution is 0.01 W; when it is used to measure the active power greater than 10 W and smaller than 100 W, the resolution is 0.1 W; when it is used to measure the active power greater than or equal to 100 W, the resolution is 1 W.

A.3 Test method

A.3.1 Test settings

A.3.1.1 Paper for test: A4 size 70 g/m^2 common printing paper (printing paper specified by the manufacturer shall be used for thermosensitive products).

A.3.1.2 Test charts are decided in accordance with the type of products:

a) the test charts of developer wastage for copying machines specified in GB/T 22372-2008 shall be used for laser, thermosensitive, dye sublimation, electronic imaging, solid ink, heat transfer printing and high-performance ink jet;

For products having the printing function, and products and fax machines having no printing function or auto-off function, the typical energy consumption test is carried out in the following order:

a) complete the initial installation of products to be tested and ensure there is enough paper for test in the paper tray;

b) connect test apparatus and products to be tested, connect the power supply of test apparatus and maintain the test conditions specified in the standard. The waiting time shall be greater than 5 min;

c) start products to be tested to make them achieve the ready mode;

d) make products to be tested to carry out a task (outputting 1 test chart at least, but the quantity shall not exceed the test quantity of output each time for the determination by calculation), record the time of the first piece of paper output and proceed to the next step after they get into the sleep mode;

e) reset the readings of test apparatus, maintain products in the final sleep mode and record the energy consumption for 1 h;

f) reset the readings of test apparatus, make products fulfill one task and record the energy consumption E_{j1} within 15 min after the task is started;

g) repeat step f) for three times and record the energy consumption each time, E_{j2}, E_{j3} and E_{j4};

h) reset the readings of test apparatus, wait until products get into the final sleep mode and record the energy consumption E_{f1} and time used t_{f1} during the period from their fulfillment of the final task to getting into the final sleep mode.

A.3.3.2 Products having the auto-off function but no printing function (not including fax machines)

For products having the auto-off function but no printing function (not including fax machines), the typical energy consumption test is carried out in the following order:

a) carry out test in accordance with the procedure specified in A.3.3.1, a) ~ d);

b) reset the readings of test apparatus, maintain products in the final sleep mode and record the energy consumption for 1 h. If products get into the auto-off mode during the period, record the time of getting into the sleep mode and the energy consumption in the sleep mode, but only proceed to the next step after the 1 h requirements is met;

c) reset the readings of test apparatus, make products fulfill one task and record the energy consumption E_{j1} within 15 min after the task is started;

d) repeat step c) for three times and record the energy consumption each time, E_{j2},

Annex B

(Normative)

Test Methods for Active Mode Energy Consumption, Default Delay Time to Get into Sleep Mode and Standby Energy Consumption of Products

B.1 Test conditions

B.1.1 Environmental conditions

Measurements shall be performed under the conditions of temperature, humidity and atmospheric pressure within the following range:

-- environmental temperature: (23 ± 5)°C;

-- relative humidity: 10% ~ 80%;

-- atmospheric pressure: 86 kPa ~ 106 kPa.

B.1.2 Power supply

The alternating voltage of test power supply is 220 (1 ± 1%) V and the frequency 50 (1 ± 1%) Hz. For the devices to be tested of nominal power greater than 1.5 kW, the alternating voltage of test power supply is 220 (1 ± 4%) V.

The total harmonic distortion of test power supply is not greater than 3%. For the devices to be tested of nominal power greater than 1.5 kW, the total harmonic distortion of test power supply is not greater than 5%.

B.2 Test apparatus

When a power meter is used to measure the active power not greater than 10 W, the resolution is 0.01 W; when it is used to measure the active power greater than 10 W and smaller than 100 W, the resolution is 0.1 W; when it is used to measure the active power greater than or equal to 100 W, the resolution is 1 W.

B.3 Test method

B.3.1 Test settings

B.3.1.1 Paper for test: A4 size 70 g/m^2 common printing paper.

B.3.1.2 Test charts are decided in accordance with the type of products:

a) the test charts A of A4 size format specified in GB/T 16685-2008 shall be used for dot matrix products;

b) the graphical test charts specified in GB/T 16685-2008 or the black test charts specified in ISO/IEC 28360:2012, of A4 size format, shall be used for ink jet products;

c) the colour test charts specified in ISO/IEC 28360:2012 shall be used for products only providing colour prints.

B.3.1.3 The settings of products to be tested are as follows:

a) the major parameters of products shall be kept as factory settings;

b) products having the printing function shall be tested in the active mode of printing, products having no printing function shall be tested in the copying mode and fax machines shall be tested in the active mode of simple copying. When fax machines do not have the simple copying function, the task shall be transmitted and executed through the telephone line;

c) if products have the auto-off function, the function shall be shut down during test;

d) fax machines and multifunction devices which is capable of sending and receiving faxes through the telephone line, shall be connected with a mobile telephone line;

e) products including network interface or data interface (not including telephone line interface used for fax machines) in factory configuration shall connect with either interface; during test, the type of interface shall be selected in accordance with the priority specified in Table A.1; no matter what type of interface is connected, products to be tested only need to connect with 1 computer; for products to be tested which are capable of connecting with the Ethernet and supporting the protocol of IEEE 802.az, during test they shall also be connected with the network switch or network router which supports the protocol of IEEE 802.az.

f) accessories (except optional items) included in factory configuration, such as paper feeder, shall be tested along with host. The dehumidification function which can be shut down by the user, shall be shut down;

g) before test, products to be tested and paper for test shall be stored for 1 h or more time under the environmental conditions specified in A.1;

h) the modes of service, maintenance and colour calibration of products to be tested shall be shut down before test.

B.3.2 Test of active mode energy consumption and default delay time

The test of active mode energy consumption and default delay time of products shall be carried out in the following order:

a) complete the initial installation of products to be tested and ensure there is

TEC—the typical energy consumption of products, in kW·h;

E_d—the daily energy consumption of products, in W·h;

P_{ao}—the power of products tested in the auto-off mode, in W.

C.2.2 The daily energy consumption of products is calculated in accordance with Formula (C.7):

$$E_d = E_{dj} + 2E_{f2} + E_{ao} \qquad \text{(C.7)}$$

where,

E_{dj}—the daily task energy consumption of products, in W·h;

E_{f2}—the energy consumption of products every day during the period from the fulfillment of task to getting into the auto-off mode;

E_{ao}—the energy consumption of products every day in the auto-off mode, in W·h.

C.2.3 The daily task energy consumption (E_{dj}) of products is calculated in accordance with Formula (C.8):

$$E_{dj} = E_{j1} \times 2 + [(M_{jd} - 2) \times E_j] \qquad \text{(C.8)}$$

where,

E_{j1}—the energy consumption when products fulfill the first task specified by the test method, in W·h;

M_{jd}—the typical number of times of work finished by products;

E_j—the mean working energy consumption of products, in W·h.

C.2.4 The daily energy consumption [E_{ao}] of products in the auto-off mode is calculated in accordance with Formula (C.9):

$$E_{ao} = \{24\ \text{h} - [(M_{jd}/4)\text{h} + (t_{f2} \times 2)]\} \times P_{ao} \qquad \text{(C.9)}$$

where,

t_{f2}—the time of getting into the auto-off mode after products fulfills the fourth task specified by the test method, in h.

C.2.5 The mean working energy consumption (E_j) of products is calculated in accordance with Formula (C.10):

$$E_j = (E_{j2} + E_{j3} + E_{j4})/3 \qquad \text{(C.10)}$$

where,

	Other wired interfaces	0.2	Interfaces connecting with flash memory card/smart card reader, digital camera or accomplishing pictbridge
	Fax modem	0.2	Only apply to fax machines and multifunction products
	Wireless radio frequency data interface	2.0	Including Bluetooth interface and 802.11 interface
	Wireless infrared data interface	0.1	Including IrDA
Wireless microphone		0.8	Irrespective of the quantity of wireless microphones that products can connect with, the factor can only be applied once. The factor is not a limit on the power dissipation of wireless microphone
Each 1 GB of memory		0.5	Decided by the total memory of products. It does not apply to hard disk or solid-state disk
Scanning function		0.5	Only apply to multifunction devices and copy machines. Apply to products scanning with cold cathode fluorescent lamps (CCFL) and non-cold cathode fluorescent lamps (such as luminous diode, metal halide lamp, hot cathode fluorescent lamp, xenon lamp, tubular fluorescent lamp and so on). Irrespective of the power and quantity of lamps, the factor can only be applied once
Power supply DC output function		$0.02 \times (P_{OUT} - 10.0)$	Only apply to the case where the total rated output power is greater than 10 W. P_{OUT} is the sum of the nominal rated DC output powers of internal and external power supplies
Touch display screen		0.2	Apply to colour or single-colour display screen
Internal disk drive		0.15	Large-capacity memory medium of products, including disk drive and solid-state disk. It does not apply to data interface connecting with external memory medium

D.3 Calculation method for standby power of products

The calculation method for standby power [P_{stb}, in W] of products is calculated in

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