Reference

Report Compiled by Working Group on Classification Standards for Computers and Magnetic Disk Units (Summary)

◦ The working group focused on improvement of the performance of magnetic disk units in terms of energy consumption, held discussions on matters to be stipulated as standards (standard energy consumption efficiency or "energy efficiency standards") on which manufacturers and other businesses can assess their products and finally compiled the discussion results into a report.

◦ The new standards set FY2023 (fiscal year of Reiwa 5) as the target fiscal year and expect large-volume magnetic disk units to improve energy consumption efficiency by about 68%* compared with the actual values in FY2015.

*Note: This ratio targets magnetic disk units on which "12 or more" disk drives can be mounted and in which the external dimensions of the disk drives have structures containing 3.5-inch disk drives, i.e., having a width of over 75mm.

1. Background to preparation of the report

The energy consumption efficiency of magnetic disk units has improved by 75.9% from that in FY2007 backed by the achievement of the target standard value in FY2011.

Meanwhile, as the internet has become more and more popular, digitalization and networking have advanced across society and it is considered that demands of data centers (facilities providing physical spaces in which computers and other equipment are installed and operated) and other facilities for large volume storage systems have been growing. According to estimates based on the data on shipment of magnetic disk units in 2015, the energy consumption of large-volume magnetic disk units on which 12 or more disk drives can be mounted accounts for over 90% of total energy consumption in all magnetic disk units. In light of this fact, the working group considers it necessary to encourage manufacturers to further improve the energy consumption performance of magnetic disk units by stipulating new energy efficiency standards for such units in order to improve the energy consumption efficiency of large-volume magnetic disk units.

2. Scope of target magnetic disk units

Target magnetic disk units exclude the following.

[i] Those whose use rate in markets is extremely small;

i.e., Those whose storage capacity is one gigabyte or less.

[ii] Those for which no measurement method is established and in which it is difficult to set any

target standard value per se;

i.e., Those which work only based on power feeding through direct-current power sources, e.g., USB cables, rather than power feeding through alternative-current power sources.

3. Matters to be stipulated as standards by which manufacturers and other businesses can assess their products

(1) Energy consumption efficiency and measurement method thereof

[i] Energy consumption efficiency

Energy consumption efficiency should be a numerical value representing measured electricity consumption by watt divided by a value representing storage capacity by gigabyte.

[ii] Major measurement method of energy consumption efficiency

In conformity with the international standards (ISO/IEC24091), energy consumption efficiency should be measured based on the following conditions.

A. The ambient temperature should be from 18 to 28 Celsius degrees, while the ambient humidity should be from 15 to 80%.

B. The range of power source voltage should be ±1% of the voltage if the rated electricity consumption is 1,500W or less, while it should be ±5% if the rated electricity consumption is over 1,500W.

C. The frequency of the power source should be a rated frequency.

D. Magnetic disk units on which 12 or more disk drives can be mounted should be measured when they comprise a necessary power source, a cache memory for buffer and a control device and they have a structure in which a storage capacity connectable to the control device can reach the maximum (hereinafter referred to as “maximum structure”). Manufacturers are permitted to calculate energy consumption efficiency by making use of calculation formulae if they face difficulties in conducting an actual measurement of the efficiency by making use of the maximum structure.

(2) Target fiscal year

The target fiscal year is FY2023 (fiscal year of Reiwa 5).

(3) Categories and target standard values

Categories and target standard values of magnetic disk units are stipulated as below.

Target standard values of magnetic disk units

Number of mountable disk drives	Style and performance of disk drives		Category names	Standard energy consumption calculation formulae
	External dimensions of disk drives	Number of disks		
1	-	1	I	E＝exp(2.98×ln(N)-30.8)
		2 or 3	II	E＝exp(2.98×ln(N)-31.2)
		4 or more	III	E＝exp(2.11×ln(N)-23.5)
2 to 11	-	-	IV	E＝exp(1.56×ln(N)-17.7)
12 or more	Having structures containing 3.5-inch disk drives (with a width of over 75mm)	-	V	0.00170
	Having structures consisting of 2.5-inch disk drives alone (with a width of 75mm or less)	-	VI	E＝exp(0.952×ln(N)-14.2)

Note 1: The letters “E” and “N” in the respective target standard values refer to the numerical values representing the following items.

E: Energy efficiency standards (unit: watt/gigabyte)

N: Number of revolutions (unit: rate per minute)

Note 2: The term “In” refers to logarithm having “*e*” as the base.

Note 3: When multiple disk drives with different revolution rates are mounted in one device, the revolution rate (N) should be the weighted average of the revolution rates of the respective disk drives based on the number of installed drives.

(5) Approach manufacturers should take to determine their achievements

Concerning magnetic disk devices shipped to domestic markets in each fiscal year following the target fiscal year, the respective manufacturers and other businesses should ensure that the weighted average based on the number of shipped magnetic disk units per category (as for a unit having multiple disk drives, the number of basic housings) should not exceed the weighted average of the energy efficiency standards based on the number of shipped magnetic disk units.

(6) Matters to be indicated

Matters to be indicated by manufacturers and other businesses concerning standard energy

consumption efficiency are compiled.

4. Recommendations for the improvement of energy efficiency

Proactive and continuous efforts by stakeholders are indispensable to secure improvement of the energy consumption efficiency of magnetic disk units under the new energy efficiency standards. The working group compiled recommendations with expectations for further efforts by stakeholders such as the government, users and manufacturers.

▫ Reference: List of Members of the Working Group on Classification Standards for Computers and Magnetic Disk Units of the Energy Efficiency and Conservation Subcommittee of the Committee on Energy Efficiency and Renewable Energy under the Advisory Committee for Natural Resources and Energy

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