

## **Report Compiled by the Working Group on Classification Standards for Air Conditioners and Electric Water Heaters (Summary)**

- The working group focused on improvement of the performance of electric water heaters 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 importers (manufacturers, etc.) can assess their products and finally compiled the discussion results into a report.
- The new energy efficiency standards set FY2025 (fiscal year of Reiwa 7) as the target fiscal year and expect electric water heaters to improve energy consumption efficiency by about 5% from the achievements in 2017.

### **1. Background to preparation of the report**

In 2013, the Agency for Natural Resources and Energy (ANRE) stipulated the target fiscal year of the energy efficiency standards for electric water heaters as FY2017, and all businesses have already achieved the target standard value. Following this stipulation of the current standards, JIS for new methods for measuring energy efficiencies of such water heaters has been established. In households, energy consumed by hot water systems accounts for about 30% of all energy consumption, showing a large proportion, in particular. In light of this fact, the working group considers it necessary to review the current target energy efficiency standards in accordance with the new measuring method that meets consumers’ conditions in using electric water heaters, thereby encouraging manufacturers, etc. to further improve the energy consumption performance of such water heaters.

### **2. Scope of target electric water heaters**

Target heat pump water heaters include all residential heat pump water heaters using carbon dioxide as a coolant, being the same as in the current standards. However, this scope excludes products having a function in which heat generated by a heat pump is used for floor heating and other heating in addition to water heating and bathtub-water reheating.

### **3. Matters, etc. to be stipulated as standards on which manufacturers, etc. can assess their products**

#### **(1) Energy consumption efficiency and measurement method thereof**

The energy consumption efficiency of heat pump water heaters should be the ratio of the amount of heat per unit time that operation of a heat pump generates and supplies to circulating hot water to the amount of power consumption. Those with a bathtub water reheating function should be assessed by the “annual water reheating efficiency,” while those with no such function should be assessed by the “annual water heating efficiency.” Moreover, the measurement method should comply with the

method stipulated by JIS C9220: 2018 for residential heat pump water heaters and these efficiencies should be calculated using the following formulae.

Those with a bathtub water reheating function

Annual water reheating efficiency

$$= \frac{(\text{Amount of heat supplied to water used annually} + \text{Amount of heat supplied to bathtub water for reheating (MJ)})}{\text{Amount of power consumption needed annually (kWh)} \times 3.6}$$

Those with no such function

$$\text{Annual water heating efficiency} = \frac{\text{Amount of heat supplied to water used annually (MJ)}}{\text{Amount of power consumption needed annually (kWh)} \times 3.6}$$

(2) Target fiscal year

The target fiscal year is FY2025 (fiscal year of Reiwa 7).

(3) Categories and target standard values

Categories and target standard values of heat pump water heaters are stipulated as below. In addition, the following three points in the approaches to setting the categories under the current standards have been revised to integrate the current 36 categories into 10.

- Integration of the categories for reheating functions (with/without reheating functions)
- Integration of the categories for multiple storage tanks by storage capacity
- Change of the number of categories for storage capacity from 4 to 3

Table : Target standard values of heat pump water heaters

Category	Presumed household	Number of storage tanks	Storage capacity	Specifications	Target standard value
A	Small family	-	-	Non-cold regions	3.0
B				Cold regions	2.7
C	Standard family	One	Less than 320 liters	Non-cold regions	3.1
D				Cold region	2.7
E			320 liters or more	Non-cold regions	3.5
F			Less than 550	Cold region	2.9

			liters		
G			550 liters or more	Non-cold regions	3.2
H				Cold regions	2.7
I		Multiple	-	Non-cold regions	3.0
J				Cold regions	2.7

Notes:

1. The term “Storage capacity” refers to the capacity of a tank capable of storing hot water specified in JIS C 9220: 2018 for residential heat pump water heaters.
2. The term “Cold regions” refers to specifications for designing and manufacturing heat pump water heaters by assuming use thereof in regions of severe cold winter, which are stipulated in JIS C 9220: 2018 for residential heat pump water heaters. The term “Non-cold regions” refers to the specifications for the regions other than cold regions.

(4) Approach manufacturers, etc. should take to determine their achievements

Concerning the energy consumption efficiency of heat pump water heaters domestically shipped in the target fiscal year, the respective manufacturers, etc. of such water heaters should ensure that the weighted harmonic mean of the energy consumption efficiency measured by the method in Item (1) above based on the number of heat pump water heaters by category in the table above that each business has shipped should not fall below the target standard values.

(5) Matters to be indicated, etc.

Matters to be indicated by manufacturers, etc. concerning the energy consumption efficiencies were compiled, including product names and types, energy consumption efficiencies and names of manufacturers, etc.

4. Recommendations for the improvement of energy conservation

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

- Reference: Member list of the Working Group on Classification Standards for Air Conditioners and Electric Water Heaters 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

### [Chairman]

Hihara Eiji                      Specially Appointed Professor, Research Department, National Institution for Academic Degrees and Quality Enhancement of Higher Education

### [Members]

Asano Hitoshi                      Professor, Department of Mechanical Engineering, Graduate School of Engineering, Kobe University

Konishi Yoko                      Senior Fellow, Research Institute of Economy, Trade and Industry

Saito Kiyoshi                      Professor, Department of Applied Mechanics and Aerospace Engineering, School of Fundamental Science and Engineering, Waseda University

Tani Tatsuya                      President, Japan Air Conditioning and Refrigeration Testing Laboratory

Nakamura Mikiko                      Executive Researcher, Jyukankyo Research Institute Inc.

Mae Masayuki                      Associate Professor, Department of Architecture, Graduate School of Engineering, the University of Tokyo

Miura Hisashi                      Senior Research Engineer, Department of Environmental Engineering, Building Research Institute

Murakami Chisato                      Chair, Committee of the Environment, Nippon Association of Consumer Specialists

Note: These members and their titles are those at the time of the third meeting of the working group as of February 15, 2021.