Standards and Target Values for Operating Equipment in Factories etc.

Table (1) Air ratios for boilers

Classification			Load Factor (%)	Air Ratio				
Item				Solid Fuel		Liquid Fuel	Gas fuel	Byproduced gas such as blast furnace gas
				Fixed Bed	Fluidized Bed			
Standard	For electric utility *		75 - 100	-	-	1.05 - 1.2	1.05 - 1.1	1.2
	General boilers (evaporation volume)	30t/h or more	50 - 100	1.3 - 1.45	1.2 - 1.45	1.1 - 1.25	1.1 - 1.2	1.2 - 1.3
		10 to less than 30 t/h	50 - 100	1.3 - 1.45	1.2 - 1.45	1.15 - 1.3	1.15 - 1.3	-
		5 to less than 10 t/h	50 - 100	-	-	1.2 - 1.3	1.2 - 1.3	-
		Less than 5 t/h	50 - 100	-	-	1.2 - 1.3	1.2 - 1.3	-
	Small once-through boilers		100	-	-	1.3 - 1.45	1.25 - 1.4	-
Target	For electric utility *		75 - 100	-	-	1.05 - 1.1	1.05 - 1.1	1.15 - 1.2
	General boilers (evaporation volume)	30t/h or more	50 - 100	1.2 - 1.3	1.2 - 1.25	1.05 - 1.15	1.05 - 1.15	1.2 - 1.3
		10 to less than 30 t/h	50 - 100	1.2 - 1.3	1.2 - 1.25	1.15 - 1.25	1.15 - 1.25	-
		5 to less than 10 t/h	50 - 100	-	-	1.15 - 1.3	1.15 - 1.25	-
		Less than 5 t/h	50 - 100	-	-	1.15 - 1.3	1.15 - 1.25	-
	Small once-through boilers		100	-	-	1.25 - 1.4	1.2 - 1.35	-

***The classification "for electric utility" above refers to boilers installed by electric power companies for power generation**

< Standard >

Note 1 : The standard values of air ratio mentioned in the table above define those to be obtained in measurements at the boiler outlet when fired at a constant level of load after regular inspection and in a stable state.

Note 2 : Turbine load factor shall be used for boilers installed for power generation, and the load factor of the boiler itself for those installed for other purposes.

Note 3 : The air ratio value of each boiler should be calculated using the following expression. Round the result to one decimal place if the corresponding standard value as defined above is significant down to the first decimal, and to two decimal places if it is significant down to the second decimal.

Air ratio = 21/[21 - (Oxygen concentration in the exhaust emission in percentage)]

Note 4 : As to the pulverized coal fired boiler included in the fixed bed solid fuel types, standard air ratio values of 1.15-1.3 shall apply to electric utilities, and 1.2-1.3 to other applications (those having the quantity of evaporation of 30 t/h or more, and of 10 to less than 30 t/h only).

< Target >

Note 1 : The target values of air ratio mentioned in the table above define those to be obtained in measurements at the boiler outlet when fired at a constant level of load after regular inspection and in a stable state.

Note 2 : Refer to Notes 2 and 3 of the above **< Standard >** for calculation of load factor and air ratio.

Note 3 : As to the pulverized coal fired boiler included in the fixed bed solid fuel types, target air ratio values of 1.15-1.25 shall apply to electric utilities, and 1.2-1.25 to other applications (those having the quantity of evaporation of 30 t/h or more, and of 10 to less than 30 t/h only).

Note 4 : Target air ratio values shall be 1.2-1.3 for boilers firing black liquor at a load factor between 50 and 100%.

Table (2) Waste gas temperatures for boilers

Classification			Waste gas temperature				
Item			Solid fuel		Liquid fuel	Gas fuel	Byproduced gas such as blast furnace gas
			Fixed bed	Fluidized bed			
Standard	For electric utility *		-	-	145	110	200
	General boilers (evaporation volume)	30t/h or more	200	200	200	170	200
		10 to less than 30t/h	250	200	200	170	-
		5 to less than 10/t	-	-	220	200	-
		Less than 5t/h	-	-	250	220	-
	Small once-through boilers		-	-	250	220	-
Target	For electric utility *		-	-	135	110	190
	General boilers (evaporation volume)	30t/h or more	180	170	160	140	190
		10 to less than 30t/h	180	170	160	140	-
		5 to less than 10/t	-	300	180	160	-
		Less than 5t/h	-	320	200	180	-
	Small once-through boilers		-	-	200	180	-

*** The classification "for electric utility" above refers to boilers installed by electric power companies for power generation**

< Standard >

* The classification "for electric utility" above refers to boilers installed by electric power companies for power generation.

Note 1 : The standard values of waste gas temperature mentioned in the table above define those to be obtained in measurements at the boiler outlet when fired at 100% of load factor (turbine load factor shall be used for boilers installed for power generation, and the load factor of the boiler itself for those installed for other applications) after regular inspection, with its inlet air temperature set at 20ºC. The boiler outlet may be the outlet of a waste heat recovery plant or a flue gas treatment system for environmental protection if such equipment is in use.

Note 2 : As to the pulverized coal fired boiler included in the fixed bed solid fuel types, standard waste gas temperature values of 150ºC shall apply to electric utilities, and 200ºC to other applications (those having the quantity of evaporation of 30 t/h or more, and of 10 to less than 30 t/h only).

< Target >

Note 1 : The target values of waste gas temperature mentioned in the table above define those to be obtained in measurements at the boiler outlet when fired at 100% of load factor (turbine load factor shall be used for boilers installed for power generation, and the load factor of the boiler itself for those installed for other applications) after regular inspection, with its inlet air temperature set at 20ºC. The boiler outlet may be the outlet of a waste heat recovery plant or a flue gas treatment system for environmental protection if such equipment is in use.

Note 2 : As to the pulverized coal fired boiler included in the fixed bed solid fuel types, target waste gas temperature values of 140ºC shall apply to electric utilities, and 160ºC to other applications (those having the quantity of evaporation of 30 t/h or more, and of 10 to less than 30 t/h only).

Note 3 : Target waste gas temperature values shall be 180ºC for boilers firing black liquor.

Table (3) Air ratios for industrial furnaces

Item		Gas fuel		Liquid fuel		
		Continuous type	Intermittent type	Continuous type	Intermittent type	
Standard	Melting furnace for metal forging	1.25	1 .35	1.3	1.4	
	Continuous reheating furnace (billet, bloom,	1.20	-	1 .25	-	
	Metal heating furnace other the above	1.25	1 .35	1 .25	1 .35	
	Metal heat treatment furnace	1.20	1.25	1 .25	1.3	
	Oil heating furnace	1.20	-	1 .25	-	
	Thermal decomposition furnace and reforming furnace	1.20	-	1 .25	-	
	Cement kiln	1.30	-	1.3	-	*1
	Coal kiln	1.30	1.35	1.3	1.35	*1
	Drying furnace	1.25	1.45	1.3	1.5	*2
Target	Melting furnace for metal forging	1.05-1.20	1.05-1.25	1.05-1.25	1.05-1.30	
	Continuous reheating furnace (billet, bloom, slab)	1.05-1.15	-	1.05-1.20	-	
	Metal heating furnace other than the above	1.05-1.20	1.05-1.30	1.05-1.20	1.05-1.30	
	Metal heat treatment furnace	1.05-1.15	1.05-1.25	1.05-1.20	1.05-1.30	
	Oil heating furnace	1.05-1.20	-	1.05-1.25	-	
	Thermal decomposition furnace and reforming f	1.05-1 .20	-	1.05-1.25	-	
	Cement kiln	1.05-1.25	-	1.05-1.25	-	*1
	Coal kiln	1.05-1.25	1.05-1.35	1.05-1.25	1.05-1.35	*1
	Drying furnace	1.05-1.25	1.05-1.45	1.05-1.30	1.05-1.50	*2

***1 Value of liquid fuel in case pulverized coal firing**
***2 Burner portion only**

< Standard >

Note 1 : The standard values of air ratio mentioned in the table above define those to be obtained in measurements at the exhaust port of kiln or furnace when fired at a level of load around the rated after inspection and repair.

Note 2 : Standard values for liquid fuel types shall apply to industrial furnaces that use by-product gases such as blast furnace gas as fuel.

< Target >

Note 1 : The target values of air ratio mentioned in the table above define those to be obtained in measurements at the exhaust port of kiln or furnace when fired at a level of load around the rated after inspection and repair.

Note 2 : Target values for liquid fuel types shall apply to industrial furnaces that use by-product gases such as blast furnace gas as fuel.

Table (4) Standard and target rates of waste heat recovery for industrial furnaces (including waste gas temperatures for reference)

Exhaust gas temperature(℃)	Capacity category	Standard waste heat recovery rate (%)	Target waste heat recovery rate (%)	Reference	
				Waste gas temperature (℃)	Preheated air temperature (℃)
Less than 500	A・B	25	35	275	190
500 - 600	A・B	25	35	335	230
600 - 700	A	35	40	365	305
	B	30	35	400	270
	C	25	30	435	230
700 - 800	A	35	40	420	350
	B	30	35	460	310
	C	25	30	505	265
800 - 900	A	40	45	435	440
	B	30	40	480	395
	C	25	35	525	345
900-1 ,000	A	45	55	385	595
	B	35	45	485	490
	C	30	40	535	440
1 ,000 or more	A	45	55	-	-
	B	35	45	-	-
	C	30	40	-	-

* In the above table, A refers to the furnaces with the rated capacity of 84,000 MJ per hour or more. And B includes the furnaces with the rated capacity from 21,000MJ per hour or more to less than 84,000MJ. Finally, C refers to the furnaces that have the hourly rated capacity from 840MJ or more to less than 21,000MJ.

< Standard >

Note 1 : The standard waste heat recovery rates mentioned in the table above define the percentage of recovered heat in relation to sensible heat of the exhaust gas emitted from the furnace chamber when fired at a level of load around the rated.

< Target >

Note 1 : The target waste heat recovery rates mentioned in the table above define the percentage of recovered heat in relation to sensible heat of the exhaust gas emitted from the furnace chamber when fired at a level of load around the rated.

Note 2 : The waste gas and preheated air temperature values indicated above as reference are those resulting from calculations of waste gas temperatures during waste heat recovery at the corresponding target rates and air temperatures during preheating using such recovered heat. The values have been calculated based on the following conditions:

(i) Temperature drop due to heat radiation-diffusion loss between furnace outlet and heat exchanger: 60ºC

(ii) Heat radiation-diffusion rate from heat exchanger: 5%

(iii) Use of liquid fuel (equivalent to heavy oil)

(iv) Outside air temperature: 20ºC

(v) Air ratio: 1.2

Table (5) Standard and target values of furnace wall outer surface temperatures (for industrial furnaces with furnace temperatures of 500℃ and higher)

Item	Furnace temperature (℃)	Furnace wall outer surface temperature (℃)		
		Ceiling	Side wall	Bottom in contact with open air
Standard	1,300 or more	140	120	180
	1,1 00-1,300	125	110	145
	900-1,1 00	110	95	120
	less than 900	90	80	100
Target	1,300 or more	120	110	160
	1,1 00-1,300	110	100	135
	900-1 ,1 00	100	90	110
	Less than 900	80	70	90

< Standard >

Note 1 : The standard values of furnace wall outer surface temperature mentioned in the table above define the average temperature of furnace wall outer surface (except specific parts) during its normal, steady operation at an outside air temperature of 20ºC.

< Target >

Note 1 : The target values of furnace wall outer surface temperature mentioned in the table above define the average temperature of furnace wall outer surface (except specific parts) during its normal, steady operation at an outside air temperature of 20ºC.

Table (6) Standard value and target value of power factor

< Standard >

The standard value of power factor at the power receiving end is 95% or more.

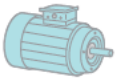
< Target >

The target value of power factor at the power receiving end is 98% or more and it is applied to the equipment listed below and electric power substation facilities.

Equipment name	Capacity (kW)
Cage-type induction motor	more than 75
Coil-type induction motor	more than 100
Induction furnace	more than 50
Vacuum melting furnace	more than 50
Induction heater	more than 50
Arc furnace	-
Flash but welder (excluding portable type)	more than 10
Arc welder (excluding portable type)	more than 10
Rectifier	more than 10,000

Table (7) Target efficiencies of high efficiency motors

Top Runner Program



7.27 AC Motors (1)

Target Scope

AC motors (limited to three-phase, cage-induction motors).
This Regulation shall not apply to:

1) motors specifically designed to operate in potentially explosive atmospheres;
2) motors which does not satisfy all of the following conditions from a to g:
   a. have a rated frequency or a base frequency of 50Hz ±5%, 60Hz ±5%, or compatible with both 50Hz ±5% and 60Hz ±5%;
   b. have a single speed;
   c. have a rated voltage of 1,000 V or less;
   d. have a rated output from 0.75 kW or more to 375 kW or less;
   e. have either 2, 4, or 6 poles;
   f. are rated on the basis of either duty type S1 (continuous duty) or S3 (intermittent periodic duty) with a rated cyclic duty factor of 80% or higher, specified in JIS C 4034-30 (2011);
   g. are driven by a commercial power supply (capable of continuous operating direct on-line);
3) motors integrated into a product (excluding models for export), for which the energy consumption efficiency cannot be measured independently from the product, as a designated energy-consuming device as defined in Article 80 Item 1 Section a;
4) motors which have a thermal class specified in JIS C 4003 (2010) of 180 (H), 200 (N), 220 (R), or 250;
5) motors which have a delta-star starting system;
6) motors designed for vessels or ocean structures (floating facilities for production, storage or loading of oil, oil platforms, etc.);
7) motors designed to operate wholly immersed in liquid;
8) motors whose difference ratio between the synchronous speed and the rotational speed of the rotor is either (a) or (b) of the following conditions:
   a. 5% or more in a case where the output is 0.75 kW or more and 110 kW or less;
   b. 3% or more in a case where the output is over 110 kW and 375 kW or less;
9) motors designed for gates of dams or flood gates;
10) motors whose stators and rotors are covered with metal materials (Canned motors);
11) motors designed for extremely low ambient air temperatures (ambient air temperatures are less than -20 °C);
12) motors made solely for inverter driving, those of external fan cooling types;
13) motors manufactured for incorporation in products for exportation.

Energy Consumption Efficiency

A numeric value (%) obtained by dividing output (input - total loss) by input (W) using the numeric value measured by the method stipulated in JIS C 4034-2-1.

Category, Target Values

In the target fiscal year and each subsequent fiscal year, energy consumption efficiency in each category shall not be below the target standard value.

Table 1 Standard Energy Consumption Efficiency in Each Category

Category			Standard energy consumption efficiency
Category name	Rated frequency or base frequency	Rated output	
1	60Hz	0.75 kW or more and less than 0.925 kW	85.5
2		0.925 kW or more and less than 1.85 kW	86.5
3		1.85 kW or more and less than 4.6 kW	89.5
4		4.6 kW or more and less than 9.25 kW	91.7
5		9.25 kW or more and less than 13 kW	92.4
6		13 kW or more and less than 16.75 kW	93.0
7		16.75 kW or more and less than 26 kW	93.6
8		26 kW or more and less than 33.5 kW	94.1
9		33.5 kW or more and less than 41 kW	94.5
10		41 kW or more and less than 50 kW	95.0
11		50 kW or more and less than 100 kW	95.4
12		100 kW or more and less than 130 kW	95.8
13		130 kW or more and 375 kW or less	96.2
14	50Hz	0.75 kW	82.5
15		1.1 kW	84.1
16		1.5 kW	85.3
17		2.2 kW	86.7
18		3 kW	87.7
19		4 kW	88.6

7.27 AC Motors (2)

Table 1 Standard Energy Consumption Efficiency in Each Category

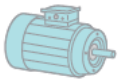
Category			Standard energy consumption efficiency
Category name	Rated frequency or base frequency	Rated output	
20	50Hz	5.5 kW	89.6
21		7.5 kW	90.4
22		11 kW	91.4
23		15 kW	92.1
24		18.5 kW	92.6
25		22 kW	93.0
26		30 kW	93.6
27		37 kW	93.9
28		45 kW	94.2
29		55 kW	94.6
30		75 kW	95.0
31		90 kW	95.2
32		110 kW	95.4
33		132 kW	95.6
34		160 kW	95.8
35		200 kW or more and 375 kW or less	96.0
36		Other	Refer to Remarks 2.

Remarks : 1. The evaluation is made using the numeric value obtained by multiplying the coefficients a to f set forth in Table 2 and Table 3 by the energy consumption efficiency obtained by measurement, respectively, and rounding to the nearest tenth.

For outputs other than the rated outputs set forth in Table 2 (60Hz), if the output in question is equal to or higher than the middle point between two of the rated outputs set forth in Table 2 which are one class higher and lower than the output in question, the coefficients a to c of the lower rated output shall be used.

Table 2 Coefficient of Each Output of 60Hz

Rated output [Kilowatts]	2 poles	4 poles	6 poles
	Coefficient a	Coefficient b	Coefficient c
0.75	1.1104	1.0000	1.0364
1.1	1.0298	1.0000	0.9886
1.5	1.0117	1.0000	0.9774
2.2	1.0347	1.0000	1.0000
3.7	1.0113	1.0000	1.0000
5.5	1.0246	1.0000	1.0077
7.5	1.0166	1.0000	1.0077
11	1.0154	1.0000	1.0076
15	1.0220	1.0000	1.0142
18.5	1.0207	1.0000	1.0065
22	1.0207	1.0000	1.0065
30	1.0184	1.0000	1.0000
37	1.0161	1.0000	1.0043
45	1.0150	1.0000	1.0053
55	1.0192	1.0000	1.0095
75	1.0138	1.0000	1.0042
90	1.0042	1.0000	1.0042
110	1.0084	1.0000	1.0000
150	1.0084	1.0000	1.0042
185～375	1.0042	1.0000	1.0042



7.27 AC Motors (3)

Table 3 Coefficient of Each Output of 50Hz

Rated output [Kilowatts]	2 poles	4 poles	6 poles
	Coefficient d	Coefficient e	Coefficient f
0.75	1.0223	1.0000	1.0456
1.1	1.0169	1.0000	1.0383
1.5	1.0131	1.0000	1.0339
2.2	1.0093	1.0000	1.0285
3	1.0069	1.0000	1.0245
4	1.0057	1.0000	1.0207
5.5	1.0045	1.0000	1.0182
7.5	1.0033	1.0000	1.0146
11	1.0022	1.0000	1.0122
15	1.0022	1.0000	1.0099
18.5	1.0022	1.0000	1.0098
22	1.0032	1.0000	1.0087
30	1.0032	1.0000	1.0075
37	1.0021	1.0000	1.0064
45	1.0021	1.0000	1.0053
55	1.0032	1.0000	1.0053
75	1.0032	1.0000	1.0042
90	1.0021	1.0000	1.0032
110	1.0021	1.0000	1.0032
132	1.0021	1.0000	1.0021
160	1.0021	1.0000	1.0021
200～375	1.0021	1.0000	1.0021

Remarks: 2. The standard energy consumption efficiency E of Category 36 set forth in Table 1 shall be calculated using the following formula.

$E = A_0 \times (\log_{10}(P_N/P_C))^3 + B_0 \times (\log_{10}(P_N/P_C))^2 + C_0 \times \log_{10}(P_N/P_C) + D_0$

Here, E: Standard energy consumption efficiency (unit: percent)

P_N:Rated output (unit: kilowatts)

P_C:1 (unit: kilowatts)

A_0:0.0773、B_0:-1.8951、C_0:9.2984、D_0:83.7025(interpolation coefficients)

However, for those whose number of poles is 2 poles and 6 poles, the evaluation shall be made using the value calculated by multiplying the energy consumption efficiency obtained by measurement by coefficient g in the case of 2 poles, and by coefficient h in the case of 6 poles (rounding to the nearest tenth).

Coefficient $g = (A_0 \times (\log_{10}(P_N/P_C))^3 + B_0 \times (\log_{10}(P_N/P_C))^2 + C_0 \times \log_{10}(P_N/P_C) + D_0) / (A_1 \times (\log_{10}(P_N/P_C))^3 + B_1 \times (\log_{10}(P_N/P_C))^2 + C_1 \times \log_{10}(P_N/P_C) + D_1)$

Here, P_N:Rated output (unit: kilowatts)

P_C:1 (unit: kilowatts)

A_1:0.3569、B_1:-3.3076、C_1:11.6108、D_1:82.2503(interpolation coefficients)

Coefficient $h = (A_0 \times (\log_{10}(P_N/P_C))^3 + B_0 \times (\log_{10}(P_N/P_C))^2 + C_0 \times \log_{10}(P_N/P_C) + D_0) / (A_2 \times (\log_{10}(P_N/P_C))^3 + B_2 \times (\log_{10}(P_N/P_C))^2 + C_2 \times \log_{10}(P_N/P_C) + D_2)$

Here, P_N:Rated output (unit: kilowatts)

P_C:1 (unit: kilowatts)

A_2:0.1252、B_2:-2.6130、C_2:11.9963、D_2:80.4769(interpolation coefficients)

Remarks: 3. If shipment includes 3 ratings (6 ratings), for 200 V / 60Hz (400 V / 60Hz), the evaluation shall be made using the value obtained by multiplying the energy consumption efficiency obtained by measurement by each of the coefficients i to k set forth in Table 4, and rounding to the nearest tenth.

For outputs other than the rated outputs set forth in Table 4 (60Hz), if the output in question is equal to or higher than the middle point between two of the rated outputs set forth in Table 4 which are one class higher and lower than the output in question, the coefficients i to k of the lower rated output shall be used.

The 3 ratings and 6 ratings are defined as follows:

3 ratings: 200 V / 50Hz, 200 V / 60Hz, 220 V / 60Hz, or 400 V / 50Hz, 400 V / 60Hz, 440 V / 60Hz

6 ratings: 200 V / 50Hz, 200 V / 60Hz, 220 V /60Hz, 400 V / 50Hz, 400 V / 60Hz, and 440 V / 60Hz

7.27 AC Motors (4)

Table 4 Coefficient by Rated Output of 3 Ratings (6 Ratings)

Rated output [Kilowatts]	2 poles	4 poles	6 poles
	Coefficient i	Coefficient j	Coefficient k
0.75	1.1325	1.0130	1.0452
1.1	1.0485	1.0188	1.0023
1.5	1.0298	1.0188	0.9908
2.2	1.0468	1.0147	1.0170
3.7	1.0229	1.0147	1.0170
5.5	1.0362	1.0099	1.0246
7.5	1.0246	1.0099	1.0246
11	1.0244	1.0109	1.0221
15	1.0310	1.0142	1.0288
18.5	1.0286	1.0119	1.0207
22	1.0286	1.0119	1.0207
30	1.0262	1.0107	1.0107
37	1.0227	1.0107	1.0150
45	1.0215	1.0106	1.0128
55	1.0258	1.0032	1.0171
75	1.0192	1.0032	1.0117
90	1.0095	1.0032	1.0117
110	1.0138	1.0042	1.0074
150	1.0126	1.0042	1.0116
185～375	1.0084	1.0042	1.0116

Remarks: 4. In regards to the number of units shipped by each business operator, if the shipment includes the 3 ratings (6 ratings) set forth in Remarks 3, the quantity ratios set forth in Table 5 shall be used to find the quantity of each rating. In the calculation, the first place after the decimal point is rounded off to obtain an integer value and, if it is necessary to adjust the fractional quantity, the adjustment shall be made by the rating whose quantity ratio is highest.

Table 5 Quantity Ratio of Each Voltage and Frequency of 3 Ratings (6 Ratings)

(1) 3 ratings of 200 V and 220 V

Rated voltage	200V		220V
Rated frequency	50Hz	60Hz	
Quantity ratiot	50%	30%	20%

(2) 3 ratings of 400 V and 440 V

Rated voltage	400V		440V
Rated frequency	50Hz	60Hz	
Quantity ratiot	50%	30%	20%

(3) 6 ratings of 200 V, 220 V, 400 V, and 440 V

Rated voltage	200V		220V	400V		440V
Rated frequency	50Hz	60Hz		50Hz	60Hz	
Quantity ratiot	40%	25%	10%	10%	5%	10%

Target Fiscal Year FY 2015 and each subsequent fiscal year

Energy Saving Effects Efficiency is expected to be improved by about 7.4% over the FY 2010 level by the target year (FY 2015).

Display Items Product name, rated output, number of poles, rated voltage, rated frequency or base frequency, category of usage, energy consumption efficiency, efficiency class, and manufacturer's name

Place of Display Location that can be readily seen on the main body of the motor, and locations that can be readily seen in catalogs with performance indications or in documents provided by the manufacturer for selecting equipment

Target Requirements of Recommendations and Orders Manufacturers or importers whose manufacturing volume or importing volume (limited to shipment to the domestic market) is 1,500 units or more.

Table (8) Benchmark index and medium-and long-term target level

Classification	Business Field	Benchmark Index	Level to Target
1A	**Iron manufacturing using blast furnaces** (business to manufacture pig iron using blast furnaces to manufacture products)	The value obtained by A/B A:Energy consumption in the blast furnaces for steel business B:Amountofraw steel	0.531 kL/t or less
1B	**Common steel manufacturing using electrical furnaces** (business to manufacture pig iron using electrical furnaces to manufacture rolled steel products, excluding iron manufacturing using blast furnaces)	Sum of (1) and (2) (1)The value obtained by A/B A:Energy consumption in the process to manufacture raw steel using electrical furnaces B:Amountofraw steel (2)The value obtained by A/B A:Energy consumption in the process to manufacture rolled common steel products from billet B:Amountofrolled steel	0.143 kL/t or less
1C	**Special steel manufacturing using electrical furnaces** (business to manufacture pig iron using electrical furnaces to manufacture special steel products(rolled special steel products, hot special steel pipes, cold-drawn special steel pipes, cold-finished special steel products, forged special steel products, casted special steel products),excluding iron manufacturing using blast furnaces)	Sum of (1) and (2) (1)The value obtained by A/B A:Energy consumption in the process to manufacture raw steel using electrical furnaces B:Amountofraw steel (2)The value obtained by A/B A:Energy consumption in the process to manufacture special steel products(rolled special steel products, hot special steel pipes, cold-drawn special steel pipes, cold-finished special steel products, forged special steel products, casted special steel products)from billet B: Amount of shipped (sold) steel	0.36 kL/t or less
2	**Electrical supplier** (industry that supplies electricity determined by2.1of Act on the Rational Use of Energy among general electricity industry determined by2.1.1of Electricity Utilities Industry Law or wholesale electricity industry determined by 2.1.3 of Electricity Utilities Industry Law)	Type A Index Sum of the following (1) to (3) (1) Efficiency of coal fired power plant divided by the target value (41.00%) multiple the ratio of coal fired power production vs. total power production (2) Efficiency of gas fired power plant divided by the target value (48.00%) multiple the ratio of gas fired power production vs. total power production (3) Efficiency of oil and other fuel fired power plant divided by the target value (39.00%) multiple the ratio of oil and other fuel fired power production vs. total power production Type B Index Sum of the following (1) to (3) (1) Efficiency of coal fired power plant multiple the ratio of coal fired power production vs. total power production (2) Efficiency of gas fired power plant multiple the ratio of gas fired power production vs. total power production (3) Efficiency of oil and other fuel fired power plant multiple the ratio of oil and other fuel fired power production vs. total power production	Type A Index 1.00 or more Type B Index 44.3 % or more
3	**Cement manufacturing** (business to manufacture portland cement (JIS R5210), blast furnace cement (JIS R 5211), silica cement (JIS R5212), fly-ash cement (JIS R5213))	Total of (1) to (4) (1)The value obtained by A/B A: Energy consumption in the raw material process B: Production volume in the raw material part (2)The value obtained by A/B A: Energy consumption in the pyroprocess B: Production volume in the pyroprocess part (3)The value obtained by A/B A: Energy consumption in the finishing process B: Production volume in the finishing part (4)The value obtained by A/B A: Energy consumption in the shipping process, etc. B: Shipping volume	3739 MJ/t or less

Classification	Business Field	Benchmark Index	Level to Target
4A	**Paper manufacturing** (mainly, business to manufacture paper (printing paper (including coated printing paper, lightweight coated printing paper and excluding tissue paper), communication paper, packing paper and newsprint paper) from wood pulp, used paper and other fibers, excluding business to manufacture special paper such as hybrid paper etc. and sanitary paper)	The value obtained by A/B A: Energy consumption in the process to manufacture paper B: Production volume	6626 MJ/t or less
4B	**Paperboard manufacturing** (mainly, business to manufacture board paper (linerboard for corrugated board(liner and corrugating medium) and board paper for paper ware (including white paperboard, strawboard, color board and chip ball)from wood pulp, used paper and other fibers, excluding business to manufacture base paper for building material, insulating paper, base paper for food and other special paper)	The value obtained by A/B A: Energy consumption in the process to manufacture paper board B: Production volume	4944 MJ/t or less
5	**Oil refining industry** (industry determined by2.5ofPetroleum Stockpiling Act)	The value obtained by A/B A: Energy consumption in the petroleum refining process B: Total of multiplying (1) by (2) (1)Coefficient recognized as appropriate based on the world average etc. of each plant in the petroleum refining process (2)Oil throughput of each plant in the petroleum refining process	0.876 or less
6A	**Basic petrochemicals manufacturing** (including derivatives produced from an integrated process)	The value obtained by A/B A: Energy consumption in the process to manufacture ethylene B: Production volume of ethylene etc. (Products: ethylene, propylene, butadiene, benzene, etc.)	11.9 GJ/t or less
6B	**Soda chemical industry**	Total of(1)and(2) (1)The value obtained by A/B A: Energy consumption in the electrolytic process B: Weight of sodium hydroxide from electrolytic cell (2)The value obtained by A/B A: Heat quantity of steam usage in the concentration process B: Weight of liquid sodium hydroxide	3.22 GJ/t or less
7	**Convenience Store**	The value obtained by A/B A: Total amount of electricity consumption for the store. B: Annual sales of the store	845 kWh/mmYen or less
8	**Hotel**	The value obtained by A/B or weighted average of those values of each hotel in the term of energy consumed for each hotel when plural hotels are operated. A: Energy consumption (unit: GJ) B: Sum of the following values (1) – (7) (1) 2.238 multiple the areas of guest rooms and common space (unit: m2). (2) 6.060 multiple the areas of restaurants, dining rooms and banquet rooms. (unit: m2) (3) 0.831 multiple the area of indoor parking (unit: m2) (4) -48.241 multiple the maximum capacity for the lodger. (5) 32.745 multiple the number of employees	0.723 or less

		(6) 0.152 multiple the annual total of lodgers (7) 0.030 multiple the annual total of guests for dining and banquet	
9	**Department Store**	The value obtained by A/B or weighted average of those values of each hotel in the term of energy consumed for each hotel when plural hotels are operated. A: Energy consumption (unit: GJ) B: Sum of the following values (1) – (3) (1) 0.0531 multiple the total floor area (unit: m2). (2) 0.0256 multiple the annual total sales amount (unit: million yen)	0.792 or less
10	**Super Market**	The value obtained by A/B or weighted average of those values of each hotel in the term of energy consumed for each hotel when plural hotels are operated. A: Energy consumption (unit: GJ) B: Sum of the following values (1) – (3) (1) 2.543 multiple the total floor area (unit: m2). (2) 0.684 multiple the annual total of business hours (unit: hours) (3) 5.133 multiple the total length of cold showcase (unit: feet)	0.799 or less
11	**Shopping Mall**	Weighted average of A in terms of energy usage in each store. A: the energy usage of each store (kl) divided by the total floor area (m2)	0.0305 kl/m2 or less
12	**Office Building**	The average of energy saving potential of each building calculated by the accredited software.	16.3 % or less

Table (9) Target power generation efficiency

Type of power generation	Target power generation terminal efficiency (%)
Coal fired power generation	**42.0**
Gas fired power generation	**50.5**
Oil or other fuel fired power generation	**39.0**

Note 1 : Target power generation terminal efficiencies listed above are based on higher heat value of the fuel.

Note 2 : Target power generation terminal efficiencies listed above are not applicable to the power generation plant that is built at small remote island for policy reasons.

Note 3 : Target power generation terminal efficiencies listed above are not applicable to the gas fired power generation plant which capacity is smaller than 200 MW and fulfills the following conditions:

(1) capable to change output at the rate of 15 % per minute or faster from starting-up to maximum output operation.

(2) power generation terminal efficiency based on higher heat value of the fuel at the rated output is greater than 44.5%.