



**BUREAU OF ENERGY EFFICIENCY**

**Request for Proposal**

**for**

**HIRING AN AGENCY TO PREPARE ENERGY EFFICIENCY GUIDELINES AND  
CODES FOR INDUSTRIES**

*To be submitted to,*

*Secretary  
Bureau of Energy Efficiency,  
Ministry of Power, Govt. of India,  
4<sup>th</sup> Floor, SewaBhawan,  
R. K.Puram, New-Delhi 110066,  
INDIA*

**Sub: RFP for hiring an agency to prepare Energy Efficiency Guidelines and Codes for Industries**

The Bureau of Energy Efficiency, Ministry of Power intends to prepare energy conservation Guidelines and Codes for Energy Intensive Industries and Small and Medium Enterprises (SMEs) in the country. In this regard, Request for Proposals are sought from leading consultancy firms / organization, consulting firms/consortiums and Empanelled Accredited Energy Auditor agencies with relevant sectoral experience & requisite infrastructure to prepare Industrial Energy Conservation Code and guidelines.

The scope of work, format for Bid Security Guarantee, Performance Security by way of Bank Guarantee and format for financial proposal have been described in Annexure "A", Annexure "1", Annexure "2" and Annexure "3". Request for Proposal (RFP) must be delivered in the office of the undersigned in a written form to the address given below within 28 days from the date of advertisement in the newspapers. Further information can be obtained at the address given below during 10.00 AM to 5.30 PM.

**Critical Information:**

Availability of RFP	19.09.2017
Pre Bid meeting	05.10.2017 at BEE Office, New Delhi at 15:00hrs (IST)
Last Date of receipt	17.10.2017 at BEE Office, New Delhi at 11:00 hrs(IST)
Opening of Pre Bid documents received	20.10.2017 at BEE Office, New Delhi at 3:00 hrs(IST)
Place of Opening of RFP	Bureau of Energy Efficiency, Sewa Bhawan, 4 <sup>th</sup> Floor, R. K. Puram, Sector-1, New Delhi-110066
Contact person for queries	1. Shri Milind Deore, Energy Economist, Bureau of Energy Efficiency, Sewa Bhawan, 4 <sup>th</sup> Floor, R. K. Puram, New Delhi-110066 Phone no- +91 11 26179699 E-mail- <a href="mailto:mdeore@beenet.in">mdeore@beenet.in</a>

	2. Shri Sameer Pandita, Assistant Energy Economist, Bureau of Energy Efficiency Phone No-+91 11 26179699 E-mail- spandita@beenet.in
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Note: BEE will use e-mail as a primary mode of communication and will upload all relevant information on BEE website ([www.beeindia.gov.in](http://www.beeindia.gov.in)).

Address for contact

**Secretary, Bureau of  
Energy Efficiency  
Government of India,  
Ministry of Power  
4<sup>th</sup> Floor Sewa Bhawan, RK Puram, Sector -1  
New Delhi -110066**

## **1.0 Introduction**

### **1.1 About BEE**

The mission of Bureau of Energy Efficiency (BEE) is to develop policy and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act (EC Act), 2001 with the primary objective of reducing energy intensity of the Indian economy. This will be achieved with active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors.

The setting up of Bureau of Energy Efficiency (BEE) provides a legal framework for energy efficiency initiatives in the country. The Act empowers the Central Government and in some instances the State Governments to:

1. Notify energy intensive industries, other establishments, and commercial buildings as designated consumers.
2. Establish and prescribe energy consumption norms and standards for designated consumers.
3. Direct designated consumers to designate or appoint certified energy manager in charge of activities for efficient use of energy and its conservation.
4. Get an energy audit conducted by an accredited energy auditor in the specified manner and intervals of time.
5. Furnish information about energy consumed and action taken on the recommendation of the accredited energy auditor to the designated agency.
6. Comply with energy consumption norms and standards, and if not so, to prepare and implement schemes for efficient use of energy and its conservation.
7. Prescribe energy conservation building codes for efficient use of energy and its conservation in commercial buildings State Governments to amend the energy conservation building codes to suit regional and local climatic conditions.
8. Direct owners or occupiers of commercial buildings to comply with the provisions of energy conservation building codes.

9. Direct mandatory display of label on notified equipment and appliances.
10. Specify energy consumption standards for notified equipment and appliance.
11. Prohibit manufacture, sale, purchase and import of notified equipment and appliances not conforming to standards.

The Energy Conservation Act, 2001 defines the powers of the State Government to facilitate and enforce efficient use of energy and its conservation. The State Governments have to designate State Designated Agencies in consultation with the Bureau of Energy Efficiency to coordinate, regulate and enforce the provisions of the Act in the State. Thus, the State Designated Agencies are the strategic partners for promotion of energy efficiency and its conservation in the country.

## **1.2 Organization**

Under the provisions of the Energy Conservation Act, 2001, Bureau of Energy Efficiency has been established with effect from 1st March, 2002 by merging into it, the erstwhile Energy Management Centre, being a society registered under the Societies Registration Act, 1860, under the Ministry of Power.

The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with the primary objective of reducing energy intensity of the Indian economy.

## **1.3 Functions of BEE**

BEE co-ordinates with designated consumers, designated agencies and other organization; recognizes, identifies and utilizes the existing resources and infrastructure, in performing the functions assigned to it under the E.C Act, 2001. The Act provides for regulatory and promotional functions. The major functions of BEE include:

- Develop and recommend to the Central Government the norms for processes and energy consumption standards.

- Develop and recommend to the Central Government minimum energy consumption standards and labelling design for equipment and appliances.
- Develop and recommend to the Central Govt. specific energy conservation building codes.
- Recommend the Central Government for notifying any user or class of users of energy as a designated consumer.
- Take necessary measures to create awareness and disseminate information for efficient use of energy and its conservation.

**Request for Proposal (RFP) from the Agencies for preparation of Energy Conservation Guidelines Codes for Large Industries and Small and Medium Enterprises (SMEs) in the country.**

**1.0 Background**

Studies reveal that Industries in India consume a lot of energy, more often than not, inefficiently, and therefore contribute to greenhouse gas emissions. Taking cognizance of this, the Government of India, launched Perform Achieve and Trade Scheme (PAT) scheme as an initiative under the National Mission on Enhanced Energy Efficiency (NMEEE) to regulate and reduce Specific Energy Consumption in energy intensive Industries. PAT has an associated market based mechanism to enhance the cost effectiveness of the energy efficiency measures through certification of excess energy saving which can be traded.

Under this scheme, reduction in specific energy saving targets are assigned to Designated Consumers (DCs) for a three year cycle. The target energy reduction for each DC is based on its current level of energy efficiency, so that energy efficient DCs will have lower target in terms of percentage reduction, as compared to less energy efficient DCs which will have higher targets. While calculating the specific energy consumption “gate-to-gate” approach is adopted, thereby including all energy consumption against the total production.

During the course of its implementation it is being observed that the Industries that are well managed in terms of energy usage are more sustainable, and therefore more competitive globally. Further, optimization of industrial systems results in greater reliability and higher productivity. Management of these Industries focus mainly on cost effective and reliable technical alternatives to improve productivity.

Energy efficiencies of the equipment likes Motors, Boilers, Compressors and pumps, deployed in the Industries have greatly improved. However, being used as a component of a larger production process these equipment consume a lot more energy than they are designed to as a result of other systemic inefficiencies.

Improved energy efficiency can contribute to an Industry’s bottom line while improving the reliability of these systems. System optimization requires taking a step back to determine

what work (process temperature maintained, production task performed, etc.) needs to be performed. Only when these objectives have been identified can analysis be conducted to determine how best to achieve them in the most energy-efficient and cost-effective manner. Therefore, a way forward is to put in place energy efficiency guidelines and prescriptive performance codes for various process subsystems and equipment in order to benchmark their operational performance with a provision of periodic monitoring , recording thereby continually improving the equipment performance through setting of process and equipment specific performance improvement targets which can be gradually ratcheted up .

## **2.0 Scope of work**

Firm proposed to be hired for the purpose of this assignment shall do the following:

### **a. Develop Energy Conservation Guideline Document:**

The overall objective of developing Energy Conservation guidelines for Large Industries and SMEs is to guide the management and operators in large Industries and SMEs to manage energy consumption by standardizing the energy performances of various energy consuming equipment and systems deployed for manufacturing process. The guidelines shall ensure the following:

1. Framing up and standardization of operational Manuals for recording and measuring the energy performance of major energy consuming equipment and process in the Industries and SMEs.
2. Setting Methodologies to evolve periodic energy reduction targets.
3. Setting control values (Min, Max), standard deviation and set points to decide good operational Management taking into consideration the characteristics, capacities and annual deterioration of the facility.
4. Setting up of a procedure for Monitoring and recording including points of measurement and frequency of measurement.
5. Set “ Benchmarking “ guidelines for each critical parameter by any of the following available methods :-
  - i. OEM’s recommendations

- ii. Standards ( If available)
- iii. Industry's best achieved
- iv. Own's best achieved

**b. Energy Conservation Codes Document for Industries**

One of the important component to be developed under the overarching framework of the Energy Conservation guideline shall be benchmarking of standard energy performance values and a procedure for establishing Target energy performance values for major energy consuming equipment deployed in the industry like Boilers, Motors, Furnaces, Burners of various capacities and Types, Waste heat recovery equipment etc. These codes will be prepared upon seeking inputs from the Industries covered under PAT cycle 1, 2 and 3 as well as the Manufacturers of the equipment.

***Template of Guideline and Code for combustion facility is enclosed for ready reference at Annexure - B***

For the purpose of these Guidelines, Industry shall be categorized into five segments as follows:

S.no	Groups of Industry types	Proposed Activities	Estimated no of units
1.0	<p><b>Category- A</b> (Energy Consumption Threshold same as that of a Designated Consumers)</p>	<p><b>Energy Conservation Guidelines, Codes and Operational manuals shall be prepared for this category of Industries. This category of Industries would comprise of large energy intensive Industries, already covered under the ongoing Perform Achieve and Trade scheme.</b> Industries in this category would be assigned mandatory specific energy reduction targets and would be required to comply with in a period of 3 years. Over-achievers will be issued Es-Certs while as the under achievers would purchase Es-Certs or else pay penalty to comply with the energy consumption Norms and Standards assigned.</p> <p>Guidelines, prescriptive Energy Performance Codes <b>shall cover energy intensive equipment namely the Boilers, Furnaces, Steam systems, Waste Heat Recovery systems, large Motors above 5 HP, Compressors, Cogeneration systems, Pumps, Heating ventilation and Air Conditioning (HVAC) and lighting.</b> Energy Efficiency Guidelines shall have <b>standard and Target Components</b> to ensure rational use of the energy in the industries. Guidelines shall be developed in consultation with the industry and equipment manufacturers. <b>Standard components would provide guidelines to the Industry to manage above functional equipment in order to ensure operation at standard or optimal values.</b></p> <p>eg. the standard component would include guidelines on the following :</p> <ul style="list-style-type: none"> <li>i. Managing the air ratio according to fuel type and combustion facility.</li> <li>ii. Managing the total thermal efficiency by adjusting the load.</li> <li>iii. Managing operational conditions according to fuel properties.</li> </ul> <p>Similarly, guidelines will be developed for the following :</p> <ul style="list-style-type: none"> <li><b>a.</b> Measurement &amp; recording of quantity of supplied fuel, temperature of Exhaust gas, residual oxygen present in the exhaust gas.</li> <li><b>b.</b> Maintenance and inspection of combustion facilities to keep them in Good condition.</li> </ul>	<p><b>735 Units</b></p>

		<p>c. Installation of new combustion facilities wherein combustion equipment shall be able to adjust the fuel amount and air ratio according to load change and the ventilation systems are able to adjust the air flow rate and combustion chamber pressure.</p> <p>In addition to the standard component, there shall be <b>Target component</b>, comprising guidelines to lower air ratio below standard value for more advanced or efficient operation. The target component shall essentially be a set of guideline to bring about <b><u>Improvement in the existing facilities, adding new installation and updating existing facilities</u></b>. Guidelines shall be framed to ensure efforts on part of the management to lower air ratio to the target value which is better than the standard operating value. For example adopting facilities that are able to adjust fuel amount and air ratio automatically, adopting ventilation facilities to adjust air flow rate, and replacing conventional burners with regenerative burners , Installing measurement devices for each combustion facility and combustion management using computers.</p>	
2.0	<p><b>Category B</b> (Energy Consumption Threshold lower than PAT industries)</p>	<p>This category of Industries would consist of energy intensive industries which do not qualify as a Designated Consumer in terms of Annual Energy Consumption and consume energy which lies below the prescribed Threshold limit of annual energy consumed for the Designated Consumers in terms of the Energy Conservation Act 2010. <b><u>Energy Conservation Guidelines and codes shall be prepared for these Industries only for major energy consuming systems deployed for</u></b> e.g. for <i>condensate recovery systems, Drive systems, VFD driven pumps and compressors assembly etc. The guidelines may be framed such that they enable Industries to adopt best energy management practices when prescribed .The guidelines must enable Industries to prepare operational Manuals for recording important operational parameters related to major energy consuming systems, Benchmarking and optimizing energy performance of the deployed process systems.</i> Compliance with these codes shall be voluntary.</p>	5000 Units
3.	<p><b>Category C</b> (This would Include Small Scale Enterprises)</p>	<p>This category will comprise of <b><u>energy intensive small enterprises like Glass, Foundry, Forging, Ceramics, Dairy, Textile etc.</u></b> These industries typically are spread across the lengths and breadth of the country in</p>	50,000 units

		clusters .These units typically incur energy costs in excess of 30% of the overall production cost .Guidelines for this category shall focus on best operational practices specific to the Industrial Cluster and equipment like Furnace, Boilers, Motors, Pumps and on manner and time in which the Industries should conduct energy assessment. Further, Cluster specific operational manuals shall be prepared capturing all the relevant process and production system parameter, variation in which shall impact the energy performance. Process and equipment specific Energy Performance codes shall be prepared for such Industries.	
4.	<b>Group –D Medium scale enterprises</b>	This group will comprise of <b><u>energy intensive Medium enterprises like, Brick, Hand Tools, Food, Limestone etc with energy cost between 10 to 30 % and which cannot be covered under Category C.</u></b> Guidelines shall be focussing on sectoral best practices. Energy Efficiency Guidelines on Motors, Pumps and Lighting equipment shall be prepared for this category. Prescriptive energy efficiency codes for equipment like motor, pumps and lighting use shall be developed.	<b>2 Lakh units</b>
5.	<b>Group E</b>	This group shall essentially comprise of micro scale industries where the material cost is more significant than the energy cost. Here Guidelines shall be prepared for optimizing the use of resource utilization for example waste minimization and for best operating practices related to motors and lighting. Energy Codes applicable shall be specific to micro scale Industries and shall be developed based on technology based situational survey which the agency will have to carry out. Operational Manuals shall not be required for these categories.	<b>8 Lakh units</b>

3. The Firm hired for the purpose of this assignment shall coordinate with the Industries and any other stakeholder for preparation of these Guidelines and Codes and shall coordinate and organize at most five stakeholder interaction workshops during the course of preparation of this document on Industrial Energy Efficiency guidelines and Codes on behalf of Bureau of Energy Efficiency. Firm shall also be responsible for making all logistic arrangements including booking of an appropriate venue and stay arrangements of any resource personnel, Identifying and inviting prominent experts

for lectures or discussions, sending of Invitations to stakeholders for the workshops and launch of Final Guidelines and Codes Document.

#### **04. Pre-Qualifying Criteria**

The agency submitting proposal should fulfil all the following criteria:

1. Is a consulting firm registered/incorporated in India.
2. Minimum Annual turnover of **INR 1.0 Crore** in at least two of the last three (3) financial years from the Energy Efficiency Consultancy Business.
3. Profitable for at least two (2) of the last three (3) Financial years.
4. Experience of minimum 5 years in working with Government, Public Sector Undertakings and with donor agencies.
5. Minimum 5 years work experience (as on 30th September, 2017) related to energy efficiency in industries and SME clusters etc.
6. The consultancy firm should have completed at least 3 assignments in providing consultancy related to Energy Efficiency policy /Roadmap/ Guidelines/standards for Large Industries and SMEs costing not less than the amount equal to 40% of the estimated cost or two similar completed works costing not less than the amount equal to 50% of the estimated cost or one similarly completed work costing not less than the amount equal to 80% of the estimated cost.
7. Agency/Consultancy should have on its rolls at least two AEAs in addition to Industry experts from Industrial sectors covered under PAT scheme and SMEs with minimum 15 years of experience in dealing with energy efficiency operations in Large Industries and SMEs .In addition to this sufficient number of Technical support (B.E or B.Tech candidates with minimum 5 years of Industrial/SME process experience should be on rolls of the firm).
8. Firm must have strong presence and at least 10 years of experience in publishing white papers /documents on energy and energy efficiency.
9. Not be black-listed by any Central / State Government / Public Sector Undertaking in India. Not be involved in any litigation that may have an impact affecting or compromising the delivery of services as required under this contract.

10. Agency should have offices in atleast Four Metro cities i.e. Delhi, Chennai, Mumbai and Kolkata for outreach and data collection.
11. Consortium is permitted.
12. Outsourcing of work related to this assignment without seeking prior written permission from BEE is not permitted for this assignment.

**Note:**

- i. If consultancy firm /agencies do not meet any of the above listed criteria, their proposals will not be considered for further evaluation.
- ii. Consultancy firm /Agencies meeting above listed criteria are required to submit evidences (details / documents audited financial statements of last 3 years) in support – otherwise proposal may be disqualified.

**05. Preparation and Submission of proposal:**

The Bidder must comply with the following instructions during preparation of Proposals:

- a. The Bidder is expected to carefully examine all the instructions, guidelines, terms and condition and formats of the Request for Proposal. Failure to furnish all the necessary information as required by the Request for Proposal or submission of a proposal not substantially responsive to all the requirements of the Request for Proposal shall be at Bidder's own risk and will be liable for rejection.
- b. The Proposal and all associated correspondence shall be written in English and shall conform to prescribed formats. Any interlineations, erasures or overwriting shall be valid only if they are initialled by the authorized person signing the Proposal.
- c. The proposal shall be in indelible ink and shall be signed by the Bidder or duly authorized person(s). The letter of authorization shall be indicated by written power of attorney and shall accompany the proposal.
- d. In addition to the identification, the envelopes containing the Proposals shall mention the name and address of the Bidder to enable the proposal to be returned in case it is declared late pursuant and for mailing purposes.

- e. Proposals received by facsimile shall be treated as defective, invalid and rejected.
- f. Only detailed proposals complete in all respect and in the forms indicated shall be treated as valid.
- g. No Bidder is allowed to modify, substitute, or withdraw the Proposal after its submission.

The technical proposal should be submitted in English and be set out in two parts:

1. Cover letter
2. Proposal (Clearly Mentioning the Methodology and specific Timelines proposed to be adopted by the bidder .This methodology should not be generic in nature and should not exceed five A-4 size pages ).
3. Separately sealed Financial and Technical Proposal shall be submitted in single sealed envelope super scribed "Financial and Technical proposal for developing "Energy Efficiency Guidelines for the Industries and SMEs.

Both Parts may be bound together. No publicity material is required in the covering letter and following information should be confirmed in the letter:

1. All personnel listed in the technical proposal will be available to provide the required services as set out in the technical proposal
2. The consultant/agency has not indulged in any corrupt or fraudulent practices in preparing this proposal.
3. The person signing the cover letter and the proposal has due authorization.
4. The cover letter must clearly mention the name, address, telephone and fax no., and email id of the authorized person who will serve as the primary point of contact for all communication.
5. The consultancy firm will bear all costs incurred in connection with the preparation and submission of the proposal and to bear any further pre-contract costs.

#### **6.0 Proposal:**

1. The proposal should contain all the documentary evidences to substantiate the claim for pre-qualifying criteria.
2. Names , CVs and duration of association of personnel who will be engaged in the said work/activities (CVs must have name and nationality of staff,

profession/designation of staff, proposed position in the team, whether employee of the firm or consultant), if staff the number of years with the firm, key qualifications, academic background, experience and languages known. Each team member who is not a full time employee of the firm is required to give an undertaking that he/she is available to undertake the tasks allocated to him/her in the technical proposal. Each CV should be a maximum of 3 pages and signed (by the key personnel) confirming that the information given in the CV is correct.

3. Moreover, consultant/agency is supposed to present a 5 page write up on the methodology it intends to follow to develop Codes/Guidelines for the categories along with timelines for project completion which must not exceed 1 year from date of awarding of contract. Please submit a CD containing the soft copy of Technical Proposal in MSWord format (to be submitted in the same envelope). Please submit 1 original and 1 copy of the technical proposal.
4. The original technical proposal shall be placed in a sealed envelope clearly marked with “TECHNICAL PROPOSAL – HIRING AN AGENCY TO PREPARE ENERGY EFFICIENCY GUIDELINE AND CODES FOR LARGE INDUSTRIES and SMEs.
5. The original Financial Proposal (excluding applicable taxes) shall be placed in a sealed envelope clearly marked with “FINANCIAL PROPOSAL –HIRING AN AGENCY TO PREPARE ENERGY EFFICIENCY GUIDELINE AND CODES FOR LARGE INDUSTRIES and SMEs”.
6. This envelope shall be sent to The Secretary, Bureau of Energy Efficiency, 4th Floor, Sewa Bhavan, R.K. Puram, and New Delhi-110066. The last date for sending the proposal document is 15.09.2017 up to 15:00 Hrs. Please submit 1 original and 1 copy of the technical proposal along with a CD containing the soft copy of your proposal in MSWord format (to be submitted in the same envelope).
7. The completed Technical and Financial Proposals must be delivered at the submission address on or before the time and date stated above. Any Proposal received after the closing time for submission of proposals shall be returned

unopened. BEE does not take any responsibility for the delay and any explanation for the same.

8. Non Refundable Bid Processing Fee of Rupees 5000 (Five Thousand ) should be enclosed in form a Demand Draft drawn in Favour of “ Bureau of Energy Efficiency” payable at New Delhi.
9. **EMD** (Earnest Money Deposit) is to be submitted by all the participating Bidders in the form of demand draft/Bank Guarantee of an amount of Rs.1,00,000/- (Rupees one lakh only/-.) of any schedule Indian bank in favour of Bureau of Energy Efficiency, Payable at New Delhi. The EMD of unsuccessful Bidder will be returned within 180 days and EMD of successful Bidder will also be returned after successful bidder submit the Performance Security.

#### 10. Evaluation Criteria:

Sl. No.	Criteria		Weightage
1	Past Experience of the firm (50 marks)	Experience in working with the Govt. of India (or a State Govt.), public sector undertaking and with donor agencies related to Energy Efficiency Policy/Roadmap/Guidelines/standards for large industries and SMEs from 1 <sup>st</sup> January 2012 onwards.	40%
		The consultancy firm should have completed at least 3 assignments in providing consultancy related to Energy Efficiency policy /Roadmap for Large Industries and SMEs costing not less than the amount equal to 40% of the estimated cost or two similar completed works costing not less than the amount equal to 50% of the estimated cost or one similarly completed work costing not less than the amount equal to 80% of the estimated cost.	60%
2	Key Personnel (40 marks)	Atleast 4 no's of Key personnel with minimum 15 years of sectorial experience in dealing with energy efficiency operations in Large Industries and SMEs.	40%
		Atleast 8 number of experts on the full time rolls of the firm as on 1.9.2017 with qualifications in Engineering (B.Tech / M.Tech or equivalent), from Institutions recognised by the Govt. of India with minimum 5 years of experience related to Industrial/SME process.	20%
		Team Lead to have atleast <b>10</b> years' experience in publishing white papers/documents on energy and energy efficiency.	20%
		CVs and duration of association of personnel who will be engaged in the said work/activities (CVs must have name and nationality of staff,	20%

Sl. No.	Criteria		Weightage
		profession/designation of staff, proposed position in the team, whether employee of the firm or consultant), if staff the number of years with the firm, key qualifications, academic background, experience and languages known.	
3	Financial Strength (10 marks)	Average Annual Turnover in the previous 3 Financial Years from Consultancy services (average of combined Annual Turnover of the partner firms, in the case of JVs).	60%
		Profit / Surplus in each of the last 3 Financial Years (Profit / Surplus of the Lead Member in the case of a JV) from energy consulting business.	40%

**NOTE:**

- a) The minimum qualifying score is 60.
- b) In the case of Key Personnel their CVs should be submitted **duly signed by the respective personnel,** and countersigned by the Authorised Signatory of the firm. Their experience need not necessarily be with the firm where they are currently employed.
- c) In the case of firms, their past experience will be considered only in those cases where they have been awarded contracts, either on individual basis or as a JV. The experience of firms where they have only been associated as Sub-Consultants for any assignment will not be considered for evaluation.
- d) The firms should substantiate their claims of experience by providing copies of the relevant contracts along with the names, designations, email addresses and contact numbers of their Clients.

**11. Performance Security**

Within twenty-eight (28) days of the receipt of notification of award from BEE, the successful bidder shall furnish the Performance Security in the form of Bank Guarantee. The value of Performance Security would be 10% of the total contract value. The Performance Security in the form of Bank Guarantee/ Demand Draft for the period of 2 years plus 30 days claim period, which can be further extended for another one year on mutual consent. The bid shall remain valid for a period of 180 days from the date of bid submission.

The Performance Guarantee will be taken against successful performance of contract. BEE may invoke the Bank Guarantee (as a performance guarantee) at its discretion if

the consultant's performance is found to be unsatisfactory, delayed or found to be violating.

## **6.0 Timeline**

Completion period is 6 months from the date of signing of contract. However, the timelines may be extended at the discretion of BEE in cases of unavoidable circumstances.

## **7.0 Contents of the Proposal**

Bidding consultant/agency is expected to examine all instructions, forms, terms & conditions and Statement of Work in the Proposal. Failure to furnish all information required or submission of a Proposal not substantially responsive to the Proposal in every respect will be at the risk and may result in the rejection of the application.

## **8.0 Conflict of Interest**

Bidding consultant/agency should not have any conflict of interest with the work that is needed to be undertaken.

## **9.0 Language of Proposal**

The Proposals prepared by the consultant/agency and all correspondence and documents relating to the proposal exchanged by the agency and BEE, shall be written in the English language, provided that any printed literature furnished by agency may be written in another language so long the same is accompanied by an English translation in which case, for purposes of interpretation of the Proposal, the English translation shall govern.

## **10. Confidentiality**

BEE requires that recipients of this document to maintain its contents in the same confidence as their own confidential information and refrain from any public disclosure whatsoever.

## **11. Authorized Signatory for consultant/Agency**

The "Consultant/agency as used in the Proposal shall mean the one who has signed the Bid document forms. The authorized signatory should be the duly Authorized Representative of the Consultant/agency, for which a certificate of

authority will be submitted. All certificates and documents (including any clarifications sought and any subsequent correspondences) received hereby, shall, as far as possible, be furnished and signed by the Authorized Representative.

The power or authorization, or any other document consisting of adequate proof of the ability of the signatory to bind the agency shall be annexed to the Proposal. BEE may reject outright any Proposal not supported by adequate proof of the signatory's authority.

## **12. Contact details of the Consultant/agency**

Consultant/agency who wants to receive BEE's response to queries should give their contact details to BEE. The Consultant/agency should send their contact details in writing at the BEE's contact address.

## **13. Pre-Bid Meeting**

1. Pre-Bid Meeting will be convened at the designated date as mentioned above at a time and place specified by the BEE.
2. A maximum of two representatives of each agency shall be allowed to participate on production of duly issued authority letter from such person and identity documents.
3. During the course of Pre-Bid Conference(s), the Bidders may seek clarifications and make suggestions for consideration of the BEE.
4. The BEE shall endeavour to provide clarifications and such further information as it may, in its sole discretion, consider appropriate for facilitating a fair, transparent and competitive Bidding Process.
5. All enquiries from the Bidders relating to this RFP notice document must be submitted to BEE before the deadline mentioned in this document
6. These queries should also be emailed at [spandita@beenet.in](mailto:spandita@beenet.in)

## **14. Modification in the RFP Notice Document**

1. At any time prior to the Bid due date, the BEE may, for any reason, whether at its own initiative or in response to clarifications requested by Bidder, modify the RFP notice document by the issuance of Addendum.

2. Any addendum / clarification issued hereunder will be in writing and will be published on the BEE's website to make it accessible to all Bidders, and shall be deemed to be a part of this document.
3. In order to afford the Bidders a reasonable time for taking an Addendum into account, or for any other reason, the BEE may, in its sole discretion, extend the Bid Due Date.

#### **15. OPENING OF BID:**

The Bidder or his authorized representative may be present at the time of opening of bid on the specified date. In case of unscheduled holiday on the closing/opening day of bid, the next working day will be treated as scheduled prescribed day of closing/opening of bid; the time notified remaining the same.

#### **16. TERMS OF PAYMENT:**

The payment shall be made by BEE, which is as follows:

1. **15% of the order/ contract value:** on acceptance of draft report of Energy Conservation Guidelines and Codes for Category A
2. **15% of the order/ contract value:** on acceptance of draft report of Energy Conservation Guidelines and Codes for Category B. and completion of interactive stakeholder workshop -1
3. **15% of the order/ contract value:** on acceptance of draft report of Energy Conservation Guidelines and Codes for Category C, D & E and completion of interactive stakeholder workshop -2
4. **15% of the order/ contract value:** on acceptance of the final report of Energy Conservation Guidelines and Codes for Category A & B.
5. **15% of the order/ contract value:** on acceptance of the final report of Energy Conservation Guidelines and Codes for Category C, D & E and completion of interactive stakeholder workshop -3
6. **10% on successful acceptance of Final Guideline and Code document for all categories i.e. A,B,C,D,&E** and completion of interactive stakeholder workshop -4
7. **15% post launch of the National Level Industrial Guidelines and Codes**

**17. LIQUIDATED DAMAGE:**

In case of delay at any stage in execution of the contract due to reasons solely attributed to successful bidder beyond the time schedule as agreed by BEE @ 1% (one percent) per week of the payment due to that stage subjected to maximum of 10% of the total value of payment due for that stage will be imposed.

**18. Other Terms & Condition:**

1. BEE will hire the consultant/agencies, in accordance with the method of evaluation set by BEE. The conclusion based on the judgment by BEE committee shall be considered as the result.
2. BEE reserves the right to reject any or all the proposals received at its discretion, without assigning any reason whatsoever, and no costs would be paid to consultant/agency for the same.
3. Acceptance of the Proposal will rest with the Competent Authority of the BEE. No reasons will be given for acceptance or rejection of the contract thereof.
4. The BEE reserves the right to cancel this RFP. Any and all proposals may be rejected in whole or in part when it is in the best interest of the BEE.

**19. Disclaimer**

BEE and its officers, employees disclaim all liability from any loss or damage, whether foreseeable or not, suffered by any person acting on or refraining from acting because of any information including statements, information, forecasts, estimates or projections contained in this document or conduct ancillary to it whether or not the loss or damage arises in connection with any omission, negligence, default, lack of care or misrepresentation on the part of BEE and/or any of its officers, employees.

BANK GUARANTEE (EARNEST MONEY)

(To be stamped in accordance with Stamp act)

This deed of Guarantee made this \_\_\_\_\_ day of \_\_\_\_\_ 2017  
by \_\_\_\_\_

**((Name of the Bank))**

having one its branch at \_\_\_\_\_  
acting through its Manager (hereinafter called the “Bank”) which expression shall wherever  
the context so requires includes its successors and permitted assigns in favour of  
Bureau of Energy Efficiency, having its office at  
\_\_\_\_\_ (hereinafter called)  
 (“BEE”) which expression shall include its successors and assigns.

WHEREAS BEE has invited tender vide its Tender Notice No.

\_\_\_\_\_ Dated \_\_\_\_\_ to be  
opened on AND WHEREAS M/s

\_\_\_\_\_

**(Name of Tenderer)**

having its office at \_\_\_\_\_  
(hereinafter called the “Tenderer”), has/have in response to aforesaid tender notice offered  
to supply/ do the job \_\_\_\_\_ as contained in the tender.

AND WHEREAS the Tender is required to furnish to BEE a Bank Guarantee for a sum of  
Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_  
\_\_\_\_\_ Only) as Earnest Money for participation in the Tender aforesaid.

AND \_\_\_\_\_ WHEREAS,  
we \_\_\_\_\_

**(Name of Bank)** have at the request of the tenderer agree to give BEE this as hereinafter  
contained.

NOW, THEREFORE, in consideration of the promises we, the undersigned, hereby  
covenant that, the aforesaid Tender shall remain open for acceptance by BEE during the  
period of validity as mentioned in the Tender or any extension thereof as BEE and the  
Tenderer may subsequently agree and if the Tenderer for any reason back out, whether  
expressly or impliedly, from his said Tender during the period of its validity or any  
extension thereof as aforesaid or fail to furnish Bank Guarantee for performance as  
per terms of the aforesaid Tender, we hereby undertake to pay BEE, New Delhi on

demand without demur to the extent of  
Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only).

**We further agree as follows:-**

01. That BEE may without affecting this guarantee extend the period of validity of the said Tender or grant other indulgence to or negotiate further with the Tenderer in regard to the conditions contained in the said tender or thereby modify these conditions or add thereto any further conditions as may be mutually agreed to in between BEE and the Tender AND the said Bank shall not be released from its liability under these presents by an exercise by BEE of its liberty with reference to the matters aforesaid or by reason of time being given to the Tenderer or any other forbearance, act or omission on the part of the BEE or any indulgence by BEE to the said Tenderer or any other matter or thing whatsoever.
02. The Bank hereby waive all rights at any time in consistent with the terms of this Guarantee and the obligations of the Bank in terms thereof shall not be otherwise affected or suspended by reason of any dispute or dispute having been raised by the Tenderer (whether or not pending before any arbitrator, tribunal or court) or any denial of liability by the Tenderer stopping or preventing or purporting to stop or prevent any payment by the Bank to BEE in terms thereof.
03. We the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of BEE in writhing and agree that any charges in the constitution, winding up, dissolution or insolvency of the Tenderer, the said Bank shall not be discharged from their liability.

NOTWITHSTADING anything contained above, the liability of the Bank in respect of this Guarantee is restricted to the said sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) and this Guarantee shall remain in force till \_\_\_\_\_ unless a claim under this guarantee is filed with the bank within 30 (thirty) days from this date or the extended date, as the case may be i.e. upto \_\_\_\_\_ all rights under Guarantee shall lapse and the Bank be discharged from all liabilities hereunder.

In witness whereof the Bank has subscribed and set its name and seal here under.

**Note: - The date shall be thirty (30) days after the last date for which the bid is valid.**

Performance Security

Bureau of Energy Efficiency  
Sewa Bhawan, 4<sup>th</sup> Floor,  
R. K. Puram, Sector-1  
New Delhi-110066  
(With due Rs.100/- stamp duty, if applicable)

**OUR LETTER OF GUARANTEE No. :** ..... **Date**.....

**Amount:** ..... **Valid Date:** .....

**Bank Name & Address:**

.....

In consideration of Bureau of Energy Efficiency having its office at Sewa Bhawan, 4<sup>th</sup> Floor, R. K. Puram, Sector-1, New Delhi-110066 (hereinafter referred to as "BEE" which expression shall unless repugnant to the content or meaning there of include all its successors, administrators and executors) and having issued list of successful agencies dated\_\_\_\_\_ against RFP No. \_\_\_\_\_dated \_\_\_\_\_ which includes M/s \_\_\_\_\_ (hereinafter referred to as "The Agency" which expression unless repugnant to the content or meaning thereof, shall include all the successors, administrators, and executors).

WHEREAS the Agency having unequivocally accepted to perform the services as per terms and conditions given in the BID/RFP No \_\_\_\_\_ dated \_\_\_\_\_ and BEE having agreed that the Agency shall furnish to BEE, a Performance Security for the faithful engagement for the entire contract, amounting to Rs. \_\_\_\_\_.

We, \_\_\_\_\_ (The Bank) which shall include OUR successors, administrators and executors herewith establish an irrevocable Letter of Guarantee No. \_\_\_\_\_ in your favour for account of \_\_\_\_\_ (The Agency) in cover of performance security in accordance with the terms and conditions of the RFP.

Hereby, we undertake to pay upto but not exceeding \_\_\_\_\_ (say \_\_\_\_\_ only) upon receipt by us of your first written demand accompanied by your declaration stating that the amount Claimed is due by reason of the Agency having failed to perform the services as per the terms & conditions given in the BID/RFP and despite any contestation on the part of above named-agency.

This Letter of Guarantee will expire on \_\_\_\_\_ including 30 days of claim period and any claims made hereunder must be received by us on or before expiry date after which date this Letter of Guarantee will become of no effect whatsoever whether returned to us or not.

\_\_\_\_\_  
**Authorized Signature**  
**Chief Manager/Manager**

**Seal of Bank**

**FORMAT FOR FINANCIAL PROPOSAL**

[Location, Date]

FROM: (Name of Firm)

TO: (Name and Address of Client)

**Subject: Financial Proposal for hiring an agency to prepare Energy Efficiency Guidelines and Codes for Industries.**

I/We, the undersigned, offer to provide the services for the above in accordance with your Request for proposal dated (Date), with our Technical and Financial Proposals.

Our Financial Proposal is for the sum of [amount in words and figures] for .....Months, excluding the Taxes and [amount in words and figures] inclusive of Taxes. The financial proposal shall take into account all expenses and tax liabilities associated in execution of the deliverables as per the RFP. BEE shall in no way be responsible to incur any other extra costs associated with this task.

Our financial proposal shall be binding upon us, subject to the modifications resulting from contract negotiations, up to expiration of the validity period of the Proposal, i.e., [Date].

We confirm that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act, 1988".

We understand you are not bound to accept any Proposal you receive.

Yours sincerely,

Authorized Signature:

Name and Title of Signatory:

Name of the Firm:

Seal:

## Standards and Target Values for Operating Equipment in Factories etc.

Table (1) Air ratios for boilers

Classification			Air ratio					
			Solid fuel		Liquid fuel	Gas fuel	Byproduced gas such as blast furnace gas	
Item	Load factor (%)	Fixed bed	Fluidized bed					
		Standard	For electric utility *	75-100	-	-	1.05-1.2	1.05-1.1
	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 30t/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	50-100	-	-	1.2-1.3	1.2-1.3	-	
	Less than 5t/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 30t/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	50-100	-	-	1.15-1.3	1.15-1.25	-	
	Less than 5t/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.

## &lt; Standard &gt;

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.

$$\text{Air ratio} = 21/[21 - (\text{Oxygen concentration in the exhaust emission in percentage})]$$

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).

## &lt; Target &gt;

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					
		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 20°C. 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 150°C shall apply to electric utilities, and 200°C 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 20°C. 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 140°C shall apply to electric utilities, and 160°C 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 180°C 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, slab)	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 furnace	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(°C)	Capacity category	Standard waste heat recovery rate %	Target waste heat recovery rate (%)	Reference	
				Waste gas temperature (°C)	Preheated air (°C)
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: 60°C
- (ii) Heat radiation-diffusion rate from heat exchanger: 5%
- (iii) Use of liquid fuel (equivalent to heavy oil)
- (iv) Outside air temperature: 20°C
- (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°C and higher)**

Item	Furnace temperature (°C)	Furnace wall outer surface temperature (°C)		
		Ceiling	Side wall	Bottom in contact with open air
Standard	1,300 or more	140	120	180
	1,100-1,300	125	110	145
	900-1,100	110	95	120
	Less than 900	90	80	100
Target	1,300 or more	120	110	160
	1,100-1,300	110	100	135
	900-1,100	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 20°C.

**< 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 20°C.

**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 butt 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**

**1) Totally enclosed types ( 0.2 – 160 kW)**

Output (kW)	Efficiency Values (%)					
	2-poles		4-poles		6-poles	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
	200V or 400V	220V or 440V	200V or 400V	220V or 440V	200V or 400V	220V or 440V
0.2	70.0	71.0	72.0	74.0	—	—
0.4	76.0	77.0	76.0	78.0	73.0	76.0
0.8	77.5	78.5	80.5	82.5	78.5	80.0
1.5	83.0	84.0	82.5	84.0	83.0	84.5
2.2	84.5	85.5	85.5	87.0	84.5	86.0
3.7	87.0	87.5	86.0	87.5	86.0	87.0
5.5	88.0	88.5	88.5	89.5	88.0	89.0
7.5	88.5	89.0	88.5	89.5	88.5	89.5
11.0	90.0	90.2	90.2	91.0	89.5	90.2
15.0	90.0	90.2	90.6	91.0	89.5	90.2
18.5	90.6	91.0	91.7	92.4	91.0	91.7
22.0	91.0	91.0	91.7	92.4	91.0	91.7
30.0	91.4	91.7	92.4	93.0	91.7	92.4
37.0	92.1	92.4	92.4	93.0	91.7	92.4
45.0	92.4	92.7	92.7	93.0	92.4	93.0
55.0	92.7	93.0	93.3	93.6	93.3	93.6
75.0	93.6	93.6	94.1	94.5	93.6	94.1
90.0	94.3	94.5	94.1	94.5	93.9	94.1
110.0	94.3	94.5	94.1	94.5	94.5	95.0
132.0	94.8	95.0	94.5	95.0	94.5	95.0
160.0	94.8	95.0	94.8	95.0	94.5	95.0

**2) Protected type (0.75 – 160 kW)**

Output (kW)	Efficiency Values (%)					
	2-poles		4-poles		6-poles	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
	200V or 400V	220V or 440V	200V or 400V	220V or 440V	200V or 400V	220V or 440V
0.75	77.5	78.5	80.0	82.0	78.0	80.0
1.5	83.0	84.0	82.0	84.0	82.0	84.0
2.2	83.0	84.0	85.0	86.5	84.0	85.5
3.7	85.0	85.5	86.0	87.5	85.5	87.0
5.5	87.0	87.5	87.5	88.5	87.0	88.5
7.5	88.0	88.5	88.5	89.5	88.0	89.0
11.0	89.0	89.5	90.0	90.6	89.0	90.0
15.0	89.5	90.2	90.2	91.0	89.5	90.6
18.5	90.6	91.0	90.6	91.4	90.6	91.4
22.0	90.6	91.0	91.4	92.1	91.0	91.7
30.0	91.0	91.4	91.7	92.1	91.4	92.1
37.0	91.4	91.7	92.1	92.4	91.7	92.4
45.0	91.7	92.1	92.1	92.7	92.1	92.7
55.0	92.1	92.4	92.4	93.0	92.4	93.0
75.0	92.4	92.7	92.7	93.3	92.4	93.0
90.0	92.7	93.0	93.0	93.6	92.7	93.3
110.0	93.0	93.3	93.3	93.6	93.0	93.6
132.0	93.3	93.6	93.3	93.9	93.3	93.9
160.0	93.9	94.1	93.6	94.5	93.6	94.1

Note : Efficiency values shall be measured according to the procedures set forth in Section 7.3 - "Efficiency Test" of JIS C 4212 titled "High-efficiency, Low Voltage Three-phase Squirrel Cage Induction Motors," by applying the tolerance values provided in its Section 4.2 - "Applicable Tolerances."

# Energy Conservation Guideline

The Energy Conservation Guideline (EC Guideline) is prepared based on “Standards of Judgment for business operators on the rational use of energy at factories etc. from “Announcement No.66 under of Ministry of Economy, Trade and Industry, Japan on 31 March 2009”

## 1. EC Guideline for Factories etc. on Rational Use of Energy

<p>Standards Components</p>	<p>Business operators should make the following efforts to appropriately manage energy, while thoroughly manage energy by the factories, etc. and facilities in detail and comply with various standard for their factories, etc. Chain business operators should do the same as above for factories, etc. they are affiliated with.</p> <ul style="list-style-type: none"> <li>A. To promote a management system for efficient and effective energy conservation as a whole.</li> <li>B. To place a person in charge of the management system.</li> <li>C. To set policies on efforts for energy conservation, including targets and policies to install new facilities or replace existing ones.</li> <li>D. To check and evaluate the policies on efforts and observance status, and to make improvements based on the evaluation.</li> <li>E. To regularly investigate the evaluation method of the policies on efforts and observance status and to improve them, if necessary.</li> <li>F. To secure the necessary funds/human resources</li> <li>G. To inform the policies on efforts and train employees about rational use of energy</li> <li>H. To grasp the situation, by creating, updating, and maintaining a document that describes the names, locations, and energy usage amounts related to factories, etc., as well as a document that describes management system of item A., policies on efforts of itme C., observance status and evaluation results of item D.</li> </ul>
<p>Target Components</p>	<ul style="list-style-type: none"> <li>- Set a target to reduce energy consumption intensity of each factory, etc. or factories, etc. as a whole by one percent or more on an annual average in medium- and long-term.</li> <li>- Make technically and economically reasonable efforts to achieve the target components.</li> <li>- Business operators specified in Table(8) shall make efforts to improve or reduce benchmark indexes and make technically and economically reasonable efforts to bring these indexes to the level described in the table.</li> <li>- Chain business operators shall make efforts to achieve targets and measures within the range of adhesive terms and conditions of the chain business.</li> <li>- Lessor and lessee shall cooperate to promote energy conservation activities and make efforts to establish mechanisms, etc. to reflect effects to the method of sharing monetary burden.</li> <li>- Business operators shall explore efforts to contribute to others' promotion of energy conservation through provision of technologies, advice, and coalition of business, etc.</li> </ul>

**I. Items related to rational use of energy in factories, etc. that are exclusively used for office or other similar applications**

		1. Air-conditioning Facilities and Ventilation Facilities
Standards Components	Management	<p>(1) Management of air-conditioning facilities and ventilation facilities</p> <p>A. Zone of air-conditioning shall be limited to reduce air-conditioning load and control operational time of the facilities and indoor temperature, etc. [Management Manual] The temperature of air-conditioning levels shall be referred to the government's recommended levels. [Management Manual]</p> <p>B. For heat source facilities that burns (absorption chillers, Chilled/hot water generators, etc.), air ratio shall be controlled. [Management Manual]</p> <p>C. The heat source facilities, heat transfer facilities, air-conditioning facilities shall be managed in a way that the efficiency will be comprehensively improved based on seasonal weather changes, etc. [Management Manual]</p> <p>D. The heat source facilities composed of multiple heat source facilities shall be managed in a way that the facilities efficiency will be comprehensively improved based on seasonal weather changes. [Management Manual]</p> <p>E. Multiple pumps of heat transfer facilities shall be managed in a way that the efficiency of facilities will be comprehensively improved, such as by adjusting the number of units operating based on the load change, etc. [Management Manual]</p> <p>F. The air-conditioning facilities composed of multiple air-conditioning units in one section shall be managed in a way that the facilities efficiency will be comprehensively improved based on load conditions, etc. [Management Manual]</p> <p>G. Ventilation facilities and equipment shall be managed in a way that zone of ventilation is limited, and ventilation volume, operational time, and temperature, etc. shall be managed. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to air-conditioning facilities and ventilation facilities</p> <p>A. The temperature and humidity levels, etc. shall be measured and recorded for each of the operational zone. [Management Manual]</p> <p>B. All factors that contribute to improvement of the facilities' collective efficiency and each unit's efficiency shall be measured and recorded. [Management Manual]</p> <p>C. Temperature and carbon dioxide concentration, etc. shall be measured and recorded for each operational zone to grasp the condition of air and to improve ventilation efficiency. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of air-conditioning facilities and ventilation facilities</p> <p>A. Air-conditioners shall be inspected and maintained to improve the each air-conditioner's efficiency and the facilities' total efficiency improvement. [Management Manual]</p> <p>B. The automatic controlling devices that are installed in the air-conditioning facilities and ventilation facilities shall be inspected and maintained to keep in good condition. [Management Manual]</p> <p>C. Ventilation facilities shall be inspected and maintained, including removing clogging, to keep the efficiency of each unit and the facilities' total efficiency in a good condition. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new air-conditioning facilities and ventilation facilities</p> <p>A. When installing new air-conditioning facilities, the following measures shall be enforced to improve the efficiency of energy use:</p> <p>(a) Each air-conditioner shall respond to the heat demand change and be independently controlled by each operational area.</p> <p>(b) High efficiency heat source such as heat pumps, etc. shall be introduced.</p> <p>(c) High efficiency operation system such as controlling the number of the operational units, etc. shall be introduced.</p> <p>(d) Variable air volume and variable flow rate system such as controlling the number of rotation, etc. shall be introduced.</p> <p>(e) Total heat exchanger, outdoor air cooling control, water humidification shall be introduced.</p> <p>(f) The heat transfer facilities with large lifting height that receives heat from heat storage system and regional air-conditioning system shall introduce heat exchanger to reduce lifting height.</p> <p>(g) When installing outdoor unit of an air-conditioner, insulation and ventilation conditions, etc. shall be considered.</p> <p>(h) Measuring devices and sensors, etc. shall be installed in each air-conditioning section and BEMS shall be introduced for appropriate control and analysis of air-conditioning.</p> <p>B. Air-conditioning facilities and ventilation facilities that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</p> <p>C. Facility architecture of ventilation facilities and equipment shall be able to respond to change of load.</p>
Target Components	Improvement of Existing Facilities	<p>-Improvement of thermal insulation where air-conditioning is done shall be investigated. In addition, shielding insulation shall be also investigated.</p> <p>-Reducing load of outside air processing by air-conditioning facilities shall be investigated. Introducing free cooling shall be investigated.</p> <p>-Introducing large temperature difference systems that can reduce air flow rate and circulation water volume shall be investigated.</p> <p>-Improvement of thermal insulation of pipes and ducts shall be investigated.</p> <p>-For engines for ventilation, introducing air flow control shall be investigated.</p>
	New Installation and Update of Facilities	<p>-Introducing heat storage heat pump system, gas cooling system, etc. for air-conditioning facilities shall be investigated. In addition, when both cooling and heating exist, introducing heat recovery system shall be investigated. Furthermore, introducing heat recover heat pumps and exhaust heat driven heat source units shall be investigated.</p>

## 2. Items related to Boiler Facilities and Hot Water Supply Facilities

### (1) Management of boiler facilities and hot water supply facilities

- A. Air ratio shall be managed according to the boiler capacities and fuel types. [Management Manual]
- B. Air ratio shall be reduced referencing the "standard value" in Table(1). [Standard]
- C. For boiler facilities, pressure and temperature of steam etc. and operating hour shall be managed. [Management Manual]
- D. Quality of water supplied to boilers shall be managed. [Management Manual]
- E. For multiple boilers, number of units operated shall be managed for comprehensive efficiency. [Management Manual]
- F. For hot water supply facilities, areas to supply water shall be limited according to seasons and work, and temperature and pressure, etc. of the supplied hot water shall be managed. [Management Manual]
- G. The heat source facilities for hot water supply facilities shall be managed in a way that the comprehensive efficiency of the facilities including the heat source units and pumps, etc. is increased according to change of load. [Management Manual]
- H. Hot water supply facilities composed of multiple heat source units shall be managed in a way that the comprehensive efficiency is increased according to change of load by adjusting the number of units operated. [Management Manual]

### (2) Measurement and recording related to boiler facilities and hot water supply facilities

- A. For boiler facilities, fuel supply, steam pressure, temperature of hot water, residual oxygen content in exhaust gas, temperature of exhaust gas, water volume supplied by boilers, etc. shall be measured and recorded. [Management Manual]
- B. For hot water supply facilities, supplied water volume, temperature of supplied hot water, etc. shall be measured and recorded. [Management Manual]

### (3) Maintenance and inspection of boiler facilities and hot water supply facilities

- A. For boiler facilities, all factors that contribute to improvement of the facilities' efficiency shall be inspected and maintained. [Management Manual]
- B. Boiler facilities shall be inspected and maintained to maintain thermal insulation and to prevent leak of steam from steam trap. [Management Manual]
- C. Hot water supply facilities shall be inspected and maintained to maintain efficiency of supplying hot water and to maintain automatic controlling devices in a good condition. [Management Manual]

### (4) Measures in installing new boiler facilities and hot water supply facilities

- A. When the temperature of waste gas from the boiler facilities exceed the value indicated in Table(2), the waste heat shall be utilized. Waste heat from the steam drain shall be recovered and used.
- B. For boiler facilities, actual record and future trend of demand of steam, etc. shall be thoroughly investigated to determine appropriate facility capacity. Economizers etc. shall be installed.
- C. If change in load of boiler facilities is expected, high efficiency operation system such as controlling the number of the operational units, etc. shall be introduced.
- D. When installing new hot water supply facilities, the following measures shall be enforced to improve the efficiency of energy use:
  - (a) Operation according to change of hot water supply load
  - (b) Localizing system for sections where demand for hot water is low
  - (c) Introduction of heat pump systems and/or heat source facilities with latent heat recovery
- E. Boiler facilities and hot water supply facilities that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.

- Efforts to lower air ratio of boiler facilities to the "target value" in Table(1) shall be made.
- Efforts to lower the waste gas temperature of boiler facilities to the "target value" in Table(2) shall be made to increase waste heat recovery.
- When hot water supply facilities are installed, improvement of efficiency such as introduction of both heat pump system and condensing heat recovery method, etc shall be investigated.

3. Items related to Lighting Systems, Elevators, and Engine Facilities		
Standards Components	Management	<p>(1) Management of lighting systems and elevators</p> <p>A. Lighting systems shall be managed referring to the provisions specified in the JIS, etc. Dimming and turning-off using dimmer control shall be managed. [Management Manual]</p> <p>B. Elevators shall be managed for limitation of floors to stop, the number of operational units, etc. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to lighting systems</p> <p>- For lighting systems, luminance of the workplace, etc. to be lighted shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of lighting systems, elevators, and engine facilities</p> <p>A. Lighting systems shall be inspected and maintained including cleaning and replacement, etc. [Management Manual]</p> <p>B. Elevators shall be inspected and maintained to reduce machine loss. [Management Manual]</p> <p>C. Engine facilities shall be inspected and maintained to reduce machine loss including plumbing installations and mechanic parking facilities. [Management Manual] Liquid machines such as pumps, etc. shall be inspected and maintained to prevent leaks and pipes, etc. shall be inspected and maintained to reduce resistance. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new lighting systems and elevators</p> <p>A. When installing a new lighting system, the following measures shall be enforced referring to the items related to lighting system of the standards of judgment for buildings to improve the efficiency of energy use:</p> <p>(a) Energy conserving facilities such as fluorescent lighting using inverters, etc. shall be considered for the installation.</p> <p>(b) High efficiency lamps such as HID lamps, etc. shall be introduced.</p> <p>(c) Maintenance factors such as cleaning, etc. shall be considered for the installation.</p> <p>(d) Comprehensive energy efficiency factors including efficiency of lighting circuits or lighting fixtures, etc. shall be considered.</p> <p>(e) For places where natural lighting can be used, separate circuits shall be considered for the installation.</p> <p>(f) Installation of motion sensors, utilization of timers, and coordination with maintenance facilities shall be considered.</p> <p>B. Machineries, office equipment, and commercial equipment relating to lighting systems that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</p> <p>C. For elevators, efficiency of energy use shall be improved referring to the items related to elevators of the standards of judgment for buildings.</p>
Target Components	Improvement of Existing Facilities	<p>- For escalators, efficient operation by motion sensors, etc. shall be considered.</p>
	New Installation and Update of Facilities	<p>- Selecting lighting systems with dimming capability or adopting automatic controlling system of lighting or luminance offset lighting shall be considered.</p> <p>- Adopting LED (light-emitting diode) lighting systems shall be considered.</p>

#### 4. Items related to Power Receiving and Transforming Facilities and BEMS

##### (1) Management of power receiving and transforming facilities

- A. Transformers and uninterruptible power systems shall be managed by adjusting the number of operating units and appropriate load dispatch so that the comprehensive efficiency is improved. [Management Manual]
- B. Phase advance capacitors, etc. shall be managed so that the phase factor at the receiving end shall be 95% or higher. [Management Manual]

##### (2) Measurement and recording related to power receiving and transforming facilities

- Power consumption, voltage and current, etc. of the power receiving and transforming facilities shall be measured and recorded. [Management Manual]

##### (3) Maintenance and inspection of power receiving and transforming facilities

- Power receiving and transforming facilities shall be inspected and maintained to keep in good condition. [Management Manual]

##### (4) Measures in installing new power receiving and transforming facilities and BEMS

- A. When introducing power receiving and transforming facilities, equipment with low energy loss shall be adopted, actual record and future trend of power demand shall be investigated, and layout of power receiving and transforming facilities, power distribution voltages, and facility capacities shall be optimized.
- B. Power receiving and transforming facilities that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.
- C. Introducing BEMS shall be considered.

- Energy management shall be enforced as time-series, considering past result to grasp consumption trend.
- Comprehensive energy conservation control including air-conditioning facilities and electrical facilities, etc. shall be considered.
- Grasping deterioration of equipment and facilities and timing of maintenance, etc. shall be considered.
- Keeping the power factor at the receiving end 98% or higher shall be considered.(refer to Table(6) for equipment to be applied)

- Introducing motors with higher efficiency than the "target value" in Table(7) shall be considered.

		5. Items related to Dedicated Power Generation Facilities and Cogeneration Facilities
Standards Components	Management	<p>(1) Management of dedicated power generation facilities and cogeneration facilities</p> <p>A. Proper operational management shall be achieved for high efficiency of the facilities. [Management Manual] Facilities that are in parallel operation shall be managed to appropriately distribute load so that the comprehensive efficiency is improved. [Management Manual]</p> <p>B. Operation of cogeneration facilities shall be controlled so that the comprehensive efficiency is improved according to load increases and decreases. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to dedicated power generation facilities and cogeneration facilities</p> <p>All factors that contribute to improvement of the facilities' collective efficiency including accessories, etc. shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of dedicated power generation facilities and cogeneration facilities</p> <p>Facilities shall be inspected and maintained to keep in the condition with high thermal efficiency including accessories, etc. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new dedicated power generation facilities and cogeneration facilities</p> <p>A. The actual result and future trends of electricity demand shall be considered and the facilities shall have optimal capacity size.</p> <p>B. The generation efficiency of new dedicated power generation facilities shall not be significantly lower than the level of the annual average generation efficiency of the domestic power generation facilities.</p> <p>C. The actual result and future trends of electricity and heat demands shall be considered and the facilities shall have optimal capacity size.</p>
Target Components	Improvement of Existing Facilities	
	New Installation and Update of Facilities	- Installing cogeneration facilities shall be considered.

6. Items related to Office Equipment and Commercial Equipment	7. Items related to Industrial Equipment	8. Items related to Other Rational Use of Energy
<p>(1) Management of office equipment Office equipment shall be managed to prevent unnecessary operation, etc.</p>	<p>(1) Management of industrial equipment</p> <ul style="list-style-type: none"> <li>- Industrial equipments including kitchen equipment and industrial refrigerators, etc. shall be managed for required items including seasons, days of the week, time slots, loads, non-operational hours, etc. [Management Manual]</li> </ul>	<p>Lessor and lessee shall cooperate to promote energy conservation activities. Lessor shall provide lessee with information on energy consumption (measured values or estimated figures)</p>
<p>(2) N/A</p>	<p>(2) Measurement and recording related to industrial equipment</p> <ul style="list-style-type: none"> <li>- All factors that contribute to understanding and improvement of operation of the professional use equipment shall be measured and recorded. [Management Manual]</li> </ul>	
<p>(3) Maintenance and inspection of office equipment Office equipment shall be inspected and maintained as required.</p>	<p>(3) Maintenance and inspection of industrial equipment</p> <ul style="list-style-type: none"> <li>- Industrial equipment shall be inspected and maintained to keep in good condition. [Management Manual]</li> </ul>	
<p>(4) Measures in installing new office equipment and commercial equipment Office equipment and commercial equipment that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</p>	<p>(4) Measures in installing new professional use equipment</p> <ul style="list-style-type: none"> <li>A. Industrial equipment with high energy efficiency shall be selected.</li> <li>B. For equipment that produce heat, limiting air-conditioning zones, restricting outdoor air, and direct emission of heat to outside of air-conditioned zones shall be considered.</li> <li>C. Industrial equipment that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</li> </ul>	
	<ul style="list-style-type: none"> <li>- For automatic vending machines, stopping operation during non-selling hours shall be considered.</li> </ul>	

## II. Items related to rational use of energy in factories

		1. Rationalization of Fuel Combustion
Standards Components	Management	<p>(1) Management of fuel combustion</p> <p>A. Air ratio shall be managed according to the type of fuel combustion facility and fuel types. [Management Manual]</p> <p>B. Air ratio of the facility shall be reduced referencing the "standard value" in Table(1). [Standard]</p> <p>C. For multiple facilities, the total thermal efficiency shall be managed by adjusting the load. [Management Manual]</p> <p>D. Operational conditions shall be managed according to fuel properties. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to fuel combustion</p> <p>- Amount of supplied fuel, temperature of exhaust gas, residual oxygen present in exhaust gas, etc. shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of combustion facilities</p> <p>- The combustion facilities shall be maintained and inspected to keep in good condition. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new combustion facilities</p> <p>A. The combustion equipment shall be able to adjust the fuel amount and air ratio according to the load change.</p> <p>B. The ventilation system shall be able to adjust the airflow rate and combustion chamber pressure.</p>
Target Components	Improvement of Existing Facilities	<p>- Efforts to lower air ratio to the "target value" in Table(1) shall be made.</p> <p>- For combustion equipment such as burners, etc. adopting facilities that are able to adjust the fuel amount and air ratio shall be considered.</p> <p>- For ventilation facilities, adopting facilities that are able to adjust the airflow rate, etc. shall be considered.</p>
	New Installation and Update of Facilities	<p>- For combustion controlling equipment, adopting equipment that is able to control air ratio shall be considered.</p> <p>- When replacing or newly installing burners, adopting regenerative burners shall be considered.</p> <p>- Measurement devices shall be installed for each combustion facility, and appropriate combustion management shall be enforced by using computers.</p>

## 2. Rationalization of Heating, Cooling, and Heat Transfer (2-1) Heating Equipment, etc.

### (1) Management of heating, cooling, and heat transfer

- A. For the facilities using heat media, the temperature, pressure, and volume of the medium shall be controlled. [Management Manual]
- B. For industrial furnaces, the thermal efficiency shall be improved to improve the heat patterns. [Management Manual]
- C. The amount of heated or cooled objects and the positioning inside the furnace shall be managed to prevent overloads or under loads. [Management Manual]
- D. When multiple facilities are used, the loads shall be adjusted to maximize the comprehensive efficiency. [Management Manual]
- E. For repetitive processes, the waiting time between processes shall be reduced. [Management Manual]
- F. Intermittent operation shall be streamlined. [Management Manual]
- G. Quality of water supplied to boilers shall be managed. [Management Manual]
- H. For steam facilities, valves shall be shut off when not in use.
- I. Dryness of steam in heating facilities shall be kept at an appropriate level.
- J. Factors related to heating, including heated or cooled objects, heat media, etc. shall be managed. [Management Manual]

### (2) Measurement and recording related to heating

- The temperature, pressure, flow rate, etc. of heat media, such as steam, etc. used for heated or cooled objects shall be measured and recorded. [Management Manual]

### (3) Maintenance and inspection of heating facilities

- Heat-transferring parts shall be maintained and inspected including removal of soot, dust, and scale, etc. of boilers and heat exchangers, etc. and prevention of deterioration of heat transfer performance, etc. [Management Manual]

### (4) Measures in installing new heating facilities

- A. Materials with high thermal conductivity shall be used for heat exchanging parts.
- B. Heat exchangers shall be aligned appropriately to improve comprehensive thermal efficiency.

- Increasing dryness of steam shall be considered.
- Improving emissivity of walls, etc. of industrial furnaces shall be considered.
- Improving heat conductivity of heat-transfer surfaces shall be considered.
- Using materials with high heat conductivity for heat exchanging parts shall be considered.
- Directly heating heated objects shall be considered.
- Increasing the stages of multiple-effect evaporators shall be considered.
- Increasing the efficiency of distillation tower shall be considered.
- Improving comprehensive thermal efficiency of heat exchangers shall be considered.
- Combination of industrial furnaces that enables multistep utilization of heat shall be considered.
- Efforts to improve the method to control heating facilities shall be made.
- Serialization, integration, cut down, and partial elimination of heating processes shall be considered.
- Preliminary processing of heated materials shall be considered.
- Heating using vacuum steam media shall be considered.

- When installing facilities that use heat such as boilers, etc., distributed arrangement and installing heat storage facilities shall be considered.
- When installing heating facilities, adopting facilities with high thermal efficiency shall be considered.

		2. Rationalization of Heating, Cooling, and Heat Transfer (2-2) Air Conditioning Facilities and Hot Water Supply Facilities
Standards Components	Management	<p>(1) Management of air-conditioning facilities and hot water supply facilities</p> <p>A. For air-conditioning to maintain manufacturing and workplace environment, air-conditioned zones shall be limited to lower air-conditioning load, and operation conditions shall be managed. [Management Manual]</p> <p>B. Zone of air-conditioning in the factories and offices, etc. shall be limited to reduce air-conditioning load and control operational time of the facilities and indoor temperature, etc. [Management Manual] The temperature of air-conditioning levels shall be referred to the government's recommended levels. [Management Manual]</p> <p>C. The heat source facilities, heat transfer facilities and air-conditioning facilities shall be managed in a way that the efficiency will be comprehensively improved based on seasonal weather changes, etc. [Management Manual]</p> <p>D. The heat source facilities composed of multiple heat source facilities shall be managed in a way that the facilities efficiency will be comprehensively improved based on seasonal weather changes, etc. [Management Manual]</p> <p>E. Multiple pumps of heat transfer facilities shall be managed in a way that the efficiency of facilities will be comprehensively improved, such as by adjusting the number of units operating based on the load change, etc. [Management Manual]</p> <p>F. The air-conditioning facilities composed of multiple air-conditioning units in one section shall be managed in a way that the facilities efficiency will be comprehensively improved based on load conditions, etc. [Management Manual]</p> <p>G. For hot water supply facilities, areas to supply water shall be limited according to seasons and work, and temperature and pressure, etc. of the supplied hot water shall be managed. [Management Manual]</p> <p>H. The heat source facilities for hot water supply facilities shall be managed in a way that the comprehensive efficiency of the facilities including the heat source units and pumps, etc. is increased according to change of load. [Management Manual]</p> <p>I. Hot water supply facilities composed of multiple heat source units shall be managed in a way that the comprehensive efficiency is increased according to change of load by adjusting the number of units operated. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to air-conditioning facilities and hot water supply facilities</p> <p>A. The temperature and humidity levels, etc. shall be measured and recorded for each of the operational zone. [Management Manual]</p> <p>B. All factors that contribute to improvement of the facilities' collective efficiency and each unit's efficiency shall be measured and recorded. [Management Manual]</p> <p>C. For hot water supply facilities, all factors that contribute to improvement of the efficiency as well as the volume and temperature, etc. shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of air-conditioning facilities and hot water supply facilities</p> <p>A. Air-conditioners shall be inspected and maintained to improve the each air-conditioner's efficiency and the facilities' total efficiency improvement. [Management Manual]</p> <p>B. Hot water supply facilities shall be inspected and maintained to improve efficiency. [Management Manual]</p> <p>C. Automatic controlling devices of air-conditioning and hot water supply facilities shall be inspected and maintained. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new air-conditioning facilities and hot water supply facilities</p> <p>A. When installing new air-conditioning facilities, the following measures shall be enforced to improve the efficiency of energy use:</p> <p>(a) Each air-conditioner shall respond to the heat demand change and be independently controlled by each operational zone.</p> <p>(b) High efficiency heat source such as heat pumps, etc. shall be introduced.</p> <p>(c) High efficiency operation system such as controlling the number of the operational units, etc. shall be introduced.</p> <p>(d) Variable air volume and variable flow rate system such as controlling the number of rotation, etc. shall be introduced.</p> <p>(e) Total heat exchanger, outdoor air cooling control, water humidification shall be introduced.</p> <p>(f) For facilities that produce heat, heat shall be directly emitted to outside of air-conditioned zones.</p> <p>(g) Local air-conditioning, radiant heating, reduction of volume, etc. to be air-conditioned shall be considered.</p> <p>(h) Gaps and openings of buildings shall be closed wherever possible.</p> <p>(i) When installing outdoor unit of an air-conditioner, insulation and ventilation conditions, etc. shall be considered.</p> <p>(j) Measurement devices, etc. required for improvement of efficiency shall be installed for each air-conditioning zone; Air-conditioning shall be appropriately controlled and analyzed by introducing factory energy management system, etc.</p> <p>B. When installing new hot water supply facilities, the following measures, etc. shall be enforced to improve the efficiency of energy use:</p> <p>(a) Operation according to change of hot water supply load</p> <p>(b) Localizing system for sections where demand for hot water is low</p> <p>(c) Introduction of heat pump systems and/or heat source facilities with latent heat recovery</p> <p>C. Air-conditioning facilities and hot water supply facilities that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</p>
Target Components	Improvement of Existing Facilities	<ul style="list-style-type: none"> <li>- Improvement of thermal insulation where air-conditioning is done shall be investigated. In addition, shielding insulation shall be also investigated.</li> <li>- Reducing load of outside air processing by air-conditioning facilities shall be investigated. Introducing free cooling shall be investigated.</li> <li>- Introducing large temperature difference systems that can reduce air flow rate and circulation water volume shall be investigated.</li> <li>- Improvement of thermal insulation of pipes and ducts shall be investigated.</li> <li>- For engines for ventilation, introducing air flow control shall be investigated.</li> </ul>
	New Installation and Update of Facilities	<ul style="list-style-type: none"> <li>- Introducing heat storage heat pump system, gas cooling system, etc. for air conditioning facilities shall be investigated. In addition, when both cooling and heating exist, introducing heat recovery system shall be investigated. Furthermore, introducing heat recover heat pumps and exhaust heat driven heat source units shall be investigated.</li> <li>- When hot water supply facilities are installed, improvement of efficiency such as introduction of both heat pump system and condensing heat recovery method shall be investigated.</li> <li>- For hot water supply facilities used for heating or drying facilities, etc., heat pump systems and/or heat source facilities with latent heat recovery shall be considered.</li> </ul>

### 3. Waste Heat Recovery and Usage

(1) Standards of waste heat recovery and usage

- A. Exhaust gas temperature or waste heat recovery rate shall be controlled according to the facility. [Management Manual]
- B. Waste gas temperature and waste heat recovery rate shall be managed referencing the "standard value" in Table(2) and (4). [Standard]
- C. Temperature, volume, and property of steam drain shall be controlled. [Management Manual]
- D. For recovery and utilization of sensible heat, latent heat, pressure, and combustible constituents of heated solid or liquid, range of recovery shall be controlled. [Management Manual]
- E. Waste heat shall be utilized in an appropriate manner according to its temperature and facilities operational conditions, etc.

(2) Measurement and recording related to waste heat

- Temperature, heat quantity, components, etc. shall be measured and recorded to grasp situation of waste heat and promote its utilization. [Management Manual]

(3) Maintenance and inspection of waste heat recovery facilities

- Waste heat recovery facilities shall be inspected and maintained including cleaning of the heat transfer surface, etc. and prevention of heat media leakage, etc. [Management Manual]

(4) Measures in installing new waste heat recovery facilities

- A. Waste heat temperature of the flues and piping, etc. of the waste heat recovery facilities shall be maintained.
- B. Properties and shapes of heat transfer surfaces shall be improved to increase waste heat recovery rate; measures to increase heat-transfer area, etc. shall be enforced.

- Efforts shall be made to lower inlet temperature of coolers and condensers for efficient heat recovery.
- Efforts to lower the waste gas temperature and to increase waste heat recovery rate to the "target value" in Table(2) and (4).
- Implementing measures to keep the waste heat temperature high in the flues, etc. shall be considered.
- Measures to improve heat-transfer efficiency of waste heat recovery facilities shall be considered.
- Methods to effectively utilize waste heat shall be investigated and considered.
- Methods to utilize sensible heat, latent heat, pressure, etc. that heated solid has shall be considered.

- Installing heat storage facilities for waste heat shall be considered.

		4. Rationalization of Conversion of Heat to Electric Power, etc. (4-1) Dedicated Power Generation Facilities
Standards Components	Management	<p>(1) Management of dedicated power generation facilities</p> <p>A. Proper operational management shall be achieved for high efficiency of the facilities. [Management Manual] Facilities that are in parallel operation shall be managed to appropriately distribute load so that the comprehensive efficiency is improved. [Management Manual]</p> <p>B. If pressure can be lowered when partial load is put on the steam turbines of thermal electricity plants, it shall be managed so that it is optimized. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to dedicated power generation facilities</p> <p>- For dedicated power generation facilities, comprehensive efficiency shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of dedicated power generation facilities</p> <p>- Dedicated power generation facilities shall be inspected and maintained so that the comprehensive efficiency is maintained high. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new dedicated power generation facilities</p> <p>A. The electricity demand and future trends shall be considered and the facilities shall have optimal capacity size.</p> <p>B. The generation efficiency of new dedicated power generation facilities shall not be significantly lower than the level of the annual average generation efficiency of the domestic power generation facilities (Dedicated power generation facilities in electricity suppliers shall have the highest level of gross efficiency among general-purpose machines).</p>
Target Components	Improvement of Existing Facilities	
	New Installation and Update of Facilities	

4. Rationalization of Conversion of Heat to Electric Power, etc.  
(4-2) Cogeneration Facilities

(1) Management of cogeneration facilities

- A. Operation of cogeneration facilities shall be controlled so that the comprehensive efficiency is improved according to load increases and decreases. [Management Manual]
- B. When bleeding gas/back pressure turbines are used for cogeneration facilities, allowable minimum levels of bleeding gas/back pressure shall be controlled. [Management Manual]

(2) Measurement and recording related to cogeneration facilities

- A. The thermal efficiency shall be measured and recorded. [Management Manual]
- B. When operating turbines at minimum pressure, inlet and outlet pressures, bleeding gas pressure, back pressure, etc. shall be measured and recorded. [Management Manual]

(3) Maintenance and inspection of cogeneration facilities

- Cogeneration facilities shall be inspected and maintained to keep in the condition with high thermal efficiency. [Management Manual]

(4) Measures in installing new cogeneration facilities

- The actual result and future trends of electricity and heat demands shall be considered and the facilities shall have optimal capacity size.

- Modification of bleeding gas turbines or back pressure turbines to improve efficiency shall be considered.

- When demand for steam or hot water is high and exhaust heat can be utilized enough in the future, installing cogeneration facilities shall be considered.

		5. Prevention of Energy Loss due to Radiation, Conduction, and Resistance, etc. (5-1) Prevention of Heat Loss due to Radiation and Conduction, etc.
Standards Components	Management	<p>(1) Standards of thermal insulation</p> <p>A. The standards of heat-using facilities' heat insulation shall be compliant with provisions of JIS, etc.</p> <p>B. Heat insulation shall be performed for newly installed industrial furnaces based on the temperature of the external surface of the furnace wall specified in Table(5). [Standard] For existing furnaces, heat insulation shall be performed based on the temperature of the external surface of the furnace wall specified in Table(5), if possible. [Standard]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to heat loss</p> <ul style="list-style-type: none"> <li>- Each facility's temperature of external surfaces of furnace wall, heated objects, waste gas, etc. shall be measured and recorded, and heat balance etc. shall be analyzed. [Management Manual]</li> </ul>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of heat-using facilities</p> <p>A. Heat-using facilities shall be inspected and maintained for heat loss prevention measures including thermal insulation work. [Management Manual]</p> <p>B. Facilities shall be inspected and maintained to maintain thermal insulation and to prevent leak of steam from steam trap. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new heat-using facilities</p> <p>A. When installing new heat-using facilities, thermal insulation shall be improved by using thicker heat insulation materials or materials with low heat conductivity, or doubly-layered thermal insulation, etc., and fire-retardant heat insulation materials shall have enough fire resistance.</p> <p>B. When installing new heat-using facilities, heat loss shall be prevented by reducing or sealing openings of heat-using facilities, installing double doors, or insulation using air flow, etc.</p> <p>C. When installing new heat-using facilities, radiation area shall be reduced by rationalization of pipe arrangement rout for heat media.</p>
Target Components	Improvement of Existing Facilities	<ul style="list-style-type: none"> <li>- Reduction of thermal capacity of carry-in wagons, etc. to industrial furnaces shall be considered.</li> <li>- Measures to improve thermal insulation properties of industrial furnaces to the "target value" in Table(5) shall be considered.</li> <li>- Improving thermal insulation of heat-using facilities shall be considered.</li> <li>- Prevention of heat loss from openings of heat-using facilities shall be considered.</li> <li>- Measures to prevent leakage of heat media shall be considered.</li> <li>- Reduction of radiation area pipes to transfer heat media shall be considered.</li> <li>- For open type facilities, etc. installing casing shall be considered.</li> </ul>
	New Installation and Update of Facilities	

5. Prevention of Energy Loss due to Radiation, Conduction, and Resistance, etc.  
(5-2) Prevention of Electricity Loss due to Resistance, etc.

(1) Management of power receiving and transforming facilities and power distribution facilities

- A. Transformers and uninterruptible power systems shall be managed by adjusting the number of operating units and appropriate load dispatch so that the comprehensive efficiency is improved. [Management Manual]
- B. Power receiving and transforming facilities shall be managed to have proper arrangement, to reduce the distribution lines and to have appropriate voltage. [Management Manual]
- C. The power factor at the receiving end shall be set to 95% or higher based on the "standard value" in Table(6), and this target shall be achieved by measures such as installing phase advance capacitors, etc.
- D. Phase advance capacitors shall be managed to properly start/stop according to the facility to which they are installed. [Management Manual]
- E. When a single-phase load is connected to a three-phase load, voltage imbalance shall be prevented and controlled. [Management Manual]
- F. Electricity-using facilities shall be operated to reduce the maximum current by equalizing the power consumption. [Management Manual]
- G. Electrical loss from power receiving and transforming facilities and power distribution facilities, etc. shall be reduced. [Management Manual]

(2) Measurement and recording related to power receiving and transforming facilities and power distribution facilities

- Power consumption, voltage and current, etc. of the power receiving and transforming facilities and power distribution facilities shall be measured and recorded. [Management Manual]

(3) Maintenance and inspection of power receiving and transforming facilities and power distribution facilities

- Power receiving and transforming facilities and power distribution facilities shall be inspected and maintained to keep in good condition. [Management Manual]

(4) Measures in installing new power receiving and transforming facilities and power distribution facilities

- A. For power receiving and transforming facilities and power distribution facilities, the actual demand and future trends of electricity demand shall be considered to determine the arrangement, distribution voltage and capacity of facilities.
- B. When introducing a new transformer, the transformer's energy efficiency shall comply with or higher than the levels stipulated in the standards for manufacturers' standards of judgment, etc. for transformers performance.

- Keeping the power factor at the receiving end 98% or higher shall be considered (refer to the "target value" in Table(6) for equipment to be applied).
- Appropriate measurement management by grasping electricity consumption situation and by using computers, etc. shall be considered.

- Adopting high efficiency transformers, preferably at the standard energy consumption efficiency level of better, shall be considered.

		6. Rationalization of Conversion of Electricity to Motive Power, Heat, etc. (6-1) Motor Applied Facilities, Electric Heaters, etc.
Standards Components	Management	<p>(1) Management of motor applied facilities and electric heaters, etc.</p> <p>A. Motor applied facilities shall be capable of stopping operation when unnecessary in order to prevent electrical loss due to motor's idle operation, taking into account of the relation with the power needed to start operation. [Management Manual]</p> <p>B. When using multiple electrical motors, the number of operating motors and the load distribution shall be appropriately adjusted so that the comprehensive efficiency of the entire electrical motors is high. [Management Manual]</p> <p>C. For fluid machines, pressure at the using end and delivery feed shall be investigated to manage the number of operating units and rotations, etc. [Management Manual] If variation of load change is constant, measures such as change of pipe work and ducts, and impeller cut, etc. shall be considered.</p> <p>D. For electrical heating facilities of induction furnaces, etc., thermal efficiency shall be improved by improving loading method of the heated object, reduction of electricity loss during unloaded operation, and insulation or waste heat recovery. [Management Manual]</p> <p>E. Efficiency of electrolytic facilities shall be improved by appropriately managing distance between electrodes, concentration of electrolytic solution, etc. [Management Manual]</p> <p>F. Electrical loss shall be lowered by managing the voltage and current, etc. of each energy-using facility. [Management Manual]</p>
	Measurement & Recording	<p>(2) Measurement and recording related to motor applied facilities and electrical heating facilities, etc.</p> <p>- For motor applied facilities, electrical heating facilities, etc., voltage and current, etc. shall be measured and recorded. [Management Manual]</p>
	Maintenance & Inspection	<p>(3) Maintenance and inspection of motor applied facilities and electrical heating facilities, etc.</p> <p>A. Motor applied facilities shall be inspected and maintained to reduce mechanical loss of the load machine, the power transmission section, and the motor. [Management Manual]</p> <p>B. Fluid machines shall be inspected and maintained to prevent the fluid leakage and to reduce the pipe resistance. [Management Manual]</p> <p>C. Electrical heating facilities, etc. shall be inspected and maintained to reduce the resistance loss of the wire connections and contact parts of switches, etc. [Management Manual]</p>
	Necessary Measures when Installing New Facilities	<p>(4) Measures in installing new motor applied facilities</p> <p>- For the motor applied facilities where frequent load change is expected, the facilities shall be configured to enable an operation easily adjustable based on the load fluctuations.</p>
Target Components	Improvement of Existing Facilities	<p>Installing electric machineries whose capacities are suitable for the required output shall be considered.</p> <p>For escalators, etc., efficient operation by motion sensors, etc. shall be considered.</p> <p>For automatic vending machines, stopping operation during non-selling hours shall be considered.</p>
	New Installation and Update of Facilities	<p>- Introducing motors with higher efficiency than the "target value" in Table(7) shall be considered.</p> <p>- For motor facilities, installing equipment to control rotation shall be considered.</p> <p>- Electrical heating facilities shall be introduced after comparing heating methods other than electricity. Electrical heating facilities with appropriate heating method shall be introduced according to the temperature level.</p> <p>- Distributed arrangement of compact air compressors and blower fans for low pressure application shall be considered.</p>

6. Rationalization of Conversion of Electricity to Motive Power, Heat, etc. (6-2) Lighting Systems, Elevators, Office Equipment, and Commercial Equipment	Factory Energy Management System
<p>(1) Management of lighting systems, elevators, and office equipment</p> <p>A. Lighting systems shall be managed referring to the provisions specified in the JIS, etc. Dimming and turning-off using dimmer control shall be managed. [Management Manual]</p> <p>B. Elevators shall be managed for limitation of floors to stop and the number of operational units, etc. [Management Manual]</p> <p>C. Office equipment shall be turned off when unnecessary and low power mode shall be configured.</p>	
<p>(2) Measurement and recording related to lighting systems</p> <p>- For lighting systems, luminance of the workplace, etc. to be lighted shall be measured and recorded. [Management Manual]</p>	
<p>(3) Maintenance and inspection of lighting systems, elevators, and office equipment</p> <p>A. Lighting systems shall be inspected and maintained including cleaning and replacement, etc. [Management Manual]</p> <p>B. Elevators shall be inspected and maintained to reduce machine loss. [Management Manual]</p> <p>C. Office equipment shall be regularly inspected and maintained as required.</p>	
<p>(4) Measures in installing new lighting systems, elevators, office equipment, and commercial equipment</p> <p>A. When installing a new lighting system, the following measures shall be enforced referring to the items related to lighting system of the standards of judgment for buildings to improve the efficiency of energy use:</p> <p>(a) Energy conserving facilities such as fluorescent lighting using inverters, etc. shall be considered for the installation.</p> <p>(b) High efficiency lamps such as HID lamps, etc. shall be introduced.</p> <p>(c) Maintenance factors such as cleaning, etc. shall be considered for the installation.</p> <p>(d) Comprehensive energy efficiency factors including efficiency of lighting circuits or lighting fixtures, etc. shall be considered.</p> <p>(e) For places where natural lighting can be used, separate circuits shall be considered for the installation.</p> <p>(f) Installation of motion sensors, utilization of timers, and coordination with maintenance facilities shall be considered.</p> <p>B. For elevators, efficiency of energy use shall be improved referring to the items related to elevators of the standards of judgment for buildings.</p> <p>C. Machineries, office equipment, and commercial equipment relating to lighting systems that fall under specified equipment with energy consumption efficiency higher than standard shall be introduced.</p>	
<p>- For escalators, efficient operation by motion sensors, etc. shall be considered.</p>	<p>-Energy management shall be enforced as time-series, considering past results to grasp consumption trend.</p> <p>-Comprehensive energy conservation control including combustion facilities, heat-using facilities, waste heat recovery facilities, cogeneration facilities, electricity-using facilities, air-conditioning facilities, ventilation facilities, and hot water supply facilities, etc. shall be considered.</p>
<p>- Selecting lighting systems with dimming capability or adopting automatic controlling system of lighting shall be considered.</p> <p>- Adopting LED (light-emitting diode) lighting systems shall be considered.</p>	<p>-Grasping deterioration of equipment and facilities and timing of maintenance, etc. shall be considered.</p>

## EC Guideline Reference Table for Major Facilities/Equipment

This table provides reference numbers & symbols for the articles and clauses of EC Guideline only where description in EM Manual (denoted by [Management Manual]) is required. As standard type facility is supposed, in case of actual use of this table some articles/clauses may not apply to or shall be added.

### II. EC Guideline for Factories

Management Classification of Facility/Assembly of Equipment	Items in EC Guideline	Management	Measurement & Recording	Maintenance & Inspection	Newly Installation/ Replacement	Notes
Steam Boiler (For Process)	1. Fuel Combustion	(1)A, B, C, D	(2)	(3)	(4)A, B	2-1. (1)A correspond to the case steam used for heating of fuel and etc. J applies to the generated steam. 3. (1)D correspond to the case of continuous blow down. Small once-through boiler bigger than 50L/H shall be subject to this category.
	2-1. Heating Equipment	(1)A, G, J	(2)	(3)	(4)A, B	
	3. Waste Heat Recovery	(1)A, B, C, D	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, B, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Steam Boiler (For HVAC)	1. Fuel Combustion	(1)A, B, C, D	(2)	(3)	(4)A, B	3. (1)D correspond to the case of continuous blow down.
	2-2. Air Conditioning Facilities	(1)C, D	(2)B	(3)A, C	(4)A	
	3. Waste Heat Recovery	(1)A, B, C, D	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, B, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
HVAC Equipment (AHU etc.)	2-2. Air Conditioning Facilities	(1)A, B, C, F	(2)A, B	(3)A, C	(4)A, C	3. correspond to the steam drain. 5-1. correspond to the piping for heat medium such as cold/hot water or steam. Supposing the pump for heat medium equipped.
	3. Waste Heat Recovery	(1)C	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Heat Transferring Equipment for HVAC System	2-2. Air Conditioning Facilities	(1)C, E	(2)B	(3)A, C	(4)A, C	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Absorption Refrigerator (Steam/Hot Water driven)	2-2. Air Conditioning Facilities	(1)C, D, E	(2)B	(3)A, C	(4)A, C	3. correspond to the steam drain.
	3. Waste Heat Recovery	(1)C	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Absorption Refrigerator (Fuel driven)	1. Fuel Combustion	(1)A, C, D	(2)	(3)	(4)A, B	Supposing that cooling tower and cooling water pump equipped.
	2-2. Air Conditioning Facilities	(1), C, D, E	(2)B	(3)A, C	(4)A, C	
	3. Waste Heat Recovery	(1)A,	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	

Electric Turbo Chiller	2-2. Air Conditioning Facilities	(1)C, D, E	(2)B	(3)A, C	(4)A, C	
	5-1. Thermal Insulation	—	—	(3)A,	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Heat Pump type Air Conditioner (Electric moter driven)	2-2. Air Conditioning Facilities	(1)A, B, F	(2)A, B	(3)A, C	(4)A, C	Suppoing packaged air conditioners, buil-multi air conditioners.
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Heat Pump type Air Conditioner (engine driven)	1. Fuel Combustion	(1)C, D	(2)	(3)	(4)A, B	
	2-2. Air Conditioning Facilities	(1)A, B, F	(2)A, B	(3)A, C	(4)A, C	
	3. Waste Heat Recovery	(1)A,	(2)	(3)		
	4-1. Power Generation Facilities	(1)A,	(2)	(3)	(4)A	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Hot Water Supply System	2-2. Hot Water System	(1)G, H, I	(2)C	(3)B, C	(4)B, C	Case that the heat source provided by the outside heat source such as DHC.
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Hot Water Supply System (Electric heater)	2-2. Hot Water System	(1)G, H, I	(2)C	(3)B, C	(4)B, C	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, B, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Hot Water Supply System (Hot water boiler included)	1. Fuel Combustion	(1)A, B, C, D	(2)	(3)	(4)A, B	Application of 1. (1)B shall be decided with taking the equivalent evaporation into consideration.
	2-2. Hot Water System	(1)G, H, I	(2)C	(3)B, C	(4)B, C	
	3. Waste Heat Recovery	(1)A,	(2)	(3)	(4)A, B,	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Hot Water Supply System (Steam utilized as heat source)	2-2. Hot Water System	(1)G, H, I	(2)C	(3)B, C	(4)B, C	
	3. Waste Heat Recovery	(1)C	(2)	(3)	(4)A, B,	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Lighting	6-2. Lighting Equipment	(1)A	(2)	(3)A	(4)A, C	
Lift/Elevator	6-2. Lift/Elevator	(1)B	—	(3)B	(4)B	
Power Receiving Facility	5-2. Power Receiving Facility	(1)A, B, C, D, E, F, G	(2)	(3)	(4)A, B	
Power Generation Facility (Steam Turbine and Condenser)	2-1. Heating Equipment	(1)A, J	(2)	(3)	(4)A, B	Ccase that the steam provided from the outside. 2-1. apply to the condenser.
	3. Waste Heat Recovery	(1)C	(2)	(3)	(4)A, B	
	4-1. Power Generation Facilities	(1)A, B	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	

Power Generation Facility (Diesel engine, Gas turbine)	1. Fuel Combustion	(1)C, D	(2)	(3)		2-1. correspond to the case that pre-heating of fuel applied. 3. (1)D apply to cooling water for the engine.
	2-1. Heating Equipment	(1)J	(2)	(3)	(4)A, B	
	3. Waste Heat Recovery	(1)A, D	(2)	(3)	(4)A, B	
	4-1. Power Generation Facilities	(1)A	(2)	(3)	(4)A, B	
	5-1. Thermal Insulation	—	—	(3)A	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Co-generation, CHP (Extract turbine, Back pressure turbine)	2-1. Heating Equipment	(1)J	(2)	(3)		2-1. (1)J correspond to extracted steam.
	3. Waste Heat Recovery	(1)C	(2)	(3)		
	4-2. Co-generation Facilities	(1)A, B	(2)A, B	(3)	(4)	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Co-generation, CHP (Diesel Engine, Gas Turbine)	1. Fuel Combustion	(1)C, D	(2)	(3)		2-1. (1)J correspond to generated steam.
	2-1. Heating Equipment	(1)J	(2)	(3)	(4)A, B	
	3. Waste Heat Recovery	(1)A, C, D	(2)	(3)	(4)A, B	
	4-2. Co-generation Facilities	(1)A	(2)A	(3)	(4)	
	5-1. Thermal Insulation	—	—	(3)A, B	(4)A, C	
	6-1. Motor Applied Facilities	(1)A, C, F	(2)	(3)A, B	(4)	
Air Compressor	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Pump, Fan	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Waste Water Treatment	6-1. Motor Applied Facilities	(1)A, B, C, F	(2)	(3)A, B	(4)	
Industrial Vehicle	1. Fuel Combustion	(1)C, D	(2)	(3)		

I. EC Guideline for Buildings

Facility	Management	Measurement & Recording	Maintenance & Inspection	Newly Installation/ Replacement	Notes
Air Conditioning Facility	1. (1)A, C, D, E, F	1. (2)A, B	1. (3)A, B	1. (4)A, B	Air Handling Unit, Fan Coil Unit, etc.
Absorption Refrigerator (Steam/Hot Water driven)	1. (1)C, D, E	1. (2)B	1. (3)B		
Absorption Refrigerator (fuel driven)	1. (1)B, C, D, E	1. (2)B	1. (3)B		
Electric Turbo Refrigerator/Chiller	1. (1)C, D, E	1. (2)B	1. (3)B		
GHP, EHP	1. (1)A, F	1. (2)A, B	1. (3)A, B	1. (4)A, B	Heat Pump
Boiler Facility	2. (1)A, B, C, D, E	2. (2)A	2. (3)A, B	2. (4)A, B, C, E	Hot Water Boiler included
Hot Water Supply System	2. (1)F, G, H	2. (2)B	2. (3)C	2. (4)D, E	
Lighting	3. (1)A	3. (2)	3. (3)A	3. (4)A, B	
Ventilator	1. (1)G	1. (2)C	1. (3)C	1. (4)C	
Lift/Elevator	3. (1)B		3. (3)B	3. (4)C	
Power Facility			3. (3)C		Plumbing System, Mechanical Parking Apparatus, etc.
Power Receiving Facility	4. (1)A, B	4. (2)	4. (3)	4. (4)A, B	
Power Generation Facility	5. (1)A	5. (2)	5. (3)	5. (4)A, B	
Co-generation Facility	5. (1)B	5. (2)	5. (3)	5. (4)C	
Office Equipment	6. (1)			6. (3)	
Consumer Appliance				6. (3)	
Commercial Equipment	7. (1)	7. (2)	7. (3)	7. (4)A, B, C	
BEMS Building Energy Management System				4. (4)C	