ASME EA-1G–2010
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Guidance for ASME EA-1, Energy Assessment for Process Heating Systems

AN ASME TECHNICAL REPORT

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Guidance for ASME EA-1, Energy Assessment for Process Heating Systems

A TECHNICAL REPORT PREPARED BY ASME AND REGISTERED WITH ANSI

ASME
SETTING THE STANDARD
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FOREWORD

This guidance document provides technical background and application details in support of the understanding and application of ASME EA-1, Energy Assessment for Process Heating Systems. This document provides background and supporting information to assist in applying the standard. The guidance document covers such topics as rationale for the technical requirements of the assessment standard; technical guidance, application notes, alternative approaches, tips, techniques, and rules-of-thumb; and example results from fulfilling the requirements of the assessment standard. This guidance document was developed to be used as an application guide on how to utilize ASME EA-1.

ASME EA-1 provides a standardized framework for conducting an assessment of process heating systems. A process heating system is defined as a group (or a set, or combination) of heating equipment used for heating material used in production of goods in an industrial plant. Assessments performed using the requirements set by ASME EA-1 involve collecting and analyzing system design, operation, energy use, and performance data and identifying energy performance improvement opportunities for system optimization. These assessments may also include additional information, such as recommendations for improving resource utilization, reducing per unit production cost, reducing life cycle costs, and improving environmental performance of the assessed system(s).

ASME EA-1 provides a common definition for what constitutes an assessment for both users and providers of assessment services. The objective is to provide clarity for these types of services that have been variously described as energy assessments, energy audits, energy surveys, and energy studies. In all cases, systems (energy-using logical groups of industrial equipment organized to perform a specific function) are analyzed through various techniques such as measurement, resulting in the identification, documentation, and prioritization of energy performance improvement opportunities.

This guide is part of a portfolio of documents and other efforts designed to improve the energy efficiency of industrial facilities. Initially, assessment standards and guidance documents are being developed for compressed air, process heating, pumping, and steam systems. Other related existing and planned efforts to improve the efficiency of industrial facilities include

(a) ASME Assessment Standards, which set the requirements for conducting and reporting the results of a compressed air, process heating, pumping, and steam assessment

(b) a certification program for each ASME assessment standard that recognizes certified practitioners as individuals who have demonstrated, via a professional qualifying exam, that they have the necessary knowledge and skills to apply the assessment standard properly

(c) an energy management standard, A Management System for Energy, ANSI/MSE 2000:2008, which is a standardized approach to managing energy supply, demand, reliability, purchase, storage, use, and disposal and is used to control and reduce an organization's energy costs and energy-related environmental impact

NOTE: ANSI/MSE 2000:2008 will eventually be superseded by ISO 50001, now under development.

(d) an ANSI measurement and verification protocol that includes methodologies for verifying the results of energy efficiency projects

(e) a program, Superior Energy Performance, that will offer an ANSI-accredited certification for energy efficiency through application of ANSI/MSE 2000:2008 and documentation of a specified improvement in energy performance using the ANSI measurement and verification protocol

The complementary documents described above, when used together, will assist organizations seeking to establish and implement company-wide or site-wide energy plans.

Publication of this Technical Report that has been registered with ANSI has been approved by ASME. This document is registered as a Technical Report according to the Procedures for the Registration of Technical Reports with ANSI. This document is not an American National Standard and the material contained herein is not normative in nature. Comments on the content of this document should be sent to the Managing Director, Technical, Codes and Standards, ASME.

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General. ASME documents are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this technical report may interact with the Committee by proposing revisions and attending Committee meetings. Correspondence should be addressed to:

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Proposing Revisions. Revisions are made periodically to the technical report to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the technical report. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this technical report. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Attending Committee Meetings. The EA Committee holds meetings or telephone conferences, which are open to the public. Persons wishing to attend any meeting or telephone conference should contact the Secretary of the EA Standards Committee.

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GUIDANCE FOR ASME EA-1, ENERGY ASSESSMENT FOR PROCESS HEATING SYSTEMS

1 SCOPE AND INTRODUCTION

1.1 Scope

This guidance document provides an application guide on how to utilize ASME EA-1, Energy Assessment for Process Heating Systems. This guidance document provides background and supporting information to assist in applying the standard.

1.2 Limitations

ASME EA-1 does not provide guidance on how to perform a process heating energy assessment, but sets the requirements that need to be performed during the assessment. ASME EA-1 was written in a form suitable for a standard, with concise text and without examples or explanations. This document was developed to be used in conjunction with the standard in order to give basic guidance on how to fulfill the requirements of the standard. This document is only a guide, does not set any new requirements, and ASME EA-1 can used with or without this document.

2 DEFINITIONS

assessment: activities undertaken to identify energy performance improvements in a process heating system that consider all components and functions, from energy inputs to the work performed as the result of these inputs. Individual components or subsystems might not be addressed with equal weight, but system assessments shall be sufficiently comprehensive to identify the major energy efficiency opportunities for improving overall system energy performance. System impact versus individual component characteristics should be discussed.

batch furnace: furnace into which the entire workload is introduced periodically.

continuous furnace: furnace into which the workload is introduced continuously or at short time intervals.

energy intensity: the ratio of the energy used during a heating operation to the product unit or mass that absorbs the energy. Also called "specific energy."

energy use baseline: amount of energy use measured during the operating conditions existing at the time of the assessment. It should be expressed in terms of energy per unit of production, energy per unit of mass or volume produced or in terms of energy per unit of time. Examples of the base line units are Btu/lb (kWh/kg), Btu/hr (kW), or Btu/unit of product (widget) (kWh/unit of product).

functional requirement: description of what the plant expects the manufacturing system to do using the heating system. The parameters could be expressed in terms such as production output, quality (insofar as it can be controlled by the heating process), energy consumption (per production unit, if applicable), and emissions.

furnace: term generically used in this Standard to describe process heating equipment such as furnaces, melters, ovens, and heaters.

heat balance: a procedure in which an imaginary control boundary is placed around a process heating system and all energies and mass flows crossing that boundary are determined and summed.

maximum installed energy input rate: The maximum amount of energy that can be supplied, usually expressed in such terms as Btu/hr, kW, kCal/hr, and kJ/h. In most cases the maximum installed energy input rating can be obtained from the nameplate of the heating equipment, the operating manual, design drawings, or documents provided by the equipment supplier. In some cases this is known as “connected heat input” or power rating.

maximum production capacity: maximum attainable or design production capacity expressed in such terms as lbs/hr, t/hr, or number of pieces/hr while operating the equipment in safe mode.

normal operating conditions: the conditions at which the heating system is operated for a majority of the time. Parameters such as production rate, operating temperatures and pressures, and load or charge conditions (e.g.,