ASME EA-3G–2010

(ANSI Designation: ASME TR EA-3G–2010)

Guidance for ASME EA-3, Energy Assessment for Steam Systems

AN ASME TECHNICAL REPORT

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Guidance for ASME EA-3, Energy Assessment for Steam Systems

A TECHNICAL REPORT PREPARED BY ASME AND REGISTERED WITH ANSI

ASME
SETTING THE STANDARD

Three Park Avenue • New York, NY • 10016 USA

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This Guide will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Guide issued to this edition.

The American Society of Mechanical Engineers
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FOREWORD

This guidance document provides technical background and application details in support of the understanding and application of ASME EA-3, Energy Assessment for Steam Systems. This guidance document provides background and supporting information to assist in applying the standard. The guidance document covers such topics as the rationale for the technical requirements of the assessment standard; technical guidance, application notes, alternative approaches, tips, techniques, 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-3.

ASME EA-3 provides a standardized framework for conducting an assessment of steam systems. A steam system is defined as a system containing steam generator(s) or other steam source(s), a steam distribution network, and end use equipment. Cogeneration and power generation components may also be elements of the system. If steam condensate is collected and returned, the condensate return subsystem is a part of the steam system. Assessments performed using the requirements set by ASME EA-3 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-3 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 resulting in the identification, documentation, and prioritization of 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 compressed air, process heating, pumping, and steam assessments

(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, which is 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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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.

GUIDANCE FOR ASME EA-3, ENERGY ASSESSMENT FOR STEAM SYSTEMS

1 SCOPE

1.1 Scope

This guidance document provides an application guide on how to utilize ASME EA-3, Energy Assessment for Steam Systems. This guidance document provides background and supporting information to assist in applying the standard.

1.2 Purpose

ASME EA-3 sets the requirements that need to be performed during the assessment. ASME EA-3 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 to give basic guidance on how to fulfill the requirements of the standard. This document is only a guide, it does not set any new requirements, and ASME EA-3 can be used with or without this document.

2 DEFINITIONS

assessment: activities undertaken to identify energy performance improvement opportunities in a steam system that consider all components and functions, from energy inputs to the work performed as the result of these inputs. Individual components or subsystems need not be addressed with equal weight, but 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.

assessment conditions: the operating conditions during the assessment period that serve as the basis of the measurements for the assessment investigations.

baseline conditions: a set of operating conditions, and the associated system energy use, that the assessment team will use as a basis for calculating energy improvement opportunity impacts. Baseline conditions can, for example, be the assessment operating conditions, normal operating conditions, future operating conditions, or past operating conditions.

Conservation of Energy (energy balance): the application of the principle of *conservation of energy* as developed from the *first law of thermodynamics* is identified as an *energy balance*. Stated simply, the principle of conservation of energy is as follows: *energy can neither be created nor destroyed by natural processes; it can only change form*. An energy balance can be applied to a single component, a composite subsystem, or an entire system.

Conservation of Mass (mass balance): the application of the principle of *conservation of mass* as developed from the *first law of thermodynamics* is identified as a *mass balance*. Stated simply, the principle of conservation of mass is as follows: *mass can neither be created nor destroyed by natural processes; it can only change form*. A mass balance can be applied to a single component, a composite subsystem, or an entire system.

efficiency: the general term used to describe the effectiveness of energy utilization in a component, a subsystem, or an entire system. Specific definitions are ascribed to the various applications of efficiency. A general identification of efficiency that satisfies most applications is the ratio of the useful energy output divided by the energy input.

energy stream: a flow of material, heat, and/or power crossing a boundary of a system. Common energy streams are electricity, fuel (e.g., natural gas, coal, process waste fuel), stack gas, steam, or water (including blowdown and condensate).