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## **Pump system energy assessment**

*Évaluation énergétique des systèmes de pompage*



Reference number  
ISO/ASME 14414:2015(E)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword - Supplementary information](#)

ISO/ASME 14414 was prepared by ISO/TC 115, *Pumps*, in collaboration with ASME EA Standards Committee — *Industrial System Energy Assessment*.

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This standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

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ISO/ASME 14414 was approved as an American National Standard by the American National Standards Institute on 2015-02-06.

## Introduction

Pumping systems account for a significant portion of a facility's energy consumption in many industries. In the majority of pumping systems the energy added to the working liquid by the pump is much greater than is required by the process. The excess energy added to the system (e.g. due to throttled control valve) increases heat, noise and vibration but also can bring the system's maintenance costs. The addition of excessive energy to the system often results in over-sizing piping system components such as pumps, process components, and control valves, resulting in an increase in capital costs.

This International Standard provides a method to assess pump systems, to identify and quantify pump system energy consumption reduction opportunities and reliability improvement opportunities. It gives a common definition for what constitutes an assessment for both users and providers of assessment services. Its objective is to provide clarity for these types of services which have been variously described as energy assessments, energy audits, energy surveys and energy studies.

In all cases, systems (energy-using logical groups of equipment organized to perform a specific function) are analysed through various techniques such as measurement, resulting in identification, documentation and prioritization of energy performance improvement opportunities.

When contracting for assessment services, facility personnel may use this International Standard to define and communicate their desired scope of assessment activity to third party contractors or consultants.

This International Standard is expected to contribute to decreased energy consumption and consequently to decreased carbon footprint.

This International Standard includes the required assessment report content in [Annex A](#). It gives examples of efficient system operation and energy reduction opportunities in [Annex B](#), information on competencies and experiences welcomed to perform audit in [Annex C](#), guidelines for analysis software in [Annex D](#), a typical example of pre-screening worksheet in [Annex E](#), information on specific energy in [Annex F](#), information on the concept of parasitic power in [Annex G](#) and examples of pumping system efficiency indicator in [Annex H](#).

This International Standard is developed within the framework of ISO 50001, ISO 50002 and ISO 50003.

# Pump system energy assessment

## 1 Scope

This International Standard sets the requirements for conducting and reporting the results of a pumping system energy assessment (hereafter referenced as “assessment”) that considers the entire pumping system, from energy inputs to the work performed as the result of these inputs.

The objective of a pumping system energy assessment is to determine the current energy consumption of an existing system and identify ways to improve system efficiency.

These requirements consist of

- organizing and conducting an assessment,
- analysing the data from the assessment, and
- reporting and documenting assessment findings.

This International Standard is designed to be applied, to open and closed loop pumping systems typically used at industrial, institutional, commercial, and municipal facilities, when requested.

This International Standard is focused on assessing electrically-driven pumping systems, which are dominant in most facilities, but is applicable with other types of drivers, such as steam turbines and engines, and drives such as belt.

The International Standard does not

- a) specify how to design a pumping system,
- b) give detailed qualifications and expertise required of the person using the International Standard although provides a list of body of knowledge in [Annex C](#),
- c) address the training or certification of persons,
- d) specify how to implement the recommendations developed during the assessment, but does include requirements for an action plan,
- e) specify how to measure and validate the energy savings that result from implementing assessment recommendations,
- f) specify how to make measurements and how to calibrate test equipment used during the assessment,
- g) specify how to estimate the implementation cost or conduct financial analysis for recommendations developed during the assessment,
- h) specify specific steps required for safe operation of equipment during the assessment. The facility personnel in charge of normal operation of the equipment are responsible for ensuring that it is operated safely during the data collection phase of the assessment,
- i) address issues of intellectual property, security, confidentiality, and safety.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.