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Monitoring and energy performance measurements of compressed air systems

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Preface

This is the first edition of CSA C837, *Monitoring and energy performance measurements of compressed air systems*.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of Natural Resources Canada, BC Hydro, Manitoba Hydro, Hydro Quebec, Ontario Ministry of Energy, Canadian Electricity Association, Independent Electricity System Operator, Nova Scotia Department of Energy, Efficiency Nova Scotia, and Sask Power.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the Subcommittee on Air Compressors, under the jurisdiction of the Technical Committee on Industrial Equipment and the Strategic Steering Committee on Performance, Energy Efficiency, and Renewables, and has been formally approved by the Technical Committee.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
3) *This Standard was developed by consensus, which is defined by* CSA policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
4) *To submit a request for interpretation of this Standard, please send the following information to* ***inquiries@csagroup.org*** *and include "Request for interpretation" in the subject line:*
   a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
   b) *provide an explanation of circumstances surrounding the actual field condition; and*
   c) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

   Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are available on the* Current Standards Activities *page at standardsactivities.csa.ca.*
5) *This Standard is subject to review within five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to* ***inquiries@csagroup.org*** *and include "Proposal for change" in the subject line:*
   a) *Standard designation (number);*
   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

C837-16
Monitoring and energy performance measurements of compressed air systems

0 Introduction

0.1

Historically, there has been a lack of consistency in the methods used to determine the energy performance of compressed air systems. This often makes it difficult for stakeholders to make informed decisions concerning energy efficiency. This lack of consistent information complicates the task of ensuring any existing, new, or optimized system is operating efficiently.

This Standard specifies which information is to be gathered and how system parameters like power, energy, flow, pressure, and production output are to be measured or calculated using transparent, uniform, validated, repeatable, and consistent methods of measurement.

0.2

This standard provides guidance in defining methodologies for establishing energy performance indicators (EnPIs) and energy baselines (EnBs) to be used as part of an overall energy management system (EnMS) or other related purposes. For compressed air systems, specific requirements outlining a consistent methodology for measuring, estimating, and reporting the energy performance are provided.

The intent of this Standard is to align with the requirements of ISO 50006, *Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) — General principles and guidance*, adapted for compressed air system.

This Standard is not intended as a replacement for a compressed air system energy efficiency assessment (audit) as defined by other standards, such as ISO 11011, nor does it specify measures that can be used to improve the energy efficiency of a compressed air system.

1 Scope

1.1 Inclusions

This Standard is intended to be used for compressed air systems with the following characteristics:

a) electrically driven three-phase air compressors equal to or greater than 5 horsepower;
b) positive displacement stationary air compressors and associated equipment;
c) operating pressures between 2.5 and 17 bar(g) (36 and 250 psi(g)); and
d) industrial and commercial applications of compressed air.

1.2 Exclusions

The Standard is not intended to be used for the following purposes or systems:

a) electrically driven single phase compressors;
b) bench testing, measurement, or certification of the performance of an air compressor;
c) measurement of heat recovery;

d) process compressors for gases other than air;
e) energy or water measurements for the mechanical cooling of water-cooled air compressors;
f) compressors driven by energy sources other than electric motors; and
g) compressors that are regulated by transportation standards.

1.3 Dual dimensions

The values given in SI units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only.

Note: *In the compressed air industry, both metric and imperial units are found in common practice and so are both used extensively in this Standard.*

1.4 Terminology

In this Standard, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

Note: *See also Annex D.*

ISO (International Organization for Standardization)

1217:2009
Displacement compressors — Acceptance tests

50006:2014
Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI) —General principles and guidance

11011:2013
Compressed air — Energy efficiency — Assessment