

Benchmark energy factor assessment of slurry pumping systems



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Preface

This is the first edition of CSA C502, *Benchmark energy factor assessment of slurry pumping systems*.

This Standard is intended as a guide to be used to assess the overall energy performance of existing industrial slurry pumping systems by using benchmark energy factor (BEF) concepts. The BEF is the energy consumption of a system divided by the essential energy required to provide the same work under ideal conditions.

CSA Group acknowledges that the development of this Standard was made possible in part by the financial support of BC Hydro, Hydro Québec, Independent Electricity System Operator, and Manitoba Hydro.

This Standard was prepared by the Subcommittee on Benchmark Energy Factor Assessment of Slurry Pumping Systems, under the jurisdiction of the Technical Committee on Energy Efficiency of Industrial Equipment and Systems and the Strategic Steering Committee on Performance, Energy Efficiency, and Renewables, and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

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.*
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 - 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.
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 - b) *relevant clause, table, and/or figure number;*
 - c) *wording of the proposed change; and*
 - d) *rationale for the change.*

CSA C502:21

Benchmark energy factor assessment of slurry pumping systems

1 Scope

1.1 Inclusions

This Standard is intended for industrial slurry pumping systems with the following characteristics:

- a) electrically driven single and multi-stage slurry pumps;
- b) flowrate greater than 10 L/s;
- c) average particle size (d_{50}) between 50 μm and 8 mm;
- d) settling slurry;
- e) slurry behaving as a viscous Newtonian fluid (shear stress is linear and proportional to velocity gradient);
- f) two-phase (liquid and solid) or three-phase (liquid, solid, and air) slurries;
- g) any viscosity; and
- h) slurry pumping systems with total pipe length less than 100 m. For longer pipe length, see Clause [5.4.2](#).

1.2 Exclusions

This Standard is not intended to be used for pumping systems with the following characteristics:

- a) slurries with transport fluid other than water;
- b) gravel and dredge pumpage (average particle size greater than 8 mm); and
- c) non-settling particle in concentrations that lead to a non-Newtonian slurry.

1.3 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.

1.4 Units of measurement

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.