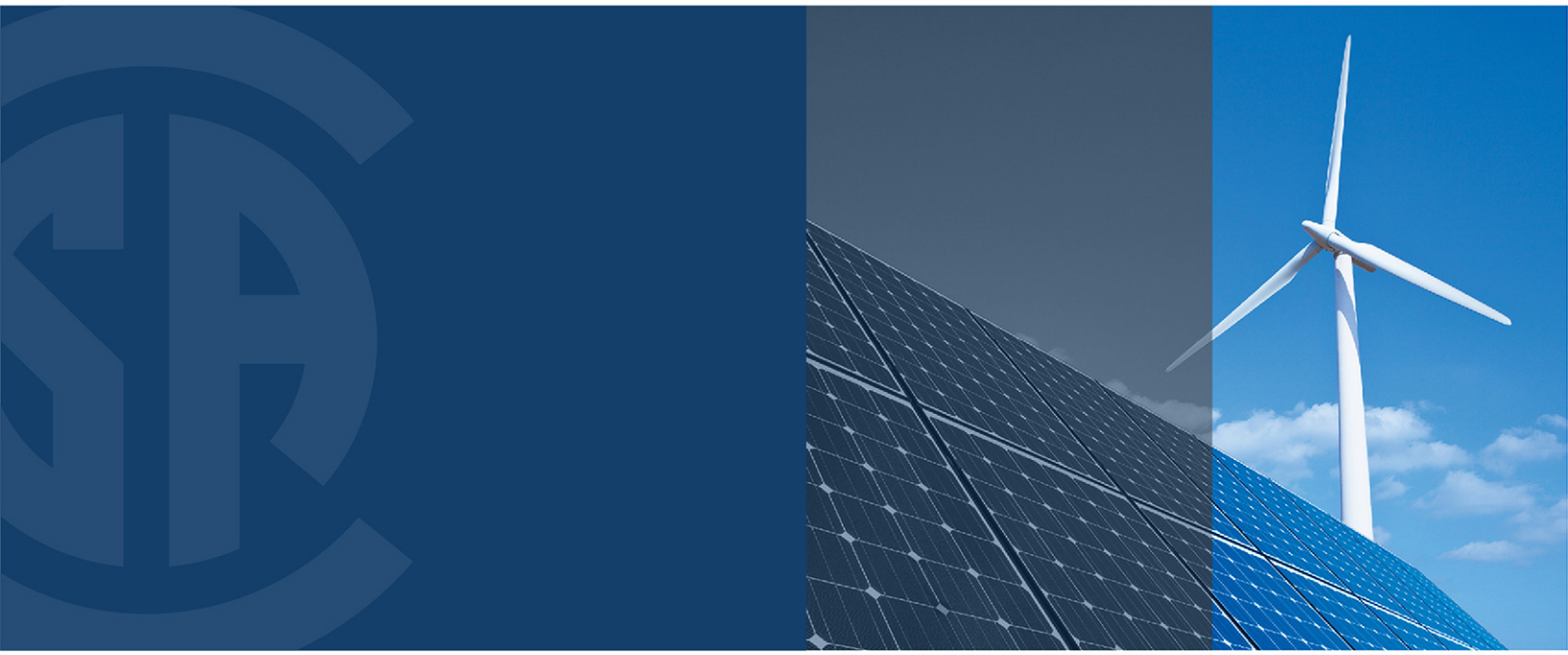
CSA C61400-1:21
(IEC 61400-1:2019, MOD)
National Standard of Canada

CSA C61400-1:21
Wind energy generation systems — Part 1: Design requirements
(IEC 61400-1:2019, MOD)



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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 to judge its suitability for their particular purpose.

National Standard of Canada

CSA C61400-1:21

Wind energy generation systems — Part 1: Design requirements

(IEC 61400-1:2019, MOD)

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Reviewed by

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CSA Preface

This is the third edition of CSA C61400-1, *Wind energy generation systems — Part 1: Design requirements*, which is an adoption, with Canadian deviations, of the identically titled IEC (International Electrotechnical Commission) Standard 61400-1 (fourth edition, 2019-02). It supersedes the previous edition, published in 2014 as CAN/CSA-C61400-1 (adopted IEC 61400-1:2007), *Wind turbines — Part 1: Design requirements*.

For brevity, this Standard will be referred to as "CSA C61400-1" throughout.

This Standard is intended to be used in conjunction with CSA C22.2 No. 272:20, *Wind turbine electrical systems*.

The Canadian deviations reflect essential differences for electrical, environmental, and structural safety requirements and provide additional requirements and guidance for the broader range of Canadian external conditions.

This Standard was reviewed for Canadian adoption by the CSA Subcommittee on Wind Turbines — Part 1: Design Requirements, under the jurisdiction of the CSA Technical Committee on Wind Turbines and the CSA Strategic Steering Committee on Requirements for Electrical Safety, 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.

Interpretations: The Strategic Steering Committee on Requirements for Electrical Safety has provided the following direction for the interpretation of standards under its jurisdiction: "The literal text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant CSA committee interpretation has not already been published, CSA Group's procedures for interpretation shall be followed to determine the intended safety principle."

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. 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.*

Canadian deviations

The following deviations are intended to meet Canadian product requirements and to align with the *Canadian Electrical Code, Part I* and the *National Building Code of Canada*.

Introduction

[Replace the first paragraph with the following]

This Standard specifies minimum design requirements for wind turbine installations in Canada and is not intended for use as a complete design specification or instruction manual.

The majority of current and proposed Canadian wind turbine installations are or will be located in environments that experience icing conditions more severe than and temperatures colder than the icing conditions and temperatures within the normal design ranges identified in IEC 61400-1. This fact has been a primary consideration in the development of the Canadian deviations to this Standard.

2 Normative references

[Add the following]

In this Standard, any reference to International Standards shall be replaced by the relevant National Standard of Canada.

Where reference is made to CSA Group or other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition. This Standard refers to the following publications, and the years shown indicate the latest editions available at the time of printing:

CSA Group

C22.1:21
Canadian Electrical Code, Part I

C22.2 No. 272:20
Wind turbine electrical systems

CAN/CSA-S37-18
Antennas, towers, and antenna-supporting structures

Z460:20
Control of hazardous energy — Lockout and other methods

Z462:21
Workplace electrical safety

The following National Standards of Canada, published by CSA Group, are adoptions of IEC Standards. The requirements of these CSA Group Standards shall take precedence over the International Standards on which they are based. Any reference within CSA C61400-1 to the International Standard shall be replaced by a reference to the equivalent Canadian Standard.

CAN/CSA-C22.2 No. 60529:16 (R2021)
Degrees of protection provided by enclosures (IP Code)

C22.3 No. 60826:19
Overhead transmission lines — Design criteria

CSA IEC 61000-6-1:19
Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity standard for residential, commercial and light-industrial environments

CAN/CSA-IEC 61000-6-2:18
Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity standard for industrial environments

C61400-2:19
Wind turbines — Part 2: Small wind turbines

C61400-3:11 (R2021)
Wind turbines — Part 3: Design requirements for offshore wind turbines

CAN/CSA-IEC 61400-24:12 (R2017)
Wind turbines — Part 24: Lightning protection

NRCC (National Research Council Canada)
National Building Code of Canada (NBCC), 2015

Structural Commentaries, User's Guide — NBC 2015, Part 4 of Division B

U.S. Federal Emergency Management Agency (FEMA)
P695 (2009)
Quantification of Building Seismic Performance Factors

3 Terms and definitions

3.74

[Replace this definition with the following]

wind turbine electrical system
a system consisting of all the electrical equipment integral to the wind turbine, including the wind turbine terminals, generators, inverters, controllers, and equipment for grounding, bonding, and communications up to the point of common coupling to the load or grid

[Add the following definitions]

3.77A

extreme wind pressure
the hourly wind pressure at 10 m, in kPa, with a recurring interval of 50 years, obtained from Table C-2 of the *National Building Code of Canada*, noted as *q* (adapted from the *NBCC*)

3.77B

site specific extreme wind pressure
the site specific equivalent wind pressure at 10 m, in Pa, averaged over 1 h, with a recurring interval of 50 years, supplied by Environment and Climate Change Canada on their Site Specific Hourly Wind Pressure Documentation Sheet, noted as Q_e

5 Principal elements

5.5 Wind turbine markings

[Add the following bulleted items]

- rated load amperes;
- whether for ac, dc, or both;
- number of phases;
- rated output current;
- overcurrent protection values provided by the wind turbine generator for stator and rotor (if applicable);
- short-circuit current rating (SCCR);
- maximum output short circuit current;
- a brief system description, including the type of generator (synchronous or induction);
- evidence of approval or other markings necessary to ensure safe and proper operation.

6 External conditions

6.4 Other environmental conditions

6.4.3.5 Earthquakes

[Replace this Clause with the following]

For consideration of earthquake conditions and effects, see Clause 11.6 and Annex D. For Canadian seismic hazard data, see Volume 1, Division B, Appendix C (“Climatic and Seismic Information”) of the *National Building Code of Canada*.

6.5 Electrical power network conditions

[Replace the third bulleted item with the following]

- Voltage imbalance — the ratio of negative-sequence component to positive-sequence component, not exceeding 2%.