PLUS 61400-12

CSA Group

CSA Guide to Canadian wind turbine codes and standards

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Preface

This is the second edition of PLUS 61400, *CSA Guide to Canadian wind turbine codes and standards.* It supersedes the preliminary edition published in 2008 under the same title but without the designation.

Changes in this edition include restructuring of topics into four main categories and content revision to match the current state of requirements within Canada.

CSA Group acknowledges that the development of this Guide was made possible, in part, by the financial support of Natural Resources Canada (NRCan).

This Guide was developed by the Subcommittee on CSA Guide to Canadian Wind Codes and Standards, under the jurisdiction of the Technical Committee on Wind Turbines and the Strategic Steering Committee on Requirements for Electrical Safety, and has been reviewed 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 Special Publication is stated in its Preface, it is important to note that it remains the responsibility of the users of this Special Publication to judge its suitability for their particular purpose.*

(3) *All enquiries regarding this Special Publication should be addressed to Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.*

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0 Introduction

Over a period of two decades, the Canadian wind-energy sector has evolved from a few small projects to one of the fastest growing wind-energy markets in the world. While this growth has been supported and encouraged by various levels of government across Canada, many of the projects have experienced cost and schedule overruns, litigation, and in some cases cancellation related to confusing or unclear regulatory requirements, which differ considerably throughout the various Canadian jurisdictions. It is important for the user of this Guide to understand that the Canadian regulatory environment is demanding and can be perceived as being complicated. Wind-energy developers are subject to dozens of approval processes involving various federal (national), provincial/territorial (state), and municipal (local) authorities. This can be further complicated by the jurisdictional makeup and ownership of the Canadian electrical transmission and distribution systems, which range from locally-owned private businesses to fully integrated provincially-owned systems, with a wide range of regulatory roles and connection requirements.

In lieu of specific and up-to-date Canadian regulations addressing the subject of wind energy, Canadian authorities having jurisdiction (AHJ) and professional engineers have used a range of reference publications to determine how to evaluate and approve the development of wind turbine installations with respect to subjects such as effects on the environment, zoning, power quality, grid integration, performance testing, and electrical, worker, and structural safety. In many cases, stakeholders have undertaken significant engineering studies to supplement the available information in order to demonstrate due diligence.

A subset of the subjects described above deals with codes and standards relating to the structural, mechanical, electrical, and operating characteristics of wind turbines. These are the subject areas where CSA Group input has been sought since the 1980s, when the following National Standards of Canada pertaining to wind turbines were developed:

- CAN/CSA-C61400-1-08, *Wind Turbines — Part 1: Design Requirements*
- CAN/CSA-C61400-2-08, *Wind Turbines — Part 2: Design Requirements for Small Wind Turbines*
- CAN/CSA-C61400-3-11, *Wind turbines — Part 3: Design requirements for offshore wind turbines*
- CAN/CSA-C61400-11-07, *Wind Turbine Generator Systems — Part 11: Acoustic Noise Measurement Techniques*
- CAN/CSA-C61400-12-1-07, *Wind Turbines — Part 12-1: Power Performance Measurements of Electricity Producing Wind Turbines*
- CAN/CSA-C61400-24-12, Wind *Turbines — Part 24: Lightning Protection*
- C22.1-12, *Canadian Electrical Code* (Section 64, Safety Standards for Electrical Installations, Sections for Small and Large Wind Systems).

Note: *The following Standards have been superseded by the standards listed above or have been withdrawn by CSA Group:*

- CAN/CSA-F416-87, *Wind Energy Conversion Systems (WECS) — Safety, Design, and Operation Criteria*;
- CAN/CSA-F417-M91, *Wind Energy Conversion Systems (WECS) — Performance*;
- CAN/CSA-F429-M90, *Recommended Practice for the Installation of Wind Energy Conversion Systems*; and
- CAN/CSA-F418-M91, *Wind Energy Conversion Systems (WECS) — Interconnection to the Electric Utility* (withdrawn by CSA in 2004). See Clause 10 (Electrical connections — Grid connected) for interconnection information.

For a list of current regulatory adoptions of CSA Group Wind Turbine Standards, see Annex A.

The approach being undertaken by CSA Group to update the National Standards of Canada for wind turbines is based on the adoption of the body of knowledge published by the International Electrotechnical Commission (IEC) Technical Committee 88 (TC 88) on Wind Turbines. It is the intent of CSA Group and its members to support the subsequent adoption of these new National Standards of

Canada into any applicable regulatory publications when the regulatory publications are updated. Annex A contains a table listing CSA Group standards that have been referenced in regulation by province/territory.

1 Scope and overview

1.1 Scope

This Guide provides general information on codes and standards pertaining to the approval, design, installation, operation, and maintenance of wind turbines for use in Canada.

Some of the information presented might appear redundant or obvious to a Canadian user; however, CSA Group receives questions from all over the world about these subjects and therefore some basic information about Canadian regulatory systems has also been included to serve these users.

To maintain relevance, the intent of this Guide will be updated and reissued as required and as resources permit to reflect timely information on the state of standards, codes, and related subject matter pertaining to wind turbines. CSA Group encourages all users of this Guide to contribute to this effort.

Notes:

(1) *Some items or documents referenced within this Guide are not codes or standards, but are included to allow the user to understand other requirements that might be part of a wind power project within Canada.*

(2) *This publication is a guide only and not an all-encompassing document. The user might require further information to complete their specific requirements.*

1.2 Overview of Clauses 4 to 7 (specific regulatory and approval subject areas)

Clauses 4 to 7 address twenty-three specific subject areas related to the development of a typical wind-energy project that currently involves (or could eventually involve) regulatory or equivalent formal approval processes. Specific information on any associated standards or codes known to CSA Group is provided for each subject area. Likely sources of additional information are also provided.

2 Reference publications

This Guide makes reference to the following publications:

CSA Group

C22.1-12
Canadian Electrical Code, Part 1

CAN/CSA-C22.2 No. 257-06 (R2011)
Interconnecting inverter-based micro-distributed resources to distribution systems

CAN/CSA-C22.3 No. 9-08
Interconnection of distributed resources and electricity supply systems

CAN/CSA-C61400-1-08
Wind Turbines — Part 1: Design Requirements

CAN/CSA-C61400-2-08
Wind Turbines — Part 2: Design Requirements for Small Wind Turbines

CAN/CSA-C61400-3-11
Wind turbines — Part 3: Design requirements for offshore wind turbines