CSA GROUP™

CSA R101:22
National Standard of Canada

Automated hydrometeorological monitoring stations: Site selection, instrument installation, and instrument maintenance

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Preface

This is the first edition of CSA R101, *Automated hydrometeorological monitoring stations: Site selection, instrument installation, and instrument maintenance*.

CSA Group has been commissioned to develop four national Standards in support of hydrometeorological monitoring programs with automated, surface-based, in-situ stations. The Standards cover the following areas:

a) dissemination of metadata for automated hydrometeorological monitoring stations;
b) automated hydrometeorological monitoring stations: site selection, instrument installation, and instrument maintenance;
c) a data quality rating system; and
d) dissemination of hydrometeorological data.

These Standards promote the standardization of methods, procedures, techniques, and practices used for collecting hydrometeorological data and related information across Canada. They are meant to be inclusive of large as well as small installations in order to encapsulate a maximum number of automated observing sites describing atmospheric and hydrologic variables.

Standardization and improved best practices will help make more hydrometeorological observations become more easily accessible to a larger and better-informed audience.

CSA Group acknowledges that the development of this Standard was made possible, in part, by the financial support of the Standards Council of Canada.

This Standard was prepared by the Subcommittee on Siting, Design, Operations, and Maintenance of Canadian Weather Stations, under the jurisdiction of the Technical Committee on Weather Stations and the Strategic Steering Committee on Environment and Business Excellence, 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.

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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.*
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   d) *rationale for the change.*

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0 Introduction

The accuracy of observations greatly affects the quality of information derived from measured data, the quality of the environmental models developed with those data and the quality of model simulations (Sevruk, 2004).

The purpose of this Standard is to provide guidance on optimally selecting sites for installing automated hydrometeorological stations, and on classifying monitoring sites and the placement of specific instruments. Further, this Standard outlines instrument installation, maintenance, calibration, and field verification best practices. Adherence to these measures will ultimately improve the representativeness of observations for the intended purpose, improve the comparability of measurements and reduce measurement uncertainty.

The monitoring objective dictates the monitoring location, which instrumentation or technology to use, at which position to mount the instrumentation, whether redundancies are required and the effort put into ongoing maintenance and calibration.

While the choice of instrument and technology can affect the accuracy of observations, this Standard does not provide any guidance on instrument and technology selection.

The optimal monitoring site depends on data users' needs, which in turn determines the environmental conditions the data are to represent. Hence monitoring sites can vary greatly for automated hydrometeorological monitoring stations (AHS) supporting, for example, numerical weather prediction, climate prediction, aviation, crop irrigation management, hydrologic modelling, fire weather monitoring, avalanche forecasting, the monitoring of road and driving conditions, the calculation of energy and moisture fluxes, or the characterization of a specific micrometeorological regime.

The characteristics of a monitoring location, such as wind exposure, elevation and shading, not only have a significant effect on the representativeness of the data collected but also on the inter-comparability of regional data. Changes in these characteristics over time can lead to data inhomogeneities and consequently increase data uncertainty.

Since there are many, often nuanced, objectives for AHSs and monitoring networks this Standard cannot account for all. Instead, this Standard focuses on identifying optimal and less than optimal variable, and sometime technology-specific monitoring locations that represent regional hydrometeorological processes on the surrounding land surface.

This Standard also provides a framework for classifying monitoring locations and installations for specific instruments. This classification system for optimally selecting monitoring sites is based on the objective of representing regional hydrometeorological processes on the surrounding land surface.