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Air quality — Environmental meteorology —

Part 2: Ground-based remote sensing of wind by heterodyne pulsed Doppler lidar

Qualité de l'air — Météorologie de l'environnement —

Partie 2: Télédétection du vent par lidar Doppler pulsé hétérodyne basée sur le sol

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 5, *Meteorology*, and by the World Meteorological Organization (WMO) as a common ISO/WMO Standard under the Agreement on Working Arrangements signed between the WMO and ISO in 2008.

A list of all parts in the ISO 28902 series can be found on the ISO website.

Introduction

Lidars ("light detection and ranging"), standing for atmospheric lidars in the scope of this document have proven to be valuable systems for remote sensing of atmospheric pollutants, of various meteorological parameters such as clouds, aerosols, gases and (where Doppler technology is available) wind. The measurements can be carried out without direct contact and in any direction as electromagnetic radiation is used for sensing the targets. Lidar systems, therefore, supplement the conventional in-situ measurement technology. They are suited for a large number of applications that cannot be adequately performed by using in situ or point measurement methods.

There are several methods by which lidar can be used to measure atmospheric wind. The four most commonly used methods are pulsed and continuous wave coherent Doppler wind lidar, direct-detection Doppler wind lidar and resonance Doppler wind lidar (commonly used for mesospheric sodium layer measurements). For further reading, refer to References [1] and [2].

This document describes the use of heterodyne pulsed Doppler lidar systems. Some general information on continuous-wave Doppler lidar can be found in Annex A. An International Standard on this method is in preparation.

Air quality — Environmental meteorology —

Part 2: Ground-based remote sensing of wind by heterodyne pulsed Doppler lidar

1 Scope

This document specifies the requirements and performance test procedures for heterodyne pulsed Doppler lidar techniques and presents their advantages and limitations. The term "Doppler lidar" used in this document applies solely to heterodyne pulsed lidar systems retrieving wind measurements from the scattering of laser light onto aerosols in the atmosphere. A description of performances and limits are described based on standard atmospheric conditions.

This document describes the determination of the line-of-sight wind velocity (radial wind velocity).

NOTE Derivation of wind vector from individual line-of-sight measurements is not described in this document since it is highly specific to a particular wind lidar configuration. One example of the retrieval of the wind vector can be found in Annex B.

This document does not address the retrieval of the wind vector.

This document may be used for the following application areas:

— meteorological briefing for, e.g. aviation, airport safety, marine applications and oil platforms;

— wind power production, e.g. site assessment and power curve determination;

— routine measurements of wind profiles at meteorological stations;

— air pollution dispersion monitoring;

— industrial risk management (direct data monitoring or by assimilation into micro-scale flow models);

— exchange processes (greenhouse gas emissions).

This document addresses manufacturers of heterodyne pulsed Doppler wind lidars, as well as bodies testing and certifying their conformity. Also, this document provides recommendations for the users to make adequate use of these instruments.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp