INTERNATIONAL STANDARD

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Air quality — Environmental meteorology —

Part 1: Ground-based remote sensing of visual range by lidar

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

Partie 1: Télédétection de la portée visuelle par lidar basée sur le sol

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 28902-1 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 5, *Meteorology* in collaboration with the World Meteorological Organization (WMO).

ISO 28902 consists of the following part, under the general title *Air quality — Environmental meteorology*:

— *Part 1: Ground-based remote sensing of visual range by lidar*

The following part is under preparation:

— *Part 2: Ground-based remote sensing by Doppler wind lidar*

Introduction

This part of ISO 28902 describes the determination of the visual range via backscattering atmospheric lidar ("Light Detection And Ranging"). Lidars have proven to be valuable systems for remote sensing of atmospheric pollutants, of various meteorological parameters such as wind velocity and direction, cloud and aerosol distribution and composition, shape of the particles, gas concentration, and of optical properties of the atmosphere like extinction and backscatter. A specific feature of lidar methods is their ability to allow spatially resolved remote sensing. The measurements can be carried out without direct contact and in any direction as electromagnetic radiation is used for sensing. Lidar systems, therefore, supplement conventional measurement technology. They are suitable for a large number of tasks that cannot be adequately performed by using *in-situ* or point measurement methods.

Air quality — Environmental meteorology —

Part 1:
Ground-based remote sensing of visual range by lidar

1 Scope

This part of ISO 28902 mainly specifies the requirements in order to perform visual range lidar measurements for the determination of direction-dependent meteorological optical range (MOR). The term “visual-range lidar” is used in this part of ISO 28902 to apply to the lidar systems making visual-range measurements, commonly referred to as “visibility measurements”. Due to physical approximations, quantitative determination is limited to a meteorological optical range of between 30 m and 2 000 m. For this range, this part of ISO 28902 specifies the performance of visual-range lidar systems utilizing the method of range-integrated visual-range measurements based on light extinction. The following parameters can be calculated based on the direction-dependent meteorological optical range:

a) horizontal visual range;

b) vertical visual range;

c) slant visual range.

NOTE The measures for visibility are strongly related to the historical definitions of visibility, which are related to human observers. The lidar technique extends the definitions to various conditions, such as daylight and night-time conditions.

In addition, this measurement principle enables the user to retrieve information on cloud base height, boundary layer depth, fog banks and aerosol profiles due to the signal attenuation by water vapour and/or aerosols. Examples of these applications are given in Annex C.

This part of ISO 28902 can be applied in the following areas:

— meteorological stations;

— airports;

— harbours;

— waterways;

— roads and motorways;

— automotive;

— oil platforms.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60825-1:2007, *Safety of laser products — Part 1: Equipment classification and requirements*