

---

---

**Meteorology — Wind measurements —**

**Part 1:**

**Wind tunnel test methods for rotating  
anemometer performance**

*Météorologie — Mesurages du vent —*

*Partie 1: Méthodes d'essai en soufflerie pour déterminer les  
caractéristiques d'un anémomètre tournant*



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## Contents

Foreword.....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Symbols and abbreviated terms .....	2
5 Summary of test method.....	3
6 Documentation.....	6
7 Apparatus .....	6
7.1 Measuring system.....	6
7.2 Recording techniques .....	7
8 Test procedures .....	7
8.1 Starting threshold ( $U_0$ ) .....	7
8.2 Transfer function ( $\hat{U} = a + bR + \dots$ ) .....	8
8.3 Distance constant ( $L_U$ ) .....	8
8.4 Off-axis response ratio ( $Q_U$ ) — Cup anemometers .....	9
8.5 Off-axis response ratio ( $Q_U$ ) — Vane-mounted propeller anemometers.....	9
8.6 Off-axis response ratio ( $Q_U$ ) — Fixed-axis propeller anemometers .....	9
8.7 Acceptance testing.....	10
9 Quality of the test method .....	10
9.1 General.....	10
9.2 Wind tunnel .....	10
9.3 Repeatability.....	10
9.4 Uncertainty .....	11
Annex A (normative) Wind tunnel standard test conditions .....	12
Annex B (informative) Examples of formats for recording run data.....	14
Bibliography .....	17

## 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 17713-1 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 5, *Meteorology*.

ISO 17713 consists of the following parts, under the general title *Meteorology — Wind measurements*:

— *Part 1: Wind tunnel test methods for rotating anemometer performance*

The following part is planned:

— *Part 2: Wind tunnel test methods for wind vanes*

## Introduction

Cup and propeller anemometers are the most frequently used meteorological instruments for the measurement of mean wind speed in the near surface layer, that portion of the atmosphere which lies within a few tens of meters of the earth's surface. Some types of cup and propeller anemometers are available for measuring wind speeds of a few tenths of a meter per second while other types can measure wind speeds approaching  $100 \text{ m s}^{-1}$ . These general purpose anemometers are used extensively for meteorology, aviation, air pollution, wind energy and numerous other applications.

This part of ISO 17713 was developed in order to have a worldwide uniform set of test methods to define the characteristics of cup and propeller anemometers. This part of ISO 17713 will allow an end user to compare different manufacturers and different models of cup and propeller anemometers to determine the suitability for a particular application.

This document is a preview generated by EVS

# Meteorology — Wind measurements —

## Part 1:

## Wind tunnel test methods for rotating anemometer performance

### 1 Scope

**1.1** This part of ISO 17713 describes wind tunnel test methods for determining performance characteristics of rotating anemometers, specifically cup anemometers and propeller anemometers.

**1.2** This part of ISO 17713 describes an acceptance test and unambiguous methods for measuring the starting threshold, distance constant, transfer function and off-axis response of a rotating anemometer in a wind tunnel.

Note that when transferring values determined by these methods to atmospheric flow, there is a difference between anemometer performance in the free atmosphere and in the wind tunnel.

### 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 applies.

ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. See also References [1], [2] and [3].

#### 3.1

##### distance constant

$L_U$

distance the air flows past a rotating anemometer during the time it takes the cup wheel or propeller to reach  $(1 - 1/e)$  or 63 % of the equilibrium speed after a step increase change in air speed

#### 3.2

##### off-axis response ratio

$Q_U$

ratio of the indicated wind speed ( $U_\theta$ ) at various angles of attack ( $\theta$ ) to the product of the indicated wind speed ( $U_i$ ) at zero angle of attack and the cosine of the angle of attack ( $\theta$ ) and thus this ratio ( $Q_U$ ) compares the actual off-axis response to a true cosine response