

Meteorology — Air temperature measurements — Test methods for comparing the performance of thermometer shields/screens and defining important characteristics

ICS 07.060

National foreword

This British Standard is the UK implementation of ISO 17714:2007.

The UK participation in its preparation was entrusted to Technical Committee EH/2, Air quality.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Meteorology — Air temperature measurements — Test methods for comparing the performance of thermometer shields/screens and defining important characteristics

*Météorologie — Mesurage de la température de l'air — Méthodes
d'essai pour comparer les performances d'abris/d'écrans pour
thermomètres et définir les caractéristiques importantes*



Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Terms and definitions.....	1
3 Field test conditions	2
3.1 Field test site	2
3.2 Respective location of screens	2
3.3 Screens	3
3.4 Thermometers	3
3.5 Additional meteorological variables	3
3.6 Data sampling	4
3.7 Reference values	4
3.8 Quality control.....	4
3.9 Long-term intercomparison	5
3.10 Typical conditions	5
3.11 Documentation	6
4 Field test methods	6
4.1 Comparability analysis.....	6
4.2 Global analysis of air temperature	6
4.3 Analysis of extreme values.....	6
4.4 Statistical analysis of radiation error.....	7
4.5 Influence of surface albedo	7
4.6 Selection of typical conditions	7
5 Measurement of screen characteristics	8
5.1 Aspiration rate.....	8
5.2 Internal ventilation factor	8
5.3 Representative height and screen reference point	8
5.4 System response time.....	8
Annex A (informative) Influence factors	10
Annex B (informative) Examples of useful test-report graphs	13
Bibliography	18

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 17714 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 5, *Meteorology*.

Introduction

Commonly used air temperature sensors require protection from influences such as solar and terrestrial radiation, rain and snow. Screens (also known as shields) protect the thermometers from these influences.

At present, there is no commonly accepted reference screen design, nor are there generally accepted test methods to determine performance characteristics of screens. Screens that protect the temperature sensors from daytime heating and nighttime cooling due to radiation transfer are necessary for proper air temperature measurements. In very general terms, a poor design of the screen will tend to give higher daytime and lower nighttime temperatures.

This International Standard was developed to define the most relevant screen characteristics and to provide the methods to determine or compare screen performances.

Air temperature is a basic meteorological variable. Temperature sensors are widely used in all human activities and are well known and controlled. For the measurement of the outside air temperature, the sensor must be protected against external influence, mainly radiation and hydrometeors (e.g. precipitation, fog). The sensor is usually protected by a screen, but even then, measurement errors of up to 5 K may be encountered.

The general function of a screen for operational temperature measurements used in meteorological applications is given in WMO No. 8 ^[3]. The following text is an extract from this document.

“Radiation from the sun, clouds, the ground and other surrounding objects passes through the air without appreciably changing its temperature, but a thermometer exposed freely in the open can absorb considerable radiation. As a consequence, its temperature may differ from the true air temperature, the difference depending on the radiation intensity and on the ratio of absorbed radiation to dissipated heat. For some thermometer elements such as the very fine wire used in an open-wire resistance thermometer, the difference may be very small or even negligible, but with the more usual operational thermometers the temperature difference may reach 25 K under extremely unfavourable conditions. Therefore, in order to ensure that the thermometer is at true air temperature it is necessary to protect the thermometer from radiation by a screen or shield which also serves to support the thermometer. This screen also shelters it from precipitation while allowing the free circulation of air around it, and prevents accidental damage. Maintaining a free circulation may, however, be difficult to achieve under conditions of rime ice accretion. Practices for reducing observation errors under such conditions will vary and may involve the use of special designs of screens or temperature-measuring instruments.”

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1 Scope

This International Standard defines characteristics of a thermometer shield/screen. It also defines test methods to inter-compare the behaviour of different screen designs.

Although screens are usually used for both air temperature and humidity measurements, this International Standard is applicable only to temperature measurements.

Both naturally and artificially ventilated screens are considered.

2 Terms and definitions

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

2.1

aspiration rate

rate of air flow passing the thermometer.

NOTE This term is only used for an artificially aspirated screen, and is expressed in metres per second.

2.2

internal ventilation factor

ratio between the internal air speed and the external wind speed, at the thermometer height

NOTE This term is only used for a naturally ventilated screen.

2.3

representative height

height above ground at which the air temperature is supposed to be measured

NOTE 1 For naturally ventilated screens, the representative measurement height is usually the height of the temperature sensor.

NOTE 2 For aspirated screens, the representative height can be different from the height of the temperature sensor. It is design dependent, however it is usually the height of the air intake.

2.4

screen

shield or shelter used to protect the thermometer from radiation, precipitation and accidental damage

2.5

screen reference point

location of the thermometer within the screen