



BSI Standards Publication

**Vacuum technology — Vacuum gauges —
Specifications, calibration and measurement
uncertainties for capacitance diaphragm gauges**

National foreword

This British Standard is the UK implementation of [ISO 20146:2019](#).

The UK participation in its preparation was entrusted to Technical Committee MCE/8/-/4, Vacuum technology.

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

Attention is drawn to the fact that during the development of [ISO 20146:2019](#), the UK committee voted against its approval as an International Standard.

The UK committee submitted a negative vote due to concerns regarding Subclauses 3.2.6 and 6.20, and the term 'Thermal transpiration'. In order to avoid any potential misapplication or misinterpretation of this standard, the UK committee draws users' attention to the following additional information and guidance.

Subclause 3.2.6

It is the opinion of the UK committee that the definition of disruption pressure (burst pressure) does not clarify whether the term means

- a failsafe condition in which the gauge diaphragm exceeds its elastic limit (therefore it will no longer function accurately) but retains its mechanical integrity,

or

- a total failure that allows gas to migrate across the gauge diaphragm.

The UK committee recommends that the indicated disruption pressure (burst pressure) should always reflect a failsafe condition.

Subclause 6.20

This subclause notes that there is a relationship between the storage temperature and the temperature for the system baking. The UK committee advises that the term 'baking' means the application of heat to a system in order to release any impurities and other contaminants from the surfaces in that system.

The UK committee also advises that some Capacitance diaphragm gauges (CDG) that can be subjected to baking have remote signal conditioning electronics that allow the gauge head to be heated to temperatures significantly above the storage temperature. Users are advised to refer to the nominal operating (environmental) conditions (see Subclause 6.19) to determine whether this is possible for their gauge.

The UK committee recommends that manufacturers give clear guidance on gauges that can be subjected to baking, and recommends that users consult the manufacturer before subjecting their gauge to any conditions that are outside the manufacturer's recommended operating conditions.

Thermal transpiration

It is the opinion of the UK committee that the standard does not fully explain the term 'thermal transpiration'. Therefore, the UK committee advises that thermal transpiration can be defined as the macroscopic flow of a gas induced by a temperature gradient, during which gas particles flow from the lower temperature region to the

higher temperature region, resulting in a higher pressure in the higher temperature region. The magnitude of the thermal transpiration effect varies between gas species. Some CDGs include self-heating systems that maintain the gauge at a constant (elevated) temperature. This can protect the internal surfaces from condensation of gas species and reduce the effects of changes in ambient temperature. Normally, the pressure indicated by a CDG is not affected by different gas species. However, the UK committee recommends that users take care when operating CDGs at elevated temperatures due to the thermal transpiration effect.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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et incertitudes de mesure des manomètres capacitifs à membrane*



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Foreword

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This document was prepared by Technical Committee ISO/TC 112, *Vacuum technology*.

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