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

*Technique du vide — Manomètres à vide — Spécifications, étalonnage  
et incertitudes de mesure pour les jauges Pirani*



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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

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

## Introduction

ISO 3567 and ISO 27893 are basic standards with no specific guidelines of a special type of vacuum gauge and are generally applicable. Detailed guidance for a specific gauge is intended to be given in separate technical specifications for the calibration of special types of gauges.

This document complements ISO 3567 and ISO 27893 when characterizing or calibrating Pirani gauges or using them as reference gauges.

Pirani gauges are widely used to measure pressures in the medium vacuum up to atmospheric pressure. The relevant parameters, calibration guidelines and uncertainties for the dissemination of the pressure scale and measurement of low and medium vacuum pressures by a Pirani gauge are described in this document.



# Vacuum technology — Vacuum gauges — Specifications, calibration and measurement uncertainties for Pirani gauges

## 1 Scope

This document identifies parameters of Pirani gauges, their calibration procedure, and describes measurement uncertainties to be considered when operating these gauges.

This document applies to Pirani vacuum gauges operating over a pressure range of 0,01 Pa to 150 kPa.

This document complements ISO 3567 and ISO 27893 when calibrating Pirani gauges and using them as reference standards.

In addition, this document defines procedures to characterize Pirani gauges for response time and hysteresis.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3567:2011, *Vacuum gauges — Calibration by direct comparison with a reference gauge*

ISO 27893, *Vacuum technology — Vacuum gauges — Evaluation of the uncertainties of results of calibrations by direct comparison with a reference gauge*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

## 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:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1 Definitions of components

#### 3.1.1

##### **thermal conductivity gauge**

vacuum gauge in which the pressure is determined in relation to the transfer of thermal energy between the surfaces of two fixed elements maintained at different temperatures

Note 1 to entry: This gauge is based on the thermal conductivity of a gas being pressure dependent.

[SOURCE: ISO 3529-3:2014, 2.4.2.2, modified — Example has been deleted.]