PD ISO/TS 6737:2023



BSI Standards Publication

Vacuum technology — Vacuum gauges — Characteristics for a stable ionisation vacuum gauge

bsi.

National foreword

This Published Document is the UK implementation of ISO/TS 6737:2023.

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 committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 20332 5

ICS 23.160

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 December 2023.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TS 6737:2023

TECHNICAL SPECIFICATION

ISO/TS 6737

First edition
2023-11

Vacuum technology — Vacuum gauges — Characteristics for a stable ionisation vacuum gauge

Technique du vide — Manomètres à vide — Caractéristiques des manomètres à ionisation stable

Reference number
ISO/TS 6737:2023(E)

© ISO 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO 2023 – All rights reserved

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **2**
5 General description of the design **2**
5.1 Components 2
5.2 Mode of operation 3
6 Specifications of the ionisation vacuum gauge **4**
6.1 General specifications and requirements for the gauge head 4
6.2 Electrical equipment 5
7 Dimensions and potentials **6**
7.1 General 6
7.2 Dimensions and tolerances 7
7.3 Potentials 9
7.4 Cathode 9
7.5 Anode cage 9
7.6 Gaps between electrodes 10
7.7 Electrode materials 10
7.8 Electrical feedthroughs 10
7.9 Surrounding tube (envelope) and flanges 10
7.10 Magnetic fields 10
8 Characteristics of the gauge (informative) **11**
8.1 Sensitivity 11
8.2 Linearity 11
8.3 Electron transmission efficiency 11
8.4 Residual current and resolution 11
8.5 Repeatability 11
8.6 Reproducibility 12
8.7 Interference 12
8.8 Temperature of electrodes 12
8.9 Environmental conditions 12
9 Handling of and measurement with the gauge **12**
9.1 Orientation of the gauge head 12
9.2 Environmental conditions 12
9.3 Conditioning of the gauge 12
9.4 Testing 12
9.5 Warm-up time 13
9.6 Sensitivity and calibration 13
9.7 Measurement 13
9.8 Transport 13
9.9 Cathode exchange 13
Annex A (Informative) **Electron and ion trajectories of recommended gauge dimensions according to simulation** **14**
Bibliography **15**

© ISO 2023 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

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

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2023 – All rights reserved

Introduction

The ionisation vacuum gauge is the only type of vacuum gauge covering the full range of high and ultrahigh vacuum.[1] Important applications need better accuracy, reproducibility and known sensitivities for many gas species, properties which all current types of ionisation vacuum gauges lack. This document provides the characteristics for a stable ionisation vacuum gauge so that this gauge is accurate, robust and long-term stable, with known sensitivity for nitrogen and known relative sensitivity factors, and can be built by any experienced manufacturer of other ionisation vacuum gauges.

© ISO 2023 – All rights reserved

Vacuum technology — Vacuum gauges — Characteristics for a stable ionisation vacuum gauge

1 Scope

This document describes a special design of an ionisation vacuum gauge which has a well-defined ionising electron path length.[2] Due to the construction design, it leads to good measurement accuracy, long-term stability, as well as gauge independent and reproducible sensitivity for nitrogen and relative sensitivity factors[3][4]. It is designed for the measurement range of 10^{-6} Pa to 10^{-2} Pa.

This document describes only those dimensions and potentials of the gauge head which are relevant for the electron and ion trajectories. This document does not describe the electrical components necessary to operate the ionisation vacuum gauge in detail. The gauge head can be operated by voltage and power sources and ammeters commercially available, but also by a controller specially built for the purpose of the operation of this gauge head.

The ionisation vacuum gauge described in this document can be built by any experienced manufacturer of other ionisation vacuum gauges. It is not subject to intellectual property protection.

It is assumed for this document that the applicant is familiar with both the physics and principles of ionisation vacuum gauges as well as high and ultra-high vacuum technology in general.

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.

EN ISO 13920, *Welding - General tolerances for welded constructions - Dimensions for lengths and angles - Shape and position (ISO 13920:1996)*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 3669, *Vacuum technology — Dimensions of knife-edge flanges*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
Wehnelt electrode
Wehnelt
an electrode with cylindrical symmetry around the electron emitting cathode, mainly used for focusing of the electron beam

© ISO 2023 – All rights reserved