International Standard 1608/1

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Vapour vacuum pumps — Measurement of performance characteristics — Part 1 : Measurement of volume rate of flow (pumping speed)

Pompes à vide à jet de vapeur — Mesurage des caractéristiques fonctionnelles — Partie 1 : Mesurage du débit-volume

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1608/1 was developed by Technical Committee ISO/TC 112, *Vacuum technology*.

It was submitted directly to the ISO Council, in accordance with clause 5.10.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 1608-1970, which had been approved by the member bodies of the following countries :

Belgium	India	Spain
Czechoslovakia	Israel	Sweden
Egypt, Arab Rep. of	Italy	Switzerland
Germany, F. R.	Japan	Thailand
Greece	Netherlands	Turkey
Hungary	Peru	United Kingdom

The member bodies of the following countries had expressed disapproval of the document on technical grounds :

France
USA

Printed in Switzerland

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0 Introduction

The purpose of this International Standard is to ensure that measurements of the performance characteristics of vapour vacuum pumps are, as far as possible, carried out by uniform procedures and under uniform conditions. It is hoped that, as a result, measurements conducted by different manufacturers or in different laboratories, and statements of performance quoted in manufacturers' literature, will be on a properly comparable basis to the benefit of both user and manufacturer.

It is envisaged that the complete International Standard will, in due course, deal comprehensively with the measurement of a wide range of performance characteristics of the main types of vapour vacuum pumps. In order, however, that useful agreements of more restricted scope may be implemented with the least possible delay, it is intended to publish this International Standard in parts.

1 Scope and field of application

This part of ISO 1608 specifies methods of measuring the volume rate of flow of vapour vacuum pumps.

The pumps considered comprise the following three classes of oil and mercury vapour pumps :

— diffusion pumps;

— ejector pumps;

— booster pumps (i.e. pumps capable of operation in both the molecular and laminar flow regions, so combining the properties of diffusion and ejector pumps).

These pumps may be with or without baffle(s) or trap(s).

2 Definitions

For the purposes of this International Standard, the following definitions apply.

2.1 volume rate of flow; pumping speed : Under ideal conditions, the volume of gas which flows in unit time through the pump inlet.

For practical purposes, however, the volume rate of flow (q_v) of a given pump for a given gas is, by convention, taken to be the quotient of the throughput (P) of that gas and the equilibrium pressure (p) at a specified position in a given test dome, and under specified conditions of operation.

Thus $q_v = P/p$. The units adopted for the volume rate of flow are the cubic metre per hour (m^3/h) or the litre per second (l/s). For vapour pumps this form of expression of volume rate of flow is considered to be valid only if p exceeds 10 p_0 where p_0 is the ultimate pressure measured by means of the same gauge (see 2.3).

2.2 test dome, test header : A chamber of specified form and dimensions attached to the inlet of the pump through which a measured flow of gas may be admitted to the pump, and which is equipped with means of pressure measurement.

2.3 ultimate pressure : The limiting pressure approached asymptotically in the dome, with the gas inlet valve closed and the pump in normal operation.

3 Apparatus

3.1 Test dome, cylindrical and of the form shown in the figure. The axial dimension of the dome is 1,5 D, where D is the internal diameter, and the test gas entrance is on the axis at a distance D from the connecting flange and so arranged that the gas entrance into the dome is in a direction away from the pump mouth. The connection to the pressure measuring gauge is at a distance 0,5 D from the connecting flange with its axis perpendicular to that of the dome. The axis of the test dome shall be perpendicular to the plane of the inlet flange (or inlet) of the pump.

The internal diameter of the test dome shall be the same as that of the mouth of the pump, or of the inlet of any baffle or trap which may be incorporated.

NOTE — If internal parts of the pump protrude beyond the flange (or inlet plane) of the pump, the reference plane is at the highest point of these internal parts and at this plane the pump mouth diameter is defined by the arrangement specified by the manufacturer.

3.2 Pressure gauge, calibrated to an accuracy within ± 5 % for pressures greater than or equal to 1 Pa* and within ± 10 % for lower pressures.

* 100 Pa = 100 N/m^2 = 1 mbar; 133 Pa ≈ 1 torr