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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 40344.3-2024**

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**Vacuum technology - Standard methods for measuring vacuum  
pump performance - Part 3: Specific parameters for mechanical  
booster vacuum pumps  
(English Translation)**

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## Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents"

Drafting:

This document is part 3 of GB/T 40344 "Vacuum Technology Standard Method for Measurement of Vacuum Pump Performance": GB/T 40344 has been issued the following parts are published:

- Part 1: General requirements;
- Part 2: Positive displacement vacuum pumps;
- Part 3: Specific parameters for mechanical booster pumps:

This document is equivalent to ISO 21360-3:2019 "Vacuum technology - Standard methods for measuring vacuum pump performance - Part 3: Mechanical booster pumps" Specific parameters of

## Introduction

The original vacuum pump standard system puts forward different requirements for the measurement of certain types of vacuum pump performance parameters, measurement devices and performance the measurement methods and other contents are often repeated and not clearly stated: The formulation of specific vacuum pump standards is based on the overall requirements and is based on their respective characteristics:

In the event of differences between the measurement method for a specific vacuum pump and the general requirements, the specific standard shall be used:

GB/T 40344 "Vacuum Technology Standard Method for Measurement of Vacuum Pump Performance" aims to provide a comprehensive and reliable vacuum pump performance test method based on the commonality and characteristics of vacuum pump performance:

The standard measurement method, namely the general requirements and specific vacuum pump standards, is planned to consist of six parts:

--- Part 1: General requirements: Aims to provide a basic document for measuring vacuum pump performance parameters and simplify future the vacuum pump standard is formulated: It includes three methods for measuring volume flow rate, as well as the basic pressure, compression ratio and critical pressure of the vacuum pump:

Method for measuring level pressure:

--- Part 2: Volumetric vacuum pumps: Aims to supplement the standard method for performance measurement of volumetric vacuum pumps based on general requirements:

The test method includes the measurement of volume flow rate, base pressure, water vapor tolerance, power consumption and minimum start-up temperature of positive displacement vacuum pumps:

--- Part 3: Specific parameters of mechanical booster pumps: Aims to describe the

maximum allowable pressure difference, effective compression ratio, zero flow  
Measurement methods and special requirements for compression ratio and relief valve  
pressure difference:

--- Part 4: Turbomolecular pumps: Aims to provide standard methods for measuring the  
performance of turbomolecular pumps based on general requirements:

Replenish:

--- Part 5: Non-evaporable getter pumps: Aims to provide a standard method for measuring  
the performance of non-evaporable getter pumps based on general requirements:

To be supplemented:

--- Part 6: Cryogenic vacuum pumps: Aims to provide a standard method for measuring the  
performance of cryogenic vacuum pumps based on general requirements:

Replenish:

Vacuum technology - Standard method for measuring vacuum pump performance Part 3:  
Specific parameters for mechanical booster pumps

## 1 Scope

This document describes the measurement methods and procedures for the maximum  
allowable differential pressure, effective compression ratio, zero flow compression ratio and  
relief valve differential pressure of mechanical booster pumps:

special requirements:

This document applies to mechanical booster pumps for medium vacuum or rough vacuum  
applications, including air-cooled mechanical booster pumps and multi-stage mechanical  
booster pump systems:

This document covers the mechanical booster characteristics of mechanical booster pumps  
that differ from common positive displacement vacuum pumps: Maximum allowable  
pressure difference ( $\Delta p_{\max}$ ), effective pressure the compression ratio ( $K_{\text{eff}}$ ), the zero  
flow compression ratio ( $K_0$ ) and the overflow valve pressure difference ( $\Delta p_1$ ) are  
specific parameters of the mechanical booster pump performance:

## 2 Normative references

The contents of the following documents constitute the essential clauses of this document  
through normative references in this document:

For referenced documents without a date, only the version corresponding to that date  
applies to this document; for referenced documents without a date, the latest version  
(including all amendments) applies to this document:

ISO 3529-1 Vacuum technology-Vocabulary-Part 1: General terms General terms) Note: GB/T 3163-2007 Vacuum technical terms (ISO 3529:1981, MOD) ISO 3529-2 Vacuum technology terminology Part 2: Vacuum pumps and related terms Note: GB/T 3163-2007 Vacuum technical terms (ISO 3529:1981, MOD) Note: GB/T 34873-2017 Vacuum gauge calibration by direct comparison with a standard vacuum gauge (ISO 3567:2011, IDT) ISO 21360-1:2012 Vacuum technology Standard methods for measuring vacuum pump performance Part 1: General requirements (Vacuumtech-Note: GB/T 40344.1-2021 Vacuum technology Standard method for measuring vacuum pump performance Part 1: General requirements (ISO 21360-1:2020, IDT)

### 3 Terms and definitions

For the purpose of this document, the terms and definitions defined in ISO 3529-1 and ISO 3529-2 and the following apply:

Based on the mechanical principle, it is used between the foreline pump and the high vacuum pump or process chamber to improve the exhaust system in medium vacuum or rough vacuum applications:

A vacuum pump that reduces the volume flow rate required by the foreline pump by either increasing the flow rate or improving the compression within the system:

**Note 1:** Multiple mechanical booster pumps can be connected in series to obtain higher performance:

NOTE 2 In some applications, a mechanical booster pump is also used for gas recirculation:

[Source: ISO 3529-2:1981, 2:4:6, modified - added the expressions "based on mechanical principles" and "or process chamber", replaced by "medium vacuum" the term "mid-pressure range" is replaced by "application or rough vacuum application" and the term "pressure distribution" is replaced by "compression":]