INTERNATIONAL STANDARD

ISO 12238

Second edition
2023-02

Pneumatic fluid power — Directional control valves — Measurement of shifting time

Transmissions pneumatiques — Distributeurs de commande directionnels — Mesure du temps de basculement

Reference number
ISO 12238:2023(E)

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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

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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 Test equipment **2**
5.1 Basic test setup 2
5.2 Pressure measuring tubes 4
5.3 Pressure transducers 5
5.4 Supply reservoir 5
5.5 Control signal 5
5.6 Data recording system 5
6 Test accuracy **8**
7 Test procedure **8**
8 Data calculations **10**
9 Reporting of test data **11**
10 Identification statement (reference to this document) **11**
Annex A (informative) **Example of generated test data and values to be reported** **12**
Annex B (informative) **Measurement of shifting time into non-exhausting positions** **13**
Bibliography **17**

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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).

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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 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components.*

This second edition cancels and replaces the first edition (ISO 12238:2001), which has been technically revised.

The main changes are as follows:

— the Scope has been extended to include monostable and bistable valves with two or three shifting position functions;

— extensions to the concept of shifting time measurement by addition of specifications for tests when shifting into non-exhausting positions have been added;

— consistency with other International Standards such as the ISO 6358 series has been improved;

— references to state-of-the-art test equipment and procedures have been updated.

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.

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Introduction

In pneumatic fluid power systems, power is transmitted and controlled through a gas under pressure circulating within a circuit. In some applications, the designer of a fluid power system needs to know the time required to cause the valving elements in a pneumatic directional control valve to move and to generate an output signal.

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Pneumatic fluid power — Directional control valves — Measurement of shifting time

1 Scope

This document specifies test procedures for measuring the shifting times of electrically or pneumatically operated directional control valves.

It is applicable to monostable and bistable pneumatic directional control valves, with 2 or 3 position functions.

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 80000-1, *Quantities and units — Part 1: General*

ISO 1219-1, *Fluid power systems and components — Graphical symbols and circuit diagrams — Part 1: Graphical symbols for conventional use and data-processing applications*

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 6358-1, *Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids — Part 1: General rules and test methods for steady-state flow*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the following 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
shifting time
time lapse measured from a change in the control signal (electrical or pneumatic) until the time at which the pressure in the associated outlet port changes by a specified amount

Note 1 to entry: Depending on the type of valve, shifting on-time or shifting off-time can mean shifting into exhausting or non-exhausting positions. For ISO 12238 the terms "shifting time (exhaust)" and "shifting time (fill)" are therefore used as well as the phrase "shifting time into non-exhausting positions". Depending on the valve type, the corresponding shifting on-time or shifting off-time is then obtained for the specifications in the catalog.

3.2
shifting on-time

shifting time when the control signal is applied

3.3
shifting off-time
shifting time when the control signal is removed

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3.4
shifting time (exhaust)
shifting time for shifts into a position where the working port is exhausting, obtained for a change of 10 % in the outlet pressure

3.5
shifting time (fill)
shifting time for shifts into a position where the working port is filling a connected component or system, obtained for a change of 10 % in the outlet pressure

3.6
shifting time (non-exhausting)
shifting time for shifts into a position where the working port is closed

4 Symbols and abbreviated terms

4.1 The symbols and units for parameters used in this document shall be as given in Table 1 and shall be in accordance with ISO 80000-1.

Table 1 — Symbols and units

Symbol	Parameter	Unit
t_0	base for time measurement	ms
t_E	shifting time (exhaust)	ms
t_F	shifting time (fill)	ms
t_{NE}	shifting time (non-exhausting)	ms

4.2 Graphic symbols used in this document shall conform to the requirements of ISO 1219-1.

5 Test equipment

5.1 Basic test setup

The basic test equipment shall be as shown in Figures 1 and 2.

When shifting into a non-exhausting valve position, the shifting time cannot be measured due to a lack of a pressure drop. For measuring the shifting time of shifts into non-exhausting valve positions (e.g. 2/2 or 5/3 closed centre position), a throttle valve and a flow sensor shall be used (also see key 9 and key 10 in Figures 1 and 2).

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