
**Pneumatic fluid power — Compressed air
pressure regulators and filter-regulators —**

Part 3:

**Alternative test methods for measuring
the flow-rate characteristics of pressure
regulators**

*Transmissions pneumatiques — Régulateurs de pression et filtre-
régulateurs pour air comprimé —*

*Partie 3: Méthodes d'essai alternatives pour mesurer les
caractéristiques de débit des régulateurs de pression*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 6953-3 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

ISO 6953 consists of the following parts, under the general title *Pneumatic fluid power — Compressed air pressure regulators and filter-regulators*:

- Part 1: *Main characteristics to be included in literature from suppliers and product-marking requirements*
- Part 2: *Test methods to determine the main characteristics to be included in literature from supplier*
- Part 3: *Alternative test methods for measuring the flow-rate characteristics of pressure regulators*

Introduction

This part of ISO 6953 defines alternative test methods for flow-rate characteristics of pneumatic pressure control valves. These alternative test methods do not use a flow meter but, instead, use an isothermal tank.

These methods measure the forward flow-rate characteristics by passing compressed air from a charged tank through the regulator under test, into an isothermal tank. Relief flow-rate characteristics are obtained by passing compressed air from an isothermal tank, through the regulator under test, and out to the atmosphere.

The test methods specified in this part of ISO 6953 have the following advantages over test methods specified in ISO 6953-2:

- a) an air source with a large flow-rate capacity is not required;
- b) components with larger flow-rate capacity can be tested more easily;
- c) air consumption is minimized; and
- d) test time is shortened.

Pneumatic fluid power — Compressed air pressure regulators and filter-regulators —

Part 3: Alternative test methods for measuring the flow-rate characteristics of pressure regulators

1 Scope

This part of ISO 6953 specifies alternative test methods for testing pneumatic fluid power components that use compressible fluids, i.e. gases. This part of ISO 6953 is applicable only to the decreasing flow rate part of the hysteresis curve of forward flow and relief flow characteristics. This method can be applied when:

- the pressure regulation dynamics of a component under test is rapid enough to be negligible, compared to the response of pressure changes during charge and discharge tests;
- the pressure response does not show any overshoot or any oscillating behaviour.

This part of ISO 6953 specifies requirements for the test installation, the test procedure and the presentation of results.

Examples of test results are given, as well as various data processing methods, and visualization of data processing procedures. Illustrations of overshoot and undershoot on regulated pressure response and large variations on inlet pressure are also given.

This part of ISO 6953 applies to the following components:

- compressed air pressure regulators and filter-regulators according to ISO 6953-1;
- electro-pneumatic pressure control valves according to ISO 10094;
- other components such as relief valves.

NOTE If pressure regulation characteristics are needed, ISO 6953-2 is applicable.

2 Normative references

The following referenced documents are indispensable for the application 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 5598, *Fluid power systems and components — Vocabulary*

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

ISO 6358-2, *Pneumatic fluid power — Determination of flow-rate characteristics of components — Part 2: Alternative test methods*¹⁾

ISO 6953-1, *Pneumatic fluid power — Compressed air pressure regulators and filter-regulators — Part 1: Main characteristics to be included in literature from suppliers and product marking requirements*

1) To be published.

ISO 6953-2, *Pneumatic fluid power — Compressed air pressure regulators and filter-regulators — Part 2: Test methods to determine the main characteristics to be included in literature from suppliers*

ISO 10094-2, *Pneumatic fluid power — Electro-pneumatic pressure control valves — Part 2: Test methods to determine main characteristics to include in the supplier's literature*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598, ISO 6358-1, ISO 6953-1 and ISO 10094-1 apply.

4 Symbols and units

4.1 The symbols and units shall be in accordance with ISO 6358-1 and ISO 6358-2, except for the pressure, p , given as the gauge stagnation pressure in this part of ISO 6953.

4.2 The subscripts to the symbols shall be in accordance with ISO 6358-1 and ISO 6358-2, except as given in Table 1.

Table 1 — Subscripts

Subscript	Meaning
1	Inlet conditions
2	Outlet conditions
3	Isothermal tank conditions
4	Relief conditions
a	Atmospheric conditions
u	Upstream conditions
d	Downstream conditions
f	Forward flow conditions
r	Relief flow conditions

4.3 The graphical symbols used in Figure 1 are in accordance with ISO 1219-1.

5 Test installation

5.1 Test circuit

A suitable test circuit as shown in Figure 1 shall be used. The key of Figure 1 defines the test circuit components.

NOTE Figure 1 illustrates the basic circuit which does not incorporate all of the safety devices necessary to protect against damage in the event of component failure. It is important that those responsible for carrying out the test give due consideration to safeguarding both personnel and equipment.