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Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids —

Part 4:
Charge test as an alternate test method

Transmissions pneumatiques — Détermination des caractéristiques de débit des éléments traversés par un fluide compressible —

Partie 4: Essai de charge comme méthode d'essai alternative

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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.

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ISO 6358-4 was prepared by Technical Committee ISO/TC 131, Fluid power systems, Subcommittee SC 5, *Control products and components*.

ISO 6358 consists of the following parts, under the general title *Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids*:

— *Part 1: General rules for components with internal flow passages that are fixed*

— *Part 2: General rules*

— *Part 3: Alternative test methods — Discharge test*

— *Part 4: Alternative test methods — Charge test*

Introduction

This part of ISO 6358 defines a charge test, or an alternative of the test method stated in ISO 6358-2 which relates to a test method for flow-rate characteristics of pneumatic components. This alternative test method tests a component by charging the atmospheric air to a tank which has already been evacuated. This method allows obtaining the sonic conductance, critical pressure ratio and subsonic index of the component under test, based on pressure response in the tank during charge.

The charge test method specified in this part of ISO 6358 has the following advantages over the test method specified in ISO 6358-2:

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) energy consumption is minimised; and

d) noise level is lower.

Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids —

Part 4: Charge test as an alternate test method

1 Scope

This part of ISO 6358 specifies an alternative method for testing pneumatic fluid power components that use compressible fluids, i.e. gases. It specifies requirements for the test installation, the test procedure and the presentation of results.

Accuracy of measurements is divided into two classes (A and B), which are explained in Annex A. Guidance on the equation for calculation of characteristics is given in Annex B. Guidance on the procedures for calculating flow-rate characteristics is given in Annex C.

This part of ISO 6358 applies to the following components with inlet and outlet ports:

— directional control valves, such as solenoid valves;

— flow control valves;

— piping components, such as connectors and flexible tubes; and

— other devices and combined systems that have inlet and outlet ports;

This part of ISO 6358 does not apply to any components whose flow coefficient is unstable during use (i.e., those that exhibit hysteretic behaviour or have an internal feedback phenomenon) and components that have cracking pressure, such as non-return (check) valves and quick-exhaust valves.

This part of ISO 6358 allows the determination of three sets of characteristic parameters: C, b and m, which may be calculated from the test results. The sonic conductance, C, represents the choked flow rate. The critical pressure ratio, b, represents the range of choked flow. The subsonic index, m, is the characteristic index, which represents several conditions flow in a component such as a variable orifice.

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

ISO 5598[1)], *Fluid power systems and components — Vocabulary*

1) Under revision.

ISO 6358-2:[2], *Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids — Part 2: General rules*

ISO 6358-3:[3], *Pneumatic fluid power — Determination of flow-rate characteristics of components using compressible fluids — Part 3: Alternative test methods — Discharge test*

3 Terms and definitions

For the purpose of this International Standard, the terms and definitions given in ISO 5598 and part 2 of ISO 6358 apply.

4 Symbols and units

4.1 The symbols and units shall be in accordance with parts 2 and part 3 of ISO 6358.

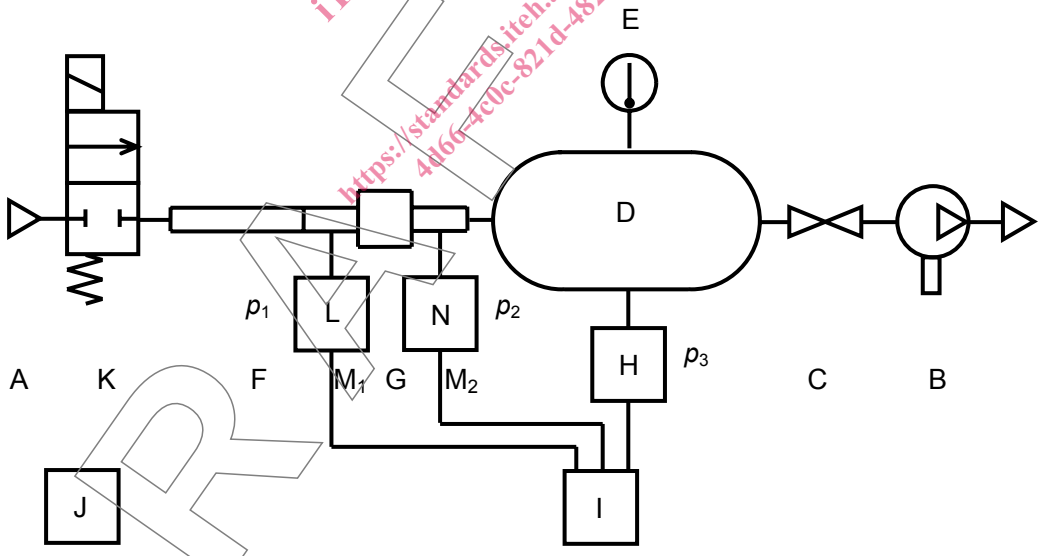
4.2 The graphical symbols used in Figure 1 are in accordance with ISO 1219-1.

5 Test installation

5.1 Test circuit

A suitable test circuit as shown in Figure 1 shall be used.

NOTE Figure 1 illustrates basic circuit that does not incorporate all 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.



NOTE See Table 3 in ISO 6358-3 and Table 1 for the key to this figure.

Figure 1 — Test circuit

[2] To be published.

[3] To be published.

Table 1 — Key to test circuit components

Reference letter	Relevant paragraph	Description
A	5.2.2	Suction port
B	-	Vacuum pump

5.2 General requirements

5.2.1 The components under test shall be installed and operated in the test circuit in accordance with the manufacturer's operating instructions.

5.2.2 A test set-up shall be constructed from the items listed in Table 3 of ISO 6358-3 and Table 1. Items A to I and L to N inclusive are essential, and the remaining item solenoid valve K may be chosen by the test operator if necessary. If the solenoid valve K is not required, it is not necessary to install the rectifier tube F.

5.2.3 If the component under test G has no control mechanism for shifting its position, install a solenoid valve K upstream of the rectifier tube F in order to shift the valve and start the test. The port size of solenoid valve K shall be equal to that of rectifier tube F.

5.2.4 The distance between tank D and pressure-measuring connector M_2 shall be as short as possible.

5.2.5 The rectifier tube F and pressure-measuring connectors M_1 and M_2 shall be in accordance with part 2 of ISO 6358. It is not necessary to have a temperature measuring connection in the rectifier because, in this test method, the temperature is measured in the tank.

5.2.6 The solenoid valve K shall have a shifting time that ensures that test data collection starts only after the solenoid valve K shifts.

5.3 Requirements for the tank (item D)

The structure, stuffed material and volume of the tank shall be in accordance with part 3 of ISO 6358.

5.4 Special requirements

The special requirements given in 5.6 of part 2 of ISO 6358 and 5.4 of part 3 of ISO 6358 apply for this part of ISO 6358.

6 Test procedures

6.1 Test conditions

6.1.1 Gas supply

The gas supply shall be in accordance with part 2 of ISO 6358.

6.1.2 Checks

The checks shall be conducted in accordance with part 2 of ISO 6358.