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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 14513.2-2019

Pneumatic fluid power -- Determination of flow-rate characteristics of components using compressible fluids -- Part 2: Alternative test methods

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Foreword

GB/T 14513 "Determination of Flow Characteristics of Pneumatic Compressible Fluid Components" is divided into the following three parts.

--- Part 1. General rules and test methods for steady flow;

--- Part 2. Alternative test methods;

--- Part 3. Calculation method for steady-state flow characteristics of the system.

This part is the second part of GB/T 14513.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section uses the translation method equivalent to ISO 6358-2.2013 "Pneumatic use of compressible fluid components for flow characteristics determination

Part 2. Alternative Test Methods.

The documents of our country that have a consistent correspondence with the international documents referenced in this part are as follows.

--- GB/T 786.1-2009 Fluid transmission systems and components - Graphical symbols and circuit diagrams - Part 1.

Graphic symbols processed (ISO 1219-1.2006, IDT)

Aerospace series -- Determination of flow characteristics of fluids - Part 1 . steady flow

General rules and test methods (ISO 6358-1.2013, IDT)

---GB/T 17446-2012 Fluid drive system and component vocabulary (ISO 5598.2008, IDT)

This part was proposed by the China Machinery Industry Federation.

This part is under the jurisdiction of the National Hydraulic and Pneumatic Standardization Technical Committee (SAC/TC3).

This section drafted by. National Pneumatic Product Quality Supervision and Inspection Center, Beijing University of Aeronautics and Astronautics, Zhejiang Yiri Pneumatic

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Technology Co., Ltd.

Division, Ningbo Jiaerling Pneumatic Machinery Co., Ltd., Ningbo Sonor Industrial Automation Equipment Co., Ltd., Ningbo Lida Pneumatic Complete Set Co., Ltd.

Introduction

In pneumatic systems, power is transmitted and controlled by the compressed air in a closed loop. The components that make up the loop, have a solid airflow

There are resistances, so it is necessary to define and determine their flow characteristics to describe their performance.

ISO 6358.1989 is based on a shrink nozzle model for determining the flow characteristics of pneumatic valves. The method includes two special

The parameters are. sound velocity conductance C and critical pressure ratio b, which are used for the proposed numerical calculation of flow characteristics. The method is based on static pressure testing

The results describe the flow characteristics of pneumatic valves ranging from damming to subsonic flow. The new version of ISO 6358-2.2013 takes into account the gas

The effect of body flow velocity on pressure measurement, using stagnation pressure instead of original static pressure.

Experience has shown that many pneumatic valves with shrinkage-expansion characteristics do not fit well with the ISO 6358.1989 model. this

In addition, pneumatic components other than pneumatic valves also require the application of this method. However, for occluded and subsonic flow areas, it is now necessary to make

The flow characteristics are defined by four parameters (C, b, m and deltapc).

This section of GB/T 14513 describes a set of three flow characteristic parameters derived from the test results. These parameters are prioritized

The descending order is described as follows.

--- Sound velocity conductance C is the most important parameter, which corresponds to the maximum flow (damped flow). This parameter is determined by the upstream stagnation condition.

--- Critical back pressure ratio b, which represents the boundary point between choking flow and subsonic flow, is the second most important parameter. Its definition is different

The definition of critical pressure in ISO 6358.1989, which characterizes the ratio of downstream stagnation pressure to upstream stagnation pressure.

--- Subsonic speed index m, more accurately represents subsonic flow characteristics when

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necessary. For components with fixed runners, m value

About 0.5 or so. In this case, only the two characteristic parameters C and b are used. For other components, m varies widely

Large, you need to determine the C, b and m values.

In order to overcome the obvious violation of the theory of compressible fluids, this section has made some changes to the test equipment. Including increasing import pressure

The measuring tube is used to meet the assumptions of ignoring the inlet speed during the test and allows direct measurement of the upstream stagnation pressure. Increase the outlet measuring tube

Used to directly measure downstream stagnation pressure to meet different pneumatic components. Description of the difference between the upstream stagnation pressure and the downstream stagnation pressure in the component

There is pressure loss.

Combine the flow characteristic parameters of any component and pipe obtained in this part of GB/T 14513 or GB/T 14513.1-2017,

ISO 6358-3 calculates an estimate of the overall flow characteristic parameter consisting of components and piping without measurement.

The deflation test method and the aeration test method specified in this part are compared with the methods specified in GB/T 14513.1-2017.

advantage.

--- No need for a large capacity gas source;

---Testing large flow components is easier;

---The energy consumption is minimal;

--- The test time for the deflation test is shortened, and the noise of the inflation test is reduced.

It should be noted that the characteristic parameters obtained according to the tests in this part are different from the characteristic parameters obtained according to the test in ISO 6358.1989.

Pneumatic flow using compressible fluid components

Determination of characteristics - Part 2. Alternative test methods

1 Scope

This part of GB/T 14513 specifies a deflation test and an inflation test as an alternative test

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method for the use of compressible

Determination of the flow characteristics of the fluid element.

This section specifies the requirements for test equipment, test procedures, and test results.

This section applies to pneumatic components with fixed or variable internal flow paths.

This section does not apply to components with unstable flow characteristics during use, such as components that exhibit significant hysteresis behavior (because they

Contains elastic parts that will deform during flow) or components with internal feedback (eg pressure relief valves) or elements that require opening pressure

Parts (eg check valves and quick exhaust valves). In addition, this section does not apply to components that exchange energy with fluids during flow measurement.

(eg cylinders, accumulators, etc.). The application of GB/T 14513 test method in various components is shown in Table 1.

Note. This section does not specify the flow characteristics test method for components with hysteresis performance. GB/T 14513.1 specifies the test method.

Table 1 GB/T 14513 test method in various components

element

Test for constant upstream pressure for variable upstream pressure testing

GB/T 14513.1

Constant upstream

pressure test

GB/T 14513.2

Inflatable test

GB/T 14513.1

Variable upstream

pressure test

GB/T 14513.2

Deflation test

First group

Directional control valve is yes yes

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