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ISO 7292

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Flowmeter regulators used on cylinders for welding, cutting and allied processes — Classification and specifications

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Détendeurs avec débitmètres utilisés sur les bouteilles pour le soudage, le coupage et les techniques connexes — Classification et spécifications

ISO 7292:1997
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Reference number
ISO 7292:1997(E)

Foreword

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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.

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Flowmeter regulators used on cylinders for welding, cutting and allied processes — Classification and specifications

1 Scope

This International Standard specifies the characteristics of flowmeter regulators, equipped with a flow control and measuring device for gases in the gaseous phase used on cylinders containing gas or mixtures of liquefied or compressed gas. Typical processes using this equipment are: tungsten inert gas arc welding (TIG), metal-arc inert gas welding (MIG), metal-arc active gas welding (MAG), plasma arc welding, tubular cored wire welding and plasma cutting.

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2 Normative references

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The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2503:—[1], *Gas welding equipment — Pressure regulators for gas cylinders used in welding, cutting and allied processes up to 300 bar.*

ISO 9539:1988, *Materials for equipment used in gas welding, cutting and allied processes.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 flowmeter regulator: Device for regulating a generally variable upstream gas pressure to a downstream pressure ensuring a controlled gas flow.

This device generally comprises:

a) a pressure regulator (see ISO 2503);

b) a flowmeter itself comprising a flow measuring system and, if necessary, a control system.

1) To be published. (Revision of ISO 2503:1983)

3.2 Pressures

3.2.1 rated (maximum) inlet pressure, p_1: Rated (maximum) upstream pressure for which the device is designed (see 8.1.1 of ISO 2503:—).

3.2.2 rated (maximum) outlet pressure, p_2: Rated (maximum) pressure for the standard discharge of the pressure regulator as specified in ISO 2503.

NOTE — This maximum pressure is defined for the pressure regulator tests and is above the normal operating pressure of the flowmeter.

3.2.3 downstream pressure, p_c: Pressure at the pressure regulator/flowmeter outlet.

4 Units

4.1 Pressure

The pressures are gauge pressures expressed in bar or megapascals.

4.2 Flow

Flow is expressed in litres per minute relative to normal conditions of 23 °C and 1 013 mbar.

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4.3 Temperature

Temperature is expressed in degrees Celsius.

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5 Common types of flowmeter

This clause does not exclude other types of flowmeters.

5.1 Classification of flowmeters

The classification criteria of flowmeters are:

— the principle of the flow control system (see 5.2);
— the principle of the flow measuring system (see 5.3);
— the relative position of two systems (see 5.4);
— the maximum rated flow (see 5.5);
— the type of gas or gas mixture used (see 5.6).

5.2 Principle of the flow control system

As examples the following two flow control systems are possible:

a) supply at constant pressure and flow control by varying the section through which the gas passes, either upstream or downstream of the measuring system;

b) constant section through which the gas passes and control of the flow by varying the supply pressure.

5.3 Principle of the flow measuring system

Four flow measuring systems are covered by this International Standard:

— System I

This system comprises a vertical transparent tube the cross-section of which increases upwards in which a float is lifted by the action of the gas flow. The float settles at a height which is a function of the flow value.

— System II

This system comprises a paddle connected to a return spring and is situated at the outlet of a calibrated gas supply orifice. The paddle is pushed by the action of the gas flow and settles at a position as a function of the flow value.

— System III

This system comprises a pressure gauge measuring the gas pressure immediately upstream of a calibrated orifice. The pressure measured is a function of the flow value.

— System IV

This system comprises a differential pressure gauge measuring the pressure drop across a calibrated orifice. This pressure drop is a function of the flow value.

5.4 Relative position of two systems

The flow control system may be situated as follows relative to the flow measuring system:

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— downstream: type A device;

— upstream: type B device.

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See figure 1.

5.5 Maximum rated flow

Maximum rated flow for which device is designed.

5.6 Type of gas or gas mixture used

A distinction is made depending on the type of gas or gas mixture for which the flowmeters are calibrated, as follows:

— flowmeters for carbon dioxide;

— flowmeters for argon and mixtures with argon base;

— flowmeters for nitrogen and mixtures with nitrogen base;

— flowmeters for helium;

— flowmeters for hydrogen.

NOTE — In each of the five categories, the flowmeters make it possible to measure the flow of a certain number of gas mixtures with the precision defined in 7.2.

The manufacturer is free to graduate the flowmeters for the gas characteristics of its class (carbon dioxide, argon, etc.) or for a conventional gas mixture of which the relative density would be close to the average of the relative densities of the gases and gas mixtures for which the device is intended.

The manufacturer should indicate the range of gas mixtures likely to be covered with the precision specified in 7.2.

EXAMPLE

Flowmeter suitable for a mixture of argon/carbon dioxide (ρ = 1,69) to a mixture of argon/hydrogen (ρ = 1,57).

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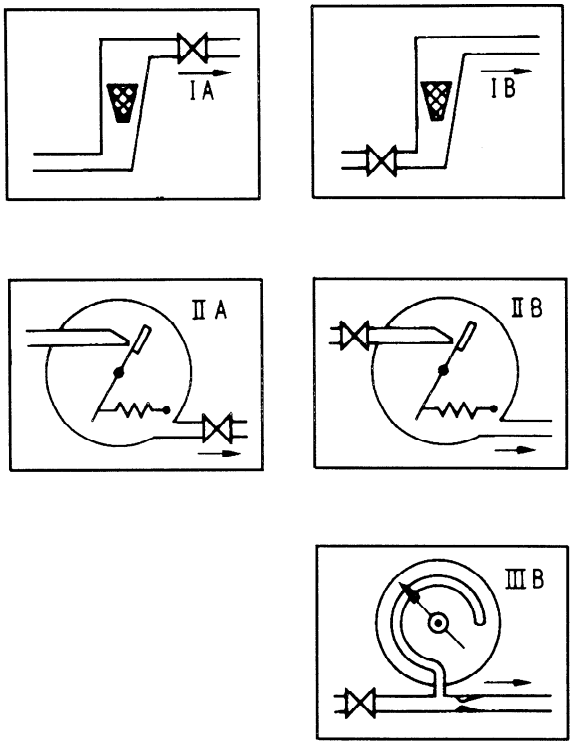

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Figure 1 — Diagrams of the different types of flowmeter covered by this International Standard

6 Manufacturing requirements

6.1 General

The requirements of clauses 6 to 10 of ISO 2503:— are applicable to the pressure regulator and flowmeter.

The marking for flowmeters shall include the chemical symbols of the recommended gases or gas mixtures compatible with the type.

The materials used shall be in accordance with ISO 9539.

6.2 Valves

Operation of the control device or of the valves fitted to the flowmeter regulators shall not lead to dismantling.

7 Operating requirements

7.1 Measuring scale — Range of the flow measuring system

The measuring scale shall comprise at least 10 graduations, with the maximum graduation corresponding to the standardized rated maximum flow.

The normal reading range shall correspond to 90 % of the scale.

7.2 Accuracy of the flow measurement

For all gases or gas mixtures for which the devices are intended and under normal operating temperatures and pressures, the flowmeters shall make it possible for the gas flow to be measured with an accuracy of ± 10 % of the rated maximum value in the normal reading range (see 7.1).

7.3 Variation of the flow reading due to regulator pressure characteristics

The characteristics of the pressure regulators shall be such that when the pressure inside the cylinder falls from p_1 to 10 % of p_1 the flow reading shall not change by more than ± 15 %.

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