SLOVENSKI STANDARD
SIST EN 13918:2003

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Oprema za plamensko varjenje - Regulatorji tlaka z vgrajenim merilnikom pretoka na plinskih jeklenkah za varjenje, rezanje in sorodne postopke - Razvrstitev, specifikacija in preskusi

Gas welding equipment - Integrated flowmeter regulators used on cylinders for welding, cutting and allied processes - Classification, specification and tests

Gasschweißgeräte - Druckregler mit integriertem Durchflussmesser für Gasflaschen für Schweißen, Schneiden und verwandte Prozesse - Einteilung, Festlegung und Prüfungen

Matériel de soudage aux gaz - Détendeurs débitmetres intégrés utilisés sur les bouteilles pour le soudage, le coupage et les techniques connexes - Classification, spécification et essais

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Gas welding equipment - Integrated flowmeter regulators used on cylinders for welding, cutting and allied processes - Classification, specification and tests

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This European Standard was approved by CEN on 13 February 2003.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 13918:2003) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

Annexes A and B are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

EN ISO 2503 deals with pressure regulators for gas cylinders for welding cutting and allied processes. These pressure regulators deliver an as constant as possible downstream pressure from a generally variable gas cylinder pressure and the adjusting device acts to increase or reduce the regulated downstream pressure. Gas flow is not controlled by the pressure regulator.

For some processes, e.g. arc welding with shielding gases, it is also necessary to control the gas flow. To achieve this, a pressure regulator coupled with a flowmeter is used. In this case the integrated flowmeter regulator adjusting device acts to increase or decrease the downstream flow. Annex A indicates the operating principles of integrated flowmeter regulators.

1 Scope

This European Standard specifies the requirements and type test methods of integrated flowmeter regulators for welding, cutting and allied processes.

It is applicable to integrated flowmeter regulators which may be equipped with flow control and measuring devices of gas flows on gas cylinders normally used for compressed gases up to 300 bar[1)] (30 MPa) and carbon dioxide (CO_2).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

[1)] 300 bar relates to max. gas cylinder charging pressure at 15 °C.

EN 560, *Gas welding equipment — Hose connections for equipment for welding, cutting and allied processes.*

EN 562, *Gas welding equipment — Pressure gauges used in welding, cutting and allied processes.*

EN 720-2, *Transportable gas cylinders — Gases and gas mixtures — Part 2: Determination of flammability and oxidizing ability of gases and gas mixtures.*

EN 13622:2002, *Gas welding equipment - Terminology - Terms used for gas welding equipment.*

EN 29539, *Materials for equipment used in gas welding, cutting and allied processes (ISO 9539:1988).*

EN ISO 2503:1998, *Gas welding equipment — Pressure regulators for gas cylinders used in welding, cutting and allied processes up to 300 bar (ISO 2503:1998).*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
integrated flowmeter regulator
device for regulating a generally variable inlet gas pressure to an as constant as possible outlet pressure, ensuring in addition a controlled gas flow. It is generally a pressure regulator equipped with flow adjusting and measuring devices which are not intended to be separated from the regulating device by the operator (see annex A)

3.2
pressures

3.2.1
nominal inlet pressure p_1
see EN 13622:2002, 2.2.1

3.2.2
maximum intermediate pressure p_{2m}
maximum intermediate pressure (i.e. as measured in the intermediate pressure chamber, downstream of the pressure regulator valve and upstream of the flow adjusting and measuring device) defined by the manufacturer

3.2.3
upstream pressure for type testing p_3
$p_3 = 2\ p_{2m} + 1$ bar (0,1 MPa)

3.3
nominal flow Q_n
flow defined by the manufacturer and measured at the outlet of the integrated flowmeter regulator (downstream of the flow adjusting and measuring devices)

3.4
indicated flow(s)
flow(s) indicated on the measuring device of the integrated flowmeter regulator

3.5
true flow
true value of the flow as measured with a calibrated measuring device

3.6
accuracy
difference between the indicated flow and the true flow, as a percent of the indicated flow

4 Units

4.1 Pressures

The pressures are gauge pressures[2] expressed in bar (0,1 MPa).

4.2 Flows

The flows are expressed in litres per minute relative to standard conditions[3].

4.3 Temperatures

The temperatures are expressed in degrees Celsius.

5 Manufacturing requirements

5.1 Materials

Materials for integrated flowmeter regulators shall conform to the requirements of EN 29539.

5.2 Design

5.2.1 Integrated flowmeter regulator for oxygen

Integrated flowmeter regulators for oxygen or gas mixtures more oxydizing than air (in accordance with EN 720-2) shall be designed, machined and manufactured such that internal ignition does not occur (see 6.8). All components and accessories shall be thoroughly cleaned and degreased before assembly.

5.2.2 Filter

The filter shall meet the requirements in accordance with EN ISO 2503:1998, 6.2.3.

5.2.3 Flow adjusting device

Integrated flowmeter regulators may be fitted with a flow adjusting device. When fitted, the adjusting knob shall be captive and the adjusting device shall meet the relevant requirements in accordance with EN ISO 2503:1998, 6.2.5.

5.2.4 Relief valve

The fitting of a relief valve is compulsory. It shall be non adjustable by the user and fitted in such a way that the gas discharges safely. It shall be fitted onto the intermediate pressure chamber.

The relief valve shall have the following characteristics:

— it shall remain gas tight up to p_{2m};

— at 2 p_{2m} its flow shall be greater or equal to the highest Q_n;

— at decreasing pressure the relief valve shall close at a pressure greater than p_{2m}.

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2) Pressures exceeding atmospheric pressure.

3) Standard conditions are 23 °C and 1,013 bar (0,1013 MPa) (according to ISO 554).

5.2.5 Pressure gauges

When fitted, pressure gauges shall conform to EN 562. If pressure gauges are used to indicate flows, the relevant operational and safety requirements stipulated in EN 562 shall apply.

5.2.6 Gas tightness

Integrated flowmeter regulators shall meet the relevant requirements in accordance with EN ISO 2503:1998, 6.2.8.

5.2.7 Mechanical resistance

Integrated flowmeter regulators shall meet the relevant requirements in accordance with EN ISO 2503:1998, 6.2.9.

5.2.8 Types of connections

5.2.8.1 Inlet connections

Integrated flowmeter regulators shall be made in such a way that the inlet connection be compatible with the corresponding gas cylinder valve outlet designed for the intended gas. The inlet pressure p_1 specified by the manufacturer, shall not be less than the maximum charging pressure (at 15 °C) permitted for the gas cylinder valve outlet.

5.2.8.2 Outlet connections

If threaded outlet connections are used, they shall conform to EN 560 and comply with the following conditions:

— the outlet connection orientation should preferably point downwards and away from the cylinder;

— curved hose tails shall not be used.

5.2.9 Stability of the flow

For an initial setting of Q_n at an inlet pressure of p_1, the change in true flow, as measured with a calibrated measuring apparatus shall be within ± 30 % at any inlet pressure between p_1 and p_3.

For integrated flowmeter regulators with multiple calibrated orifices, the stability requirement shall be fulfilled by the orifice allowing the highest flow (see 6.4 for the tests).

5.2.10 Accuracy of the flow and classification

At any pressure between p_1 and p_3 the accuracy shall remain within the limits defined by the classification indicated in Table 1 or ± 1 l/min, whichever is greater.

Table 1 — Classification

Accuracy class	10	20
Measured accuracy	± 10 %	± 20 %

Accuracy class shall be insured for any reading between Q_n and 30 % of Q_n or for any calibrated orifice (see 6.5 for the tests).

EXAMPLE 1 For an integrated flowmeter regulator of class 10 and Q_n = 40 l/min, the allowed true flow at Q_n is (40 ± 4) l/min

at Q = 12 l/min (30 % of Q_n) the allowed true flow is (12 ± 1,2) l/min

at Q = 26 l/min (65 % of Q_n) the allowed true flow is (26 ± 2,6) l/min

EXAMPLE 2 For an integrated flowmeter regulator with multiple calibration orifices of class 10 and presettings of 10 l/min, 20 l/min, 30 l/min and 40 l/min the allowed true flows are respectively (10,00 ± 1) l/min, (20,00 ± 2) l/min, (30,00 ± 3) l/min, (40,00 ± 4) l/min.

6 Type test procedure

6.1 General

The following test methods are to be applied to integrated flowmeter regulators to be tested for compliance with this standard (tests shall be carried out on new integrated flowmeter regulators).

6.2 Test conditions

6.2.1 General characteristics of the test installation

All the pipeline of the testing installation together with the valve controlling the flow of the test installation shall have a passage greater than that of the integrated flowmeter regulator to be tested.

The test bench shall be constructed in such a way that the upstream pressure and the downstream flow rate can be controlled, as necessary. The equipment may be operated by remote control.

The gas supply for the nominal inlet pressure p_1 shall have sufficient capacity.

6.2.2 Type of gas

Tests can be carried out with the gas intended for use or with another gas (e.g. air or nitrogen). The results shall then be corrected to the intended gas, taking into account the conversion coefficient *U*. Some values of *U* are given in Table 2.

Table 2 — Conversion coefficient, *U*

Test gas	Conversion coefficient				
	Air	Nitrogen	Argon	Helium	CO_2
Air	1	1,02	0,851	2,695	0,808
Nitrogen	0,983	1	0,837	2,65	0,792

Conversion coefficient, *U*, based on the formula:

$$U = \sqrt{\frac{\gamma_0}{\gamma_1}} \qquad (1)$$

where

γ^0 is the specific weight of test gas;

γ^1 is the specific weight of gas used.

In all cases tests shall be carried out with gas free from oil and grease, with a maximum moisture content of 0,005 % corresponding to a dew point of - 48 °C.

6.2.3 Accuracy of the flow measuring apparatus

The accuracy of the flow measuring apparatus shall not exceed ± 3 % of the measured value.