Czech Metrological Institute

Okružní 31, 638 00

Brno

1. ------IND- 2011 0589 CZ- EN - ------ 20111128 --- --- PROJET

As a body with material and local competence in matters concerning the establishment of metrological and technical requirements for the specified measurement device and the establishment of testing methods for type approval and during validation of the specified measurement device pursuant to Section 14 Paragraph 1 of Act No 505/1990 Coll. on metrology, as amended, and pursuant to the provisions of Section 172 et seq. of Act No 500/2004 Coll., the Rules of Administrative Procedure (hereinafter referred to as 'RAP'), the Czech Metrological Institute (CMI) has launched ex officio an administrative proceeding pursuant to Section 46 of the RAP on 30 September 2010, and, on the basis of the documentation, issues the following:

I.

GENERAL MEASURE

Number: 0111-OOP-C023-11

Reference no. 0313/023/11/Pos.,

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establishing metrological and technical requirements for specified measurement devices, including testing methods for the type approval and validation of the specified measurement devices

'laboratory measurement devices for measuring the flow quantity of gas'

1 Basic definitions

For the purposes of this general measure, the terms and definitions pursuant to the VIM[1)] as well as the following terms and definitions shall apply:

1.1.1 laboratory (drum) gas meter: gas meter with measuring drum divided into chambers which rotates in the liquid; intended for measuring the volume of unheated, pure and non-corrosive gases, such as air, nitrogen or argon

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[1)] International Vocabulary of Metrology – Basic and general concepts and associated terms (Mezinárodní metrologický slovník – Základní a všeobecné pojmy a přidružené termíny – VIM)

1.1.2 loss of pressure: The difference between the pressure measured at the input and output of the gas meter when the gas meter is in operation

1.1.3 measurement error: A value which expresses the ratio of the difference between the volume indicated by the gas meter and the volume which actually flowed through the gas meter to the actual flow volume in per cent

1.1.4 nominal flow *Q*: The ideal continuous gas meter load defined by the gas meter's manufacturer at which the value of the maximum permissible error or value of the permissible pressure loss may not be exceeded

1.1.5 cyclic volume *V*: A volume of gas corresponding to the gas meter's work cycle, i.e. all movements of moving parts which (with the exception of the indication device and transmission drives) first return to the position they were in at the beginning of the cycle

2 Metrological requirements

2.1 Specified operating conditions

2.1.1 Flow range

The gas flow range must meet the requirements for the mutual ratios of the maximum flow Q_{max}, the minimum flow Q_{min}, and the overload flow Q_r:

a) $Q_{max}/Q_{min} \geq 15$

b) $Q_r/Q_{max} = 1{,}2$

2.1.2 Maximum operating pressure

The manufacturer shall specify the laboratory gas meter's maximum operating pressure p_{max}.

2.1.3 Temperature range

All gas meters must be capable of meeting the requirements for the minimum ambient temperature range 15 °C to 30 °C.

2.2 Maximum permissible error

2.2.1 Maximum permissible error during validation

The maximum permissible errors for laboratory gas meters are generally specified in Table 1.

Table 1 – Maximum permissible errors

Flow (m^3/h)	Maximum permissible errors	
	Initial (before commissioning the measurement device)	During use
$Q_{min} \leq Q < Q_{max}$	± 0.50 %	± 1.0 %

Laboratory gas meters are classified in accuracy class 0.5.

2.2.2 Maximum permissible error during use

When validating measurement devices in use at the request of a party whose interests may be mutually damaged by improper measurement, the 'maximum permissible error during use' specified in Table 1

shall be applied, or, in the case of older measurement devices which were previously used, two times the maximum permissible error specified in the type approval certificate.

2.3 Loss of pressure

The mean loss of pressure for a gas meter in the measurement cycle range may not exceed 40 Pa at nominal flow Q of air with a density of 1.2 kg/m^3.

3 Technical requirements

3.1 Measurement device design

3.1.1 Measurement drum

The measurement space of the laboratory gas meter is formed by the walls of a rotating drum with a horizontal axis and a level of liquid which the drum is submersed in. The measurement volume of the drum is determined by the level which the gas meter is filled at before being put into operation. The drum's rotating motion moves the defined volume of gas, which is comprehensively recorded and indicated using the indication device.

3.1.2 Measurement device connection

Laboratory gas meters have two connection points for flanged or threaded measurement device connections.

3.1.3 Filling liquid

The manufacturer must specify the precise procedure for filling the laboratory gas meter drum with the precise quantity of filling liquid, setting the level and inspecting it at the level gauge. The manufacturer must precisely specify the filling liquid.

3.3 Counter

The gas meter must be equipped with a metrologically inspected counter (display).

The counter must function properly under normal conditions of use throughout the typical service life of the gas meter being tested.

The counter may be a cylindrical mechanical device which is non-volatile and cannot be reset to zero.

The digits on the counter must indicate cubic metres, decimal multiples or portions of cubic metres. The m^3 symbol must be specified on the counter’s label near the digit cylinder or on the counter display.

With mechanical counters, the rotation of the cylinder during the final tenth of its course, i.e. from 9 to 0, must cause the cylinder of the next higher digit place to move by one unit.

With electronic counters, the number of the next higher digit place must increase by one when any number changes from 9 to 0.

It must be possible to read the counter clearly and properly at an angle of 15° from the perpendicular line to the aperture within the ambient temperature range from 15 °C to 30 °C or greater, if specified by the manufacturer.

The counter’s inspection element may be an indicator moving above the counter or a rotating disc with a graduated scale for a fixed reference symbol. The volume corresponding to one rotation of the indicator or disc must be marked on the numbered scale of the control element. The beginning of the scale must be marked with zero.

3.4 Design and materials

The gas meter’s components which are exposed to the effects of the gas medium being measured as well as the filling liquid must be able to withstand the effects of the constituents of the gas medium in

which they are working, and must be resistant to wear during the gas meter's normal service life to such an extent that they do not affect the gas meter's measurement ability. The body and all parts of the gas meter must be made of materials or surfaces capable of withstanding the media for which they are intended.

3.5 Resistance to improper handling

The gas meter must be designed so that any kind of mechanical effect which is capable of affecting measurement accuracy will visibly and permanently damage the measurement device or the official or security seals.

3.6 Spirit level

The laboratory gas meter must be equipped with a spirit level in order to ensure that the measurement device is in the proper position when installed.

3.7 Impulse generator

The gas meter may be equipped with an integral impulse generator with outputs which must carry the indication value of one impulse, for instance in the following form:

"1 imp = dm^3 (or m^3)", or

"1 dm^3 = imp.".

This additional device (if built in) constitutes an inseparable part of the gas meter.

3.8 Storage and transport

Wherever possible, the gas meter's connections must be equipped with suitable caps or covers which prevent foreign matter from getting into the meter during transport and storage.

4 Gauge markings

4.1 Every gas meter must be marked with at least the following information on the counter or on a separate label:

- manufacturer's name or trademark,
- type of laboratory gas meter,
- serial number and year of production,
- maximum flow Q_{max},
- minimum flow Q_{min},
- cyclic volume V,
- maximum operating pressure p_{max},
- the type approval mark.

The connection points used for sensing the pressure and temperature from the gas meter must be properly marked with the applicable labels.

The markings must be at a clearly visible location and must be permanent under normal conditions of gas meter use.

4.2 Gas flow direction marking

The direction of gas flow must be clearly indicated in relation to the connection points in the gas meter's technical documentation.

4.3 Placement of official marking

The placement of the official marking is established by the type approval certificate. Special attention must be paid to setting the level of liquid in the gas meter.

5 Gauge type approval

5.1 General

The type approval process for the laboratory drum gas meter encompasses the following tests:

a) external inspection,

b) tightness test,

b) accuracy test,

c) loss of pressure test,

c) test of resistance to external effects,

d) long-term durability test.

5.2 External inspection

The following aspects are evaluated during the external inspection of the laboratory drum gas meter:

a) completeness of the specified technical documentation, including operating instructions,

b) conformity of the metrological and technical characteristics specified by the manufacturer in the documentation with the requirements of this Regulation, specified in Chapters 2, 3 and 4,

c) completeness and functional condition of the gas meter according to the specified technical documentation,

The durability and legibility of the markings is also inspected.

5.3 Tightness test

The tightness of the gas meter as well as the strength of its materials and connections is tested using air pressure equivalent to two times the maximum permissible pressure. During the test, the gas meter is submersed in water or its tightness is inspected using a pressure gauge. The gas meter may not indicate any air leakage during the test.

Gas meters which are filled with liquid must be hermetically sealed; the liquid may not escape from them.

5.4 Function tests

5.4.1 Requirements for test equipment

The test equipment must include reference calibrating devices suitable for testing the applicable gas meters.

Pressure gauges, thermometers and/or reference calibrating devices for volume flow must have up-to-date metrological traceability.

The total uncertainty of establishing the actual error of the measurement device being tested must be at least three times less than the value of the maximum permissible error specified for the measurement device being tested.

5.4.2 Accuracy test

The functional condition of the gas meter is inspected by testing continuity of the gas meter's operation. If the gas meter is loaded at a flow of Q_{min}, then it may not be stopped during operation.

Gas meters shall be tested at flows of Q_{max}, Q, $0.25Q_{max}$, Q_{min}; the test temperature of the surrounding environment shall be (20 ±2) °C.

The gas meter's detected errors may not exceed the maximum permissible error pursuant to Article 2.2.1 in the entire flow range.

During the accuracy test, it is necessary to inspect all devices in the gas meter which are capable of generating an electronic signal commensurate to the flowing gas volume.

5.4.3 Loss of pressure test

Gas meters are tested using air with a density of 1,2 kg/m^3 at a nominal flow of Q and the differential pressure is measured between the gas meter's input and output. The test temperature of the surrounding environment is (20 ±2) °C.

The mean loss of pressure, calculated as the mean measured maximum and minimum differential pressure, may not exceed the maximum permissible loss of pressure pursuant to Article 2.3.

5.5 Test of resistance to external effects

5.5.1 Test of resistance to overloading

A gas meter which has already passed the tests of function pursuant to Article 5.4 is left to be loaded by overload flow Q_r for 1 hour. It is then subjected to the tests of function pursuant to Article 5.4 again.

During this test, the maximum permissible error pursuant to Article 2.2.1 and the maximum permissible loss of pressure pursuant to Article 2.3 may not be exceeded.

5.5.2 Test of temperature effect

A gas meter which has already passed the tests of function pursuant to Article 5.4 conducted at the temperature (20 ±2) °C, shall again be subjected to the tests of function pursuant to Article 5.4 at a different temperature within the temperature range specified in Article 2.1.3.

During this test, the maximum permissible error pursuant to Article 2.2.1 and the maximum permissible loss of pressure pursuant to Article 2.3 may not be exceeded.

5.6 Long-term durability test

A gas meter which has already passed the tests of function pursuant to Article 5.4 is left to be loaded by overload flow Q for 1,000 hours. It is then subjected to the tests of function pursuant to Article 5.4 again.

During this test, the maximum permissible error pursuant to Article 2.2.1 and the maximum permissible loss of pressure pursuant to Article 2.3 may not be exceeded.

6 Initial validation

6.1 General

The following tests are conducted during initial validation:

a) visual inspection,

b) accuracy test,

c) loss of pressure test.

6.2 Visual inspection

The following aspects are evaluated during the visual inspection of the gas meter:

a) the measurement device's conformity with the type approval,

b) the appearance (including description) and functional condition of the measurement device.

6.3 Test of the gas meter's accuracy

The test of the gas meter's accuracy shall be conducted in accordance with Article 5.4.2, provided that the gas meters are preferentially tested at the flows specified in the type approval certificates (if the certificate does not specify the test flows, then the flows specified in 5.4.2 shall be used).

6.4 Loss of pressure test

The loss of pressure test shall be conducted in accordance with Article 5.4.3.

7 Follow-up validation

A procedure identical to the initial validation pursuant to Chapter 6 is applied during the follow-up validation.

8 Declared standards

For the purposes of specifying the metrological and technical requirements for measurement devices and specifying testing methods during validation based on this general measure, the CMI declares Czech technical standards, other technical standards or technical documents of international or foreign organisations or other technical documents containing more detailed technical requirements (hereinafter referred to as 'declared standards'). The CMI announces a list of these notified standards assigned to the applicable measure together with the general measure by means accessible to the public (at www.cmi.cz).

In the scope of and under the conditions established by the general measure, compliance with these declared standards or compliance with portions thereof is deemed to be compliance with said requirements established by the general measure to which the these standards or portions thereof relate.

II.

GROUNDS

The CMI issues this general measure establishing metrological and technical requirements for the specified measurement devices and testing methods during the validation of said specified measurement devices for the purposes of implementing Section 24c of Act No 505/1990 Coll. on metrology, as amended.

Regulation No 345/2002 Coll. establishing measurement devices for compulsory validation and measurement devices subject to type approval, as amended, classifies laboratory measurement devices for measuring the flow quantity of gas as measurement devices subject to validation in the Second List of Specified Measurement Devices in the Annex under Item 1.3.10 c).

The CMI hereby issues this general measure establishing metrological and technical requirements for laboratory measurement devices for measuring the flow quantity of gas and testing methods for the type approval and validation of said specified measurement devices for the specific type of measurement devices 'laboratory measurement devices for measuring the flow quantity of gas' for the purposes of implementing Section 24c of Act No 505/1990 Coll. on metrology, as amended.

This Regulation (General measure) was notified in accordance with European Parliament and Council Directive 98/34/EC of 22 June 1998 on the procedure for the provision of information in the field of

technical standards and regulations and rules on Information Society services, as amended by Directive 98/48/EC.

III.

LEGAL INSTRUCTIONS

Legal remedies may not be applied against this general measure (Section 173 Paragraph 2 Act No 500/2004 Coll., Rules of Administrative Procedure, as amended (hereinafter referred to as the 'Rules of Administrative Procedure').

In accordance with the provisions of Section 172 Paragraph 5 of the Rules of Administrative Procedure, appeals may not be raised against decisions on objections.

The general measure's conformity with the statutory regulations can be evaluated in the research procedure pursuant to the provisions of Section 94 to 96 of the Rules of Administrative Procedure. The participant may submit a motion to conduct a research procedure to the administrative body which issued this general measure. If the administrative body does not find reason to initiate a research procedure, it shall inform the submitter of this fact and substantiate its reasons within thirty days. Rulings on the initiation of a research procedure may be issued within three years as of the general measure's entry into legal effect in accordance with the provisions of Section 174 Paragraph 2 of the Rules of Administrative Procedure.

IV.

ENTRY INTO LEGAL EFFECT

This general measure shall enter into legal effect on the fifteenth day as of the date of its promulgation (Section 24d of Act No 505/1990 Coll. on metrology, as amended).