

1. -----IND- 2018 0593 CZ- EN- ----- 20181217 --- --- PROJET

Executive summary for the EC (not part of this legislation)

'Rotary-piston and velocity gas flow meters' may be placed on the market and put into use in the Czech Republic pursuant to Directive 2014/32/EU (MID) or for non-MID areas pursuant to Act No 505/1990 on metrology, as amended. Pursuant to this act, the specified measuring instruments are measuring instruments in the List of Specified Measuring Device Types (Decree No 345/2002) and specified (by the manufacturer/importer) for measurement with relevance in the protection of public interests in the following areas: *consumer protection; contractual relations; stipulation of sanctions, fees, tariffs and duties; health protection; environmental protection; occupational safety or protection of other public interests protected by special legislation.* This therefore refers to a purpose similar to that used to identify stipulated products — non-automatic measuring and weighing instruments pursuant to Directives 2014/31/EU and 2014/32/EU. The requirements of this legislation do not apply to measuring instruments not placed on the market in the Czech Republic for the above purposes, identified by Act No 505/1990 on metrology.

The purpose of this notified regulation is to stipulate:

- 1) metrological and technical requirements for specified measuring instruments and tests for purposes of type approval, if these measuring instruments are not being placed on the market with conformity assessment pursuant to MID; and
- 2) tests for purposes of verification of specified measuring instruments (once they have been placed on the market), regardless of whether they are being placed on the market pursuant to Act No 505/1990 on metrology, or pursuant to MID with conformity assessment.

(End of executive summary)

Author: Mgr. Tomáš Hendrych

Telephone: +420 545 555 414

As the authority with substantive and territorial jurisdiction in the matter of laying down metrological and technical requirements for legally controlled measuring instruments and stipulating the testing methods for type approval and verification of legally controlled measuring instruments pursuant to § 14(1) of Act No 505/1990, on metrology, as amended (hereinafter the 'Metrology Act'), and in accordance with the provisions of § 172 et seq. of Act No 500/2004, the Code of Administrative Procedure (hereinafter the 'CAP'), the Czech Metrology Institute (hereinafter the 'CMI') commenced ex officio proceedings on 12 March 2017 pursuant to § 46 of the CAP, and, based on supporting documents, issues the following:

I.

DRAFT MEASURE OF A GENERAL NATURE

number: 0111-OOP-C031-18

laying down metrological and technical requirements for legally controlled measuring instruments, including the testing methods for the type approval and verification of legally controlled measuring instruments:

'rotary-piston and velocity gas flow meters'

This legislation stipulates metrological and technical requirements for type approval and initial verification of rotary-piston and velocity gas flow meters used expressly in areas of use other than those defined by Government Regulation No 120/2016, on assessment of conformity of measuring instruments when they are placed on the market, as amended (hereinafter 'Government Regulation No 120/2016').

This legislation also stipulates metrological and technical requirements for subsequent verification of rotary-piston and velocity gas flow meters.

1 Basic definitions

For the purposes of this general measure, terms and definitions pursuant to VIM and VIML¹⁾ and the following apply:

1.1

gas meter with rotary pistons (hereinafter a 'rotary gas meter')

a volumetric gas meter in which a fixed measuring chamber is formed between the walls of a stationary chamber and a rotary element; each rotation cycle of the element(s) moves a defined volume of gas, which is comprehensively recorded and indicated on a display device.

1.2

turbine gas meter

a velocity gas flow meter in which the dynamic forces of the flowing gas cause the turbine wheel to rotate at a velocity which is the function of the volumetric flow; the number of rotations of the turbine wheel form the basis for indicating the volume which flowed through the turbine gas meter

1.3

ultrasonic gas meter

a velocity gas flow meter in which the measurement principle is to measure the velocity of the gas flowing in a pipe. This measurement principle is based on determining the time it takes for ultrasonic signals to pass through the flowing gas between the units for transmitting and receiving the ultrasonic signals. ultrasonic gas meters can be classified as classical multi-path meters, which contain several ultrasonic measurement paths (usually three or more), and are manufactured with nominal dimensions from DN80 and higher, and belong to an accuracy class 1.0. ultrasonic gas meters for the home (hereinafter 'household ultrasonic gas meters') have a maximum flow rate of 10 m³/h, usually contain one measurement path, are shaped like a household membrane gas meter, are used at pressures up to 0.5 bar, are battery-powered, and belong to accuracy class 1.5.

1.4

vortex gas flow meter

A velocity gas flow meter which is based on an effect in which vortices are alternately separated on both sides of a non-aerodynamically shaped obstacle around which gas flows on both sides. The vortices are generated at a frequency which is proportionate to the velocity of the gas flow, and thus the size of the flow as well. A suitable sensor picks up the frequency of the vortices which are generated this way and converts them into the value of the volumetric flow in the required measurement units.

¹⁾ International Vocabulary of Metrology – Basic and General Concepts and Associated Terms (VIM) and International Vocabulary of Terms in Legal Metrology (VIML) are part of the technical harmonisation compendium 'Terminology in the Area of Metrology', which is publicly accessible at www.unmz.cz.

1.5**pressure drop**

the difference between the pressure recorded at the intake and outlet of the gas meter if it is in operation

1.6**error**

a percentage value that expresses the ratio of the difference between the volume indicated by the gas meter and the volume that actually flowed through the gas meter, to the actual flow volume.

1.7**maximum flow Q_{\max}**

the maximum flow for which the gas meter provides readings that comply with requirements for maximum permissible error (MPE).

1.8**minimum flow Q_{\min}**

the minimum flow for which the gas meter provides readings that comply with requirements for maximum permissible error (MPE).

1.9**transitional flow Q_t**

a value between the maximum and minimum flow that splits the flow range into two bands: the 'upper band' and the 'lower band'. A specific maximum permissible error (MPE) applies to each band.

2 Metrological requirements

Metrological requirements are based on the requirements of relevant harmonised European standards and norms. Gas meters must have the required metrological characteristics over the entire range of conditions for which they have been approved and the required repeatability and reproducibility.

Measuring instruments that are type approved pursuant to the Metrology Act or pursuant to European directives²⁾ are subject to the metrological requirements applicable at the time they were put into circulation.

2.1 Stipulated operating conditions**2.1.1 Flow range**

The gas flow range must meet requirements for relative proportions of maximum flow Q_{\max} , minimum flow Q_{\min} , transitional flow Q_t and overload flow Q_r :

- a) $Q_{\max}/Q_{\min} \geq 20$
- b) $Q_{\max}/Q_t \geq 5$
- c) $Q_r/Q_{\max} = 1.2$

The following relative proportions of maximum flow Q_{\max} , minimum flow Q_{\min} , transitional flow Q_t and overload flow Q_r apply only to household ultrasonic gas meters:

- a) $Q_{\max}/Q_{\min} \geq 150$

²⁾ Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments and Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments.

- b) $Q_{\max}/Q_t \geq 10$
 c) $Q_r/Q_{\max} = 1.2$

2.1.2 Maximum load

After being subjected for one hour to an overload flow of Q_r , the gas meter must be within the limits of maximum permissible error within its measurement range.

2.1.3 Maximum operating pressure

The gas meter's maximum operating pressure must be marked on its label.

2.1.4 Temperature range

All gas meters must be capable of meeting the requirements for the minimum ambient temperature range $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

The minimum gas temperature range is $40\text{ }^{\circ}\text{C}$.

2.1.5 Stability

Gas meters must meet metrological requirements for their stipulated period of use, which is demonstrated through a long-term stability test.

2.2 Maximum permissible error

2.2.1 Maximum permissible error during verification

The maximum permissible errors for rotary and velocity gas meters are generally specified in Table 1.

Table 1 – Maximum permissible errors

Flow (m^3/h)	Maximum permissible errors	
	During verification	During use
$Q_{\min} \leq Q < Q_t$	$\pm 2.0\%$	$\pm 4\%$
$Q_t \leq Q \leq Q_{\max}$	$\pm 1.0\%$	$\pm 2\%$

Rotary and velocity gas meters are in accuracy class 1.0.

Maximum permissible errors for household ultrasonic gas meters are specified in Table 2.

Table 2 – Maximum permissible errors for household ultrasonic gas meters

Flow (m^3/h)	Maximum permissible errors	
	During verification	During use
$Q_{\min} \leq Q < Q_t$	$\pm 3.0\%$	$\pm 6\%$
$Q_t \leq Q \leq Q_{\max}$	$\pm 1.5\%$	$\pm 3\%$

Household ultrasonic gas meters have an accuracy class of 1.5.

With certain types of gas meters to which the national technical standards were applied during approval, the maximum permissible error valid at the time of approval may differ from the maximum permissible error specified above; in such case, the maximum permissible error specified in the type-approval certificate will take precedence.

2.3 Pressure drop

The manufacturer must declare the maximum pressure drop at Q_{max} .

The mean pressure drop for a gas meter at maximum flow Q_{max} with an air density of 1.2 kg/m^3 must not exceed the manufacturer's specified values or the values in the type-approval certificate, if specified.

3 Technical requirements

Technical requirements are based on requirements of relevant harmonised European standards or OIML standardisation documents.

3.1 Construction of the measuring instrument

Rotary and velocity gas flow meters have two connection points for flanged or threaded measuring instrument connections, or one coaxial connection.

3.2 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 can be a mechanical device comprising cylinders that cannot be zeroed, minimally for a volume corresponding to the volume recorded after 8 000 h at flow Q_{max} . The counter's cylinders past the decimal point must be framed or have a different colour than the cylinders before the decimal point.

The counter's digits must indicate cubic metres or decimal multiples or fractions of a cubic metre. The mark m^3 must be situated on the counter's label near the digit cylinders or on the counter's display.

For a mechanical counter, 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 to move by one unit.

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

It must be possible to read the counter clearly and correctly at an angle of 15° from the perpendicular to the window over a temperature range of -10°C to 40°C or greater if specified by the manufacturer.

3.3 Materials

The components of the gas meter in the gas flow must be resistant to the effects of the constituents of the gas medium in which they operate, and they must be resistant to ageing and corrosion over the standard life of the gas meter. The housing and all other parts of the gas meter must be made of materials or surfaces capable of withstanding pressure and the environment for which they are intended.

3.4 Resistance to improper handling

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

3.5 Storage and transport

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

3.6 Gas meter operating position

The operating position in which the gas meter is to be used must be indicated on the label of the gas meter, or it must be specified on the type-approval certificate.

3.7 Rectifier tubes

A gas meter with which the metrological properties depend on the length of the rectifier tube connected to the gas meter must be validated and used with the rectifier tube specified by the manufacturer or on the type-approval certificate.

3.8 Software

If the evaluation or indication unit contains software which is essential to the metrological properties, it must be identified and secured. The gas meter must enable the software to be identified by simple means.

3.9 Electronics

If the gas meter contains electronic components, they must comply with relevant EMC requirements.

4 Measuring instrument markings

Requirements for marking measuring instruments pursuant to this chapter concern measuring instruments that are approved pursuant to the Metrology Act. They do not apply to measuring instruments placed on the market with type approval pursuant to Government Regulation 120/2016.

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

- a) the identification mark or name of the manufacturer;
- b) the serial number and year of production;
- c) maximum flow Q_{\max} (m³/h);
- d) minimum flow Q_{\min} (m³/h);
- e) maximum operating pressure p_{\max} ;
- f) for rotary gas meters, the rated cyclic volume value V (dm³);
- g) the impulse number value, which corresponds to the specified recorded flow volume at the place where the impulse transmitter is to be used;
- h) transitional flow Q_t , only for gas meters approved pursuant to this legislation;
- i) a type-approval mark.

Connectors for sampling pressure and temperature from the gas meter must be properly marked with the appropriate labels.

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

With certain gas meters whose type was approved in accordance with the national technical standards, the requirement for the measuring instrument's markings which were valid at the time the measuring instrument received its type approval may differ from the above-mentioned official requirement. In such case, the requirements specified on the type-approval certificate will be decisive.

4.2 Gas meter with two connectors

Gas meters with two connectors must have the gas flow direction clearly and permanently marked by an arrow between these two connection points.

5 Type approval of measuring instruments

Type approval of measuring instruments that are not covered by Government Regulation No 120/2016 and are subject to type approval pursuant to the Metrology Act, as amended, are subject to requirements that are identical to those of Government Regulation No 120/2016.

6 Initial verification

Initial verification applies to measuring instruments that at the given time have a valid type-approval certificate. A procedure identical to that used for subsequent verification referred to in Chapter 7 is applied in the initial verification.

7 Subsequent verification

7.1 General

The following tests are performed during initial verification of a gas meter:

- a) a visual inspection;
- b) accuracy test;
- c) a pressure loss test, but only in cases where this is specified on the type-approval certificate.

7.2 Visual inspection

The visual inspection checks whether the gas meter submitted for verification is in conformity with the approved type or with the measuring instrument design for which conformity was declared during placement on the market, and special attention must be paid in checking that markings are correct pursuant to Article 4.1 or the relevant certificate.

The durability and legibility of the markings is also checked.

Gas meters that have been mechanically damaged and those that do not conform with the approved type or measuring instrument design for which conformity was declared during placement on the market will not be tested further.

7.3 Functional tests

Compliance with relevant metrological and technical requirements pursuant to Chapters 2, 3 and 4 is monitored over the course of functional tests and evaluation thereof.

7.3.1 Test equipment requirements

Test equipment must be equipped with reference standards that are suitable for testing the relevant gas meters and have up-to-date metrological traceability.

Pressure gauges, thermometers and reference calibrating devices for volume flow must have up-to-date metrological traceability and must state the uncertainty of calibration.

The total extended uncertainty when testing and determining the error of the gas meter must be at least three times less than the value of the maximum permissible error specified for the measuring instrument undergoing testing at the given flow.

7.3.2 Accuracy test

Prior to the accuracy test it is necessary to ensure that the gas meter has been tempered sufficiently, perform a leak test on the gas meter's connection to the test station, and operate the gas meter for a sufficient amount of time at approximately $0.6Q_{\max}$. If the gas meter is not being tested at a high-pressure test lab, the tests must take place at ambient temperature ($18 - 25$ °C) and at relative humidity less than or equal to 80 %.

Gas meters are preferentially tested at the flows specified in the Table 3 below.

Table 3 — Test flows for verification of gas meters

Gas meter measurement range $Q_{\max}:Q_{\min}$	Test flows
20:1	$Q_{\max}; 0.7Q_{\max}; 0.4Q_{\max}; 0.25Q_{\max}; 0.1Q_{\max}; 0.05Q_{\max}$
Over 20:1 up to 30:1	$Q_{\max}; 0.7Q_{\max}; 0.4Q_{\max}; 0.25Q_{\max}; 0.1Q_{\max}; 0.05Q_{\max}; Q_{\min}$
Over 30:1 up to 50:1 and higher	$Q_{\max}; 0.7Q_{\max}; 0.4Q_{\max}; 0.25Q_{\max}; 0.15Q_{\max}; 0.05Q_{\max}; Q_{\min}$

Household ultrasonic gas meters are tested with the following flows: $Q_{\max}; 0.2Q_{\max}; Q_{\min}$.

Measuring instruments to which the requirements of national technical standards were applied during their approval are tested at the flow rates specified in the type-approval certificate. Tests are always performed from the highest flow to the lowest.

In the case of velocity gas meters that will be used at the installation location under static pressure greater than 4 bar and if simultaneously the user intends to use gas meter error correction in a connected gas volume converter, it is necessary to perform verification using natural gas at static pressure corresponding to the gas pressure at the installation location. In this case, after verification, the gas meter can be used over a pressure range of $0.5P_{\text{test}}$ to $2P_{\text{test}}$, where P_{test} is the static gas pressure at which the given velocity gas meter was tested during verification.

If the type-approval certificate for multi-path ultrasonic gas meters specifies that they must be verified under increased static pressure, then accuracy tests for verification of these gas meters must be performed using natural gas at a high-pressure test lab. In this case the gas meter can be used following verification over a pressure range of $0.5P_{\text{test}}$ to $2P_{\text{test}}$, where P_{test} is the static pressure of gas used to test the given multi-path gas meter during verification.

The calculated indication error for individual test flow rates must meet the requirements for the maximum permissible error during verification specified in Table 1 or 2 or in the type-approval certificate.

If specified on type-approval certificates, it is necessary to meet gas meter installation requirements such as the length of the calming tube before and after the gas meter and the position of the gas meter (vertical, horizontal) during testing.

During the accuracy test all apparatus in the gas meter capable of generating an electronic signal or pulses proportional to the amount of gas that has flowed through the meter are checked at least at flow Q_{\max} .

Vortex gas flow meters are tested using a different method pursuant to a special technical regulation.

7.3.3 Loss of pressure test

The loss of pressure test is conducted in cases in which its value was specified by the manufacturer or is specified on the type-approval certificate. Gas meters are tested using air with a density of 1.2 kg/m^3 at a maximum flow of Q_{\max} and the differential pressure is measured between the gas meter's inlet and outlet.

The mean pressure drop, calculated as the mean of the measured maximum and minimum differential pressure, may not exceed the maximum pressure drop specified by the manufacturer or on the type-approval certificate.

7.3.4 Official mark placement

Gas meters that have complied with verification requirements stipulated by this legislation and their type-approval certificate are sealed using official marks in places specified in the type-approval certificate.

7.3.5 Other

A type-approval certificate can stipulate other requirements that need to be fulfilled when verifying a gas meter.

8 Measuring instrument examination by request of a concerned party

Examination of a measuring instruments pursuant to § 11a of the Metrology Act at the request of a person who may be affected by incorrect measurement takes place pursuant to Chapter 7, except for the last sentence of Article 7.2. The test is always performed if it is technically possible. The 'maximum permissible errors during use' specified in Table 1 or Table 2, as applicable, will be used as maximum permissible errors.

In the case of measuring instruments in use up to now to which requirements of national technical standards were applied during their approval, the maximum permissible error will be double the maximum permissible error specified in the type-approval certificate.

9 Notified standards

For the purposes of specifying the metrological and technical requirements for measuring instruments and specifying the testing methods for their type approval and verification arising from this general measure, the CMI will notify 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 'notified standards'). The CMI will publish a list of these notified standards attached to the relevant measures, together with the general measure, in a manner accessible to the public (www.cmi.cz).

Compliance with notified standards or parts thereof is considered, to the extent and under the conditions laid down in the general measure, as compliance with those requirements laid down in this measure to which these standards or parts thereof apply.

Compliance with notified standards is one way of demonstrating compliance with the requirements. These requirements may also be met by using another technical solution guaranteeing an equivalent or higher level of protection of legitimate interests.

II.

G R O U N D S

Pursuant to § 14(1)(j) of the Metrology Act, the CMI has issued this Measure of a General Nature toward the implementation of § 6(2), § 9(1) and (9), and § 11a(3) of the Metrology Act, laying down metrological and technical requirements for specified measuring instruments and tests for type approval and verification of specified measuring instruments — rotary-piston and velocity gas flow meters.

Decree No 345/2002 stipulating measuring instruments for mandatory verification and measuring instruments subject to type approval, as amended, classifies this type of measuring instrument as a

measuring instrument subject to verification under item 1.3.10(b) in the Annex 'List of Specified Measuring Device Types'.

This legislation (Measure of a General Nature) will be notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.

III. INSTRUCTIONS

In accordance with § 172(1) APC in conjunction with § 39(1) APC, the CMI has stipulated a time limit for comments of 30 days as of the date of posting the draft on the official notice board. Comments submitted after this time limit will not be considered.

The persons concerned are hereby invited to comment on this general draft measure. With regard to the provisions of § 172(4) APC, comments are to be submitted in writing.

Pursuant to the provisions of § 174(1) APC, in conjunction with the provisions of § 37(1) APC, it must be clearly stated who is submitting the comments, which general measure the comments concern, how the draft contradicts legislation or how the general measure is inaccurate. The comments must also contain the signature of the person making the comments.

The supporting documents for this draft general measure may be consulted at the Czech Metrology Institute, Legal Metrology Department, Okružní 31, 638 00 Brno, after making arrangements by telephone.

This draft general measure shall be posted for 15 days.

RNDr.Pavel Klenovský
Director-General

Person responsible for accuracy: Mgr. Tomáš Hendrych

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