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PUBLIC DECREE

As the authority with substantive and territorial jurisdiction for laying down metrological and technical requirements for specified measuring instruments and stipulating test methods for type approval and verification of specified measuring instruments pursuant to § 14(1) of Act No 505/1990 *on metrology, as amended* (hereinafter the 'Metrology Act' or the 'Act'), and in accordance with the provisions of § 172 et seq. of Act No 500/2004, *the Administrative Code* (hereinafter the 'AC'), the Czech Metrology Institute (hereinafter the 'CMI') commenced ex officio proceedings on 1. 7. 2024 pursuant to § 46 AC, and, based on the supporting documents, issues the following:

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MEASURE OF A GENERAL NATURE

number: 0111-OOP-C106-26

laying down metrological and technical requirements for specified measuring instruments, including test methods for type approval, verification and checking of specified measuring instruments:

'measuring systems for determining the energy value of energy gases and their mixtures'.

1 Definitions

For the purposes of this measure of a general nature, terms and definitions pursuant to VIM and VIML[1] as well as the terms and definitions stated below apply:

1.1
measuring systems for determining the energy value of energy gases and their mixtures

equipment consisting of individual measuring instruments by means of which the energy content delivered to the customer can be calculated

1.2
energy gas

gas that can be transported via pipelines and used for energy purposes in households or industry

1.3
energy content (of energy gas)

the gross calorific value or net calorific value of the energy gas.

Note: In the Czech Republic, the concept of gross calorific value is preferred in this field.

[1] TNI 01 0115 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 field of metrology', which is publicly accessible at www.unmz.gov.cz.

1.4
gross calorific value
the amount of heat released by the complete combustion of a specified amount of gas in air in such a way that the pressure p_1 at which the reaction takes place remains constant: all combustion products are returned to the same specific temperature t_1 as would be the temperature of the reactive components, all of which are in a gaseous state, with the exception of water created by combustion which has condensed to the liquid state at the temperature t_1

1.5
net calorific value
the amount of heat released by the complete combustion of a specified amount of gas in air in such a way that the pressure p_1 at which the reaction takes place remains constant: all combustion products are returned to the same specific temperature t_1 as would be the temperature of the reacting components, all of which are in a gaseous state

1.6
rated operating conditions
conditions of use for which the specified metrological characteristics of the measuring instrument lie within defined limits

1.7
reference conditions
the conditions of use prescribed for functional tests of the measuring instrument or for comparison between the results of measurement

1.8
basic conditions
the specified conditions to which the measured quantity of gas is converted

1.9
network topology
the model of the gas network on which the measuring system for determining the energy value of energy gases and their mixtures is operated

2 Metrological requirements

During verification, measuring systems for determining the energy value of energy gases and their mixtures are subject to the metrological requirements applicable at the time they were put into circulation.

2.1 Description of the measuring system

The measuring system for determining the energy value of energy gases and their mixtures is designed for determining the value of the gross calorific value of energy gases. These may include, for example, natural gas, hydrogen, a mixture of natural gases of varying quality (from different sources), a mixture of natural gas and biogas (biomethane), or a mixture of natural gas and hydrogen.

The value of the gross calorific value may be determined either as a proxy determined from the input conditions or as the value obtained by reconstruction of the state of the gas network.

The output value of the measuring system is the average daily determined energy (gross or net calorific value).

Input variables and system parameters:

a) the energy content of the gas being measured (heat of combustion);
b) flow quantity (volume) of gas;
c) gas pressure;
d) gas temperature;
e) network topology.

2.2 Rated operating conditions

The system manufacturer must specify:

a) the range of operating conditions;
b) the basic conditions for determining the value of the gross calorific value;
c) requirements for measuring instruments of input quantities;
d) network topology.

Measuring instruments of a measuring system must be capable of meeting the requirements for a minimum ambient temperature range from −10 °C to +40 °C.

2.3 Reference conditions

They are derived from measures of a general nature relating to the types of measuring instruments used, in so far as they are not covered by the conditions set out in the system's type-approval certificate for the determination of the energy value of energy gases and their mixtures.

2.4 Measuring range

The measuring range of a system for determining the energy value of energy gases and their mixtures is stipulated by the manufacturer according to the type of gas being measured.

2.4.1 Measured gas

The energy gas being measured must be specified by name or type, the physical properties of which are defined and generally known (e.g. natural gas), or must be specified directly by stating the ranges of the relevant physical properties with which manufacturers supply these gases.

2.4.2 Energy value of the measured gas (gross calorific value)

The measurement range for the components to be determined and the calorific value is specified by the manufacturer of the measuring instrument suitable for the given purpose (e.g. a process gas chromatograph). The measuring range must comply with the conditions of use of the measuring system.

2.4.3 Flow quantity (volume) of gas

The flow measuring range is specified by the manufacturer of the flow meter. The measuring range must comply with the conditions of use of the measuring system. It must be designed so that the flow is between the minimum and maximum flow, except for the process state when no gas is being transported.

2.4.4 Gas pressure

The measuring range of the pressure is specified by the manufacturer of the pressure transducer. The measuring range must comply with the conditions of use of the measuring system.

For absolute pressures less than 2.1 MPa, an absolute gas pressure converter must be used. For absolute pressures equal to or greater than 2.1 MPa, a pressure transducer designed to measure gauge

pressure may be used, in which case the average barometric pressure at the installation site must be added to this value.

2.4.5 Gas temperature

The temperature measuring range is specified by the manufacturer of the temperature sensor. The measuring range must comply with the conditions of use of the measuring system.

The minimum gas temperature range is 40 °C.

2.5 Preservation of metrological properties

The measuring system must be designed in such a way that it is capable of maintaining the required metrological characteristics throughout the period of validity of the verification.

2.6 Accuracy classification of measuring systems

2.6.1 Accuracy class

To determine the energy value of energy gases and their mixtures, measuring systems of accuracy class ‘A’, ‘B’ or ‘C’ given by the maximum permissible error of the measuring system are used.

2.6.2 Maximum permissible errors (MPE) for measuring systems

The maximum permissible errors for measuring systems for determining the energy value of energy gases
and their mixtures are shown in Table Error: Reference source not found.

Table 1: Maximum permissible errors (MPE) of a measuring system

Maximum permissible errors	during verification	in operation
Accuracy class ‘A’	±1 %	±2 %
Accuracy class ‘B’	±2 %	±3,5 %
Accuracy class ‘C’	±3 %	±5 %

2.6.3 Maximum permissible errors (MPE) for input variable measuring instruments

The maximum permissible errors for input variable measuring instruments are shown in Table Error: Reference source not found.

Table 2: Maximum permissible errors (MPE) for input variable measuring instruments

Maximum permissible errors	Accuracy class ‘A’	Accuracy class ‘B’	Accuracy class ‘C’
Volume under operating conditions	±0,7 %	±1,2 %	±1,5 %
Conversion to volume under standard conditions or to mass	±0,5 %	±1 %	±1,5 %
Measurement of gross calorific value	±0,5 %	±1 %	±1 %
Determination of a representative value of the gross calorific value	±0,6 %	±1,25 %	±2 %

2.6.4 Maximum permissible errors (MPE) for elements of gas flow quantity measuring systems

The maximum permissible errors of members of gas flow quantity measuring systems are shown in Table Error: Reference source not found.

Table 3: Maximum permissible errors (MPE) for members of gas flow quantity measuring systems

Maximum permissible errors	Accuracy class 'A'	Accuracy class 'B'	Accuracy class 'C'
Volume under operating conditions	±0,7 %	±1,2 %	±1,5 %
Gas pressure	±0,2 %	±0,5 %	±0,75 %
Gas temperature	±0,5 °C	±0,5 °C	±1 °C
Gas density	±0,35 %	±0,7 %	±1 %
Compressibility factor	±0,3 %	±0,3 %	±0,5 %

2.6.5 Maximum permissible errors (MPE) for instruments measuring operational state variables in a measuring system

The maximum permissible errors of instruments measuring operational state variables of a measuring system for determining the energy value of energy gases and their mixtures are given in Table 4.

Table 4: Maximum permissible errors (MPE) for instruments measuring a system's operational state variables

Maximum permissible errors	Accuracy class 'A'	Accuracy class 'B'	Accuracy class 'C'
Gas pressure	±0,5 %	±0,75 %	±1 %
Gas temperature	±0,8 °C	±0,8 °C	±1,25 °C

The measuring instruments used must have guaranteed and documented continuity in connection with the stipulated period of validity of verification of the measuring system. Conformity with specified requirements (MPE) must be demonstrated and declared during verification of the measuring system.

3 Technical requirements

During verification, measuring systems for determining the energy value of energy gases and their mixtures are subject to the technical requirements applicable at the time they were put into circulation.

3.1 Basic elements of a measuring system

The configuration of a measuring system must be adapted to the specific topology of the gas network, the intended operating conditions and the technologies used for data processing and transmission.

The usual core elements of a measuring system are or may be:

a) measuring equipment for recording and storing qualitative gas parameters at inputs (process gas chromatographs, equipment for recording measured values);
b) measuring equipment for recording and storing volumetric flow rates at inlet and outlet (volume meters, equipment for recording measured values);
c) reference measurement points (e.g. process gas chromatographs);
d) other measuring equipment for recording supporting operating values (e.g. gas pressure measurement);
e) network topology (pipe diameter, roughness, compressors and regulators, gate valves, geodetic elevation);

f) equipment, programs and procedures for data transmission, data storage and programs for generating substitute values;
g) programs for gas flow reconstruction and determination of data on gas quality for each sampling point;
h) auxiliary programs for process documentation, visualisation of network topology and system control.

3.2 Measuring equipment and data transmission

Measuring instruments at the inlets and outlets of the measuring system that are used to measure volumetric flows at the inlets and outlets of the gas network, and measuring instruments for measuring gas quality at the network inlets must be specified measuring instruments and must be verified at intervals stipulated for the given type of measuring instrument. The compatibility of other measuring instruments used to indicate the state variables of the measuring system is governed by the conditions set out in the type-approval certificate for the measuring system for determining the energy value of energy gases and their mixtures.

Data in measuring systems are usually stored temporarily and transmitted to a central system. For this purpose, known measuring recording devices can be used as well as remote control systems for system management.

3.3 Data processing and software

Data from measuring systems are transferred to the central system and are then used as input data for the reconstruction system.

In addition the reconstruction software itself, the measuring system software also consists of programs for transmission, processing and storage of input and output data. As part of the approval procedure, the parts of the program that are subject to type approval are determined, checked and described (see Chapter 5).

3.4 Network topology requirements

The network topology of the metering system for determining the energy value of energy gases and their mixtures is defined by the gas network model. The network model must correspond as closely as possible to the real gas network. It is essential that the different objects in the model correspond to reality on the ground. In particular, the following are relevant:

a) all pipes, with details of their length, internal diameter, surface roughness and geodetic elevation;
b) all inlet points (natural gas transfer stations, biomethane production plants, etc.) with a definition of the necessary parameters (gas quality and volume, gas pressure);
c) all outlet points (transfer points, own consumption, etc.) with a definition of the required parameters (gas volume, gas pressure);
d) controls in the gas network (valves, gate valves, etc.);
e) other elements of the gas network affecting the reconstruction (gas storage facilities, compression stations, etc.).

Pressure levels in individual lines must be separable in the same way as in real-world operation. In the case of large-scale models, the network may be further subdivided into individual subsystems. The verification of the model must be carried out using a set of static and dynamic scenarios that cover the usual gas transmission modes. \All information on the network topology may be taken from the geographic information system (GIS) of the gas network operator.

The description and specifications of the network topology are a necessary condition for the type approval and verification of the measuring system in question. It must be possible to display it at any time in a clear form (e.g. a network diagram). Changes in network topology must be documented in a traceable manner.

It is necessary to ensure that the correct network topology applicable at a given time is always used when determining the value of the gross calorific value. There must be clearly defined procedures and rules for managing changes to the network topology, taking into account the conditions for type approval of the metering system and the validity of its verification, for both permanent and temporary (operational) changes.

In the event of permanent changes in the network topology, such as the addition of new nodes (new gas supplier, new demand point) or a change in the physical infrastructure, it is necessary to carry out a thorough analysis of the consequences in relation to the conditions specified in the type-approval certificate and in relation to the validity of the verification. The user of a metering system is obliged to give prior notice of any significant changes to the network topology to the authority that issued the type approval certificate for the relevant metering system for determining the energy content of energy gases and their mixtures, for the purpose of assessing compliance with the type approval conditions. In the case of temporary changes, such as operational changes or network reconfiguration, procedures and rules must be established to eliminate the risk of termination of the verification of the measuring system.

3.5 Software

Software that is critical for the metrological characteristics of the system, i.e. legally relevant software, must be identifiable and must be secured. It must be possible to identify the software in a simple manner.

Back-up copies must be verified and archived in a suitable manner.

4 Marking

4.1 In general

All writing and symbols must be easily visible, legible and indelible under normal conditions.

4.2 Marking of the measuring system

At the time of marking, measuring instrument are subject to technical requirements applicable at the time they were put into circulation.

A measuring system for determining the energy value of energy gases and their mixtures must have a nameplate with at least the following information:

a) the manufacturer's name or trade mark;
b) type designation of the measuring system;
c) software version;
d) serial number and year of production;
e) type approval mark.

The nameplate may also be in electronic form. It must be adequately protected against changes.

4.3 Marking of components of the measuring system

Each individual metrologically relevant component of the measuring system must be clearly identifiable.

4.4 Record-keeping

In the case of measuring systems, the user must keep a record of each separate metrologically relevant component of the measuring system.

The user of the measuring system must also keep records of changes in network topology. Every permanent change in network topology must be documented.

Operational changes to network topology, such as the closure of part of the network for maintenance, are not required to be documented.

4.5 Location of official marks

Suitable locations for placement of the type-approval mark and official mark(s) must be ensured.

All separate metrologically relevant components of the measuring system must be marked with official marks.

The measuring system as a whole must be marked with the main official mark on, or in the immediate vicinity of, the nameplate. If the nameplate is electronic, the mandatory information may be secured with a software stamp (which must be tamper-proof and easily accessible), and the main official mark may be placed on the certificate of conformity.

5 Type approval

The type approval of a measuring system for determining the energy value of energy gases and their mixtures must define the characteristics, requirements and conditions necessary to guarantee:

a) stability and accuracy of results during system use;
b) compliance with operational error limits and system verification at each outlet point of the gas network;
c) system verifiability.

Type approval for these systems cannot be granted on a general basis, but is always linked to the specific infrastructure of the gas supplier who will be using the system in question.

The type approval process for a measuring system includes the following tests and activities:

a) software validation;
b) network topology assessment;
c) measuring instrumentation assessment (measuring instruments/measuring equipment);
d) determination of measurement uncertainty.

5.1 Software validation

Measuring systems for determining the energy value of energy gases and their mixtures may have, from the perspective of WELMEC 7.2[2], a basic configuration of type P (embedded SW in the device), type U (basic software requirements for measuring instruments using a generic computer) . In addition, optional L (storage of measured data), S (software separation) and D (downloading of legally relevant software) extensions may be applied. To meet all requirements, risk class C is selected. Extension O (operating systems) is mandatory if the basic configuration is type U.

5.1.1 Basic software requirements for type P and type U basic configuration

Specific software requirements for measuring instruments using a general purpose computer are as follows:

5.1.1.1 Documentation

In addition to the specific documentation listed below, basic documentation must include:

a) a description of the functions of legally relevant software, the meaning of the data, etc.;

[2] WELMEC 7.2: Software Guide (Measuring Instruments Directive 2014/32/EU) – *publicly available at* www.welmec.org

b) a description of the user interface, a list of commands, menus and dialogues;
c) a description of the communication interface and a list of commands;
d) identification of legally relevant software;
e) clear information about the system's hardware, including, for example, a topological diagram, the type of computer(s), the network type;
f) a description of protective mechanisms and means for legally relevant software data and parameters;
g) for operating system configuration documentation, see type O extension;
h) operating manual.

In addition to the points above, the technical documentation must contain an explanation of applied requirements set out in Articles Error: Reference source not found to Error: Reference source not found

5.1.1.2 Software identification

Legally relevant software must be clearly identified. The identification must be permanently displayed by the instrument or must be displayed in a command or during use.

5.1.1.3 The influence of user interfaces

Commands entered through user interfaces must not influence legally relevant software, instrument-specific parameters or measured data in an impermissible manner.

5.1.1.4 The influence of communication interfaces

Commands entered through the instrument's communication interface must not affect legally relevant software, instrument-specific parameters or measured data in an impermissible manner.

5.1.1.5 Security and protection of legally relevant software and specific equipment parameters

Legally relevant software and instrument-specific parameters must be secured against accidental or unintentional changes.

5.1.1.6 Protection of software and measured data

Legally relevant software and measured data must be protected against intentional changes.

5.1.1.7 Protection of parameters

The specific parameters of the instrument must be protected from impermissible changes.

5.1.1.8 Displaying measured data

The authenticity of the measured data presented must be guaranteed, and the manner in which they are displayed must be clear and accompanied by all the information necessary to inform the user of the significance of the result.

5.1.2 Extension L: Measured data storage

The specific requirements for data storage software are as follows:

5.1.2.1 Completeness of the stored measured data

Stored measured data must be accompanied by all relevant information needed for legal purposes.

5.1.2.2 Security and protection of stored measuree data

Stored measured data must be protected against accidental and unintended changes.

5.1.2.3 Protection of stored measured data

Stored measured data must be protected against intentional changes.

5.1.2.4 Traceability of stored measured data

It must be possible to trace back the relevant measurement and measuring instrument that generated the stored measured data.

5.1.2.5 Protection of confidential information

Confidential information must be protected from alteration, kept confidential and protected from disclosure.

5.1.2.6 Retrieval, verification and display of stored data

If measurement data are used for legally relevant purposes, there must be a legally relevant component or module for reading, verifying, handling and displaying the stored measured data.

5.1.2.7 Automatic storage

Measured data must be stored automatically after the end of the measurement.

5.1.2.8 Memory capacity and continuity

Memory capacity for long-term storage of data must be sufficient for the intended purposes.

5.1.3 Extension S: Software separation

The specific requirements for software in the case of software separation are as follows:

5.1.3.1 Implementation of software separation

The part of the software containing the legally relevant software and parameters must be clearly separated from the other parts of the software.

5.1.3.2 Mixed indications

A legally relevant datum must be generated by legally relevant software and must be clearly distinguishable from a legally non-relevant datum.

5.1.3.3 Protective interface

The interaction and data exchange between legally relevant and legally non-relevant software is carried out exclusively through a protective interface that is fully under the control of the legally relevant software.

5.1.4 Extension D: Downloading legally relevant software

The specific software requirements are as follows:

5.1.4.1 Download mechanism

Both stages of the software download process – the transfer and the subsequent installation – must take place automatically and without affecting the security of the legally relevant software.

5.1.4.2 Proof of trustworthiness of the transmitted software

Means must be implemented to ensure the authenticity of the transferred software.

5.1.4.3 Integrity of downloaded software

Means must be used to prevent software modification during transmission.

5.1.4.4 The continuity of legally relevant software being downloaded

For the purposes of subsequent checks, the device must be equipped with appropriate technical means to ensure the traceability and trackability of legally relevant software downloads.

5.1.5 Extension O: Operating systems

In the case of extension O, software components must be divided into two categories:

Category 1: components that are part of the measurement process, i.e. they process measurement data
to generate and indicate the final value of the quantity measured together with the relevant data of the measurement result.

Category 2: components that further process the measurement result without modifying the final value of the measured quantity and the related relevant measurement result data.

For category 1, all requirements of extension O apply and for category 2, the following applies:

- O2 is not applied;
- O3, O4 and O5 are applied in full;
- O1, O6 and O7 apply to the operating system configuration/settings.

5.1.5.1 Hardware protection (O1)

The hardware component on which the legally relevant operating system runs must be protected against deliberate alterations.

5.1.5.2 Boot process (O2)

For Category 1 components and complete devices, the boot process configuration must provide an environment configured in such a way as to enable the execution of legally relevant software.

5.1.5.3 System resources (O3)

The operating system configuration must provide sufficient resources for the operation of a legally relevant application.

5.1.5.4 Protection during use (O4)

The operating system must be configured in such a way that legally relevant software cannot be unduly affected by the functions of the operating system or by other software.

5.1.5.5 Protective interface (O5)

Operating system functions accessible through open interfaces must not unduly affect legally relevant software, legally relevant parameters or measurement data.

5.1.5.6 Operating system identification and configuration (O6)

The operating system and its configuration must be identifiable. Operating system identification and operating system configuration identification must be displayed on command or during operation.

5.1.5.7 Operating system protection (O7)

The operating system must be protected against deliberate alterations.

5.2 Assessment of network topology

During type approval of a measuring system for determining the energy value of energy gases and their mixtures, it must be clearly defined how the network topology (gas network model) will be transferred to the system. Initial network topology data is usually generated from a geographic information system (GIS). Alternatively, data can also be imported from other network calculation software tools. The system manufacturer must submit for assessment the gas network model on which the measuring system is to be operated.

In general, information on the following elements is needed to describe network topology:

a) gas pipeline junctions;
b) pipes;
c) pressure regulators;
d) compressors;
e) volumetric flow regulators;
f) valves.

An overview of topological data of any gas network is provided in Table Error: Reference source not found.

Table 5: Topological data for a gas network

Topological elements	Variable	Unit
pipeline nodes	- type (inlet/outlet node) - geographical coordinates - geodetic altitude	m --- ---
pipeline sections	- length l - diameter d - roughness λ - topological location (e.g. connection to nodes)	km mm mm ---
pressure regulators/compressors	- topological location (e.g. connection to nodes)	---
volumetric flow regulators;	- topological location (e.g. connection to nodes)	---
valves	- valve position (open/closed) - topological location (e.g. connection to nodes)	--- ---

It must be demonstrated that the network model can be displayed in a clear and concise form at any time (for example, a network diagram). It must also be demonstrated that changes in network topology will be documented in a traceable manner, thus ensuring that the correct network topology valid at the given time is always used when determining the value of the gross calorific value.

5.3 Assessment of individual metrologically relevant components of the measuring system

During type approval of a measuring system for determining the energy value of energy gases and their mixtures, there must be a clear definition of the metrologically relevant components of the measuring system, which can be divided into the following groups:

a) gauges at the inlet and outlet points of the measuring system;
b) auxiliary measuring instruments;
c) measuring instruments for checking the measuring system.

An overview of the measured variables in the measuring system is provided in Table Error: Reference source not found.

Table 6: Measured variables

Description	Variable	Unit
gas quality parameters at network inlet points (hourly/daily averages)	- gross calorific value/net calorific value H_s - density under normal conditions ρ_n (optional) - carbon dioxide concentration x_{CO_2} (optional) - other gas components (optional)	kWh/m^3 kg/m^3 mol % mol %
volumes under normal conditions at network entry and exit points (hourly averages)	- volume under normal conditions V_n	m^3

pressures at representative points in the network (at least one pressure measurement for each section of the network)	- pressure p	kPa (abs.)

5.4 Determination of measurement uncertainty

Before a measuring system for the determination of the energy value of energy gases and their mixtures is put into operation, it is necessary to determine the uncertainty of the determination of that energy value. The uncertainty analysis must be based on real network topology data. The aim of the uncertainty analysis is to demonstrate what output variable uncertainties (e.g. daily mean values of gross calorific value) can be achieved at network sampling points using known assumptions about the statistical behaviour of input values.

In real practice, the uncertainty values of the determination of the average daily gross calorific value are represented by the maximum permissible errors of the measuring systems for the determination of gross calorific value (see Article Error: Reference source not found).

During measuring system type approval, it is possible to use predefined daily profiles of the input values for the individual measured variables in simulations, simulating a typical day in the gas industry.

6 Initial verification

A check is performed whether the measuring system for the determination of the energy value of energy gases and their mixtures submitted for verification conforms to the approved type and that it is functional as a whole (system).

The following tests and activities are carried out:

a) network topology assessment;
b) measuring instrumentation assessment;
c) accuracy test.

6.1 Network topology assessment

During initial verification of the measuring system, the network topology (gas network model) must be clearly defined. An up-to-date model of the gas network on which the metering system will be operated must be submitted for assessment.

It must be demonstrated that the network model can be displayed at any time in a clear and concise form (for example, a network diagram) and that changes to the network topology are documented in a traceable manner, thereby ensuring that the correct network topology valid at any given time is always used when determining the calorific value.

6.2 Measuring instrumentation assessment

Separate metrologically relevant components of the measuring system must be clearly defined during the initial verification of the measuring system. For their assessment, the manufacturer of the measuring system must provide a complete list of measuring instruments used in the measuring system.

6.3 Accuracy test

Before using a measuring system to determine the energy value of energy gases and their mixtures, a basic validation of the system is carried out. Validation may be performed as an uncertainty

calculation in combination with comparative measurements using appropriate gas quality measurement instruments.

Measurement uncertainty can be verified by comparative measurement with suitable gas quality measuring instruments (e.g. process gas chromatographs or calorimeters). Both mobile and stationary measuring instruments can be used. Alternatively, gas sampling techniques may be used. The appropriate measurement locations are determined according to the predicted flow situation. Measurements are preferably taken at outlet points where variations in the quality of the gas and of the mixture of gases of different qualities are expected. These are network outlet points where higher uncertainties can be expected.

The measurement uncertainty is considered to be verified if the deviations in the qualitative properties of the gas over the measurement period are in accordance with the maximum permissible errors specified for the relevant accuracy class in Chapter 2. If the uncertainty cannot be calculated, more complex validation procedures using measurement must be used.

7 Subsequent verification

The procedure for subsequent verification of measuring systems for determining the energy value of energy gases and their mixtures is the same as the procedure for initial verification under Chapter Error: Reference source not found.

8 Shortened test

The purpose of the shortened test is to verify whether the measuring system for the determination of the energy value of energy gases and their mixtures meets the requirements for the maximum permissible errors for the determination of energy (gross heat value) or for other qualitative characteristics of the energy gas.

The shortened test of the measuring system is carried out where it is installed and used:

a) after one year from the date of performance of the previous shortened test, for the duration of the measuring system's verification validity period;
b) in the event of a permanent change in network topology, for example closure or construction of a new network branch.

The following tests and activities are carried out during a shortened test of a measuring system:

a) network topology assessment;
b) measuring instrumentation assessment;
c) accuracy test.

8.1 Network topology assessment

The user of the measuring system must document changes in network topology in a traceable manner. In the short test, an up-to-date model of the gas network on which the metering system is operated must be submitted for assessment.

8.2 Measuring instrumentation assessment

For the purposes of the assessment, the user of the measuring system must submit a complete list of the measuring instruments used within the measuring system.

8.3 Accuracy test

The short test is carried out in the same way as the initial verification of the measuring system (see Article Error: Reference source not found). When carrying out short tests at the installation site, the maximum permissible errors of the measuring system in operation, as set out in Table 1, apply.

9 Checking a measuring instrument

When checking measuring instruments pursuant to § 11a of the Metrology Act at the request of a person who may be affected by incorrect measurement, the procedure under Chapter Error: Reference source not found is followed, and the maximum permissible errors of the measuring system in operation pursuant to Table 1 apply.

10 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 shall 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 'notified standards'). The CMI shall publish a list of these notified standards associated with the relevant measure, together with the general measure, in a manner accessible to the public (at www.cmi.cz).

Compliance with notified standards or parts thereof is considered, to the extent and under the conditions stipulated by a general measure, to be compliance with the requirements stipulated by this measure to which these standards or parts thereof apply.

Compliance with a notified standard is one of the ways to demonstrate compliance. 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 to implement § 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, verification and testing of specified measuring instruments – 'measuring systems for determining the energy value of energy gases and their mixtures'.

Decree No 345/2002 specifying measuring instruments for mandatory verification and measuring instruments subject to type approval, as amended, classifies this type of measuring instruments under item 8.3.2 in the annex entitled 'List of the types of specified measuring instruments' as measuring instruments subject to type approval and verification.

This legislation (Measure of a General Nature) shall 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.

Director-General