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Surveillance from first commissioning on measuring devices used in natural gas supply to the installations of the activities under the Directive 2003/87/EC establishing a scheme of CO_2 emissions trading

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Surveillance from first commissioning on measuring devices used in natural gas supply to the installations of the activities under the Directive 2003/87/EC establishing a scheme of CO_2 emissions trading

Surveillance de la mise en service des appareils de mesure utilisés pour la fourniture de gaz naturel aux installations pour les activités sous la Directive 2003/87/CE établissant un schéma d'échange d'émissions de CO_2

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Foreword

This document (CEN/TR 16478:2012) has been prepared by “CEN Sector Forum Gas Infrastructure”.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

The document C(2007) 3416 — COMMISSION DECISION of 18 July 2007 (2007/589/EC) establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council [15] — will be used as common guidelines in the determination of the greenhouse gas emissions for all categories of activities listed in the Annex I of the Directive itself.

In the fifth paragraph of Clause 3, these guidelines establish that “It shall be ensured that the emission determination is systematically neither over nor under true emissions. Sources of uncertainties shall be identified and reduced as far as practicable. (…) All metering or other testing equipment used to report monitoring data shall be appropriately applied, maintained and calibrated, and checked.”

This Technical Report is intended to be used as a guideline in conjunction with the document C(2007) 3416 and to be applied to measuring instruments of natural gas measuring stations based on EN 1776, and possibly stand alone measuring instruments measuring the natural gas used in the categories of activities listed in the Annex I of the Directive 2003/87/EC.

Within the European Union, at the time of writing, there was no common guideline dealing with how to ensure an established difference of indication of a natural gas metering equipment in the use throughout their technical life. The associated risk: to manage the greenhouse gas emissions data declared by different Member States that are not completely comparable because of their determination by calculations based on consumption of natural gas data not homogeneous with regard to the reliability of the accuracy of their measurements.

The intent of this Technical Report is to give minimum provisions for surveillance in the use of natural gas measuring equipment in order to ensure compliance with an established difference of indication, leading to comparable greenhouse gas emissions data.

Furthermore, it is a proposal addressed to the Commission and the Member States to reflect on a consistent procedure that would enable an equivalent determination of the CO_2 amounts of emissions across the EU countries.

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1 Scope

This Technical Report establishes minimum provisions for the surveillance, based on available standards from first commissioning, of devices and systems with measuring function throughout their technical life when used in the activities of the categories listed in the Annex I of the European Directive 2003/87/EC. It does so in order to ensure the compliance with the expected maximum allowable difference of indication.

This Technical Report applies to devices/systems with the function to measure:

— volumetric or mass amount of natural gas consumption (any type of gas meters),

— volumetric amount of natural gas consumption at specified base conditions (conversion devices),

— composition of natural gas (gas chromatographs),

for calculating, in accordance with the applicable provisions of the guidelines C(2007) 3416, the amount of the CO_2 emissions from the source stream of natural gas.

Users of this document should be aware that more detailed national recommendations/standards and/or codes of practice as well as national measures possibly approved by National Regulator may exist inside the EU Member States.

When national regulations have to be applied, this document should not be considered.

Except in the aforementioned case, this Technical Report is intended to be applied in association with applicable national recommendations/standards and/or codes of practice setting out the above mentioned surveillance provisions.

In the event of conflict in terms of different requirements in national regulations/standards and in the provisions of this document, the national regulations/standards will take precedence.

Referring to the aforesaid Commission's guidelines C(2007) 3416, SFG_I opts for the calculation based method to determine the amount of the CO_2 emissions.

Regarding commercially traded of natural gas, competent authorities may permit the determination of the annual gas consumption leading to evaluation of CO_2 emissions based solely on the invoiced amount of gas without further individual proof of associated uncertainties, provided that national legislation or the documented application of standards ensures that respective uncertainty requirements for activity data are met for commercial transactions (guidelines C(2007) 3416 -annex 1 §7).

Referring to 5.2 and to Chapter 16, annex 1 of guidelines C(2007) 3416, for installations with “de minimis” souce streams and with low emissions respectively, the provisions of this document can be waived.

2 Terms and definitions

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

NOTE The pilot terms are listed in alphabetic order. The derived terms from a pilot term, if any, are listed in the appropriate order just after the relevant pilot term.

2.1
competent person
person who is trained, experienced and approved to perform measuring surveillance activities

[SOURCE: EN 12186:2000, modified]

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2.2
difference of indication
difference between the indicated value V_m of a device with measuring function and the one of a reference instrument V_r for a specific operating datum of the same measurand expressed as percentage of the value measured by the reference instrument:

$$D = \frac{V_m - V_r}{V_r} \times 100$$

2.3
maximum allowable difference
maximum absolute value of the difference of indication

2.4
measuring device
measuring instrument capable of measuring a process datum (e.g. gas meters, pressure transducer, pressure indicator, temperature transducer, etc.)

2.5
measuring systems
assembly of several measuring devices capable of measuring a process datum via several other process data (e.g. a gas meter + pressure and temperature transducer + conversion device)

[SOURCE: MID, Directive 2004/22/EC of the European Parliament and the Council of 31 March 2004 on measuring instruments]

2.6
recalibration
activities consisting of the verification that the differences of indication of a device with measuring function are within the limits specified in the relevant standard and re-alignment of the indication when needed

2.7
self-diagnostic
mean, e.g. software, capable of warning when the measuring device/system is not operating properly

2.8
self-recalibration
recalibration activity carried out automatically by the measuring device itself, e.g. gas chromatograph

2.9
significant parameter
measurable characteristic involved in the measuring process (of the measuring devices/system) which, in case of drift out from pre-established limits, may imply errors of the measuring process

Note 1 to entry: For example, when in an ultrasonic gas meter, the transient times reflect a significant different speed of sound for one of the paths compared with the average speed of all paths.

Note 2 to entry: This document considers following limits for significant parameter:

— **normal thresholds:** the maximum and/or minimum values of a significant parameter identified in the type test of a measuring device/system for normal operating conditions; when these limits are met it is presumed that the necessary conditions for proper measurements occur;

— **care thresholds:** values of a significant parameter still ensuring proper measurement but signalling the risk that the significant parameter may further drift and reach the alarm level;

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— **alarm thresholds:** values of a significant parameter that imply inacceptable differences of indication of the measuring process and that, when they occur, require the activation of corrective actions to reestablish the necessary conditions under which it is presumed that proper measurement process occurs.

2.10
Gas Measuring System Operator (GMSO)
natural or legal person who is responsible for the operation and maintenance of the measuring system

2.11
warnings
visible/perceptible signal indicating that malfunctions have occurred in the measuring device/system

3 Surveillance

3.1 General

All those activities carried out from the first commissioning of measuring devices/systems throughout their technical life until the last de-commissioning aimed at ensuring that the differences of indication during the operating life are not higher than the maximum allowable difference.

3.2 Activities of the surveillance for conversion devices, gas chromatographs and gas meters

The activities of the surveillance should include:

a) first commissioning;

b) specific activities related to warnings from self-diagnostic means only where applicable;

c) periodical activities:

   1) visual inspection, and

   2) verification, and

   3) re-lubrication where requested as per the relevant maintenance manual.

d) recalibration applicable only to gas chromatograph; periodical recalibration applicable to gas meters and converters;

e) periodical monitoring of the difference of indication and, when needed, subsequent recalibration (not applicable to gas chromatograph).

The Gas Measuring System Operator fulfilling activities d) does not need to consider the activities e).

3.3 Planning of surveillance

3.3.1 General

The stability during operation of the metrological performance depends on both the measuring equipment and the operating conditions. When establishing the surveillance policy, the following should be considered:

a) the specific composition of fuel gas;

b) the specific location and layout of the measuring system (e.g. redundancy of measuring devices);

c) the reliability of the historical measured-performance data;

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d) the measuring-reliability of the stations;

e) the impact of the difference of indication on the involved parties (e.g. global amount of measured gas, uncertainty thresholds requested by the document C(2007) 3416, etc.);

f) the need for the continuity of the gas supply, the presence of the auto-diagnosis function;

g) any other elements that may affect the measuring-performances of any measuring devices/systems.

For the surveillance activities on devices/systems with measuring controls, it should be considered that:

h) the first commissioning takes place only at initial start up of a single new measuring device/system/stations,

i) the periodical monitoring of the difference of indication should be followed by a subsequent recalibration only when needed as described in 3.5.2, and

j) the advantage to combine, for each intervention at site, surveillance activities for other equipment of the same installation.

3.3.2 First commissioning

The first commissioning should be carried out in accordance with:

— national regulations/standards where available,

— codes of practices of the Gas Measuring System Operator (GMSO),

but at least according to this guideline in case of lack of national regulations/standards or codes of practice.

The task of first commissioning should include following verifications:

— the conformity of installation with the applicable prescriptions;

— compliance with MID or national standards for meters, converters and other measuring devices where applicable (markings and integrity of the seals);

— a self calibration of gas chromatographs (followed by self-recalibrations which take place periodically);

— the availability of the relevant user's manual and test certificate according to relevant standard.

3.3.3 Specific activities related to warnings from, self-diagnostic means

Where measuring devices and/or systems provide specific warnings, in case of their activation the recommended actions detailed in the relevant user’s manual should be implemented within due time in accordance with the provisions in force.

3.3.4 Periodical visual inspection/verification/re-lubrication

The periodical specific visual inspections/verifications/re-lubrication activities are usually listed and described in the concerned use/maintenance manual.

In general, these activities should be carried out in the period between two consecutive recalibrations and/or monitoring of the difference of indication. The activities listed in Table 1 should be selected by the operator, where applicable.

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Table 1 — Periodical visual inspection/verification and maintenance (meters + converters) [1)]

Description of the activities	Equipment concerned	Acceptance criteria
Visual inspection of external conditions of indicating device	All measuring devices	No visible damages, Readable over operating temperature range
		External Surface protection in normal conditions
		No any abnormal corrosion
Noise emissions	Measuring devices with mobile parts (e.g. turbine gas meters)	No any emission of abnormal noise
Verification of: ➢ cleaning, ➢ external aspect and ➢ dimensions of orifice plate and other internal parts	Orifice meters	As per the relevant standard and user's manual
Maintenance activities (e.g. lubrication and re-lubrication) as listed in the user's manual	Those measuring devices for which the use/maintenance manual specifies the need of periodical re-lubrication	As per relevant use/maintenance manual

3.4 Recalibration for gas chromatograph

3.4.1 General

The gas chromatograph is a measuring device that can undertake self-recalibration at periodical intervals or can be calibrated regularly.

For this equipment, the self-recalibration or regular calibration together with the activities outlined in a), b) and c) of 3.2 should be sufficient to ensure that the specified metrological performances are met.

3.4.2 Specific requirements for surveillance

The planning of surveillance should consider:

a) The frequency of self recalibration should be established on the basis of:

1) national regulations/standards where available,

2) code(s) of practice of Gas Measuring System Operator,

but at least according to this guideline in case of lack of national regulations/standards.

b) The above approach should evaluate following pre-conditions:

1) the installation conditions (temperature, protection, etc.) of the bottles of gas samples should be carried out as per the recommendations listed in the relevant installation manual;

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1) The applicable activities to be complied with should be selected by the operator.

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2) the replacement of the bottles of gas samples should be done as per the recommendations listed in the installation manual; the composition of the gas sample should be certified by an accredited test laboratory;

3) the electronic memory of gas chromatograph should give evidence of an appropriated number of last automatic self-recalibration carried out (e.g. 10 last self-recalibrations) as well as the relevant errors of indication based on a statistical data collection. All these historical data should be periodically examined by a competent person to evaluate whether there is a need to introduce corrective actions aimed to ensure the expected reliability of the metrological performance.

c) Furthermore, it shall be noted that the examination of historical data should comply with national regulations/standards where available.

3.5 Specific surveillance activities on gas meters and on gas converters

3.5.1 Periodical recalibration

3.5.1.1 General

Gas Measuring System Operators carrying out the surveillance on gas meters and on converters according to the method described in this subclause would not need to consider the method of surveillance described in 3.5.2.

The method of recalibration should be that followed for calibration as per the relevant standard.

The minimum frequency should be established on the basis of:

— national regulations/standards where available,

— codes of practice of the Gas Measuring System Operator (GMSO) in case of lack of national regulations/standards but at least on the basis of the frequencies showed in Table 2 of this guideline.

3.5.1.2 Specific conditions for a decreasing of the frequency of periodical recalibrations for gas meters equipped with self-diagnostic means

Where the gas meters are equipped with self-diagnostic means and the periodical recalibration method has been chosen for the surveillance in use, the Gas Measuring System Operator can prolong the pre-established period of time between two subsequent recalibrations if the self-diagnostic function is capable of detecting care threshold and alarm threshold for significant parameters.

Some gas meters, e.g. the ultrasonic and Coriolis gas meters, are equipped with self-diagnostic software capable of warning when the necessary conditions for proper measurement are not met. These conditions are often identified by limiting minimum and maximum values for certain diagnostic functions or parameters. Practically, the warning consists of alarms that indicate when some significant measuring parameters are outside the identified limits.

For example, in the ultrasonic meters it is very common to introduce some limits for the differences of the various speeds of sound calculated for each path from the average speed of sound of all paths. In other words, when these limits are exceeded, the cause (dirty, fault, etc.) should be traced and investigated and appropriate corrective actions implemented.

The self-diagnostic function can detect following two different warnings for a significant measuring parameter:

— a care threshold (e.g. yellow light) or

— an alarm threshold (e.g. red light).

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