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Goriva za motorna vozila - Ocena kakovosti motornih bencinov in dizelskih goriv - Monitoring kakovosti goriv (FQMS)

Automotive fuels - Assessment of petrol and diesel quality - Fuel quality monitoring system (FQMS)

Kraftstoffe für Kraftfahrzeuge - Ermittlung der Qualität von Ottokraftstoff und Dieselkraftstoff - System zum Kraftstoffqualitätsnachweis (FQMS)

Carburants pour automobiles - Evaluation de la qualité de l'essence et du combustible pour moteur diesel (gazole) - Système de suivi de la qualité des carburants (FQMS)

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Automotive fuels - Assessment of petrol and diesel quality - Fuel quality monitoring system (FQMS)

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Foreword

This document (EN 14274:2013) has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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.

This document supersedes EN 14274:2003.

This document had originally been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. In line with the recent Amendments [3] and [4] to EU Directive 98/70/EC [1], [2], mainly the additional reporting requirement for manganese, the need to update the original document came forward.

This European Standard, which makes use of statistical reasoning, describes a fuel quality monitoring system (FQMS) which may be applied to assess quality of fuels being placed on the market in a European Member State in relation to the European Directive 98/70/EC [1] and its amendments, 2003/17/EC [2], 2009/30/EC [3] and 2011/63/EU [4]. For the purpose of this European Standard, each European Member State is regarded as the smallest unit for which the results of the monitoring system are representative.

Therefore, this European Standard cannot be used without considerable adjustment for the representative monitoring of fuel quality in a specific region nor for a specific distribution chain nor for policing purposes, as the statistical reasoning, which forms the basis for this European Standard, may not be valid for these purposes. The required adjustments for an extension of the monitoring system are rather complex. They are beyond the scope of this European Standard and are therefore not included here. The provisions in this European Standard may, however, in principle be extended to allow for additional purposes.

For several specific parameters, the European fuel specifications in EN 228 and EN 590 request that each country selects limiting values from a given set of values and specifies these country specific limiting values in the corresponding normative annex to EN 228 and EN 590 in order to adjust for geographic and climatic factors. These values may differ from country to country. Therefore, for these specific parameters, also the results obtained in this monitoring system will differ from country to country.

The minimum number of samples that are to be drawn is based on the information and comprehensive statistical analysis available at the time of publication of this European Standard. A statistical explanation on how the different statistical models and minimum samples numbers were achieved will be added as an informative annex to this document at a later stage. As more information becomes available, the number of samples required may change. For this reason this European Standard will be reviewed from time to time.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard describes a fuel quality monitoring system (FQMS) for assessing the quality of petrol and automotive diesel fuel placed on the market in any of the Member States within the European Community.

European Directive 98/70/EC [1] requires that every separate nationally defined fuel grade should comply with one specification as defined in the Directive. Therefore, for each nationally defined fuel grade, there will be a corresponding European parent fuel grade. For instance, unleaded petrol grades placed on the market in Europe can be 91, 95, 98 RON petrol. See also the example discussed in 5.4.2.

Some basic background ideas behind the FQMS are given in Annex A.

Since the specifications for automotive fuels contain climatic related requirements, the FQMS is run twice a year, once during the winter period and once during the summer period. Information about the dates for the summer and winter periods in a specific country are defined in the country's national annex to EN 228 and EN 590. Fuel samples taken during transition periods shall not be included in the FQMS.

For the purposes of this FQMS, grades of petrol that constitute less than 10% of the total amount of petrol placed on the market in any one country, and grades of automotive diesel fuels that constitute less than 10% of the total amount of automotive diesel fuel dispensed in any country may require separate handling as described in Clause 5 of this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 228, *Automotive fuels — Unleaded petrol — Requirements and test methods*

EN 590, *Automotive fuels — Diesel — Requirements and test methods*

EN 14275, *Automotive fuels — Assessment of petrol and diesel fuel quality — Sampling from retail site pumps and commercial site fuel dispensers*

EN ISO 4259, *Petroleum products — Determination and application of precision data in relation to methods of test (ISO 4259)*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*

3 Terms and definitions

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

3.1
fuel grade
specific automotive fuel quality of petrol or of diesel fuel for which there exists specifications in:

a) European Directive 98/70/EC [1] and and its subsequent amendments [2], [3] and [4]; or

b) national implementations of EN 228 and EN 590; or other EN automotive fuel standards, or

c) other national automotive fuel standards

3.1.1
parent fuel grade
fuel grade that conforms to the requirements of Directive 98/70/EC [1] and its subsequent amendments [2], [3] and [4] or to the appropriate European automotive fuel specifications as laid down in the corresponding EN standards, and to which nationally defined fuel grades shall be referred

3.2
country size
size of a country in relation to the total amount of fuel being placed on the market in that country

3.2.1
small-size country
country in which a total of 15 million tons or less of automotive fuel is being placed on the market per annum

3.2.2
large-size country
country in which a total of more than 15 million tons of automotive fuel is being placed on the market per annum

3.3
fuel dispensing site
site, retail or commercial, where fuel is dispensed into road vehicles for propulsion

3.3.1
retail site
site where the general public can purchase automotive fuel

3.3.2
commercial site
site that is not open to the general public but where automotive fuel is dispensed

3.4
model
design of the FQMS based on a number of different statistical, administrative or logistic criteria

3.5
sample size
minimum number of samples required to be analysed in one country to make the results of the monitoring system representative for that country

Note1 to entry: A country may, at its own discretion, use more than the minimum number of samples, but not less.

3.6
summer period
period of the year as defined in specifications for fuel grades as per 3.1

3.7
winter period
period of the year as defined in specifications for fuel grades as per 3.1

3.8
macro regions
specific grouping of geographical or political regions within a country formed for efficient design of the FQMS

Note1 to entry: See also 5.5.

3.9
variability factor
factor, not exceeding a value of 10, designed to describe the variability in fuel supply in a specific macro region, which takes account of the number of different fuel sources (petrol or diesel fuel) that distribute fuel in a macro

region, and come from refineries located in it and/or from terminals that receive the fuel from a refinery located outside the macro region

4 Information required to set up the FQMS

The information specified in this clause as a requirement for setting up the FQMS is basically divided into two sets. The first set, described in 4.1, specifies the requirement for a working list which contains all the locations from which samples are to be drawn. The second set, described in entries 4.2 to 4.5, specifies the need for information about how the fuel volumes being placed on the market are dispensed across the country. This information is needed in order to make the results of the FQMS representative for the whole country. The information in entries 4.2 to 4.5 should be applied in a step-wise fashion with decreasing preference in the listed order, depending on the data available in the Member State.

4.1 Requirement for a working list.

A list of retail sites (3.3.1) and commercial sites (3.3.2) where automotive fuels are dispensed. This list shall contain information about the region (see 5.2) in which the site is located. This list shall be updated each year. The retail sites may be further subdivided into main oil company sites, super-/hypermarket sites and independently owned sites, provided that all necessary information detailed elsewhere in this European standard is available.

4.2 Amounts and regional distribution of automotive fuel dispensed.

NOTE Depending on the complexity of the FQMS to be used, the amounts of fuel dispensed on a regional basis could be required.

4.2.1 Total amount of automotive fuel dispensed in the whole country, including regional distribution, if available.

4.2.2 Total amount of each grade of petrol dispensed in the whole country, including regional distribution, if available.

4.2.3 Total amount of diesel fuel dispensed.

4.3 Sources of the fuel and its supply and distribution patterns, if applicable.

4.4 Population size and regional distribution, if applicable.

4.5 Number of vehicles and their regional distribution, if applicable.

4.6 Organisations accredited for sampling and for analytical work.

Organisations conducting sampling, testing and analyses required for monitoring fuel quality in the market, shall demonstrate their competence by complying with the minimum criteria set out in Annex B. For sampling of fuel, or volatile materials, the organisation should be accredited for using EN 14275. A list of accredited laboratories, qualified to carry out the tests required for the FQMS should be compiled and maintained by the national accreditation body of the Member State or its nominated alternate. A list of accredited laboratories or organisations for the sampling should be compiled and maintained as well.

5 Setting up the FQMS

5.1 Country size

Using the criteria of the amount of fuel dispensed, a decision shall be made whether the Member State is a large-size or small-size country (3.2).

5.2 Regions

Each country shall define a set of appropriate regions based on either geographic or administrative criteria, taking into consideration the procedures and criteria described in this European Standard, such as amount of fuel being placed on the market, number of fuel dispensing sites, population distribution, vehicle distribution.

Each region may be further subdivided into sub-regions based on marketing and distribution patterns. In such cases the FQMS would be based on samples drawn from an appropriate grouping of these regions and sub-regions.

5.3 Minimum number of samples for fuel grades with market shares of 10% and above

For fuel grades with market shares of 10% and above, the minimum number of fuel dispensing sites in any country to be sampled and tested is given in Table 1, taking into consideration the provisions given in 5.5.

If a country decides to assess more than this required minimum number of samples, this should be specified in its national annex to this European Standard.

Table 1 — Minimum number of samples per fuel grade in each winter and summer period

Model	A	B	C
Small-size country			
Petrol, per grade	50	100	50
Diesel fuel	50	100	50
Large-size country			
Petrol, per grade	100	200	--
Diesel fuel	100	200	--

5.4 Minimum number of samples for fuel grades with market shares below 10%

5.4.1 For fuel grades with market shares below 10%, the minimum number of fuel dispensing sites in any country to be sampled shall be calculated as follows.

5.4.2 For each fuel grade with a market share of less than 10%, taking petrol and diesel separately, the minimum number of fuel dispensing sites to be sampled shall be calculated proportionally from the number of samples for the corresponding parent grade, using the following formula:

$$N_{\text{Grade X}} = \frac{\text{market share (Grade X)}}{\text{market share (parent grade)}} \times N_{\text{parent grade}} \quad (1)$$

EXAMPLE

	Parent grade Super 95	Parent grade Regular 91	Grade X Super 98
Parent of grade X	yes	no	--
Market share	55 %	38 %	7 %
Sample numbers	100	100	13

5.4.3 When a regional model is used (see 5.5) and the minimum sample number for a specific grade is calculated to be less than 1, at least one sample of that fuel grade shall be drawn from within that region.

NOTE This applies equally if a sub-regional model is used.

5.5 Models for the FQMS

5.5.1 General

For each model, the number of samples per grade per region or macro region (model A) is obtained by setting the number of samples (diesel fuel and petrol separately) to be proportional to the volume sales within each region, macro region, or sub-region (see 5.2).

5.5.2 Model A – macro regions

The regions within a country are grouped (preserving some geographical identity) into macro regions so that they have similar total sales volumes relative to each other and also about the same number of different supply sources (measured by the variability factor, see 3.9). This approach is recommended for all countries as it is designed to capture fuel variation efficiently and hence requires a smaller total number of samples, as reflected in Table 1.

If geographical, administrative or other circumstances do not allow fulfilment of the requirements for the design of this preferred model, model B shall be considered the next best model.

In defining the macro regions, a country shall first list all the principal supply points of petrol and diesel fuel (i.e. refineries, in-land terminals and coastal terminals) within each proposed macro region.

The variability factor for a macro region takes account of the number of different fuel types, which are distributed within the region, as well as the number of refineries (R) and supply terminals (T) in that region.

EXAMPLE If, in a certain region of this country, there is only one refinery (R) which supplies two terminals (T1 and T2), and if those three are the only supply points in that region, then the variability factor is 1, because the "fuel type" served in that region comes only from one production site. If, on the other hand, one of the two terminals (T2) is supplied by another refinery (located outside the region), then the variability factor is 2.

Therefore, the variability factor is not simply the sum of all refineries and terminals present in a certain region, but the number of different supply points that are supplying fuel from different sources.

Once these variability factors have been defined for each geographical or political region in the country, the regions shall be grouped into macro regions with approximately the same total variability factor and same total volumes in each macro region, thereby ensuring that the sampling proportional to fuel volumes also captures fuel variability.

An explicit example is given in Annex C. If appropriate, the macro regions may be further split into sub regions by sales channel and the sampling carried out in proportion to the volumes in these sub regions. The minimum overall number of samples per grade and per season is 50 per small-size country and 100 per large-size country.

5.5.3 Model B – Non-macro region

If the construction of macro regions (based on fuel supply patterns) is not possible within a country, then the country shall be divided into regions using only geographic and administrative criteria. To ensure that fuel variability is reliably captured, a larger minimum number of samples per grade are required: 100 for small-size countries and 200 for large-size countries. An example is given in Annex C.

5.5.4 Model C – Non region model

If the country is small-sized (see 3.2.1) and when it can be demonstrated that a division into macro regions (5.5.1) or non-macro-regions (5.5.2) is not possible, having considered the procedures and provisions given in this European Standard, then the country shall be considered as one region for sampling purposes.

5.6 Number of fuel dispensing sites to be sampled

Based on the total volume of fuel dispensed (4.2) or the population size (4.4) and the model chosen (5.5), the minimum number of samples to be taken during the summer and the winter periods shall be calculated for each region, macro region and/or sub region. If, for any region or sub region, and for any one fuel grade, the minimum

number of samples is calculated to be less than one, at least one sample of that fuel grade shall be drawn from within that region or sub region.

In order to make the FQMS as robust and representative as possible, all available information shall be used to calculate the minimum number of samples to be used. The general procedure to be followed is given in Annex D in form of a flow chart. Extension of this system is possible, provided that no other provisions in this European Standard are violated.

5.7 Identification of fuel dispensing sites

Each site that is to be monitored shall be given a unique and unmistakable identification number. This number shall appear on all samples drawn from the site and in the analytical reports.

5.8 Appointment of organisations

A qualified organisation, organisations or laboratories shall be appointed to draw samples. Laboratories shall be appointed to carry out the tests; see 4.6. An organisation shall be appointed to collect and compile the summary report see 6.6, containing all necessary information and data to allow the construction of a final report, see Clause 7.

6 Procedure

6.1 From the list of sites to be sampled for each region, macro region and/or sub-region, randomly select the required number of sites to be sampled. Randomly select an additional 10% of sites to be used if any of the previously selected sites have been shut down or are not currently in operation.

6.2 Provide the organisation(s) that will draw the samples with a list of sites to be sampled. The information given shall be sufficient to allow the site to be located and uniquely identified.

6.3 Obtain samples for each grade to be sampled from the selected sites in accordance with EN 14275.

This sampling procedure may be repeated as many times as necessary in order to obtain replicate samples which may be required for compliance with any additional national requirements.

6.4 Submit the samples to an accredited laboratory (4.6) for analysis and testing. Samples shall be analysed and tested for the characteristics given in the European Directive 98/70/EC [1]. Only those methods specified in EN 228 and EN 590 shall be used for testing the samples.

The parameters to be analysed are the emission relevant parameters currently listed in European Directive 98/70/EC or in updates thereof. Additional fuel quality characteristics as specified in EN 228, EN 590 or other automotive fuel standards may also be checked (see 3.1).

6.5 The analytical report prepared by the laboratory shall only contain the following information:

- laboratory identifier;
- sample identification code;
- site identification code;
- sample collection date;
- type of fuel and fuel grade (see 3.1);
- date of test;
- complete results of the tests (as defined in Annex E).