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Test gases - Determination of emissions from appliances burning gaseous fuels during type-testing

Táto technická normalizačná informácia obsahuje anglickú verziu CEN/TR 1404:2024.  
This Technical standard information includes the English version of CEN/TR 1404:2024.

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TECHNICAL REPORT

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TECHNISCHER REPORT

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Supersedes CR 1404:1994

English Version

## Test gases - Determination of emissions from appliances burning gaseous fuels during type-testing

Determination of emissions from appliances burning  
gaseous fuel during type-testing

Bestimmung von Emissionen von Gasgeräten während  
der Typprüfung

This Technical Report was approved by CEN on 22 January 2024. It has been drawn up by the Technical Committee CEN/TC 238.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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**CEN/TR 1404:2024 (E)****European foreword**

This document (CEN/TR 1404:2024) has been prepared by Technical Committee CEN/TC 238 “Test gases, test pressures, appliance categories and gas appliance types”, the secretariat of which is held by AFNOR.

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

This document supersedes CR 1404:1994.

In comparison with CR 1404:1994, the following significant changes have been made:

- for NO<sub>x</sub> emissions, an alternative to the correction formula derived from the BCR program (E.1) is proposed by CETIAT (E.2), this alternative formula is based on measurements;
- characteristics to be checked before carrying out tests are explained (warming-up period, response time, setting of zero or repeatability);
- the way to determine the main performances characteristics of analysers are more detailed (linearity, drifts, interferences, measuring range and converter efficiency are more detailed);
- the calculation of the uncertainties of the measurements of NO<sub>x</sub> and CO is no longer covered by this document, and Annex III, *Uncertainty calculation of NO<sub>x</sub> and CO measurements*, has been deleted.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

## Introduction

This document is based on CR 1404 and other information coming from the Guide for Laboratory Practice (GLP) for the measurement, conversions and corrections of CO and NO<sub>x</sub>. CR 1404 was published by CEN in 1994. Several standards refer to it concerning the measurement, conversion and correction of the emissions of CO and NO<sub>x</sub>.

The ECOTEST project under mandates M/534 - ECODESIGN WATER HEATERS and 535 ECODESIGN Central heating appliances under the "Specific agreement number: SA/CEN/GROW/EFTA/534/535/2015-14 Rev" used the CR 1404:1994 as a reference document for the measurements of the emissions of CO and NO<sub>x</sub> of gas and liquid fuel boilers and water heaters tested under this project.

After a brainstorming made by ECOTEST experts, it was recommended to CEN/TC 238 to revise this document. CEN/TC 238 decided to revise it and publish it as a CEN Technical Report (CEN/TR).

This document describes test methods and automatic measurements for the determination of NO<sub>x</sub> (NO+NO<sub>2</sub>), CO, CO<sub>2</sub> and O<sub>2</sub> emissions in the flue gases including the sampling system and the calibration gases. Parts of this document are already introduced in the relevant gas appliances standards.

Gas cookers, flue less appliances and appliances especially designed for use in industrial processes carried out on industrial premises are excluded from the scope.

According to their principles of analysing the combustion products, the analysers are classified into the following families:

- Analysers based on the chemiluminescent effect: NO and NO<sub>2</sub>,
- Analysers based on the absorption of infra-red and ultra-violet radiation: NO and NO<sub>2</sub> (for concentrations higher than 100 ppm), CO and CO<sub>2</sub>,
- Analysers based on the paramagnetic principle: O<sub>2</sub>,
- Electrochemical analysers: they are considered to be inadequate for laboratory testing procedures.

This document presents the procedures to convert the measured values of NO<sub>x</sub> and CO to reference aeration conditions.

It also explains how to correct the emissions of NO<sub>x</sub> from the measured combustion air temperature and humidity to the reference conditions of 20 °C and 10 g of water/kg of air.

## CEN/TR 1404:2024 (E)

### 1 Scope

This document covers the measurements of the emissions of carbon monoxide (CO) and nitrogen oxides (NO<sub>x</sub>) produced by the combustion of gaseous fuel in domestic appliances. It is also possible to adapt it to liquid fuel appliances.

It explains how to correct the measured values obtained at the testing conditions of temperature, humidity and gas used into the reference conditions, as well as their conversion to different aeration factor expressed as %O<sub>2</sub> in the dry products of combustion.

The document also contains information on the types of sampling probes, mainly their form and their dimensions, which depend on the type of flue gas system.

It also gives detailed information on the sampling of the flue gas to be analysed, the transport / transfer lines and their components, and the materials recommended for their construction.

This document contains hints on the calculation of the uncertainties and the parameters to be considered in the whole analysis chain from the sampling probe to the analysers including the calibration gases.

The calculation of the uncertainties of the measurements of NO<sub>x</sub> and CO is not covered by this document.

### 2 Normative references

There are no normative references in this document.

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**