

DIN EN 14792:2017-05 (E)

Stationary source emissions - Determination of mass concentration of nitrogen oxides - Standard reference method: chemiluminescence

Contents		Page
European foreword		5
1	Scope	6
2	Normative references	6
3	Terms and definitions	7
4	Symbols and abbreviations	13
4.1	Symbols	13
4.2	Abbreviated terms	14
5	Principle	14
5.1	General	14
5.2	Measuring principle	14
6	Description of the measuring system	15
6.1	General	15
6.2	Sampling and sample gas conditioning system	16
6.2.1	Sampling probe	16
6.2.2	Filter	17
6.2.3	Sample gas line	17
6.2.4	Sample gas conditioning system	17
6.2.5	Sample gas pump	18
6.2.6	Secondary filter	18
6.2.7	Flow controller and flow meter	18
6.3	Analyser equipment	18
6.3.1	General	18
6.3.2	Converter	19
6.3.3	Ozone generator	19
6.3.4	Reaction chamber	19
6.3.5	Optical filter	19
6.3.6	Photomultiplier tube	20
6.3.7	Ozone removal	20
7	Performance characteristics of the SRM	20
8	Suitability of the measuring system to the measurement task	21
9	Field operation	22
9.1	Measurement planning	22
9.2	Sampling strategy	22
9.2.1	General	22
9.2.2	Measurement section and measurement plane	22
9.2.3	Minimum number and location of measurement points	22
9.2.4	Measurement ports and working platform	22
9.3	Choice of the measuring system	23
9.4	Setting of the measuring system on site	23
9.4.1	General	23
9.4.2	Preliminary zero and span check, and adjustments	23
9.4.3	Zero and span checks after measurement	24

10	Ongoing quality control	25
10.1	General	25
10.2	Frequency of checks	25
11	Expression of results	26
12	Equivalence of an alternative method	27
13	Measurement report	27
Annex A (informative) Validation of the method in the field		28
A.1	General	28
A.2	Characteristics of installations	28
A.3	Repeatability and reproducibility in the field	29
A.3.1	General	29
A.3.2	Repeatability	30
A.3.3	Reproducibility	31
Annex B (informative) Sampling and conditioning configurations		32
Annex C (normative) Determination of conversion efficiency		33
C.1	General	33
C.2	First method: cylinder gases for calibration	33
C.3	Second method: gaseous phase titration	33
Annex D (informative) Examples of different types of converters		35
D.1	Quartz converter	35
D.2	Low temperature converter (molybdenum)	35
D.3	Stainless steel converter	35
Annex E (informative) Calculation of the uncertainty associated with a concentration expressed for dry gas and at an oxygen reference concentration		36
E.1	Uncertainty associated with a concentration expressed on dry gas	36
E.2	Uncertainty associated with a concentration expressed at a oxygen reference concentration	38
Annex F (informative) Example of assessment of compliance of chemiluminescence method for NOx with requirements on emission measurements		40
F.1	General	40
F.2	Elements required for the uncertainty determinations	40
F.2.1	Model equation	40
F.2.2	Combined uncertainty	41
F.2.3	Expanded uncertainty	41
F.2.4	Determination of uncertainty contributions in case of rectangular distributions	43
F.2.5	Determination of uncertainty contributions by use of sensitivity coefficients	44
F.3	Example of an uncertainty calculation	44
F.3.1	Site specific conditions	44
F.3.2	Performance characteristics of the method	45
F.3.3	Calculation of concentration values	46
F.3.4	Determination of the uncertainty contributions	47
F.3.5	Result of uncertainty calculation	50
F.3.5.1	Standard uncertainties	50
F.3.5.2	Combined uncertainty	51
F.3.5.3	Expanded uncertainty	52
F.3.5.4	Evaluation of the compliance with the required measurement quality	52

Annex G (informative) Example of correction of data from drift effect	53
Annex H (informative) Significant technical changes	55
Bibliography	56