

DIN EN 14789:2017-05 (E)

Stationary source emissions - Determination of volume concentration of oxygen - Standard reference method: Paramagnetism

Contents		Page
European foreword		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	6
4	Symbols and abbreviations	12
4.1	Symbols	12
4.2	Abbreviated terms	13
5	Principle	13
5.1	General	13
5.2	Measuring principle	13
6	Description of the measuring system	13
6.1	General	13
6.2	Sampling and sample gas conditioning system	14
6.2.1	Sampling probe	14
6.2.2	Filter	14
6.2.3	Sample gas line	14
6.2.4	Sample gas cooler or permeation drier	15
6.2.5	Sample gas pump	15
6.2.6	Secondary filter	15
6.2.7	Flow controller and flow meter	15
6.3	Different variants of the paramagnetism principle	15
7	Performance characteristics of the SRM	16
8	Suitability of the measuring system for the measurement task	17
9	Field operation	18
9.1	Measurement planning	18
9.2	Sampling strategy	18
9.2.1	General	18
9.2.2	Measurement section and measurement plane	18
9.2.3	Minimum number and location of measurement points	18
9.2.4	Measurement ports and working platform	18
9.3	Choice of the measuring system	18
9.4	Setting of the measuring system on site	19
9.4.1	General	19
9.4.2	Preliminary zero and span check and adjustments	19
9.4.3	Zero and span checks after measurement	20
10	Ongoing quality control	21
10.1	General	21
10.2	Frequency of checks	21
11	Expression of results	21

12	Equivalence of an alternative method	21
13	Measurement report	22
	Annex A (informative) Validation of the method in the field	23
A.1	General	23
A.2	Characteristics of installations	23
A.3	Repeatability and reproducibility in the field	24
A.3.1	General	24
A.3.2	Repeatability	25
A.3.3	Reproducibility	26
	Annex B (informative) Example of assessment of compliance of paramagnetic method for oxygen with given uncertainty requirements	27
B.1	General	27
B.2	Elements required for the uncertainty determinations	27
B.2.1	Model equation	27
B.2.2	Combined uncertainty	28
B.2.3	Expanded uncertainty	28
B.2.4	Determination of uncertainty contributions in case of rectangular distributions	29
B.2.5	Determination of uncertainty contributions by use of sensitivity coefficients	29
B.3	Example of an uncertainty calculation	30
B.3.1	Site specific conditions	30
B.3.2	Performance characteristics	30
B.3.3	Determination of the uncertainty contributions	31
B.3.4	Results of uncertainty calculation	34
B.3.4.1	Standard uncertainties	34
B.3.4.2	Combined uncertainty	35
B.3.4.3	Expanded uncertainty	36
B.3.4.4	Evaluation of the compliance with the required measurement quality	36
	Annex C (informative) Schematic diagram of the measuring system	37
	Annex D (informative) Example of correction of data from drift effect	38
	Annex E (informative) Significant technical changes	40
	Bibliography	41