

DIN EN 14385:2025-03 (E)

Stationary source emissions - Determination of the total emission of As, Cd, Cr, Co, Cu, Mn, Ni, Pb, Sb, Tl and V

Contents		Page
European foreword		5
Introduction		6
1	Scope	7
2	Normative references	7
3	Terms and definitions, symbols and abbreviated terms	7
3.1	Terms and definitions	7
3.2	Symbols	9
3.3	Abbreviated terms	9
4	Principle	10
5	Apparatus and chemicals	10
5.1	General	10
5.2	Chemicals and filter material	13
6	Sampling equipment	15
6.1	General requirements	15
6.2	Isokinetic sampling equipment	16
6.3	Absorbers and absorption efficiency	16
7	Cleaning of the sampling equipment prior to sampling	17
8	Procedure	17
8.1	General requirements	17
8.2	Preparation and installation of equipment	18
8.3	Performance of the sampling	19
8.4	Disassembling the equipment	19
8.4.1	General	19
8.4.2	Disassembly of the filter housing	19
8.4.3	Rinsing of the sampling equipment	19
8.4.4	Rinsing of the connection tubing to the first absorber	20
8.4.5	Handling of the absorption solutions from the absorbers	20
8.5	Field blanks	20
8.6	Requirements for storage of the samples	21
8.7	Pre-treatment before analysis	21
8.7.1	General	21
8.7.2	Pre-cleaning of the digestion equipment	21
8.7.3	Treatment of CRM and filter	21
8.7.4	Pre-treatment of absorption solutions	23
8.7.5	Pre-treatment of rinsing solutions	23
8.8	Analysis	23
9	Expression of results	25
10	Test report	28
Annex A (informative) Examples of absorption vessels		29

Annex B (informative) Types of isokinetic equipment and leak test methods	30
B.1 Types of isokinetic equipment	30
B.2 Leak test methods	31
Annex C (informative) Pre-cleaning procedures of the sampling equipment at the laboratory and determination of the absorption efficiency	34
C.1 General	34
C.2 Chemicals	34
C.2.1 General	34
C.2.2 Rinsing solution	34
C.2.3 Diluted aqua regia	34
C.2.4 Laboratory cleaning solution	34
C.2.5 Dilute hydrogen peroxide	34
C.2.6 Rinsing acid	34
C.3 Equipment	34
C.3.1 Procedure A	34
C.3.2 Procedure B	35
C.3.3 Procedure C	35
C.4 Absorption and storage bottles	35
C.4.1 Procedure A	35
C.4.2 Procedure B	35
C.4.3 Procedure C	35
C.4.4 Procedure D	35
Annex D (informative) Measurement results of two field tests	36
D.1 General	36
D.2 Absorption efficiency	36
D.3 Repeatability	36
D.4 Reproducibility	38
Annex E (informative) Pre-tests for the determination of the efficiency, of the digestion and of the performance of the analytical procedures	40
E.1 Analytical efficiencies of reference materials	40
E.2 Comments of field study data	42
E.2.1 General	42
E.2.2 Pre-treatment and analysis	43
E.2.3 Absorption efficiency	43
E.2.4 Detection limit	43
E.2.5 Repeatability and reproducibility	43
Annex F (informative) Example of assessment of compliance of the standard reference method	44
F.1 Introduction	44
F.2 Elements required for the uncertainty determinations - Model equation	44
F.3 Example of an uncertainty calculation in case of side-stream sampling system	44
F.3.1 General	44
F.3.2 Determination of the model equations	45
F.3.3 Equations for calculating combined uncertainties of gas volumes sampled in standardized conditions	47
F.3.4 Equations for calculating combined uncertainties of concentrations	48
F.3.5 Quantification of standard uncertainty components	51
F.4 Estimation of measurement uncertainty in case of main-stream sampling system	64
F.4.1 General	64
F.4.2 Determination of the model equations	64
F.4.3 Equations for calculating combined uncertainties of gas volumes sampled in standardized conditions	65
F.4.4 Equations for calculating combined uncertainties of concentrations	65

Annex G (normative) Determination and reporting of limits of detection and quantification	68
G.1 Introduction to Limit of Detection and Quantification	68
G.2 Limit of detection (LoD)	69
G.3 Limit of quantification (LoQ)	69
G.4 Rules to be adopted when summing the various parts of a metals sample train where the levels are at LoQ or below	69
Annex H (informative) Alternative digestion method for the filters by use of an HF-free digestion Mixture [3],[4]	73
H.1 Background to alternative method	73
H.2 Reagents	73
H.3 Digestion of filter	73
H.4 Analysis	73
Bibliography	74