DIN EN 13936:2014-04 (E)

Workplace exposure - Procedures for measuring a chemical agent present as a mixture of airborne parti cles and vapour - Requirements and test methods

Contents

Page

Foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms and definitions 6

4 Requirements 7
4.1 General 7
4.2 Sampler requirements 7
4.3 Pumps 7
4.4 Measurement procedure requirements for mixtures of airborne particles and vapour 7
4.4.1 Storage test 7
4.4.2 Expanded uncertainty 7
4.4.3 Method description 7

5 Test methods 8
5.1 Sample distribution between the collection substrate for airborne particles and the collection substrate for vapour 8
5.2 Compliance with EN 1076 9
5.3 Storage 9
5.4 Uncertainty of the measurement 10
5.4.1 Calculation of the combined standard uncertainty 10
5.4.2 Calculation of the expanded uncertainty 10

6 Test report 10

Annex A (informative) Possible approaches to sample mixtures of airborne particles and vapour 11

A.1 General 11
A.2 Filter plus pumped sorbent tube 11
A.2.1 General 11
A.2.2 Sampling flow rate 11
A.3 Reagent-impregnated sampling system 12
A.4 Transport and storage 12

Annex B (informative) Physical behaviour of a mixture of airborne particles and vapour 13

B.1 Generation of a mixture of airborne particles and vapour 13
B.2 Sampling of chemical agents having a vapour pressure of more than 100 Pa at room temperature (process temperature) 13
B.3 Sampling of chemical agents having a vapour pressure of more than 0,001 Pa and less than or equal to 100 Pa at room temperature 13
B.4 Sampling of chemical agents having a vapour pressure of less than 0,001 Pa at room temperature 15

Annex C (informative) Estimation of uncertainty of measurement 16

C.1 Uncertainty components 16
C.2 Two collection substrates for airborne particles and vapour 16
C.2.1 Sampled air volume and sampling efficiency 16
C.2.2 Sample storage 16
C.2.3 Effects of temperature and humidity 16
C.2.4 Analysis 17
C.2.5 Bias of sample distribution between the collection substrate for airborne particles and the collection substrate for vapour (distribution bias) 17
C.2.6 Calculation of the relative combined uncertainty 17
C.2.6.1 Samples analysed separately 17
C.2.6.1.1 General 17
C.2.6.1.2 Same sampling volume for airborne particles and vapour 18
C.2.6.1.3 Different sampling volumes for airborne particles and vapour 18
C.2.6.1.4 Airborne particles or vapour collection substrate not analysed 19
C.2.6.2 Samples analysed together 19
C.3 One collection substrate for airborne particles and vapour 19
C.3.1 General 19
C.3.2 Sampling 19
C.3.3 Analysis 19
C.3.4 Calculation of the relative combined standard uncertainty 20

Bibliography 21