# DIN EN 14626:2026-10 (E)

## Ambient air - Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy

## Contents

Page


European foreword ..... 5

1 Scope ..... 6

2 Normative references ..... 7

3 Terms and definitions ..... 8

4 Abbreviated terms ..... 13

5 Principle ..... 13
5.1 General ..... 13
5.2 Measuring principle ..... 13
5.3 Type testing ..... 14
5.4 Field operation and quality control ..... 14

6 Sampling ..... 15
6.1 General ..... 15
6.2 Sampling location ..... 15
6.3 Sampling system ..... 15
6.3.1 Construction ..... 15
6.3.2 Particle filter ..... 16
6.3.3 Loss of carbon monoxide ..... 16
6.3.4 Conditioning ..... 16
6.4 Control and regulation of sample flow rate ..... 16
6.5 Sampling pump for the manifold ..... 17

7 Analyser equipment ..... 17
7.1 General ..... 17
7.2 Details about analyser equipment ..... 17
7.3 Pressure measurement ..... 17
7.4 Flow rate indicator ..... 17
7.5 Sampling pump for the analyser ..... 18
7.6 Particle filter ..... 18

8 Type testing of carbon monoxide analysers ..... 18
8.1 General ..... 18
8.2 Relevant performance characteristics and performance criteria ..... 19
8.3 Design change ..... 23
8.4 Procedures for determination of the performance characteristics during the laboratory test ..... 23
8.4.1 General ..... 23
8.4.2 Test conditions ..... 23
8.4.3 Response time ..... 26
8.4.4 Short-term drift ..... 28
8.4.5 Repeatability standard deviation ..... 28
8.4.6 Lack of fit of linearity of the calibration function ..... 29
8.4.7 Sensitivity coefficient to sample gas pressure ..... 30
8.4.8 Sensitivity coefficient to the sample gas temperature ..... 31
8.4.9 Sensitivity coefficient to the surrounding temperature ..... 31
8.4.10 Sensitivity coefficient to electrical voltage ..... 32

8.4.11 Interferents ... 33
8.4.12 Averaging test ... 34
8.4.13 Difference sample/calibration port ... 35
8.5 Determination of the performance characteristics during the field test ... 36
8.5.1 General ... 36
8.5.2 Selection of a monitoring station for the field test ... 36
8.5.3 Operational requirements ... 37
8.5.4 Long-term drift ... 38
8.5.5 Reproducibility standard deviation under field conditions ... 39
8.5.6 Period of unattended operation ... 39
8.5.7 Period of availability of the analyser ... 39
8.6 Expanded uncertainty calculation for type testing ... 40

9 Field operation and ongoing quality control ... 41
9.1 General ... 41
9.2 Suitability evaluation ... 41
9.2.1 General ... 41
9.2.2 Analyser for a monitoring station or task ... 41
9.3 Initial installation ... 43
9.4 Ongoing quality assurance/quality control ... 43
9.4.1 General ... 43
9.4.2 Frequency of calibrations, checks and maintenance ... 44
9.5 Calibration of the analyser ... 47
9.5.1 General ... 47
9.5.2 Calibration gases ... 48
9.5.3 Data adjustment function ... 48
9.5.4 Testing the sampling system ... 48
9.5.5 Treatment of data after exceedance of performance criteria ... 50
9.6 Checks ... 52
9.6.1 Zero and span checks ... 52
9.6.2 Lack-of-fit ... 53
9.6.3 Testing the sampling system ... 54
9.7 Maintenance ... 56
9.7.1 Change of particle filters ... 56
9.7.2 Maintenance of sampling system ... 56
9.7.3 Change of consumables as applicable ... 56
9.7.4 Preventive/routine maintenance of components of the analyser ... 56
9.8 Data handling and data reports ... 56
9.9 Measurement uncertainty ... 57

10 Expression of results ... 57

11 Test reports and documentation ... 58
11.1 Type testing ... 58
11.2 Field operation ... 59
11.2.1 Suitability evaluation ... 59
11.2.2 Documentation ... 59
11.2.3 Ambient air quality data reports ... 60

Annex A (normative) Test of lack-of-fit ... 61

A.1 Establishment of the regression line ... 61
A.2 Calculation of the residuals of the averages ... 61

Annex B (informative) Sampling equipment ... 63

Annex C (informative) Schematics of non-dispersive infrared spectrometer ... 65

Annex D (informative) Manifold testing ... 67

D.1 Procedure for applying test gas ... 67
D.2 Procedure for the cross test ... 68

D.2.1 General ..... 68
D.2.2 Initial stage ..... 68
D.2.3 Stage 1 ..... 69
D.2.4 Stage 2 ..... 69
D.2.5 Data Processing ..... 69
D.2.6 Evaluation ..... 69

Annex E (normative) Type testing ..... 71

E.1 Type testing and uncertainty calculation ..... 71
E.1.1 Type testing ..... 71
E.1.2 Uncertainty calculation ..... 71
E.2 Type testing Requirement a) ..... 71
E.3 Type testing Requirement b) ..... 73
E.3.1 General ..... 73
E.3.2 Calculation of standard uncertainties ..... 76
E.3.3 Example calculation ..... 83
E.4 Type testing Requirement c) ..... 85
E.5 Type testing Requirement d) ..... 85
E.5.1 General ..... 85
E.5.2 Combined standard uncertainty ..... 87
E.5.3 Absolute expanded uncertainty ..... 87
E.5.4 Relative expanded uncertainty ..... 88
E.5.5 Calculation of standard uncertainties ..... 88
E.5.6 Example calculation ..... 90

Annex F (informative) Calculation of uncertainty in field operation at the 8-hour limit value ..... 92

F.1 General ..... 92
F.2 Combined standard uncertainty ..... 92
F.3 Standard uncertainties ..... 93
F.3.1 General ..... 93
F.3.2 Influence quantities ..... 94
F.3.3 Interferents ..... 97
F.3.4 Averaging effect ..... 98
F.3.5 Reproducibility under field conditions ..... 98
F.3.6 Long-term drift at zero ..... 98
F.3.7 Long-term drift at level of the 8-hour limit value ..... 98
F.3.8 Zero gas ..... 99
F.3.9 Calibration gas ..... 99
F.3.10 Difference sample/calibration port ..... 99
F.4 Example calculation ..... 100

Annex G (informative) Test stand for the test point "sensitivity coefficient of sample gas pressure" ..... 102

Annex H (informative) Significant changes ..... 104

Bibliography ..... 105