IEC 62990-2:2021-06 (E)

Workplace atmospheres - Part 2: Gas detectors - Selection, installation, use and maintenance of detectors for toxic gases and vapours

Contents

Page

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 7
4 Properties and detection of toxic gases and vapours 13
4.1 Properties and detection 13
4.2 The difference between detecting gases and vapours 14
4.3 Effects of water vapour on detection 17
4.4 Effects of temperature and pressure on detection 17
4.5 Effects of corrosion on detection 17
4.6 Detection by oxygen deficiency measurement 17
5 Measurement tasks 18
5.1 General 18
5.2 Exposure measurement (health monitoring) 18
5.3 General gas detection (safety monitoring) 19
6 Selection of equipment 20
6.1 General 20
6.2 Performance and electrical tests 21
6.3 Indication range, measuring range and uncertainty of measurement 21
6.4 Selectivity requirements 22
6.5 The influence of environmental conditions 23
6.6 The influence of electromagnetic interference 23
6.7 Time of response and time of recovery 24
6.8 Time to alarm 25
6.9 Data logging 25
6.10 Instruction manual 26
7 Design and installation of fixed toxic gas detection equipment 26
7.1 General 26
7.2 Basic considerations for the installation of fixed systems 27
7.3 Location of detection points 28
7.4 Access for calibration and maintenance 33
7.5 Additional considerations for sample lines 33
7.6 Summary of considerations for the location of sensors or sampling points 34
7.7 Installation of sensors 35
7.8 Integrity and safety of fixed systems 35
7.9 Commissioning 36
7.10 Operating instructions, plans and records 37
8 Operation of toxic gas detection equipment 38
8.1 Alarm setting 38
8.2 Operation of portable equipment 39
8.3 Operation of transportable and fixed equipment 43
8.4 Sample lines and sampling probes 45
8.5 Accessories 45
9 Maintenance and calibration 46
9.1 General 46

9.2 Sensor 46
9.3 Flow systems of aspirated equipment 46
9.4 Readout devices 47
9.5 Alarms 47
9.6 Maintenance 47
9.7 Calibration 48
9.8 Operation test 49
9.9 Records 50
10 Training 50
10.1 General 50
10.2 Operator training 50
10.3 Maintenance and calibration training 51
Annex A (informative) Commonly used measurement principles 52
A.1 General 52
A.2 Chemiluminescence 52
A.3 Colorimetry 53
A.4 Electrochemical 54
A.5 Flame-ionization 55
A.6 Gas chromatography 55
A.7 Infrared photometry 56
A.8 Ion mobility spectrometry 57
A.9 Mass spectrometry 58
A.10 Photo-ionization 59
A.11 Semiconductor 60
A.12 Ultra-violet/visible photometry 61
Bibliography 62

Figure 1 – Relationship between indication range and measuring range (See 6.3.1) 11
Figure 2 – Example of zero uncertainty 11
Figure 3 – Example of warm-up time in clean air 12
Figure 4 – Relationship between indication range and measuring range 22
Figure 5 – Gas response curves for test gas volume fractions of 40 ppm and 100 ppm 24
Figure 6 – Time to alarm at 25 ppm set point for test gas volume fractions of 40 ppm and 100 ppm 25

Table A.1 – Chemiluminescence 52
Table A.2 – Colorimetry 53
Table A.3 – Electrochemical 54
Table A.4 – Flame-ionization 55
Table A.5 – Infrared photometry 56
Table A.6 – Ion mobility spectrometry 57
Table A.7 – Mass spectrometry 58
Table A.8 – Photo-ionization (PID) 59
Table A.9 – Semiconductor 60
Table A.10 – Ultra-violet/visible photometry 61