ISO/IEC 80079-49:2024-05 (E)

Explosive atmospheres - Part 49: Flame arresters - Performance requirements, test methods and limits for use

Contents

Page

FOREWORD 5
INTRODUCTION 7
1 Scope 8
2 Normative references 9
3 Terms and definitions 9
4 Abbreviated terms and symbols 13
5 Hazards and flame arrester classifications 14
5.1 Flame transmission classification: deflagration, stable and unstable detonation 14
5.2 Flame transmission classification: stabilized burning 15
5.3 Index of tests 15
6 General requirements 16
6.1 Measuring instruments 16
6.2 Flow measurement (air) 17
6.3 Flame transmission test 17
6.3.1 General 17
6.3.2 Test mixtures 17
7 Specific requirements for static flame arresters 19
7.1 Construction requirements for prototype arresters 19
7.2 Design series 19
7.3 Flame transmission tests 20
7.3.1 General 20
7.3.2 Deflagration test 21
7.3.3 Tests for detonation flame arresters 24
7.3.4 Short time burning test 30
7.3.5 Endurance burning test 33
8 Specific requirements for liquid product detonation flame arresters 34
8.1 Liquid seals 34
8.2 Foot valves 35
8.3 Flame transmission test 36
9 Specific requirements for dynamic flame arresters (high velocity vent valves) 37
9.1 General 37
9.2 Flame transmission tests 37
9.2.1 Low flow flame transmission test 37
9.2.2 Flame transmission test by opening and closing 39
9.2.3 Deflagration test 40
9.2.4 Endurance burning test 40
10 Specific requirements for hydraulic flame arresters 41
10.1 Equipment 41
10.2 Flame transmission tests 41
10.2.1 General 41

10.2.2 Short time burning test 41
10.2.3 Deflagration test 41
10.2.4 Detonation test 42
11 Test of flame arresters installed on or within gas conveying equipment 44
11.1 General 44
11.2 Flame transmission tests 44
11.2.1 General 44
11.2.2 Test procedure for gas conveying equipment with inlet pressure > 600 hPa 46
11.2.3 Test procedure for gas conveying equipment with inlet pressure ≤ 600 hPa 47
12 Instructions 47
13 Marking 48
13.1 Location 48
13.2 Flame arrester housing 49
13.2.1 General information 49
13.2.2 Warning markings 49
13.2.3 Examples of marking 50
13.3 Flame arrester element 51
14 Manufacturing and production 51
14.1 Construction 51
14.2 Housing 51
14.3 Joints 51
14.4 Pressure test 51
14.5 Leak test 52
Annex A (normative) Flow measurement 53
A.1 General 53
A.2 In-line flame arresters 54
A.3 End-of-line flame arrester 54
A.3.1 General 54
A.3.2 Special flow measurement for dynamic flame arresters 55
A.4 Undamped oscillation tests of dynamic flame arrester (High velocity vent valves) 56
Annex B (informative) Information for selecting flame arresters 58
Annex C (informative) Recommended practice 59
Annex D (informative) Evaluation of test results 60
Annex E (normative) Application 62
E.1 General 62
E.2 Limits for use for static flame arresters 63
E.2.1 In-line flame arrester 63
E.2.2 Pre-volume flame arrester 63
E.2.3 Detonation flame arrester 63
E.2.4 Short time burn flame arrester 63
E.3 Limits for use for liquid detonation flame arresters 64
E.4 Limits for use for dynamic flame arresters (high velocity vent valves) 64
E.5 Limits for use for hydraulic flame arresters 64
Annex F (informative) Significant changes between this document and EN ISO 16852:2016 67
Bibliography 69

Figure 1 – Test apparatus for end-of-line flame arrester for deflagration test 21
Figure 2 – Test apparatus for in-line flame arrester for deflagration test 22
Figure 3 – Test apparatus for pre-volume flame arrester for deflagration test 24
Figure 4 – Test apparatus for detonation flame arrester for detonation without restriction 26
Figure 5 – Test apparatus for detonation flame arrester for detonation with restriction 28
Figure 6 – Test apparatus for short time burning test 31
Figure 7 – Test apparatus for endurance burning test 33
Figure 8 – Liquid product detonation flame arrester 35
Figure 9 – End-of-line flame arrester incorporating a non-return valve (foot valve) 35
Figure 10 – Test apparatus for liquid product detonation flame arresters 36
Figure 11 – Test apparatus for determining the non-hammering conditions for dynamic flame arresters 39
Figure 12 – Test apparatus for hydraulic flame arresters 43
Figure 13 – Test apparatus for the flame transmission test of flame arresters installed on or within gas conveying equipment 45
Figure 14 – Example of marking plate, burn rating "a" 50
Figure 15 – Example of marking plate, burn rating "b" 50
Figure A.1 – Test apparatus for recording the pressure drop/flow rate curve for in-line flame arresters 54
Figure A.2 – Test apparatus for recording the pressure drop/flow rate curve for end-of-line flame arresters with or without integrated pressure/vacuum valve 56
Figure A.3 – Test apparatus for determining the non-oscillating conditions for dynamic flame arresters 57
Figure D.1 – Decision process for stable detonation arrester (DET3 and DET4) 60
Figure D.2 – Decision process for unstable detonation arrester (DET1 and DET2) 61
Figure E.1 – Test apparatus for hydraulic flame arresters 66

Table 1 – Flame arrester classification for deflagration, stable and unstable detonation 15
Table 2 – Summary of tests to be conducted 16
Table 3 – Specification of gas-air mixtures for deflagration and detonation tests 18
Table 4 – Specification of gas-air mixtures for short time burning tests and burning tests of dynamic flame arresters 18
Table 5 – Specification of gas-air or vapour-air mixtures for endurance burning tests of static flame arresters 19
Table 6 – Design series 20
Table 7 – Ratio p_{md}/p_{TB} 27
Table 8 – Number of the individual tests and test parameters for the flame transmission test of flame arresters installed on or within gas conveying equipment with inlet pressures > 600 hPa 46
Table 9 – Number of the individual tests and test parameters for the flame transmission test of flame arresters installed on or within gas conveying equipment with inlet pressures ≤ 600 hPa 47
Table B.1 – Information for selecting flame arresters 58
Table F.1 – Significant changes with respect to EN ISO 16852:2016 67