

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 |