

DIN EN 1839:2017-04 (E)

Determination of the explosion limits and the limiting oxygen concentration (LOC) for flammable gases and vapours

| Contents | Page |
|---|-------------|
| European foreword | 5 |
| Introduction | 6 |
| 1 Scope | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 7 |
| 4 Test methods | 9 |
| 4.1 General | 9 |
| 4.2 Method T ("tube" method) | 10 |
| 4.2.1 Detailed method | 10 |
| 4.2.2 Reagents and materials | 10 |
| 4.2.3 Apparatus | 11 |
| Table 1 -- Maximum permissible uncertainty of measurement for the amount of test substance in the test mixture | 12 |
| Figure 1 -- Scheme of the 'tube' apparatus for determining the explosion limits resp. Limiting oxygen concentration | 12 |
| 4.2.4 Preparation of the test mixture | 13 |
| 4.2.5 Procedure | 13 |
| 4.3 Method B ("bomb" method) | 14 |
| 4.3.1 Principle | 14 |
| 4.3.2 Reagents and materials | 14 |
| 4.3.3 Apparatus | 14 |
| 4.3.4 Preparation of the test mixture | 16 |
| 4.3.5 Procedure | 17 |
| 4.3.6 Determination of explosion limits | 17 |
| 4.3.7 Determination of the limiting oxygen concentration | 18 |
| 4.4 Determination of the limiting oxygen concentration | 18 |
| 4.4.1 Metering devices and additional equipment | 18 |
| 4.4.2 Procedure | 19 |
| Figure 2 -- Short procedure scheme for the determination of the LAC | 20 |
| Figure 3 -- Extended procedure scheme for the determination of the LAC | 21 |
| 4.5 Recording of results | 22 |
| 4.5.1 General | 22 |
| 4.5.2 Determination of explosion limits | 22 |
| 4.5.3 Determination of the limiting oxygen concentration | 23 |
| 5 Verification | 23 |
| 6 Test report | 23 |
| Annex A (normative) Method for determination of the explosion limits and limiting oxygen concentration of substances that are difficult to ignite | 25 |

| | | |
|--|--|----|
| A.1 | Background | 25 |
| A.2 | Explanation | 25 |
| A.2.1 | Explosion criterion -- flame detachment | 25 |
| A.2.2 | Degree of halogenation | 25 |
| A.3 | Apparatus | 25 |
| A.3.1 | Test vessel | 25 |
| A.3.2 | Reagents and materials | 26 |
| A.3.3 | Ignition source | 26 |
| A.3.4 | Equipment for preparing the test mixture | 26 |
| A.4 | Safety equipment | 26 |
| A.5 | Preparation of the test mixture | 26 |
| A.6 | Procedure | 27 |
| A.6.1 | Determination of LEL and UEL | 27 |
| A.6.2 | Determination of LOC | 27 |
| Annex B (informative) Conversion of the values for the explosion limits | | 28 |
| B.1 | Abbreviations and symbols | 28 |
| B.2 | Substance characteristics of air | 28 |
| B.3 | Definitions | 29 |
| B.4 | Mixture preparation | 29 |
| B.5 | Conversion | 30 |
| Table B.1 -- Formulas for the conversion | | 31 |
| Annex C (informative) Examples to describe flame detachment | | 32 |
| Annex D (informative) Example of recommended evaporator equipment | | 33 |
| Figure D.1 -- Evaporator equipment for producing test mixtures from liquid flammable substances | | 33 |
| Annex E (normative) Safety measures | | 35 |
| E.1 | General | 35 |
| E.2 | General safety measures | 35 |
| E.3 | Additional safety measures concerning the tube method | 35 |
| Annex F (informative) Examples of the determination of the LOC | | 36 |
| F.1 | Example 1: determination of the LOC - short procedure | 36 |
| Figure F.1 -- Determination of the LAC of a ternary system of n-hexane, air and nitrogen at 100 °C and ambient pressure | | 36 |
| F.2 | Example 2: determination of the LOC - extended procedure | 36 |
| Figure F.2 -- Determination of the LAC of a ternary system of hydrogen, air and nitrogen at 20 °C and ambient pressure | | 37 |
| Annex G (normative) Verification | | 38 |
| Table G.1 -- Data for verification of the apparatus with respect to the lower explosion limit | | 38 |
| Table G.2 -- Data for verification of the apparatus with respect to the upper explosion limit | | 38 |
| Annex H (informative) Example of a form expressing the results | | 40 |
| Annex I (informative) Significant Changes between this European Standard and Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/34/EU aimed to be covered | | 43 |
| Table ZA.1 -- Correspondence between this European Standard and Annex II of Directive 2014/34/EU | | 43 |
| Bibliography | | 44 |