

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