SVENSK STANDARD
SS-EN 14034-2:2006+A1:2011

Fastställd/Approved: 2011-01-17
Publicerad/Published: 2011-02-09
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 13.230

Explosiv atmosfär – Bestämning av explosionsegenskaper hos dammoln –
Del 2: Bestämning av maximala värdet för tryckstegrings-hastighet $(dp/dt)_{max}$

Determination of explosion characteristics of dust clouds –
Part 2: Determination of the maximum rate of explosion pressure rise $(dp/dt)_{max}$ of dust clouds

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Europastandarden EN 14034-2:2006+A1:2011 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 14034-2:2006+A1:2011.

Denna standard ersätter SS-EN 14034-2:2006, utgåva 1.

The European Standard EN 14034-2:2006+A1:2011 has the status of a Swedish Standard. This document contains the official version of EN 14034-2:2006+A1:2011.

This standard supersedes the Swedish Standard SS-EN 14034-2:2006, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Utrustning för användning i explosiv atmosfär, SIS/TK 112.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14034-2:2006+A1

January 2011

ICS 13.230

Supersedes EN 14034-2:2006

English Version

Determination of explosion characteristics of dust clouds - Part 2: Determination of the maximum rate of explosion pressure rise $(dp/dt)_{max}$ of dust clouds

Détermination des caractéristiques d'explosion des nuages de poussière - Partie 2: Détermination de la vitesse maximale de montée en pression d'explosion $(dp/dt)_{max}$ des nuages de poussière

Bestimmung der Explosionskenngrößen von Staub/Luft-Gemischen - Teil 2: Bestimmung des maximalen zeitlichen Druckanstiegs $(dp/dt)_{max}$ von Staub/Luft-Gemischen

This European Standard was approved by CEN on 20 April 2006 and includes Amendment 1 approved by CEN on 13 November 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 14034-2:2006+A1:2011: E

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Foreword

This document (EN 14034-2:2006+A1:2011) has been prepared by Technical Committee CEN/TC 305 “Potentially explosive atmospheres - Explosion prevention and protection”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2011, and conflicting national standards shall be withdrawn at the latest by July 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1, approved by CEN on 2010-11-13.

This document supersedes EN 14034-2:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟦A1⟩ ⟨A1⟧.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

For relationship with the EU Directive 94/9/EC, see informative Annex ZA, which is an integral part of this document.

This European Standard is one of a series of standards as listed below:

EN 14034 "Determination of explosion characteristics of dust clouds"

– Part 1: Determination of the maximum explosion pressure p_{max} of dust clouds;

– Part 2: Determination of the maximum rate of explosion pressure rise $(dp/dt)_{max}$ of dust clouds;

– Part 3: Determination of the lower explosion limit LEL of dust clouds;

– Part 4: Determination of the limiting oxygen concentration LOC of dust clouds.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard specifies a method for experimental determination of the maximum rate of explosion pressure rise of dust clouds. The maximum rate of explosion pressure rise is the maximum value of the pressure rise per unit time during explosions of explosive atmospheres in the explosion range of a combustible dust in a closed vessel. The measurement of the maximum rate of explosion pressure rise forms the basis for explosion protection by design and construction of equipment, protective systems and components to reduce the explosion effects.

〖A1〉 *deleted text* 〈A1〗

1 Scope

This standard describes a test method for the determination of the maximum rate of explosion pressure rise of dust clouds in a closed vessel under defined initial conditions of pressure and temperature.

This method is not suitable for use with recognised explosives, like gunpowder and dynamite, explosives which do not require oxygen for combustion, pyrophoric substances, or substances or mixtures of substances which may under some circumstances behave in a similar manner. Where any doubt exists about the existence of hazard due to explosive properties, expert advice should be sought.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14460, *Explosion resistant equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
dust
small solid particles in the atmosphere which settle out under their own weight, but which may remain suspended in air for some time (includes dust and grit, as defined in ISO 4225)

NOTE Generally maximum particle size will not exceed 500 µm.

3.2
combustible dust
dust able to undergo an exothermic reaction with air when ignited

NOTE The terms “flammable” and “combustible” are used synonymously.

3.3
explosion pressure
p_{ex}
highest overpressure occurring during an explosion of a dust cloud in a closed vessel

3.4
explosive atmosphere
mixture with air, under atmospheric conditions, of flammable (combustible) substances in the form of gases, vapours, mists or dusts, in which, after ignition has occurred, combustion spreads to the entire unburned mixture

3.5
ignition delay
t_v
time between the initiation of the dust dispersion and the activation of the ignition source

3.6
initial pressure
p_i
pressure in the explosion vessel at the moment of ignition

3.7
initial temperature
T_i
temperature in the explosion vessel at the moment of ignition

3.8
K_{max}, K_{St}
dust specific, volume independent characteristic which is calculated using the cubic law equation

$$(\mathrm{d}p/\mathrm{d}t)_{max} \cdot V^{1/3} = \text{const.} = K_{St} = K_{max}$$

3.9
rate of explosion pressure rise
$(\mathrm{d}p/\mathrm{d}t)_{ex}$
the maximum slope of the pressure/time curve during an explosion of a dust cloud in a closed vessel

3.10
maximum rate of explosion pressure rise
$(\mathrm{d}p/\mathrm{d}t)_{max}$
maximum value of the pressure rise per unit time during explosions of all explosive atmospheres in the explosion range of a combustible substance in a closed vessel under specified test conditions and standard atmospheric conditions

NOTE This parameter when determined in the 1 m^3 vessel is numerically identical with the parameters K_{max} (EN 26184-1) and K_{St} (VDI 2263-1) but the units of the latter are bar · m · s^{-1} whereas the unit of the $(\mathrm{d}p/\mathrm{d}t)_{max}$ is bar · s^{-1}.

4 Test apparatus

4.1 General

The standard test apparatus to determine the maximum rate of explosion pressure rise $(\mathrm{d}p/\mathrm{d}t)_{max}$ of dust clouds is an explosion pressure resistant vessel of 1 m^3, as used for the determination of the maximum explosion pressure and the lower explosion limit of dust clouds as well as the limiting oxygen concentration of dust/air/inert gas mixtures.

The main components of the test apparatus are

— explosion vessel;

— dust dispersion system;

— ignition source;

— control unit;

— pressure measuring system.

NOTE The 20 l sphere apparatus is an alternative explosion vessel for these determinations (see Annex C).