SLOVENSKI STANDARD
SIST EN 14034-1:2005+A1:2011

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Ugotavljanje eksplozijskih značilnosti oblakov prahu - 1. del: Ugotavljanje najvišjega tlaka eksplozije pmax oblakov prahu

Determination of explosion characteristics of dust clouds - Part 1: Determination of the maximum explosion pressure pmax of dust clouds

Bestimmung der Explosionskenngrößen von Staub/Luft-Gemischen - Teil 1: Bestimmung des maximalen Explosionsdruckes pmax von Staub/Luft-Gemischen

Détermination des caractéristiques d'explosion des nuages de poussière - Partie 1: Détermination de la pression maximale d'explosion pmax des nuages de poussière

Ta slovenski standard je istoveten z: **EN 14034-1:2004+A1:2011**

ICS:

13.230	Varstvo pred eksplozijo	Explosion protection

SIST EN 14034-1:2005+A1:2011 **en,fr,de**

EUROPEAN STANDARD

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EN 14034-1:2004+A1

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English Version

Determination of explosion characteristics of dust clouds - Part 1: Determination of the maximum explosion pressure p_{max} of dust clouds

Détermination des caractéristiques d'explosion des nuages de poussière - Partie 1: Détermination de la pression maximale d'explosion p_{max} des nuages de poussière

Bestimmung der Explosionskenngrößen von Staub/Luft-Gemischen - Teil 1: Bestimmung des maximalen Explosionsdruckes p_{max} von Staub/Luft-Gemischen

This European Standard was approved by CEN on 9 July 2004 and includes Amendment 1 approved by CEN on 13 November 2010.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 14034-1:2004+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of an identical text or by endorsement, at the latest by July 2011, and conflicting national standards shall be withdrawn at the latest by July 2011.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 14034-1:2004.

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 Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document includes a Bibliography.

This document is one of a series of standards as listed below:

— EN 14034-1,Determination of explosion characteristics of dust clouds - Part 1: Determination of the maximum explosion pressure p_{max} of dust clouds;

— ▌A1⟩ EN 14034-2 ⟨A1▌, Determination of explosion characteristics of dust clouds - Part 2: Determination of the maximum rate of explosion pressure rise $(dp/dt)_{max}$ of dust clouds;

— ▌A1⟩ EN 14034-3 ⟨A1▌, Determination of explosion characteristics of dust clouds – Part 3: Determination of the lower explosion limit LEL of dust clouds;

— EN 14034-4, Determination of explosion characteristics 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 document specifies a method for experimental determination of the maximum explosion pressure of dust clouds. The maximum explosion pressure is the maximum value of the overpressure during explosions of explosive atmospheres in the explosion range of a combustible dust in a closed vessel. The measurement of the maximum explosion pressure forms the basis for explosion protection by design and construction of equipment, protective systems and components to reduce the explosion effects.

This maximum explosion pressure is a safety characteristic used for hazard identification and designing safety measures for the mitigation of destructive effects of dust explosions.

〚A1〛 *deleted text* 〚A1〛

1 Scope

This document describes a test method for the determination of the maximum explosion pressure 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, substances 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.

〚A1〛 EN 14460 〈A1〉, *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}
the 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
the pressure in the explosion vessel at the moment of ignition

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

3.8
maximum explosion pressure
p_{max}
maximum overpressure occurring in a closed vessel during the explosion of an explosive atmosphere determined under specified test conditions and standard atmospheric conditions. (Maximum value of the explosion pressure p_{ex} determined by tests covering the explosible range of dust concentrations).

4 Test apparatus

4.1 General

The standard test apparatus to determine the maximum explosion pressure p_{max} of dust clouds is an explosion pressure resistant vessel of 1 m³, as used for the determination of the maximum rate of explosion pressure rise (K_{St}-value) 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)

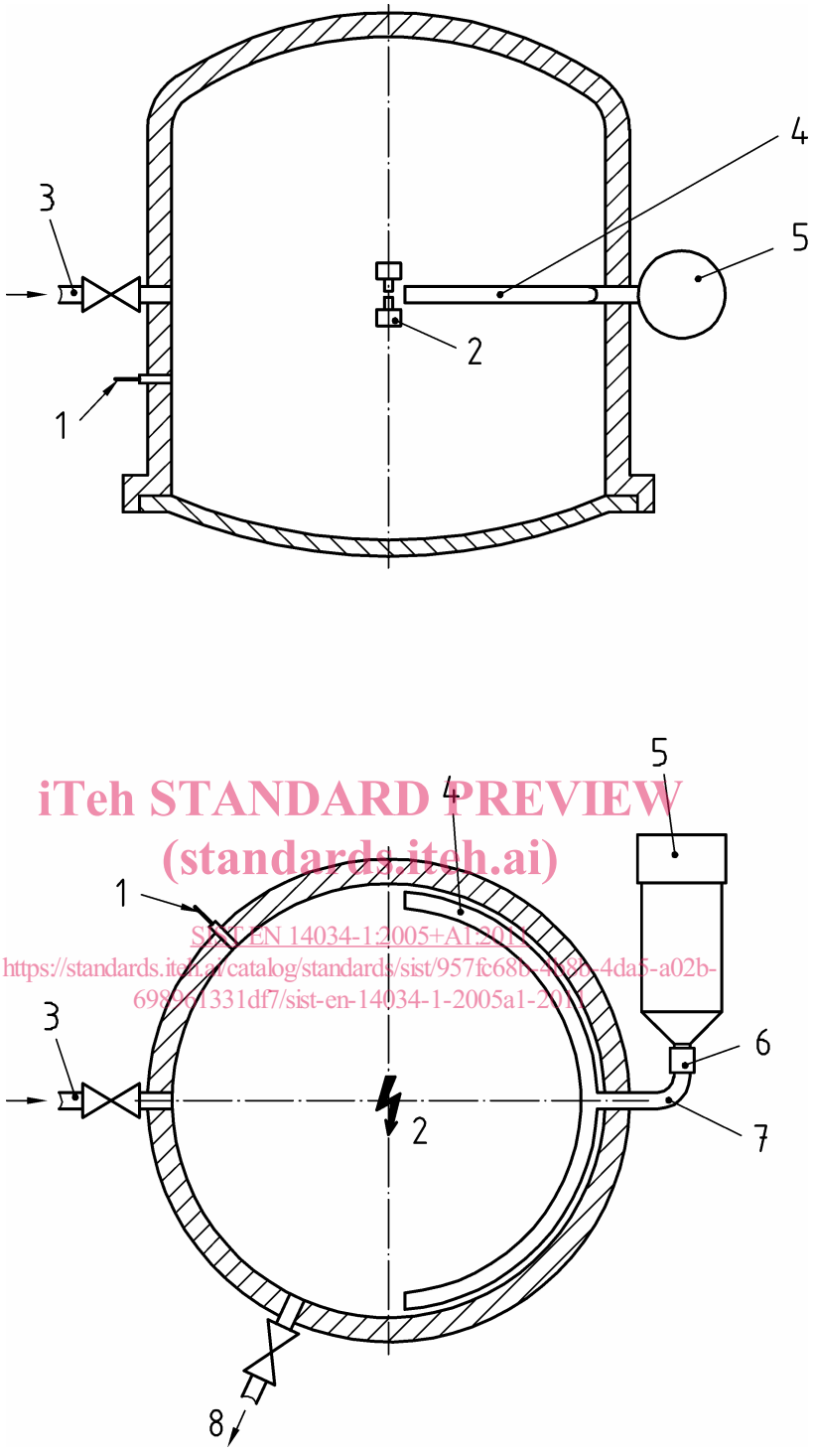
4.2 Explosion vessel

The standard explosion vessel is an explosion pressure resistant, spherical or cylindrical vessel in accordance with ⟨A1⟩ EN 14460 ⟨A1⟩ having a volume of 1 m³. The aspect ratio of the cylindrical vessel shall be 1:1 ± 10 % (see Figure 1).

NOTE It is recommended that the explosion vessel be designed to withstand an overpressure of at least 20 bar.

The apparatus shall be fitted with electrical and/or mechanical cut-offs as far as possible to ensure that any openings in the vessel (e.g. main door, instrument ports, inlet or outlet) are properly closed before a test procedure can start.

The apparatus shall also be equipped as far as possible to ensure that any residual pressure inside the vessel is vented before the vessel can be opened.



Key

1	Pressure sensor	5	Dust container
2	Chemical igniters	6	Fast acting valve
3	Inlet for purge air	7	Connecting tube
4	Dust disperser	8	Outlet for exhaust gas

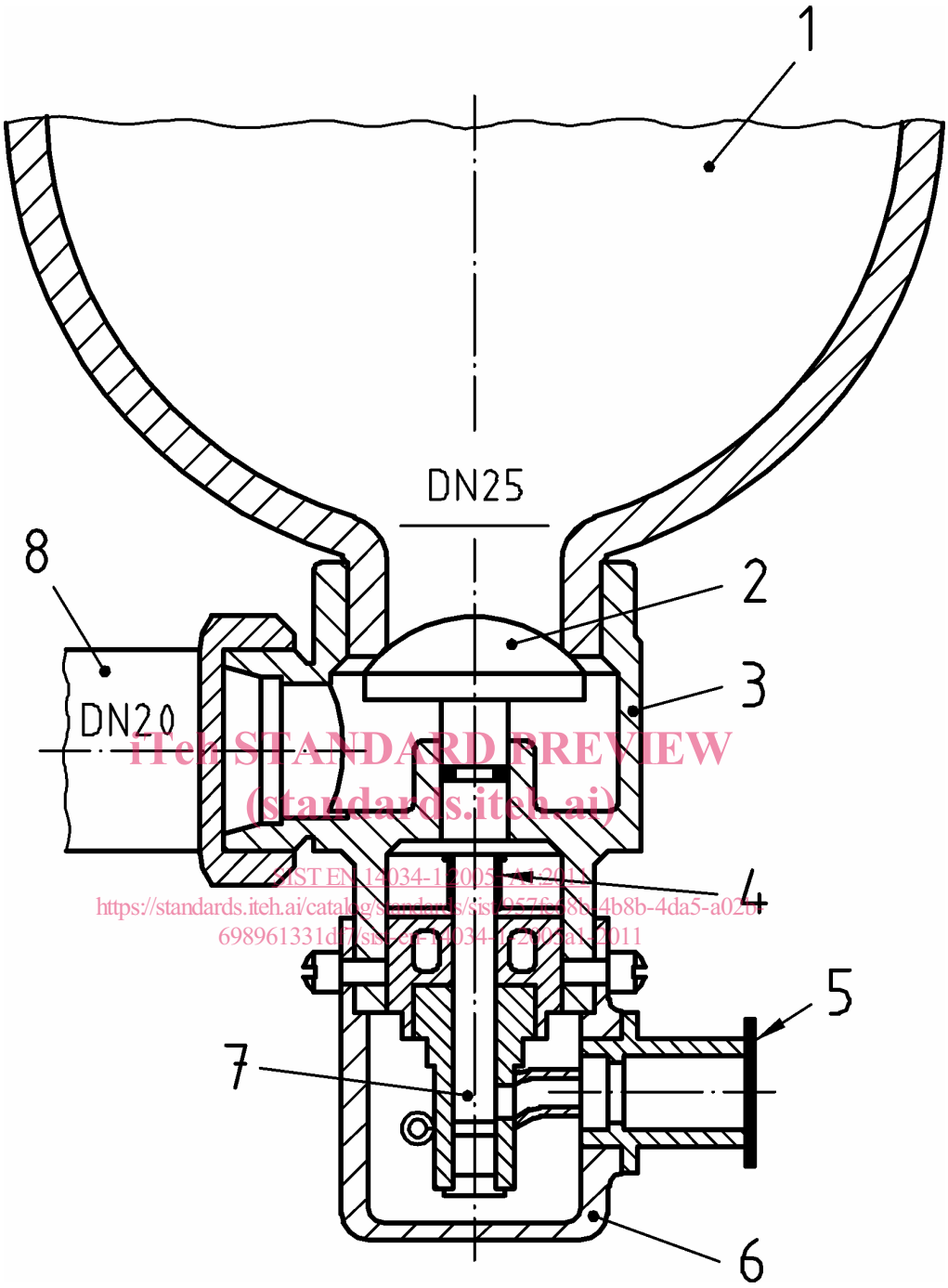
Figure 1 — 1 m³ vessel (schematic)

4.3 Dust dispersion system (dust container, fast acting valve, connecting tube, dust disperser)

The dust to be dispersed is charged into a dust container having a volume of 5,4 dm³. Its aspect ratio is 3:1. It is designed to withstand an internal overpressure of at least 20 bar (see Figure 2).

The dust container has an outlet at the base, through which the dust leaves the container. This outlet is closed by a fast acting valve activated by a blasting cap. The valve has a mushroom-shaped seal. The seal is held in position against the pressure in the dust container by a small ring. The ring is destroyed by firing a blasting cap and the valve opens due to the pressure inside the dust container (see Figure 2). The valve shall be designed so that it opens in less than 10 ms. For alternative valves see annex A.

The fast acting valve is connected to the side of the explosion vessel. The connecting tube between the fast acting valve and the dust disperser shall be not longer than 350 mm (see Figure 1).



Key

1 Dust container
2 Mushroom shaped seal
3 Seal housing
4 Support ring
5 Protective hood
6 Protective hood
7 Blasting cap
8 Connecting tube

Figure 2 — Dust container with blasting cap activated valve as commonly used for explosion suppression (schematic; it is commercially available)