SLOVENSKI STANDARD
SIST EN 16447:2014

01-oktober-2014

Eksplozijsko izolacijski ventili

Explosion isolation flap valves

Rückschlagklappen zur explosionstechnischen Entkopplung

Clapet d'isolation d'explosion

Ta slovenski standard je istoveten z: **EN 16447:2014**

ICS:

13.230	Varstvo pred eksplozijo	Explosion protection
23.060.50	Blokirni ventili	Check valves

SIST EN 16447:2014 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16447

July 2014

ICS 13.230; 23.060.50

English Version

Explosion isolation flap valves

Vanne à clapet d'isolation d'explosion

Rückschlagklappen zur explosionstechnischen Entkopplung

This European Standard was approved by CEN on 28 May 2014.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword

This document (EN 16447:2014) 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of an identical text or by endorsement, at the latest by January 2015 and conflicting national standards shall be withdrawn at the latest by January 2015.

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 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.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard describes the general requirements for flap valves used for dust explosion isolation. An explosion isolation flap valve is a protective system, which prevents a dust explosion from propagating via connecting pipes or ducts into other parts of apparatus or plant areas.

An explosion isolation flap valve can only stop the propagation of a dust explosion when it propagates against the direction of the normal process flow. It does not stop explosions running in the normal process flow direction. This European Standard specifies methods for evaluating the efficacy of explosion isolation flap valves.

This European Standard is applicable only to explosion isolation flap valves which are intended to avoid explosion propagation from a vessel, into other parts of the installation via connecting pipes or ducts. The standard covers isolation of such vessels that are protected by explosion venting (including flameless venting), explosion suppression or explosion resistant design.

NOTE 1 This standard is only applicable to cases where the explosion starts in a vessel and not in pipes or ducting.

Explosion isolation flap valves are not designed to prevent the transmission of fire or burning powder transported by the normal process flow.

NOTE 2 It is necessary to take this into account in risk assessments.

This European Standard is only applicable for dust explosions.

This European Standard is not applicable for explosions of materials listed below, or for mixtures containing some of those materials:

a) gases, vapours and hybrid mixtures;

b) chemically unstable substances;

c) explosive substances;

d) pyrotechnic substances.

2 Normative references

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

EN 13237, *Potentially explosive atmospheres - Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres*

EN 14373, *Explosion suppression systems*

EN 14460, *Explosion resistant equipment*

EN 15089, *Explosion isolation systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13237, EN 14373, EN 15089 and the following apply.

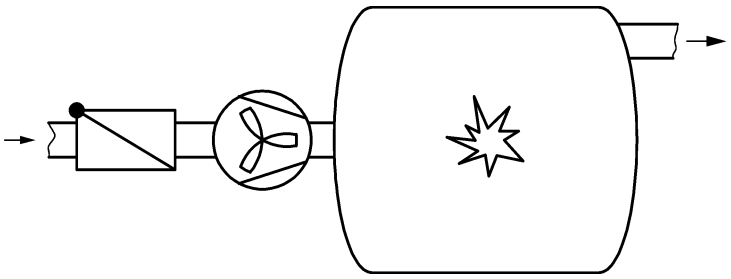
3.1
explosion isolation flap valve
valve containing a flap which is fixed to the housing on an axis perpendicular to the flow direction, kept open by the process flow and able to stop explosions from propagating through pipelines in the direction opposite to the normal process flow through the valve

Note 1 to entry: This definition partially modifies that given in EN 13237.

3.2
explosion source
vessel from which the explosion originates

3.3
push flow situation
situation where the fan is located upstream (with reference to the direction of the normal process flow) of the explosion source

a)



b)

Key

1 fan
2 explosion isolation flap valve
3 vessel

Figure 1 — Push flow situation

3.4
pull flow situation
situation where the fan is located downstream (with reference to the direction of the normal process flow) of the explosion source

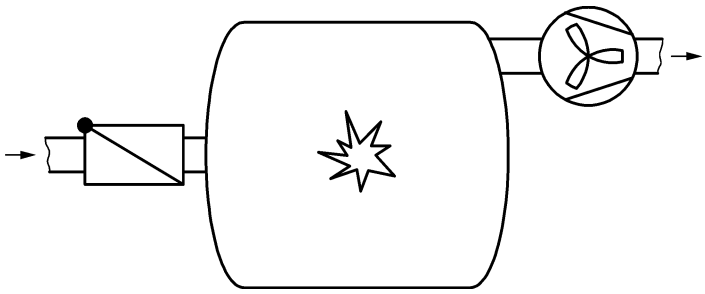


Figure 2 — Pull flow situation

4 Explosion isolation flap valves

4.1 General

An explosion isolation flap valve is a protective system, which prevents a dust explosion from propagating via connecting pipes or ducts into other parts of apparatus or plant areas. It is installed such that the normal process air flow passes in one direction through the valve and keeps it open. It closes when the air flow reverses due to a dust explosion event. The valve shall stay closed long enough to avoid flames from transmitting during an explosion event (see Note 1). Explosion isolation shall also be ensured during periods without process flow.

NOTE 1 Re-opening of the valve is possible e. g. due to pressure oscillations caused by the fan or the venting process.

Explosion isolation flap valves are designed to be connected to ducting. The valve housing is fitted with inlet and outlet connections to connect with the ducting.

NOTE 2 Adapters are often used to connect to an oversize valve.

4.2 Mechanical integrity

Any part of an explosion isolation flap valve shall be constructed such that it can withstand the loads imposed by any explosion that can be expected in accordance with its intended use, without losing its ability to perform its safety function. The construction can be either explosion-pressure resistant or explosion-pressure shock-resistant in accordance with EN 14460.

NOTE The explosion pressure acting on the explosion isolation flap valve may be higher than the (reduced) explosion pressure in the connected vessel as a result of pressure piling and/or flame acceleration through the ducting.

5 Experimental testing of efficacy and mechanical integrity

5.1 General

The testing shall reflect the intended use.

As a minimum the following information is necessary prior to testing:

a) a general type-description;

b) intended use;

1) ambient conditions external to the flap valve and process conditions internal to the flap valve (e. g. temperature range, flow velocity, maximum allowable dust concentrations in the process flow);

2) dust combustion properties, specifically K_{St}, p_{max}, metal dust yes/no, MIE, MIT;

3) explosion protection measure of the connected vessel venting (including type of explosion venting device (re-closing device / non-re-closing device), suppression, explosion pressure resistant construction);

4) smallest and largest volume of the vessel in which the explosion starts ;

5) specific product characteristics (such as sticky material, moisture content, abrasive, corrosive, toxic, tendency for product built-up);

6) installation requirements (push-, pull flow situations; minimum and maximum installation distance; presence of bends/pipe restrictions; inclination);

c) installation and operating instructions;

d) part list;

e) approval drawings, system layout;

f) explosion resistance of the explosion isolation flap valve.

5.2 Test Modules

5.2.1 General

The experimental testing consists of three main modules:

Module A: Explosion resistance testing;

Module B: Flame transmission testing;

Module C: Functional testing.

Explosion isolation flap valves shall in principle be tested according to all three modules but where possible the modules can be combined. If a combination is chosen, the critical test conditions from the various modules shall be covered in the combination. For an untested new explosion isolation flap valve module C shall always be carried out.

5.2.2 Module A: Explosion resistance testing

Explosion resistance shall be confirmed by explosion testing according to the following procedure:

1) Test arrangement:

- The explosion isolation flap valve is mounted to a test vessel according to Figure 3. The explosive atmosphere inside the test vessel and the pipe connecting the valve may be of any type (gas or dust), provided the pressure generated is sufficient to subject the valve to the required pressure. The