National Standards Authority of Ireland

IRISH STANDARD

I.S. EN 13463-6:2005

ICS 13.230

NON-ELECTRICAL EQUIPMENT FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES - PART 6: PROTECTION BY CONTROL OF IGNITION SOURCE 'B'

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http://www.standards.ie

This Irish Standard was published under the authority of the National Standards Authority of Ireland and comes into effect on:
June 22, 2005

Price Code H

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13463-6

April 2005

ICS 13.230

English version

Non-electrical equipment for use in potentially explosive atmospheres - Part 6: Protection by control of ignition source 'b'

Appareils non électriques destinés à être utilisés en atmosphères explosibles - Partie 6: Protection par contrôle de la source d'inflammation 'b'

Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 6: Schutz durch Zündquellenüberwachung 'b'

This European Standard was approved by CEN on 15 March 2005.

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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 Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 13463-6:2005: E

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Foreword

This document (EN 13463-6:2005) 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of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

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 94/9/EC of 23 March 1994.

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

This document is to specify the requirements for the type of protection "Control of ignition sources" for equipment intended for use in potentially explosive atmospheres and should be used in conjunction with EN 13463-1 " Non-electrical equipment for potentially explosive atmospheres – Part 1: Basic method and requirements”.

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

Introduction

Many types of non-electrical equipment intended for use in potentially explosive atmospheres of gas, vapour, mist and/or combustible dust, do not contain an effective ignition source in normal operation. However, there is a risk that an ignition source might arise in such equipment if the moving parts suffer a malfunction or an abnormal operation occurs.

An example of this is a fan, having high speed rotating blades fixed to a shaft, supported on rolling element bearings, inside a stator. In normal operation, no frictional ignition sources should be present. However, because the clearances between the rotor and stator are very small, malfunctions such as the collapse of a shaft bearing, distortion of a rotating blade, build up of foreign material on a rotating blade, etc. could cause the clearance to be reduced and frictional sparking, or hot surfaces, to occur.

To prevent potential ignition sources from becoming effective during normal operation, malfunction and rare malfunction, it is possible to incorporate sensors into the equipment to detect impending dangerous conditions and initiate control measures at an early stage of deterioration before the potential sources are converted into effective sources. The control measures applied, may be initiated automatically, via direct connections between the sensors and the ignition prevention system, or manually, by providing a warning to the equipment operator (With the intention of the operator applying the ignition prevention measures e.g. by stopping the equipment).

In this document, the incorporation of such sensors and their associated automatic/manual ignition prevention measures, to prevent potential ignition sources becoming effective ignition sources, is known as protection by “Control of ignition source ‘b’ ”

This type of ignition protection, and the devices used to achieve it, can take many forms. In practice, they may be mechanical, electrical, optical, visual or a combination of all of these. Although this document deals with the ignition protection of non-electrical equipment, it nevertheless has to take account of the fact that an increasing amount of non-electrical equipment makes use of electrical sensors to detect and initiate the ignition prevention measures. It is therefore impossible to produce a non-electrical equipment protection standard without making reference to the use of electrical sensors and their associated ignition prevention system circuits.

Some examples of mechanical sensor / actuator devices are:

a) fuseable plugs (as used in fluid couplings), that melt to release the energy contained in the power transmission fluid before the temperature of ignition capable parts exceed allowable limits;

b) centrifugal speed governors, that directly control the power throttle and prevent rotating parts attaining frictional ignition capable rotational speeds;

c) thermostatic valves, that close to reduce the input energy, or open to increase the amount of coolant, thereby preventing ignition capable temperatures being attained;

d) pressure relief valves (using springs or weights), that open to limit pressure levels and consequent temperature rise during gas compression. Alternatively, to protect against catastrophic failure leading to the exposure of unintended hot surfaces.

Some examples of combined electro-mechanical sensor / actuator devices are:

e) temperature, flow and level monitoring/control devices, that detect temperature / flow / level and initiate a solenoid valve to reduce the input energy, or increase the amount of coolant,

f) optical pulse counters, that sense abnormal rotational speeds on the teeth of gears and send signals to a speed controller,

g) vibration sensors, that detect abnormal vibration, from e.g. rolling element bearings, before they fail (usually indicated by high frequency vibrations), or rotating parts that are becoming out of dynamic balance (usually indicated by low frequency vibrations),