Maa-aluste kaevanduste plahvatusohtlikus keskkonnas kasutamiseks mõeldud seadmed ja komponendid KONSOLIDEERITUD TEKST

Equipment and components intended for use in potentially explosive atmospheres in underground mines CONSOLIDETED TEXT

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 1710:2005+A1:2008 sisaldab Euroopa standardi EN 1710:2005+A1:2008 ingliskeelset teksti.	This Estonian standard EVS-EN 1710:2005+A1:2008 consists of the English text of the European standard EN 1710:2005+A1:2008.
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English Version

Equipment and components intended for use in potentially explosive atmospheres in underground mines

Appareils et composants destinés à être utilisés dans les mines souterraines grisouteuses

Geräte und Komponenten für den Einsatz in schlagwettergefährdeten Bereichen von untertägigen Bergwerken

This European Standard was approved by CEN on 26 September 2005 and includes Amendment 1 approved by CEN on 18 March 2008.

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Foreword

This European Standard (EN 1710:2005+A1:2008) 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of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

This document includes Amendment 1, approved by CEN on 2008-03-18.

This document supersedes EN 1710:2005.

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

This European Standard 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).

[A1⟩ For relationship with EU Directive(s), see informative Annexes ZA, ZB and ZC which are integral parts of this document. ⟨A1]

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, 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 requirements for the constructional features of equipment and components that may be an individual item or form an assembly, to enable them to be used in mines, or parts of mines, susceptible to explosive atmospheres of firedamp and/or combustible coal dust.

Most of the electrical equipment used on mining machinery is certified as an individual item of equipment e.g. the motor, switchgear etc., and meets its own marking requirements. This Notified Body Certification, however, does not deal with the interconnection of these items of equipment by cables or the machine electrical power system as an entity. In order to comply with 1.6.4 of the Essential Safety Requirements of the ATEX Directive (94/9/EC), the equipment and components including their interconnections should be assessed, from an ignition point of view, by the manufacturer.

Both non-electrical equipment and the interconnection of electrical/non-electrical equipment require an ignition hazard risk assessment to satisfy the Essential Health and Safety requirements of the ATEX Directive and be put in the appropriate declaration of conformity document.

Therefore, it is necessary that not just the equipment, but all its parts, is examined by the manufacturer according to a formally documented hazard assessment that establishes and lists all the possible ignition sources of the equipment including the cables and electrical supply system. The documentation shall list the measures that shall be introduced to prevent possible ignition sources becoming effective.

The need for this European Standard arises because of major operational differences between underground mining operations and those in other industries working with, or in, potentially explosive atmospheres. Examples of these differences are:

— the product being won from the underground strata may be combustible and continually releases firedamp during the winning process;

— the ignitability of the atmosphere around equipment and components usually depends upon the amount of dilution offered by an active ventilating system;

— the atmosphere in the general body of mine air in which machinery is working may change from one that is potentially explosive to one that is explosive (for example, during an outburst of firedamp);

— persons working in the mine are usually situated within the potentially explosive atmosphere;

— there is a need to monitor constantly the mine atmosphere at strategic places to ensure that power can be disconnected from all equipment except that which is suitable for use in an explosive atmosphere;

— in gassy coal mines, an explosion of firedamp at a machine can raise a combustible dust cloud that exacerbates the explosion;

— some mining machinery, especially that associated with winning the product, contains cutting devices and drilling devices that are intended to cut into the combustible product as part of their normal operation. This introduces an ignition risk from frictional heating or frictional sparking from contact with strata containing high concentrations of quartz or iron pyrites;

— long roadways in coal mines are equipped with mineral conveying systems carrying a product that has a potential for raising an explosive dust cloud.

To decide which equipment or its component parts should merit inclusion in this European Standard, ignition data has been examined based on French, German and UK experience.

When drafting this European Standard, it has been assumed that equipment and components are:

— designed in accordance with good engineering practice, taking account of expected shocks, vibrations and failure modes;

— of sound mechanical and electrical construction;

— made of materials with adequate strength and of suitable quality;

— free from defects and

— are kept in good repair and working order, e.g. so that the required dimensions remain within permissible tolerance despite wear.

1 Scope

This European Standard specifies the explosion protection requirements for the construction and marking of equipment that may be an individual item or form an assembly. This includes machinery and components placed on the market by a single supplier for use in mines susceptible to explosive atmospheres of firedamp and/or combustible dust (at atmospheric conditions as defined in EN 1127-2).

NOTE 1 This European Standard deals only with the ignition protection of mining machinery and manufacturers will need to take account of all other relevant EU Directives relating to the construction of machines e.g. the consolidated Machinery Directive 98/37/EC ▌A1⟩ and Directive 2006/42/EC ⟨A1▐. Additionally, manufacturers will need to take account of any national legislation in the country where they intend to market their equipment.

NOTE 2 Where the flammable gas in the atmosphere is not predominantly methane, reference will need to be made to 4.1 in either EN 60079-0:2004 or EN 13463-1:2001.

NOTE 3 The definition of ‘equipment’ is contained in EN 13463-1. The definition of ‘assembly’ can be found the ATEX guidelines, published by the European Commission.

Equipment complying with the relevant clauses of this European Standard is considered to meet the requirements for equipment of Group I - Category M2.

This European Standard also deals with the prevention of ignitions of explosive atmospheres caused by burning (or smouldering) of combustible material such as fabric fibres, plastic ”O”-rings, rubber seals, lubricating oils or greases used in the construction of the equipment if such items could be an ignition source. For example, the mechanical failure of rotating shaft bearings can result in frictional heating that ignites its plastic cage, plastic seal or lubricating grease. See also 5.2.4 of EN 13463-1:2001.

NOTE 4 The above clause of EN 13463-1 requires the ignition hazard assessment to include those components which, if they failed, could ignite any flammable substance (e.g. lubricating oil) contained within the equipment and which could consequently become, or create, an ignition source. In the case of coal mining equipment and components, the ignition temperature of the mineral oils or greases used is often below that of firedamp, i.e. below 560 °C.

2 Normative references

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

EN 982, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics.*

EN 983, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics.*

EN 1127-1:1997, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology.*

EN 1127-2:2002, *Explosive atmospheres — Explosion prevention and protection — Part 2: Basic concepts and methodology for mining.*

EN 1554, *Conveyor belts — Drum friction testing*.

EN 1676, *Aluminium and aluminium alloys — Alloyed ingots for remelting — Specifications.*

EN 1834-2:2000, *Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 2: Group I engines for use in underground workings susceptible to firedamp and/or combustible dust.*

EN 1889-1:2003, *Machines for underground mines — Mobile machines working underground — Safety — Part 1: Rubber tyred vehicles.*

EN 12163, *Copper and copper alloys — Rod for general purposes.*

EN 13463-1:2001, *Non-electrical equipment for potentially explosive atmospheres — Part 1: Basic method and requirements.*

EN 13463-5:2003, *Non-electrical equipment for potentially explosive atmospheres — Part 5: Protection by constructional safety.*

EN 13478, *Safety of machinery — Fire prevention and protection.*

EN 50303:2000, *Group I, category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust.*

EN 60079-0:2004, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements (IEC 60079-0:2004).*

EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997).*

EN 60204-11:2000, *Safety of machinery — Electrical equipment of machines — Part 11: Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV (IEC 60204-11:2000).*

EN 60332-1-1, *Tests on electric and optical fibre cables under fire conditions — Part 1-1: Test for vertical flame propagation for a single insulated wire or cable — Apparatus (IEC 60332-1-1:2004).*

EN 60332-1-2, *Tests on electric and optical fibre cables under fire conditions — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable — Procedure for 1 kW pre-mixed flame (IEC 60332-1-2:2004).*

EN 60332-1-3, *Tests on electric and optical fibre cables under fire conditions — Part 1-3 Test for vertical flame propagation for a single insulated wire or cable — Procedure for determination of flaming droplets/particles (IEC 60332-1-3:2004).*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989).*

EN ISO 340, *Conveyor belts — Laboratory scale flammability characteristics — Requirements and test method (ISO 340:2004).*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003).*

ISO 1940-1:2003, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances.*

ISO 4952, *Structural steels with improved atmospheric corrosion resistance.*

ISO 7010:2003, *Graphical symbols — Safety signs in workplaces and public areas.*

3 Terms and definitions

For the purposes of this European Standard, the definitions in EN 1127-1:1997, EN 1127-2:2002, EN 60079-0:2004, EN 50303:2000 and EN 13463-1:2001 apply.

4 Requirements for equipment (machines) and components

4.1 General

All electrical and non-electrical equipment and components for use in a potentially explosive atmosphere shall be designed and constructed to good engineering practice and in conformity with requirements of group I category M2 equipment to ensure that ignition sources do not occur.

To specify the category of the equipment, it shall be subject to an ignition hazard assessment in accordance with 5.2 of EN 13463-1:2001 for non-electrical and EN 60079-0 for electrical equipment.

NOTE 1 Where necessary, to determine any local conditions of use that affect the ignition hazard assessment, negotiations may need to take place between the manufacturer or authorized representative, purchaser and/or user.

NOTE 2 Examples of the ignition hazard assessment for various types of mining machinery have been included in the informative Annexes A and B. These are based on specific machines, but are not definitive and can contain alternatives. Manufacturers are required to carry out an ignition hazard assessment for each individual machine and determine the most appropriate measures to prevent those ignition sources becoming effective.

In particular, the following requirements described in EN 60079-0 and EN 13463-1 apply to all machines and shall be taken into account:

— the need to restrict the maximum surface temperature;

— the need to meet the electrostatic requirements;

— the need to restrict the use of exposed light metals;

— the need to perform tests on non-metallic parts on which the ignition protection depends to ensure they will not deteriorate in the conditions of use in mines and cause the protection to be lost (see also clause 6).

NOTE 3 To meet the requirements for maximum surface temperature, the assessment needs to be made at the maximum duty cycle that the equipment is subject to in operation. This can be based on a combination of direct measurement of the equipment under test, calculation or previous experience.

Equipment may be prevented from exceeding the maximum surface temperature by one, or a combination of, the following measures:

— continuous rating of the equipment so that it can easily cope with the maximum duty cycle;

— a suitable short-time rating of the equipment;

— additional cooling systems;