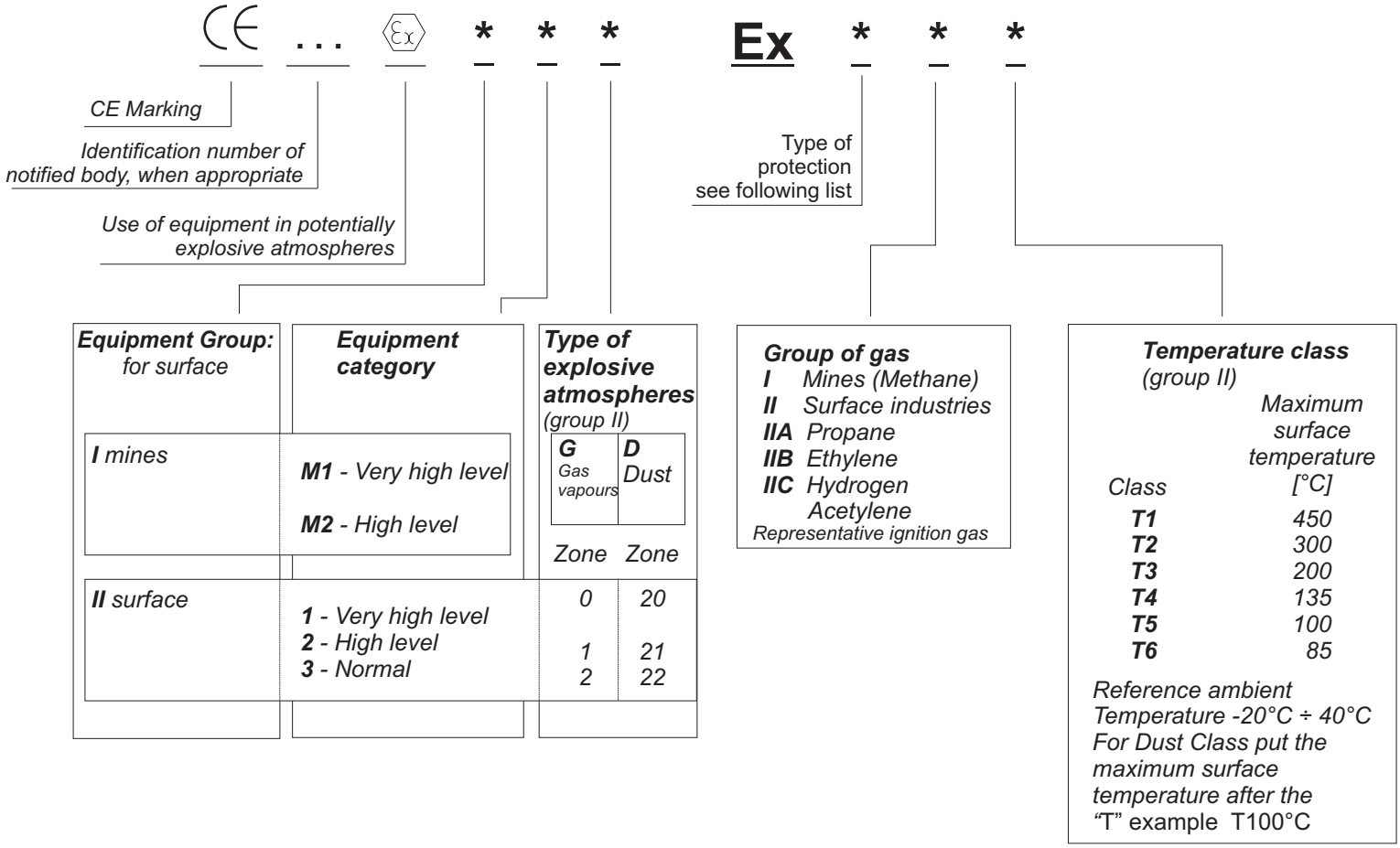
# ATEX GUIDE

**European ATEX Directive 94/9/CE**

*Electrical and non-electrical equipment and protection systems*




## CATEGORY OF EQUIPMENT

***Equipment of mines - Group I***
***Category M1***
*Level of protection: Very high level*
*2 types of protection or 2 indipendent faults*
***Category M2***
*Level of protection: High level*
*1 type of protection Normal operation*

***Equipment of surface - Group II***
***Category 1***
*Level of protection: Very high level*
*2 types of protection or 2 indipendent faults*
***Category 2***
*Level of protection: High level*
*Common frequent malfunction*
***Category 3***
*Level of protection: Normal*
*Required level of protection*

## STANDARDS AND TYPE OF PROTECTION

***Electrical equipment for gas (G)***

| | Code | EN Rule | Category |
|---|---|---|---|
| *General requirements* | | 60079-0 | |
| *Oil immersion* | o | 60079-6 | M2-2G |
| *Pressurized apparatus* | p | 60079-2 | M2-2G |
| *Powder filling* | q | 60079-5 | M2-2G |
| *Flameproof enclosure* | d | 60079-1 | M2-2G |
| *Increased safety* | e | 60079-7 | M2-2G |
| *Intrinsic safety* | ia | 60079-11 | M1-1G |
| *Intrinsic safety* | ib | 60079-11 | M2-2G |
| *Encapsulation* | m | 60079-18 | M2-2G |
| *Protection type "n"* | n | 60079-15 | 3G |
| *Category 1G* | | 60079-26 | 1G |
| *Category M* | | 50303 | M1 |

***Electrical equipment for dust (D)***

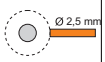
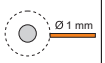
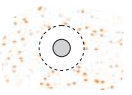
| | | | |
|---|---|---|---|
| Protection by enclosures | Ex tD | EN 61241-1 | 1D |
| Protection by pressure | Ex pD | EN 61241-4 | 2D |
| Protection by intrinsic safety | Ex iD | EN 61241-11 | 1D |
| Protection by encapsulation | Ex mD | EN 61241-18 | 1D |

# CLASSIFICAZIONE DEI GAS E VAPORI INFIAMMABILI
# *INFLAMMABLE GASES AND VAPOURS CLASSIFICATION*

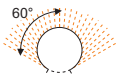
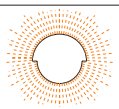
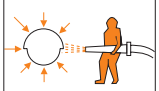
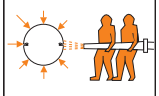
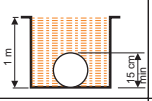
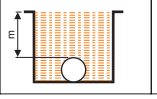
| Gruppo Apparecchiatura *group of container* | I | IIA | IIB | IIC |
|---|---|---|---|---|
| gas o vapore *gas or vapour* | Metano (grisou) *Methane (firedam p)* | Ammoniaca *Ammonia*<br>Metano ind. *Industrial methane*<br>Gas d'altoforno *Blas-furnace gas*<br>Ossido di Carbonio *Carbon monoxide*<br>Propano *Propane*<br>Butano *Butane*<br>Pentano *Pentane*<br>Esano *Esane*<br>Eptano *Eptane*<br>Iso-ottano *Iso-octane*<br>Decano *Decane*<br>Benzene *Benzene*<br>Xilene *Xilene*<br>Cicloesano *Cyclohexane*<br>Acetone *Acetone*<br>Etil-metil-chetone *Ethyl-methyl-ketone*<br>Acetato di metile *Methyl acetate*<br>acetato di etile *Ethyl acetate*<br>Acetato di n-propile *Normal propyl acetate*<br>Acetato di n-butile *Normal butyl acetate*<br>Acetato di amile *Amyl acetate*<br>Cloroetilene *Cloroethylene*<br>Metanolo *Methanol*<br>Etanolo *Ethanol*<br>iso-Butanolo *Iso Butanol*<br>n-Butanolo *Normal Butanol*<br>Alcool amilico *Amyl alcohol*<br>Nitrito di etilene *Ethyl nitrite* | Buta1:3-diene *Buta 1:3-diene*<br>Etilene *Ethylene*<br>Etere dietilico *Diethyl ether*<br>Ossido di etilene *Ethylene oxide*<br>Gas di città (gas illuminante) *Town gas*<br>Gas di forno a coke *Coke-oven gas* | Idrogeno<br>Acetilene<br>*Hydrogen*<br>*Acetylene* |

# GRADO DI PROTEZIONE IP - *INDEX OF PROTECTION*

1 Cifra-*1 st figure*:
protezione contro il contatto di corpi solidi
*protection against solid bodies*

| IP | tests | |
|---|---|---|
| 0 | | Nessuna protezione - *No protection* |
| 1 |  | Protezione contro corpi solidi di dimensioni superiori<br>a 50 mm (dal contatto accidentale con le mani)<br>*Protected against solid bodies larger than 50 mm (eg. : accidental contact with the hand)* |
| 2 |  | Protezione contro corpi solidi di dimensioni superiori a 12,5 mm (dal contatto accidentale con le mani)<br>*Protected against solid bodies larger than 12,5 mm (eg. : accidental contact with the hand)* |
| 3 |  | Protezione contro corpi solidi di dimensioni superiori a 2,5 mm (utensili, cavi)<br>*Protected against solid bodies larger than 2,5 mm (tools, wires)* |
| 4 |  | Protezione contro corpi solidi di dimensioni superiori a 1 mm (piccoli utensili, cavi sottili)<br>*Protected against solid bodies larger than 1 mm (fine tools, small wires)* |
| 5 |  | Protezione contro la polvere (no deposito dannoso)<br>*Protected against dust (no harmful deposit)* |
| 6 |  | Protezione completa dalla polvere<br>*Completely protected against dust* |

2 Cifra - *2 st figure:*
Protezione dalla penetrazione di liquidi
*protection against liquids*

| IP | tests | |
|---|---|---|
| 0 | | Nessuna protezione - *No protection* |
| 1 |  | Protezione dalla caduta verticale di gocce d'acqua (condensa)<br>*Protected against vertically-falling drops of water (condensation)* |
| 2 |  | Protezione dalla caduta di gocce d'acqua inclinazione max 15°<br>*Protected against drops of water falling at up to 15° from the vertical* |
| 3 |  | Protezione dalla caduta di gocce d'acqua inclinazione max 60°<br>*Protected against drops of rainwater at up to 60° from the vertical* |
| 4 |  | Protezione contro gli spruzzi d'acqua provenienti da tutte le direzioni<br>*Protected against projections of water from all directions* |
| 5 |  | Protezione contro getti d'acqua provenienti da tutte le direzioni<br>*Protected against jets of water from all directions* |
| 6 |  | Protezione contro ondate o getti d'acqua potenti<br>*Completely protected against jets of water or similar force to heavy seas* |
| 7 |  | Protezione contro gli effetti dell'immersione<br>*Protected against the effects of immersion* |
| 8 |  | Protezione contro gli effetti della prolungata immersione a condizioni particolari<br>*Protected against effects of prolonged immersion under specified conditions* |

# CENELEC-IEC AND NEC COMPARISON

## International electrotechnical Commission (www.iec.ch)

*The IEC (International Electrotechnical Commission), created in 1904 in Geneva (Switzerland) establish the IEC regulations. In 1947, with the creation of the International Standards Organisation (ISO) by the United Nations, the IEC became responsible for the organisation of the electrical division, while still remaining independant.*
*The IEC has defined three categories of hazardous zones:*
*- Zone 0 : the explosive atmosphere is continuously present.*
*- Zone 1 : the explosive atmosphere is often present.*
*- Zone 2 :the explosive atmosphere may accidentally be present.*

## Gas and vapour classification

*Gases are divided into four groups by the CEC and the NEC (with some additional gases). The IEC also defines different groups of gases and vapours. The IEC and North American groups are viewed as fundamentally the same, apart from the fact that there are three groups in the IEC and four for the NEC. (See table as follows)*

## Temperature classification

*IEC defined a temperature classification for materials used in hazardous areas. Following this, CEC and NEC have also been modified to include a temperature classification. (See table as follows)*

**GAS AND VAPOUR CLASSIFICATION**

| Group | | Group or vapour |
|---|---|---|
| IEC | NEC (North America) | |
| II C | A | Acetylene |
| II C | B | Hydrogen |
| II B | C | Ethylene |
| II B | C | Ethyl9 ether |
| II B | C | Cyclopropane |
| II B | C | Butadene 1-3 |
| II A | D | Propane |
| II A | D | Ethane |
| II A | D | Butane |
| II A | D | Benzène |
| II A | D | Pentane |
| II A | D | Heptane |
| II A | D | Acetone |
| II A | D | Methyl Ethyl |
| II A | D | Methyl Alcohol |
| II A | D | Ethyl Alcohol |

**TEMPERATURE CLASSIFICATION**

| Temperatures IN °C | Classification | |
|---|---|---|
| | IEC | NEC (North America) |
| 450 | T1 | T1 |
| 300 | T2 | T2 |
| 280 | T2 | T2A |
| 260 | T2 | T2B |
| 230 | T2 | T2C |
| 215 | T2 | T2D |
| 200 | T3 | T3 |
| 180 | T3 | T3A |
| 165 | T3 | T3B |
| 160 | T3 | T3C |
| 135 | T4 | T4 |
| 120 | T4 | T4A |
| 100 | T5 | T5 |
| 85 | T6 | T6 |

*Group 1 - underground workin mine*
*Group 2 - surface industry*

# CENELEC-IEC / NEC COMPARISON

| Inflammable Material | CENELEC/IEC | | | | NEC | | |
|---|---|---|---|---|---|---|---|
| | Protection | Zone | Group | Subdivision | Class | Division | Group |
| **Gases and vapours** | | | | | | | |
| Acetylene | d - e | 1,2 | II | C | I | 1 - 2 | A |
| Hydrogen | d - e | 1,2 | II | C | I | 1 - 2 | B |
| Propylene Oxide Ethyl oxide Butadiene | d - e | 1,2 | II | B | I | 1 - 2 | B |
| Cyclopropane Ethyl ether Ethylene | d - e | 1,2 | II | B | I | 1 - 2 | C |
| Acetone Benzene Butane Propane Hexane Paint Solvents Natural Gas | d - e | 1,2 | II | A | I | 1 - 2 | D |
| | Protection | | Zone | | | | |
| ***Combustible dusts*** Magnesium Aluminium or metallic dusts with $R \leq 10^5$ Ohms x cm | D/DIP | | 21-22 | | II | 1 | E |
| Coal | D/DIP | | 21-22 | | II | 1 | F |
| Floor Non metallic dusts with $R > 10^5$ Ohms x cm | D/DIP | | 21-22 | | II | 2 | G |
| ***Fibers and flying*** Rayon Cotton Linen Wood Hemp Flax bast Tow Coconut fiber Oakum | | | | | III | 1-2(1) | |

(1) Division 1: Manufacturing location
Division 2: Storage location