### Marking of electrical equipment for use in potentially explosive atmospheres

#### Conditions and subdivisions

<table>
<thead>
<tr>
<th>Flammable materials</th>
<th>Temporary behavior of explosive atmospheres</th>
<th>Classification of hazardous area</th>
<th>Required marking on the usable operating equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gases, vapours</td>
<td>a) present continually or for long periods or frequently</td>
<td>Zone 0</td>
<td>Ex ia Ex ib Ex ic EN 60079-11</td>
</tr>
<tr>
<td></td>
<td>b) present in the form of a cloud, continuously, or if it does, will persist for a short time only</td>
<td>Zone 1</td>
<td>Ex ia Ex ib Ex ic EN 60079-11</td>
</tr>
<tr>
<td></td>
<td>c) present in the form of a cloud, occasionally, or if it does, will persist for a short time only</td>
<td>Zone 2</td>
<td>Ex ia Ex ib Ex ic EN 60079-11</td>
</tr>
<tr>
<td></td>
<td>d) not likely to develop into a cloud during normal operation, or if it does, for at least three minutes</td>
<td>Zone 21</td>
<td>Ex ia Ex ib Ex ic EN 60079-11</td>
</tr>
</tbody>
</table>

#### Subdivisions of gases and vapours

<table>
<thead>
<tr>
<th>Gases and vapours</th>
<th>Equipment group</th>
<th>Explosion temperature of gases and vapours according to the ignition temperature</th>
<th>Temperature class</th>
<th>Maximum permissible temperature of equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gases, vapours</td>
<td>Gb or Ga</td>
<td>&gt; 200 °C ... &lt; 300 °C</td>
<td>Zone 1</td>
<td>130 °C</td>
</tr>
<tr>
<td></td>
<td>Db or Da</td>
<td>&gt; 300 °C ... &lt; 450 °C</td>
<td>Zone 2</td>
<td>130 °C</td>
</tr>
<tr>
<td></td>
<td>Db or Da</td>
<td>&gt; 450 °C</td>
<td>Zone 22</td>
<td>130 °C</td>
</tr>
</tbody>
</table>

#### Applications

- **Gas**
  - switchgear, power electronics
  - control stations, motors, fuses, connection systems
  - solenoid valves, motors, analyzers, computers
  - measurement and control technology, automation technology, sensors, actuators

- **Dust**
  - optical fibres, fibre-optic cables
  - gases, vapours (G) and dusts (D) in atmospheres
  - gases, vapours (G) and dusts (D) in atmospheres where there is a risk of explosion

#### Protection principles/types of protection

- general requirements
- protection by enclosure
- protection by encapsulation
- protection by pressurization
- protection by interlocking

#### Use of the operating equipment

- without operating equipment can be used without restriction
- X: special conditions of use
- D: operating equipment with gases containing CO, CO₂, CH₄, CH₃OH is certified when it is installed into a complete line of operating apparatus

#### Classification of dust

- Zone 22: dusts that have a density of at least 1 kg/m³
- Zone 21: dusts that have a density of at least 0.1 kg/m³

#### Groups of dust

- Zone 20: dusts that have a density of at least 0.01 kg/m³

#### Temperature classes of equipment

- Zone 1: 200 °C ≤ T ≤ 300 °C
- Zone 2: 300 °C ≤ T ≤ 450 °C
- Zone 22: T > 450 °C

#### Equipment protection level

- I: very high level of protection
- II: high level of protection
- III: enhanced level of protection

#### Equipment group

- IIA, IIB, IIC

#### Equipment protection concept

- Flameproof enclosure
- Encapsulation
- Pressurization
- Intrinsic safety

#### Equipment markings

- Ex db eb IIC T6 Gb NB³ 16 ATEX 1234 X
- Ex tb IIIC T120 °C Db NB³ 16 ATEX 1234 X

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1) Bar-Code: identification number
2) a = very high level of protection
3) b = high level of protection
4) c = enhanced level of protection
5) ATEX = ATEX Directive 2014/34/EU