

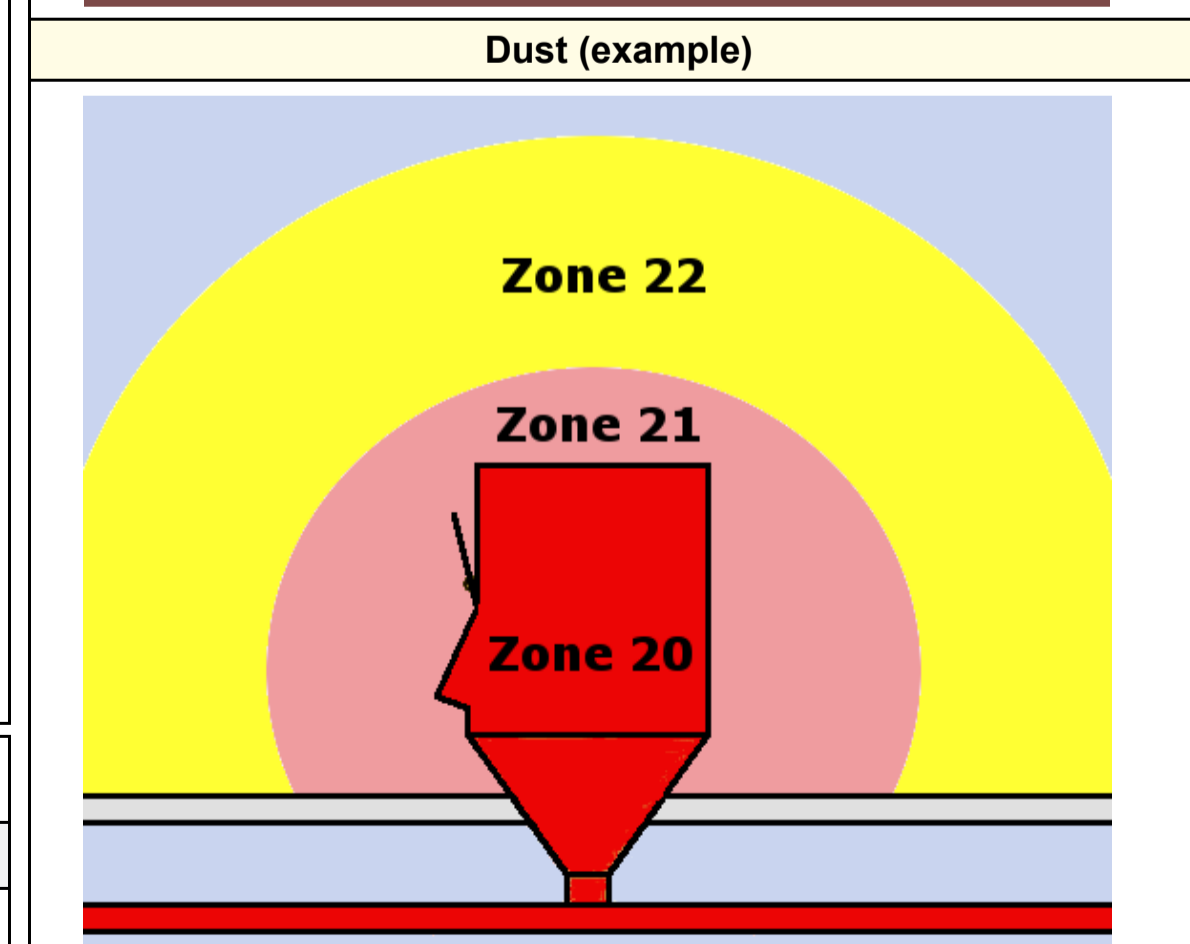
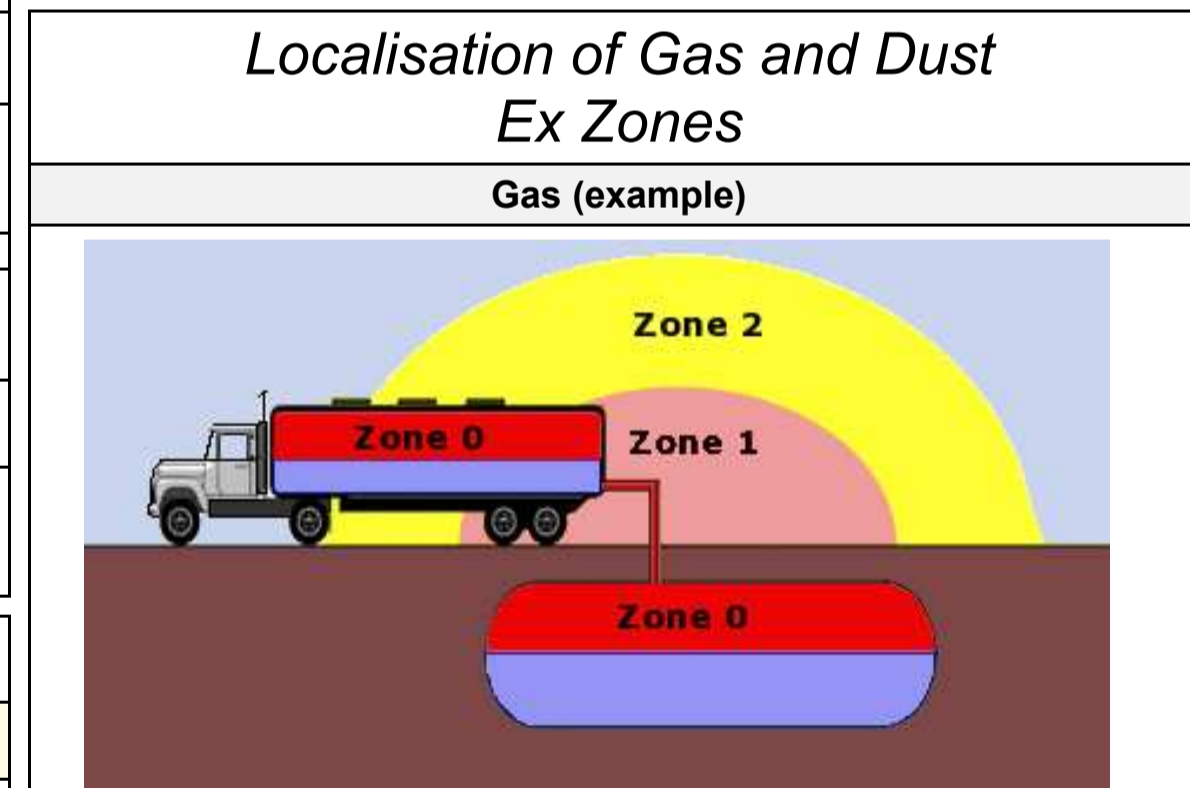
Explosion Protection - Markings

| 94/9/EC (ATEX) Markings | | | | Typical IEC/CENELEC Product Markings | | | |
|---|--|--|--|---|--|--|--|
| ATEX Required Markings | | | | Gas | | Dust | |
| Ex II 2 G / D | | | | Ex de IIC T6 Gb¹⁾ | | Ex tb IIIC T80°C Db¹⁾ IPXX | |
| Explosion Protection Marking | | | | Explosion Protection Marking | | | |
| Equipment Group | | | | Equipment Group | | | |
| Equipment Category | | | | Equipment Category | | | |
| Explosive Atmosphere Suitability (G - Gas, vapor or mist) | | | | Explosive Atmosphere Suitability (G - Gas, vapor or mist) | | | |
| Explosive Atmosphere Suitability (D - Dust) | | | | Explosive Atmosphere Suitability (D - Dust) | | | |
| Explosion Marking | | | | Explosion Marking | | | |
| Typ of protection (Gas) | | | | Typ of protection (Gas) | | | |
| Explosion Group (Gas) | | | | Explosion Group (Gas) | | | |
| Temperature Class (Gas) | | | | Temperature Class (Gas) | | | |
| Equipment Protection Level (EPL-Gas) | | | | Equipment Protection Level (EPL-Gas) | | | |
| Explosion Protection Marking | | | | Explosion Protection Marking | | | |
| Typ of protection (Dust) | | | | Typ of protection (Dust) | | | |
| Explosion Group (Dust) | | | | Explosion Group (Dust) | | | |
| Max. Surface Temperature (Dust) | | | | Max. Surface Temperature (Dust) | | | |
| Equipment Protection Level (EPL-Dust) | | | | Equipment Protection Level (EPL-Dust) | | | |
| IP Protection Level | | | | IP Protection Level | | | |

| Method of Explosion Protection | | | | | | | |
|--|--|--|--|------------------------|-----------------------------|----------------------------------|---|
| Type of Protection / Description of Protection | | | Protection Concept | Zone | Norm | | Applications |
| in potentially explosive gas atmospheres | | | | | EN | Category / EPL | |
| o | Oil Immersion | | Exclusion of Ex-atmosphere and the surface temperature | 1 or 2 | EN 60079-6 | 2 G / Gb | Transformers, relays, control stations, magnetic contactors |
| q | Powder Filling | | Prevent the flame propagation and the surface temperature | 1 or 2 | EN 60079-5 | 2 G / Gb | Capacitors, transformers, relays |
| ma mb mc | Encapsulation | | Exclusion of Ex-atmosphere and the surface temperature | 0, 1, 2 1 or 2 2 | EN 60079-18 | 1 G / Ga 2 G / Gb 3 G / Gc | Coils of motors or relays, solenoid valves, connection systems |
| px py pz | Pressurized Enclosure | | Exclusion of Ex-atmosphere and the surface temperature | 1 or 2 1 or 2 2 | EN 60079-2 | 2 G / Gb 2 G / Gb 3 G / Gc | Switch and control stations, motors, analyzers, computers |
| d | Flameproof Enclosure | | Contain the explosion, prevent the flame propagation and the surface temperature | 1 or 2 | EN 60079-1 | 2 G / Gb 3 G / Gc | Control stations, motors, fuses, switchgear, power electronics |
| e | Increased Safety | | No arcs, sparks or hot Surfaces | 1 or 2 | EN 60079-7 | 2 G / Gb 3 G / Gc | Junction and connection boxes, enclosures, motors, lights, terminals |
| ia ib ic | Intrinsically Safety Intrinsically Safety Intrinsically Safety | | Limit the energy of the spark and the surface temperature | 0, 1, 2 1 or 2 2 | EN 60079-11 EN 60079-25* | 1 G / Ga 2 G / Gb 3 G / Gc | Measurement and control technology, automation technology, sensors, actuators |
| nA | Non-Sparking | | No arcs, sparks or hot surfaces | 2 | EN 60079-15 | 3 G / Gc | all applications for zone 2 |
| nC | Enclosed Break | | Prevent the flame propagation | | | | |
| nR | Restricted Breathing | | Protection by enclosure | | | | |
| op is | Optical Radiation | | Limit or prevent energy transmission from optical radiation | 0, 1, 2 | EN 60079-28 | 1 G, 2 G, 3 G / Ga, Gb, Gc | Opto-electronic devices |
| op pr op sh | Optical Radiation | | 1 or 2 | EN 60079-28 | 2 G, 3 G / Gb, Gc | | |

| Zone Classification / Equipment Protection Level | | | | | | | |
|--|---|---------------------|-----------------|----------|------------------|--------------------------------|------------------|
| Hazardous mixture | Period of precense of the flammable substances | Zone Classification | Equipment Group | Category | Protection Group | Equipment Protection Level EPL | Protection Level |
| Gas Mist Vapor | Continuously for long periods or frequently | Zone 0 | II | 1 G | II | Ga | very high |
| | Occasional occurrence | Zone 1 | II | 2 G | II | Gb | high |
| | Not likely, but if it does occur only rarely and for a short period | Zone 2 | II | 3 G | II | Gc | increased |
| Dust | Period of precense of the flammable substances | Zone 20 | II | 1 D | III | Da | very high |
| | Occasional occurrence | Zone 21 | II | 2 D | III | Db | high |
| | Not likely, but if it does occur only rarely and for a short period | Zone 22 | II | 3 D | III | Dc | increased |

| Additional marking | |
|--------------------|--|
| Marking | Conditions |
| without | device can be used without restriction |
| X | special conditions for safe use |
| U | Ex component with partial certificate cannot be used alone |



| Gas Groups | | |
|------------|----------|-----------------|
| Marking | Gas | Ignition energy |
| IIA | Propane | > 180 µJ |
| IIB | Ethylene | 60 ... 180 µJ |
| IIC | Hydrogen | >40 µJ |

| Ignition temperature / Temperature Class of gas | | |
|---|--------------------|--|
| Ignition temperature of gas | Explosion Group II | |
| ammonia | 630°C | |
| methane | 595°C | |
| hydrogen | 560°C | |
| propane | 470°C | |
| ethylene | 425°C | |
| butane | 365°C | |
| acetylene | 305°C | |
| cyclohexane | 259°C | |
| diethyl ether | 170°C | |
| carbon disulphide | 95°C | |

| Dust Groups | |
|-------------|---------------------|
| Marking | Dusts |
| IIIA | Combustible flyings |
| IIIB | Non-conductive dust |
| IIIC | Conductive dust |

| Dust ignition temperature | |
|---|---|
| Permissible temperature of the dust layer | $T_{perm. layer} = T_{5 mm layer} - 75 K$ |
| Permissible temperature of the dust cloud | $T_{perm. cloud} = 2/3 T_{cloud}$ |
| Maximum permissible surface temperature of the device | $T_{perm. layer} > T_{perm.} < T_{perm. cloud}$ |

| Dust ingress protection | | | |
|-------------------------|------|------|------|
| Geräte der Gruppe | | | |
| Protection Level | IIIC | IIIB | IIIA |
| „ta“ | IP6X | IP6X | IP6X |
| „tb“ | IP6X | IP6X | IP5X |
| „tc“ | IP6X | IP5X | IP5X |

Exepd Exepd GmbH
 i_Park Tauberfranken 23
 97922 Lauda Königshofen
 Tel: +49 (0) 9343 627055-0
 Fax: +49 (0) 9343 627055-99
 Mail: info@exepd.de
 Web: www.exepd.de

| Method of Explosion Protection | | | | | | | |
|--|-------------------------|--|---|------------------------------|-------------|----------------------------------|---|
| Type of Protection / Description of Protection | | | Protection Concept | Zone | Norm | | Applications |
| in potentially explosive gas atmospheres | | | | | EN | Category / EPL | |
| ta tb tc | Protection by enclosure | | Keep the combustible dust out and the surface temperature | 20, 21, 22 | EN 60079-31 | 1 D / Da 2 D / Db 3 D / Dc | Junction and connection boxes, enclosures, motors, lights, switch and control cabinets, plugs |
| ia ib ic | Intrinsically Safety | | Limit the energy of the spark and the surface temperature | 20, 21, 22 21 or 22 | EN 60079-11 | 1 D / Da 2 D / Db 3 D / Dc | Measurement and control technology, automation technology, sensors, actuators |
| pD | Pressurized | | Exclusion of Ex-atmosphere and the surface temperature | 22 | EN 61241-4 | 2 D / Db 3 D / Dc | Switch and control stations, motors, analyzers, computers |
| ma mb mc | Encapsulation | | Exclusion of Ex-atmosphere and the surface temperature | 20, 21, 22 21 or 22 22 | EN 60079-18 | 1 D / Da 2 D / Db 3 D / Dc | Coils of motors or relays, solenoid valves, connection systems |

1) Standard marking - alternate marking possible e.g.: Ex db eb IIC T6 / Ex tb IIIC T80°C IPXX

* Intrinsically safe systems