

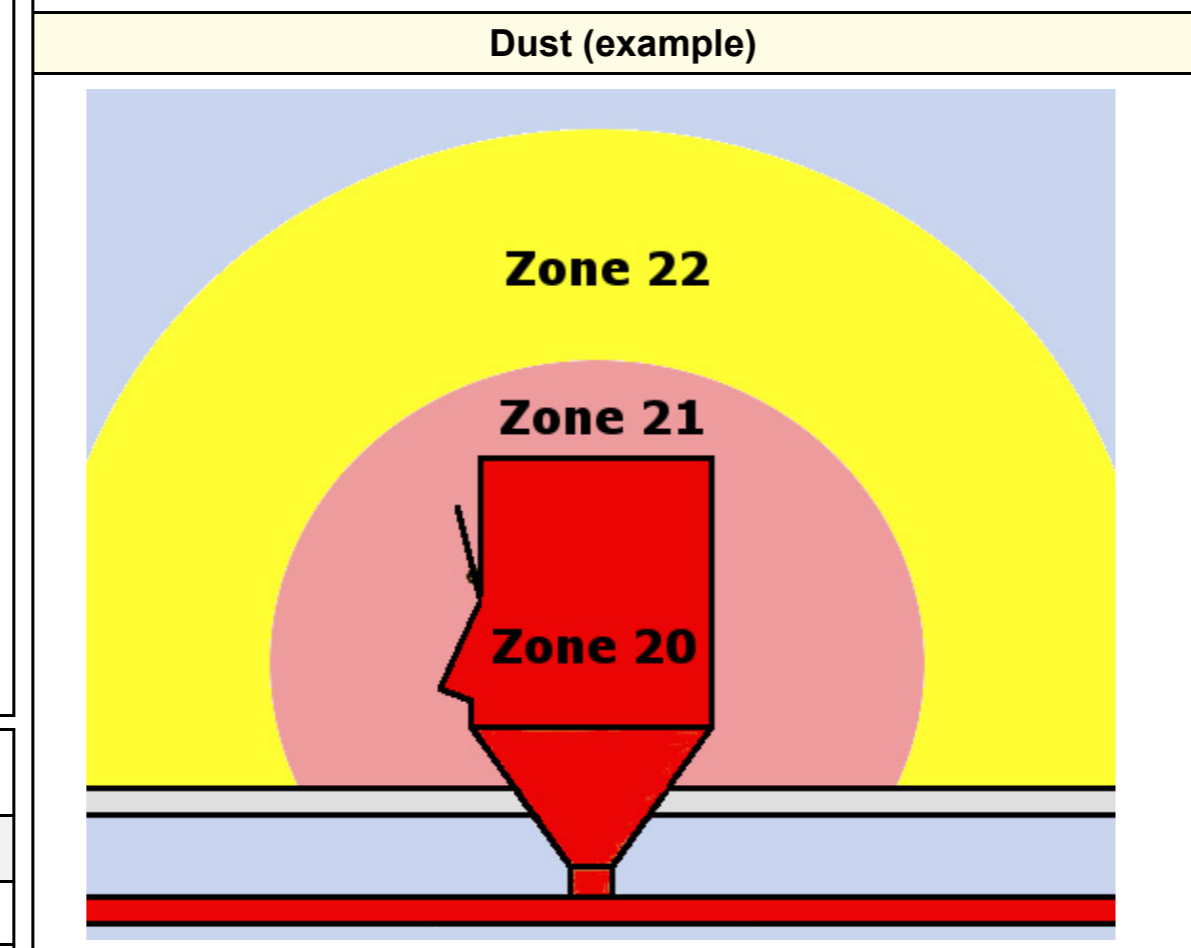
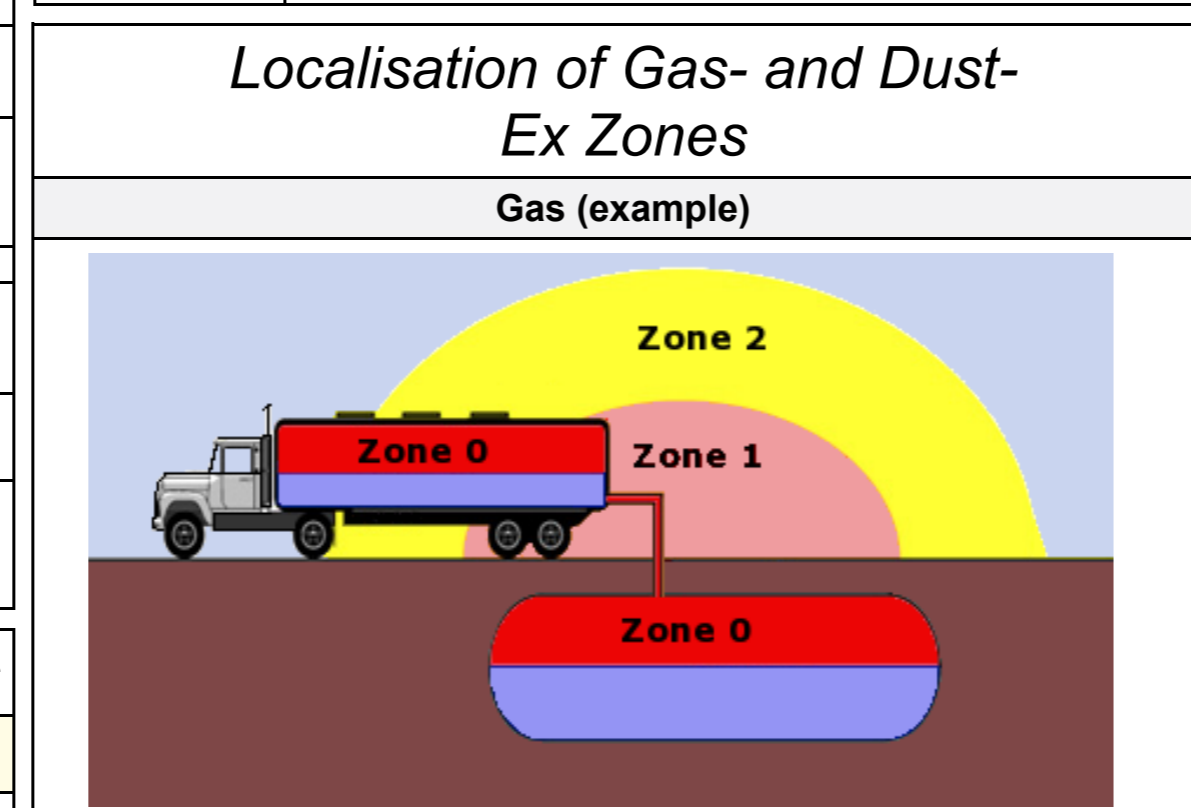
Explosion Protection - Markings

94/9/EC (ATEX) Markings		Typical IEC/CENELEC Product Markings	
ATEX Required Markings		Gas	Dust
	II 2 G / D	Ex de IIC T6 Gb ¹⁾	Ex tb IIIC T80°C Db ¹⁾ IPXX
Explosion Protection Marking			
Equipment Group			
Equipment Category			
Explosive Atmosphere Suitability (G - Gas, vapor or mist)			
Explosive Atmosphere Suitability (D - Dust)			
Explosion Protection Marking			
Type of protection (Gas)			
Explosion Group (Gas)			
Temperature Class (Gas)			
Equipment Protection Level (EPL-Gas)			
Explosion Protection Marking			
Type of protection (Dust)			
Explosion Group (Dust)			
Max. Surface Temperature (Dust)			
Equipment Protection Level (EPL-Dust)			
IP Protection Level			

Method of Explosion Protection							
Type of Protection / Description of Protection in potentially explosive gas atmospheres	Protection Concept	Zone	Norm		Applications		
			EN	Category / EPL			
o Oil Immersion		Exclusion of Ex-atmosphere and surface temperature limitation	1 or 2	EN 60079-6	2 G / Gb 3 G / Gc	Transformers, relays, control stations, magnetic contactors	
q Powder Filling		Prevent the flame propagation and surface temperature limitation	1 or 2	EN 60079-5	2 G / Gb 3 G / Gc	Capacitors, transformers, relays	
ma mb mc Encapsulation		Exclusion of Ex-atmosphere and surface temperature limitation	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 surface temperature limitation	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 surface temperature limitation	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 surface temperature limitation	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 presence of the flammable substances	Zone Classification	Equipment Group	Equipment Category	Explosion 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	Continuously for long periods or frequently	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
IIB	Non-conductive dust
IIC	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	IIC	IIB	IIIA
„ta“	IP6X	IP6X	IP6X
„tb“	IP6X	IP6X	IP5X
„tc“	IP6X	IP5X	IP5X

Exepd Exepd GmbH
 i. Park Tauberfranken 23
 97922 Lauda Königshofen
 Germany
 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 in potentially explosive dust atmospheres	Protection Concept	Zone	Norm		Applications		
			EN	Category / EPL			
ta tb tc Protection by enclosure		Keep the combustible dust out and surface temperature limitation	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 surface temperature limitation	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 surface temperature limitation	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 surface temperature limitation	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