Definition of the ATEX Zone

ATEX

Which ATEX zones exist?

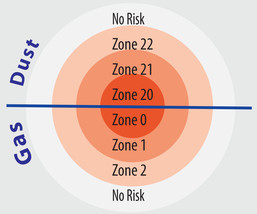
Risk of explosion caused by GAS: Zone 0, 1 and 2

Risk of explosion caused by DUST: Zone 20, 21 and 22

How does a Company know which ATEX zones exist in each area of their business?

Each company has to estimate the risk within its plant. This is the task for the authorized safety manager. His role is to analyse all of the production processes and classify the zones according to their risk potential and record this in an explosion document.

The authorized safety manager classifies the zones according to their risk potential.



Definition of the ATEX zones for Gas and Dust			
Zones			
Gas	Dust	Definition	Risk potential
0	20	Areas where a potentially explosive atmosphere comprising dust/air mixture is present **continuously**, over extended periods, or frequently.	**Continuously**
1	21	Areas where it is expected that a hazardous potentially explosive atmosphere comprising dust/air mixtures will occur **occasionally and for short periods**.	**Occasionally**
2	22	Areas where it is not expected that a potentially explosive atmosphere will occur. If this does occur, then in all probability only **rarely and for a short period**.	**Rarely**

Ignition Protections

The norm EN 60079-01 describes the kind of ignition protection and how a device must be protected.

Ignition protection Gas / Dust		
Degree of protection	ATEX Code	Norm
General requirements	-	EN 60079-0
Pressure proof encapsulation	Ex d	EN 60079-1
Increased safety	Ex e	EN 60079-7
Oil encapsulation	Ex o	EN 60079-6
Overpressure encapsulation	Ex p	EN 60079-2
Sand encapsulation	Ex q	EN 60079-5
Casting encapsulation	Ex mb	EN 60079-18
Non sparking	Ex n	EN 60079-15
Intrinsic safety. The intrinsically safety electric circuits are not able to cause an ignition when there is a failure (ib) or two failures (ia)	Ex ia	EN 60079-11
Protection by housing	Ex td	EN 60079-31

The RECHNER Sensors, ATEX product range, includes sensors of the protection class casting encapsulation (mb), protection by housing (td) and intrinsic safety (ia).

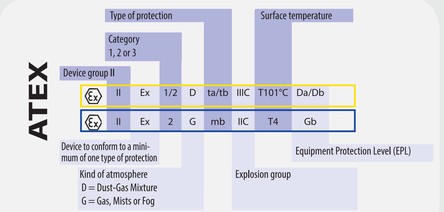
Product Marking

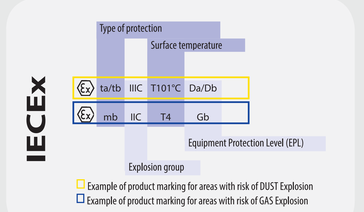
Permitted units have the following marking:

The Ex mark

The CE marking and the number of the notifying body (0158 = DEKRA EXAM GmbH) for products that conform to the norm for free trading within the EU. Definition of the application range. This information must be permanently fixed and durable on the unit (e.g. with laser marking).

IEC IECEx





Capacitive Sensors

Gas Zone 0, 1 and 2

Zone 0 and 1

❶ = KAS-40-... Capacitive NAMUR Sensor.

The Ex Barrier is placed outside of the danger area.

❷ = KAS-40-....

Here the active area of the sensor can be in zone 0 or 1

and the cable exit side can be in Zone 2.

The Ex Barrier is placed outside of the danger area.

Zone 1 / 2

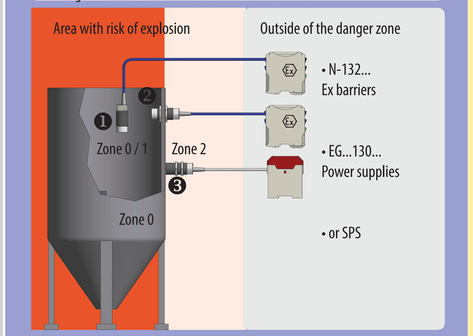
❷ = KAS-70-...StEx, KAS-80...-StEx (= All-in-One Sensor)

The active area of the sensor is in zone 1 and the cable exit side in zone 2. The power supply is outside of the danger zone.

Zone 2

❸= KAS-70-...-3G, KAS-80-...-3G , with manufacturer declaration.

The level is detected through the non-metal container wall or sight window. The sensor is mounted in zone 2



Dust Zone 20, 21 and 22

Zone 20

❶ = KAS-40-...StEx Capacitive NAMUR Sensor.

Zone 20 / 21

❷ = KAS-70-...StEx, KAS-80...-StEx (= All-in-One Sensor)

The active surface of the sensor in Zone 20 and the cable exit side in Zone 21.

Zone 21

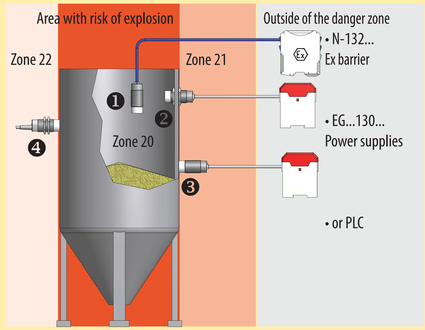
❸ = KAS-70-...StEx, KAS-80...-StEx

Level measurement through the container wall or a non-metal sight window. The sensor is in zone 21.

Zone 22

❹ = KAS-70-...-3D, KAS-80-...-3D with manufacturer declaration.

The level is detected via a non-metal container wall or sight window. The sensor is mounted in Zone 22.



Capacitive Level Measuring Systems

Gas Zone 0, 1 and 2

Zone 1 / 2

❶ = KFX-5-1-...PTFE/VA-G1"-StEx, binary, 1 switching point

The active area of the probe is in zone 1.

The connection head is in zone 2.

Zone 1 / 2

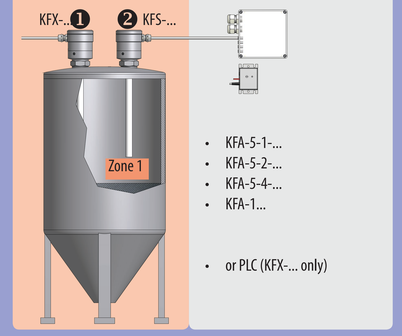
❷ = KFS-5-1-...PTFE/VA-G1"-StEx , binary 1 switching point

KFS-1-...PTFE/VA-G1"-StEx, analog

The active area of the probe is in zone 1.

The connection head is in Zone 2.

The matching evaluation electronics KFA-5-1 or KFA-1-... is outside of the area with risk of explosion.



Dust Zone 20, 21 and 22

Zone 20 /21

❶ = KFX-5-1-...PTFE/VA-G1"-StEx, binary, 1 switching point

The active area of the probe is in zone 20 .

The connection head is in zone 21 or 22.

Zone 20 /21

❷ = KFS-5-1-...-PTFE/VA-G1"-StEx - binary, 1 switching point

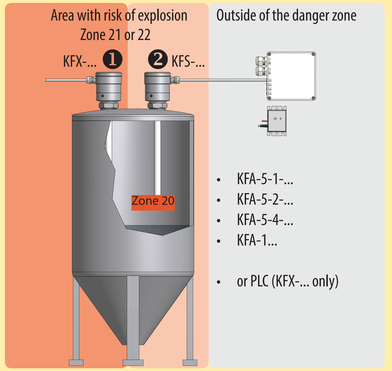
KFS-5-2-...-PTFE/VA-G1"-StEx - binär, 2 switching points

KFS-1-...-PTFE/VA-G1"-StEx - analogue measuring area

The active area of the probe is in zone 20.

The connection head is in zone 21 or 22.

The matching evaluation electronics KFA-5-... is placed outside of the area with risk of explosion.



Explosion Group

The explosion groups are devided into:

I Device or protective system in areas with danger of firedamp, e. g. Mines.
(RECHNER Sensors do not have sensors for this group)

Device Group	Category (Mines)	Typical substances
I	M1	Methane and dust
I	M2	Methane and dust

II Device or protective system in areas with danger of explosion Gas

Gas Group	Typical gases are
IIA	Propane
IIB	Ethylene
IIC	Hydrogene

III Device or protection system in areas with danger of explosion Dust

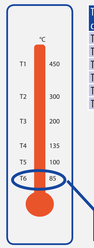
Dust Group	Typically these are
IIIA	Combustible fluff
IIIB	Non-conductive dust
IIIC	Conductive dust

Device Category

Device Category	Equipment protection Level (EPL)	Typical zone classification
1G	Ga	Equipment suitable for zone 0, 1, 2
1D	Da	Equipment suitable for zone 20, 21, 22
2G	Gb	Equipment suitable for zone1, 2
2D	Db	Equipment suitable for zone 21, 22
3G	Gc	Equipment suitable for zone 2
3D	Dc	Equipment suitable for zone 22

Temperature Classification

Combustible materials are classified according to their ignition temperature between T1 and T6, where the lowest ignition temperature T6 is the most dangerous.



Temperature classes	Maximum surface temperature of the equipment	Ignition temperature of combustible substances
T1	450 °C	> 450 °C
T2	300 °C	> 300 °C
T3	200 °C	> 200 °C
T4	135 °C	> 135 °C
T5	100 °C	> 100 °C
T6	85 °C	> 85°C

Example of ignition temperature of some materials:

Ignition temperature IEC 50381-2-1	
Cotton	350 °C
Cereals	290 °C
Wood flour	300 °C
Cocoa	460 °C
Carbon Disulfide	95°C
Concentrated feed	295 °C
Starch	290 °C
Tee	300 °C
PVC	380 °C

IP XX

↑ ↑

2. Digit: Protection against liquids

1. Digit: Protection against foreign bodies

IP PROTECTION CLASSES

	1. Digit protection against solids	2. Digit protection against liquids
IP	0 No protection	0 No protection against water
IP	1 Protection against solid foreign bodies Ø > 50 mm	1 Protection against vertical water drops
IP	2 Protection against solid foreign bodies > Ø 12,5 mm	2 Protection against diagonal water drops (up to a 15° angle)
IP	3 Protection against solid foreign bodies > Ø 2,5 mm	3 Protection against spray water
IP	4 Protection against solid foreign bodies > Ø 1 mm	4 Protection against splashing water
IP	5 Protection against harmful dust deposits, dust protected	5 Protection against water jet
IP	6 Protection against contact with voltage-carrying parts. Protection against penetration of dust	6 Protection against strong water jet
		7 Protection against ingress of water when the equipment is immersed in water, up to 1 m depths and for a period of 30 minutes
		8 Protection against ingress of water when the equipment is immersed in water, under conditions determined from the manufacturer.
		9 Protection against ingress of water during high pressure or steam cleaning under defined conditions

RECHNER SENSORS

RECHNER Industrie-Elektronik GmbH
Gaußstraße 6 - 10 • 68623 Lampertheim • Germany
info@rechner-sensors.de • www.rechner-sensors.com
T: +49 (0) 6206 5007-0 • F: +49 6206 5007-20