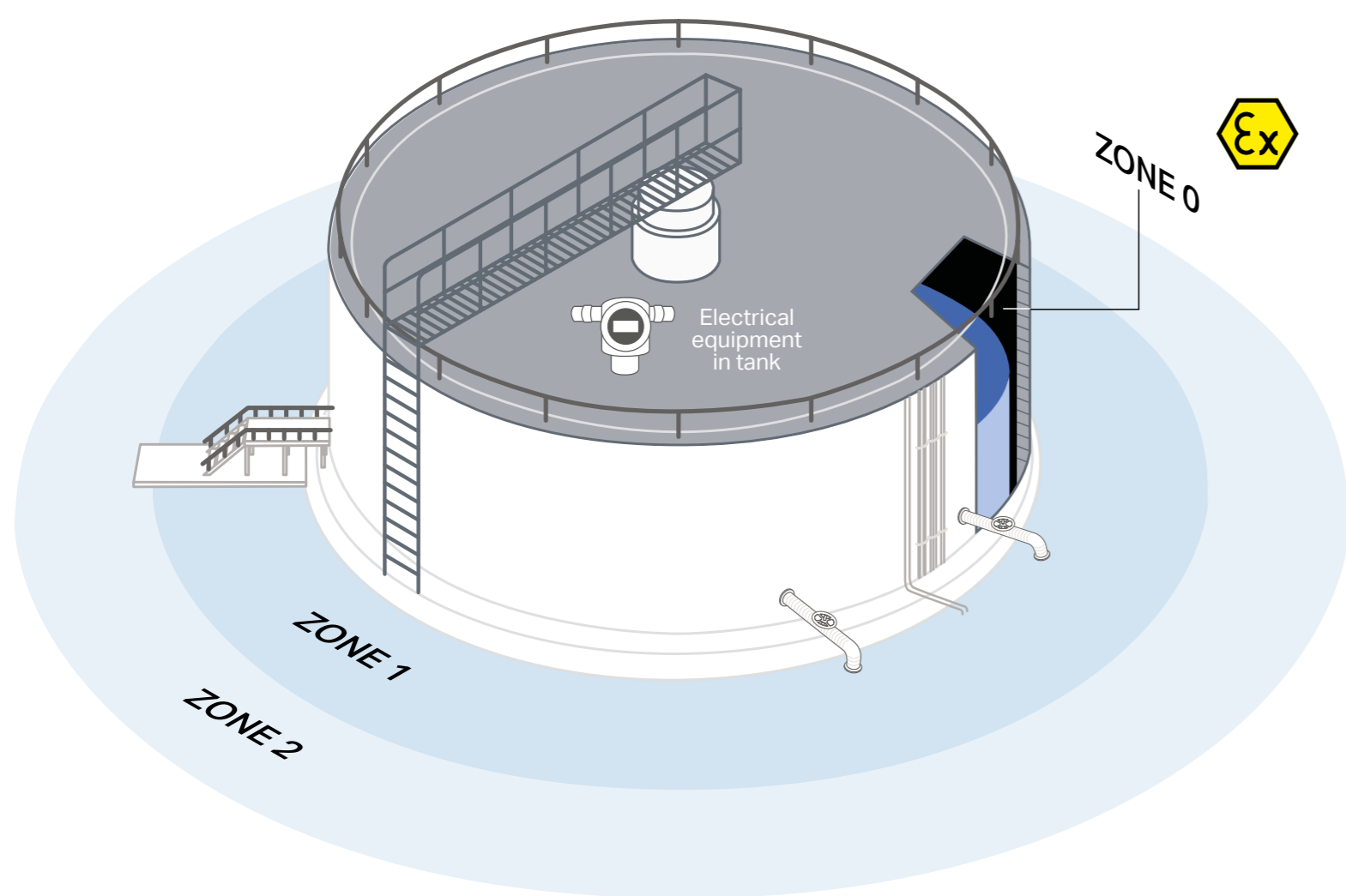


Explosion Protection

Normative Marking per IEC Standard and European Directive

	Registration office	Approval year	Approval number	Marking per ATEX	Ex marking per standard
IECEx	TÜV 10	IECEx	2539 X CE	Ex ec [Ia Ga]	II C T4 Gc
ATEX	TÜV 10	ATEX	2539 X CE	II 3 (1) G	Ex ec [Ia Ga] II C T4 Gc

WAGO also supports the following national Ex approvals:
AEx, CCC, ICs, UL, DNV, ABS, CCA, SA, KEMA/KEUR, EAC, Inmetro, UKCA



Device Category and Equipment Protection Level (EPL)

Required marking for equipment to be used per EU Directive 2014/34/EU (ATEX)	per CENELEC and IEC	Temporary behavior of flammable substances	Classification of hazardous areas
Device group	Device category*	EPL	
Methane, coal dust			
I	M1	Ma	Permanently, for long periods, frequently
I	M2	Mb	Constantly
Gases, vapors, liquids			
II	1 G, (1) G	Ga	Permanently, for long periods, frequently
II	2 G, (2) G	Gb	Occasionally
II	3 G, (3) G	Gc	Normally not, only for a short period
Dust			
II	1 D, (1) D	Da	Permanently, for long periods, frequently
II	2 D, (2) D	Db	Occasionally
II	3 D, (3) D	Dc	Normally not, only for a short period

* If the device category is in parentheses, e.g. (1) G, this denotes associated equipment for installation in the safe area.

Zones/Divisions

Explosive atmospheres due to:	Permanently, for long periods, frequently	Occasionally	Normally not, only for a short period
Gases, vapors, liquids	CENELEC/IEC/NEC 505	Zone 0	Zone 1
	NEC 500 (Class I)	Division 1	Division 2
Dust	CENELEC/IEC/NEC 506	Zone 20	Zone 21
	NEC 500 (Class II, III)	Division 1	Division 22

Groups

IEC, CENELEC, NEC 505, NEC 506	Typical gas	Ignition power / μ J	Class	Group
Group I (firedamp group)				
I	Methane	280	-	-
Group II (gas group)				
II A	Propane	> 180	Class I	Group D
II B	Ethylene	60 ... 180	Class I	Group C
II C	Hydrogen	> 20	Class I	Group B
	Acetylene	> 20	Class I	Group A
	Typical dust	Dust type	Class	Group
Group III (dust group)				
III A	Flammable lint		Class III	
III B	Non-conducting dust	Non-carboniferous dust	Class II	Group G
III C	Conducting dust	Carboniferous dust	Class II	Group F
		Metal dust	Class II	Group E

Marking per NEC (National Electrical Code)

Class/zone categorization US CNEC 505 and PEG 506	Marking per NEC	Ex marking per standard
NEC 505	Class I, Zone 2	AEx nA [Ia Ga] II C T4 Gc
NEC 506	Zone 22	AEx tb III C T 135 °C Dc
NEC 500	Class I, Division 2	Group A, B, C, D T4

Ignition Protection Categories

Type of protection for electrical equipment used in hazardous areas	Zone	Protection principle	Standards	Application examples
Pressure-tight encapsulation	0 1 2	Protection by pressure-resistant housing	EN 60079-1 IEC 60079-1 UL 60079-1	Switch and command systems, heating equipment, lights and motors
Pressure encapsulation	1 21 22	Protection through shielding gas within a housing (under preload pressure)	EN 60079-2 IEC 60079-2 UL 60079-2	Switching, control and analysis devices
Sand encapsulation	1	Protection through surrounding filler	EN 60079-5 IEC 60079-5 UL 60079-5	Transformers, relays, safety fuses, switches
Liquid encapsulation	1 2	Protection from the environment liquid	EN 60079-6 IEC 60079-6 UL 60079-6	Transformers, starting resistors, switching devices
Increased safety	1 2	Protection through prevention of high temperatures, sparks and electric arcs	EN 60079-7 IEC 60079-7 UL 60079-7	Junction and connection boxes, housings, terminal blocks
Intrinsic safety	0 20 21 22	Protection through energy limitation	EN 60079-11 IEC 60079-11 UL 60079-11	Measuring and control technology, sensors, actuators
Intrinsically safe systems			EN 60079-25 IEC 60079-25 UL 60079-25	
Intrinsically safe fieldbus systems (FISCO) and non-sparking fieldbus systems (FISCO)	1, 2		EN 60079-27 IEC 60079-27	
Non-sparking equipment	2	Protection through prevention of high temperatures, sparks and electric arcs		
Sparking equipment	2	Protection by pressure-resistant housing	EN 60079-15 IEC 60079-15 UL 60079-15	All electrical equipment for Zone 2
Vapor tightness	2	Protection by housing		
Cast encapsulation	0 20 21 22	Protection through surrounding cast mass	EN 60079-18 IEC 60079-18 UL 60079-18	Relays, sensors, solenoid valves
Optical radiation	0 20 21 22	Protection through limitation/prevention of optical radiation energy transfer	EN 60079-28 IEC 60079-28	Optoelectronic devices
Protection by enclosure	20 21 22	Protection through exclusion of explosive atmosphere	EN 60079-31 IEC 60079-31 UL 60079-31	Terminal and junction boxes, motors, switching devices and switchgear units, lights

Ex Marking per Standard

Marking for:	Application area	EN/IEC 60079-0	UL 60079-0
Equipment	Use within hazardous area	Ex ec IIC T4 Gc	AEx ec IIC T4 Gc
Associated equipment []	Use outside hazardous area, effective in Ex area	Ex ec [Ia Ga] IIC T4 Gc	AEx ec [Ia Ga] IIC T4 Gc
Simple electrical equipment	Use of components with simple design that do not adversely effect the intrinsic safety (see types of protection) of the circuit	Approval is not necessary since no source of ignition is present. No marking may be attached.	

Permissible Surface Temperature

In mining (coal mining) susceptible to firedamp	Gas	Ignition temperature	Group I
Methane		150 °C	With deposits of coal dust on the operating equipment
		450 °C	Without deposits of coal dust on the operating equipment
In other applications			
Gas	Ignition temperature	CENELEC/IEC/NEC500/NEC505	
Ammonia	630 °C		
Hydrogen	560 °C		
Propane	470 °C		
Ethylene	425 °C		
Butane	365 °C		
Acetylene	305 °C		
Cyclohexane	259 °C		
Diethyl ether	170 °C		
Carbon disulfide	95 °C		

