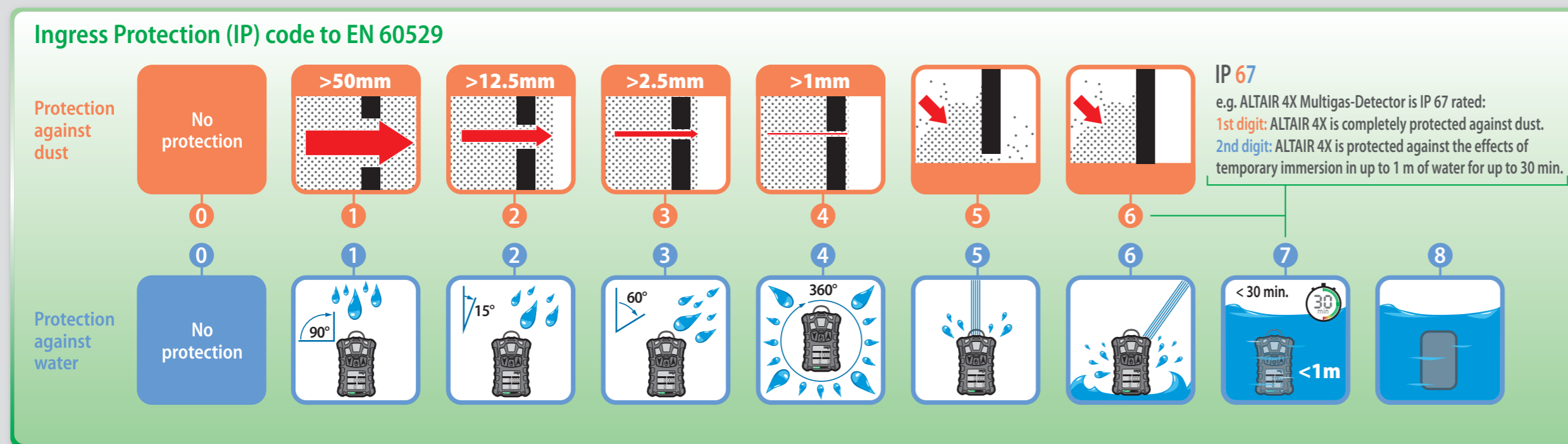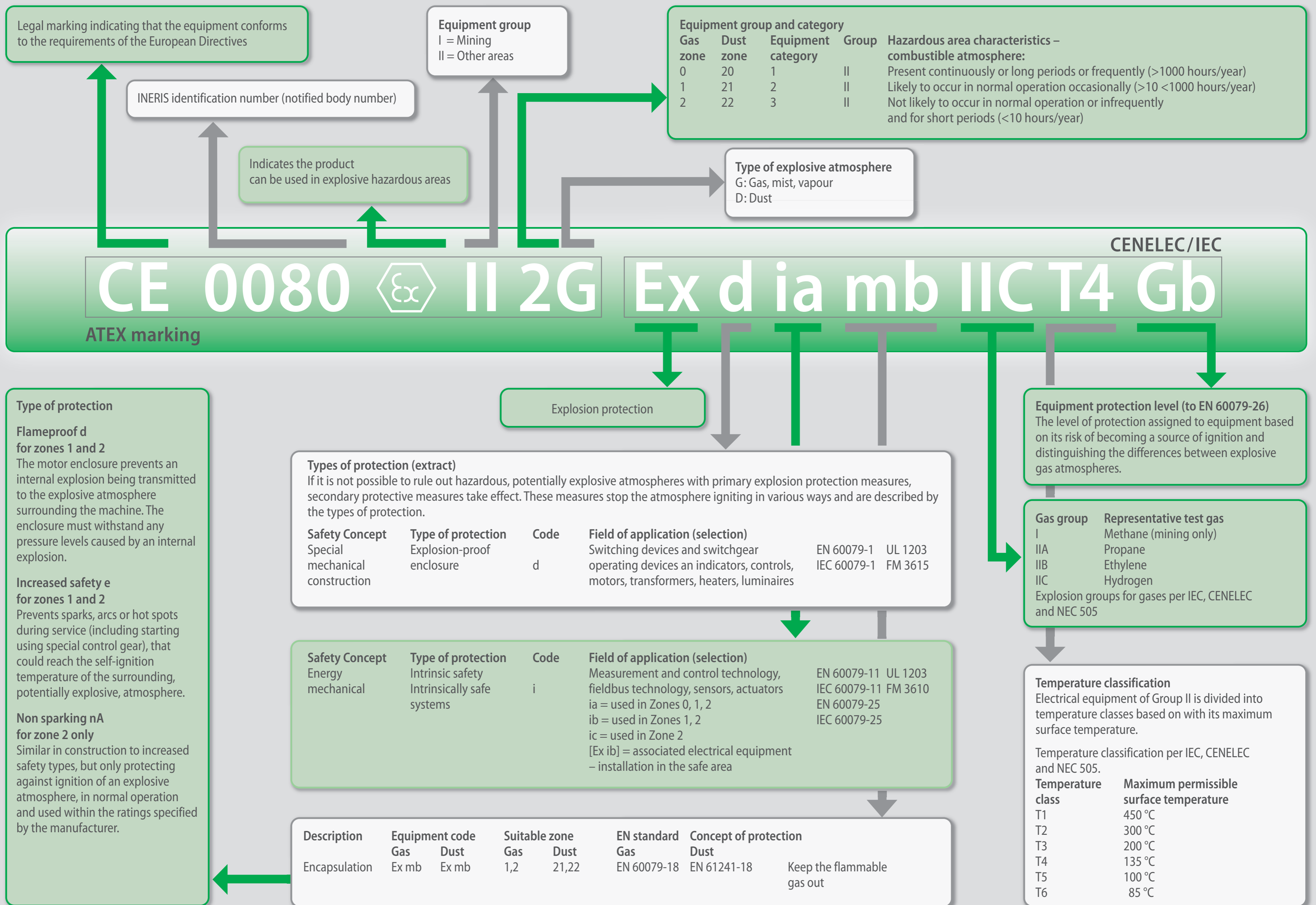# Standards **& Regulations**
for Gas Detectors

Gas detectors are used to detect potential hazardous in the atmosphere, be they oxygen deficiency, toxic gas build-up or the accumulation of potentially explosive gas. Explosion protection is extremely important when dealing with flammable gases and vapours and this especially applies not only to equipment used in these areas, but also applies to the gas detectors themselves. Since gas detectors are categorised as electrical equipment, they must fulfil the relevant requirements for operating in potentially explosive areas. Within the European Union, this is regulated by using the relevant harmonised European Directives.

ATmosphere **EX**plosible is French for potentially explosive atmosphere. According to the ATEX manufacturer directive 94/9/EC (ATEX 95) and user directive 1999/92/EC (ATEX 137) the electrical safety of all electronic

gas detectors and personal monitors used in potentially explosive atmospheres must be tested and marked "ATEX" (EN 60079-0 et seq.). If the gas detector for flammable gases and vapours is used as a safety device "with a measuring function for explosion protection" it must be performance approved by a notified body in addition to the "ATEX" marking. Correspondence with other globally accepted standards (e.g. wheel mark approval) must also be ensured during the construction of the electrical equipment.

At MSA, we work tirelessly to build smarter, better gas detectors which people around the world can rely on.

Legal marking indicating that the equipment conforms to the requirements of the European Directives

INERIS identification number (notified body number)

Equipment group
I = Mining
II = Other areas

Indicates the product can be used in explosive hazardous areas

Equipment group and category

Gas zone	Dust zone	Equipment category	Group	Hazardous area characteristics – combustible atmosphere:
0	20	1	II	Present continuously or long periods or frequently (>1000 hours/year)
1	21	2	II	Likely to occur in normal operation occasionally (>10 <1000 hours/year)
2	22	3	II	Not likely to occur in normal operation or infrequently and for short periods (<10 hours/year)

Type of explosive atmosphere
G: Gas, mist, vapour
D: Dust

CENELEC/IEC

CE 0080 〈Ex〉 II 2G Ex d ia mb IIC T4 Gb

ATEX marking

Explosion protection

Equipment protection level (to EN 60079-26)
The level of protection assigned to equipment based on its risk of becoming a source of ignition and distinguishing the differences between explosive gas atmospheres.

Type of protection

Flameproof d
for zones 1 and 2
The motor enclosure prevents an internal explosion being transmitted to the explosive atmosphere surrounding the machine. The enclosure must withstand any pressure levels caused by an internal explosion.

Increased safety e
for zones 1 and 2
Prevents sparks, arcs or hot spots during service (including starting using special control gear), that could reach the self-ignition temperature of the surrounding, potentially explosive, atmosphere.

Non sparking nA
for zone 2 only
Similar in construction to increased safety types, but only protecting against ignition of an explosive atmosphere, in normal operation and used within the ratings specified by the manufacturer.

Types of protection (extract)
If it is not possible to rule out hazardous, potentially explosive atmospheres with primary explosion protection measures, secondary protective measures take effect. These measures stop the atmosphere igniting in various ways and are described by the types of protection.

Safety Concept	Type of protection	Code	Field of application (selection)		
Special mechanical construction	Explosion-proof enclosure	d	Switching devices and switchgear operating devices an indicators, controls, motors, transformers, heaters, luminaires	EN 60079-1 IEC 60079-1	UL 1203 FM 3615

Safety Concept	Type of protection	Code	Field of application (selection)		
Energy mechanical	Intrinsic safety Intrinsically safe systems	i	Measurement and control technology, fieldbus technology, sensors, actuators ia = used in Zones 0, 1, 2 ib = used in Zones 1, 2 ic = used in Zone 2 [Ex ib] = associated electrical equipment – installation in the safe area	EN 60079-11 IEC 60079-11 EN 60079-25 IEC 60079-25	UL 1203 FM 3610

Description	Equipment code Gas	Dust	Suitable zone Gas	Dust	EN standard Gas	Dust	Concept of protection
Encapsulation	Ex mb	Ex mb	1,2	21,22	EN 60079-18	EN 61241-18	Keep the flammable gas out

Gas group | **Representative test gas**
I | Methane (mining only)
IIA | Propane
IIB | Ethylene
IIC | Hydrogen
Explosion groups for gases per IEC, CENELEC and NEC 505

Temperature classification
Electrical equipment of Group II is divided into temperature classes based on with its maximum surface temperature.

Temperature classification per IEC, CENELEC and NEC 505.

Temperature class	Maximum permissible surface temperature
T1	450 °C
T2	300 °C
T3	200 °C
T4	135 °C
T5	100 °C
T6	85 °C

Ingress Protection (IP) code to EN 60529

Protection against dust

>50mm	>12.5mm	>2.5mm	>1mm

No protection — 0
1, 2, 3, 4, 5, 6

IP 67
e.g. ALTAIR 4X Multigas-Detector is IP 67 rated:
1st digit: ALTAIR 4X is completely protected against dust.
2nd digit: ALTAIR 4X is protected against the effects of temporary immersion in up to 1 m of water for up to 30 min.

Protection against water

No protection — 0
1, 2 (90°), 3 (15°), 4 (60°), 5, 6 (360°), 7 (<30 min., <1m), 8 (30)

Select the appropriate instrument:

		ALTAIR	ALTAIR PRO	ALTAIR 4X	ALTAIR 5X (IR)	SIRIUS
	Number of sensors	1	1	1–3*	1–5*	1–5
Combust.	0–100% LEL			●	●	
	0–100 Vol.%				●	
O₂	Oxygen (O₂)	●	●	●	●	●
Toxic Gases	Ammonia (NH₃)		●		●	
	Carbon Monoxide (CO)	●	●	●	●	
	Carbon Dioxide (CO₂)				●	
	Chlorine (Cl₂)		●		●	
	Chlorine Dioxide (ClO₂)		●		●	
	Hydrogen Cyanide (HCN)		●		●	
	Hydrogen Sulphide (H₂S)	●	●	●	●	●
	Nitric Dioxide (NO₂)		●		●	
	Nitrogen Oxide (NO)		●		●	
	Phosphine (PH³)		●		●	
	Sulfur Dioxide (SO₂)		●		●	
	Volatile Organic Compounds (VOC)					●
Features	Internal Pump				●	●
	Alarms (Audible & Visual)	●	●	●	●	●
	Vibration Alarm	●	●	●	●	
	MotionAlert			●	●	
	InstantAlert			●	●	
	24-hour bump checkmark	●	●	●	●	
	Eventlogging		●	●	●	●
	Datalogging		●	●	●	●
	End-of-Sensor Life Indicator			●	●	
	ALTAIR QuickCheck compatible	●	●			
	GALAXY GX2 System compatible	●	●	●		

*Dual-Tox sensors available

Performance Approval
According to the ATEX manufacturer directive 94/9/EC and the ATEX user directive 1999/92/EC any gas detection system (detectors and controller) and any personal monitor for flammable gases, if used as safety device to reduce the risk of explosion, has to be performance approved. Performance approval is also required if the oxygen content of the air during inertisation or the concentration of toxic gas needs to be measured.
The EC type test certificate must then show compliance according to EN 60079-29-1 and EN 50104 for ATEX and EN 50104 and EN 45544 for oxygen and toxic gases (according to national regulations).

MED Marine Equipment Directive 96/98/EC, or wheel mark, is an authorisation of equipment and products for the marine industry and covers any ship flying a flag of an EEA member state.

Explosive Atmosphere Zones:
Zone 1
Zone 2 — Zone 2
Zone 0
Zone 1

GALAXY GX2 — ALTAIR — ALTAIR PRO — ALTAIR 4X — ALTAIR 5X (IR) — SIRIUS