



Flameproof  
Motors

## Atex: Standards Evolution

# GAS

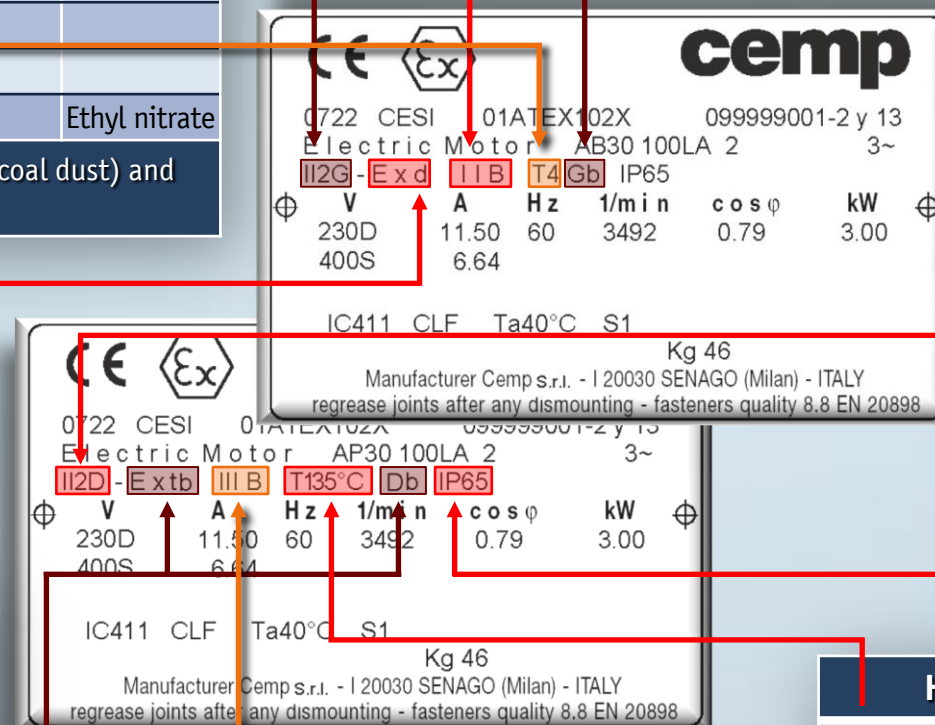
Max surface temper.	Temperature Class	Gases or vapors (Group II)		
		Explosion Group		
		IIA	IIB	IIC
450°C	T1	Acetic acid, Acetone, Ammonia, Benzene, Ethane, Methane, Propane, Toluene...	Coke-over gas, Water gas...	Hydrogen...
300°C	T2	Butane, Ethanol, Methanol, Iso-Propyl alcohol...	Ethylene, Methyl ethyl ketone, n-propyl alcohol...	Acetylene...
200°C	T3	Cyclohexane, Gasoline, Kerosene...	Hydrogen sulphide, Isoprene...	
135°C	T4	Acetaldehyde, Ether...	Ethyl ether	
100°C	T5			
85°C	T6			Ethyl nitrate
N.B. For <b>Group I</b> applications, equipment has rigid 150°C (coal dust) and 450°C (methane) limits rather than T classes				

Group	Zone	Equipment		
as per 94/9/CE	Gas	Category	Group	Protection level
II	0	<b>1G</b>	II	<b>Ga</b>
II	1	<b>2G</b> (or 1G)	II	<b>Gb</b> (or Ga)
II	2	<b>3G</b> (or 2G, or 1G)	II	<b>Gc</b> (or Gb, or Ga)
	<b>Dust</b>			
II	20	<b>1D</b>	III	<b>Da</b>
II	21	<b>2D</b> (or D1)	III	<b>Db</b> (or Da)
II	22	<b>3D</b> (or D2, or D1)	III	<b>Dc</b> (or Db, or Da)
	<b>Mining</b>			
I	M1	<b>M1</b>	I	<b>Ma</b>
I	M2	<b>M2</b> (or M1)	I	<b>Mb</b> (or Ma)

Equipment of higher categories can also be used instead of those of a lower category

# DUST

Protection concepts				
Electrical	Symbol	EPL	Zone	IEC-EN
Increased safety	e	<b>Gb</b>	1, 2	60079-7
Type "n" (non-sparking)	nA	<b>Gc</b>	2	60079-15
Flameproof	d	<b>Gb</b>	1, 2	60079-1
<b>Dust (Electrical)</b>				
Enclosure	t	<b>Da, Db, Dc</b>	20, 21, 22	60079-31



Protection concepts		
1 <sup>st</sup> digit	IP	2 <sup>nd</sup> digit
Protection against harmful dust deposit	<b>55</b>	A jet of water squirting out of a nozzle towards the motor from all directions has no harmful effect
Protection against the penetration of dust	<b>65</b>	

Dust Equipment Group	
IIIA	Combustive flyings
IIIB	Non-conductive dust
IIIC	Conductive dust

How to calculate DUST ignition temperature		
Dust ignition temperature	Cloud <b>Tcl</b>	Layer <b>T5mm</b>
Safety temperature	Ts1 = 2/3 Tcl	Ts2 = T5mm -75k
Maximum surface temperature	<b>Tamm</b> = the lowest between Ts1 e Ts2	
Motors surface temperature ≤ <b>Tamm</b>		