

Zones		
Zone	gases	dusts
0	20	continually present
1	21	likely to occur in normal operation occasionally
2	22	not likely to occur in normal operation and only for very short durations

ATEX Marking- 2014/34/EU (was 94/9/EC)				
Equipment Group	Category	Environment	Zone of use	
I	M1	Methane and Coal Dust	N/A	
I	M2		N/A	
II	1	Gas, Vapour, Mists and Dusts	0/20	
II	2		1/21	
II	3		2/22	

Temperature Class	
T- Class	Maximum Surface Temperature in °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Groups (IEC)			
Group	Environment	Location	Typical Substance
I	Gas/Dust	Coal Mining	Methane (Fire Damp)
IIA	Gases, Vapours and mists	Surface and other mines	Methane, Propane etc.
IIB			Ethylene
IIC			Hydrogen, Acetylene etc.
IIIA	Combustible Dust	Surface	Combustible flying's
IIIB			Non-conductive
IIIC			Conductive

Useful Standards for the electrical designer and/or installer	
Topic	IEC (CENELEC) Standard
Area Classification - Gases, Vapours and Mists	IEC (EN) 60079-10-1
Area Classification - Combustible Dusts	IEC (EN) 60079-10-2
Electrical Equipment Installation	IEC (EN) 60079-14
Electrical Equipment Inspection and maintenance	IEC (EN) 60079-17
Electrical Equipment Repair and Overhaul	IEC (EN) 60079-19
Material Characteristics of Gases and Vapours	ISO/IEC 80079-20-1
Material Characteristics of Combustible Dusts	ISO/IEC 80079-20-2

Typical Equipment Marking: ATEX (Europe) and UKCA Marking	
	EU
Legislation	II 2G
Standards Applied Marking	Ex db IIB T5 Gb -20 °C ≤ T <sub>amb</sub> ≤ 50 °C
Conformity Scheme Marking	CE UKCA
Certificate Number	21ATEX1234 21UKEX1235

Group II: Electrical Protection Concepts (Gas) excluding Mining									
Concept Method	Symbol & EPL	EPL	ATEX	Zone	Concept Method	Symbol & EPL	EPL	ATEX	Zone
Flameproof	da	Ga	1	0, 1 and 2	Pressurized	pxb	Gb	2	1 and 2
	db	Gb	2	1 and 2		pyb	Gb	2	1 and 2
	dc	Gc	3	2		pzc	Gc	3	2
Increased Safety	eb	Gb	2	1 and 2	Liquid Immersion	ob	Gb	2	1 and 2
	ec	Gc	3	2		oc	Gc	3	2
Intrinsic Safety	ia	Ga	1	0, 1 and 2	Special	sa	Ga	1	0, 1 and 2
	ib	Gb	2	1 and 2		sb	Gb	2	1 and 2
	ic	Gc	3	2		sc	Gc	3	2
Encapsulation	ma	Ga	1	1 and 2	Powder	qb	Gb	2	1 and 2
	mb	Gb	2	0, 1 and 2		qc	Gc	3	2
	mc	Gc	3	2		Restricted Breathing	nR	Gc	3
Optical Radiation	op is	Ga	1	0, 1 and 2	Non-incendive		nC	Gc	3
	op sh	Ga	2	0, 1 and 2		op pr	Gb	2	1 and 2

Relationship between Gas/Vapour or Dust and Equipment Group	
Location gas/vapour or dust subgroup	Permitted equipment group
IIA	II, IIA, IIB or IIC
IIB	II, IIB or IIC
IIC	II or IIC
IIIA	IIIA, IIIB or IIIC
IIIB	IIIB or IIIC
IIIC	IIIC

Ex d Flange equipment Obstruction Distances	
Location Gas Group	Permitted Distance mm
IIA	10
IIB	30
IIC	40

Zones/ATEX Categories/EPL's		
Zone	ATEX Categories (Level of Protection) Group II (Typical)	Equipment Protection Levels
0	1G	Ga
1	2G	Gb
2	3G	Gc
20	1D	Da
21	2D	Db
22	3D	Dc

Typical Equipment Marking: IEC Marking							
Ex	db	IIC	T*	Gb	Db	+	/
Explosive Atmosphere	Concept letter + EPL	IEC Equipment group Gas (IIIA, IIB or IIC) or Combustible Dusts (IIA, IIB or IIC)	Temperature Class * For dust equipment this is the surface temperature and would be in °C	Environment Gas EPL	Dust EPL	Two concepts together allowed in a higher EPL location	Equipment in a boundary wall

Non-Electrical Protection Concepts (Gases)					
Concept Method	Concept Letter	Symbol	EPL	Zone	ATEX
Constructional Safety	c	h	Ga, Gb and Gc as may be appropriate	1, 2 and 3 as may be appropriate	1, 2 and 3 as may be appropriate
Control of ignition sources	b		Ga, Gb and Gc as may be appropriate		1, 2 and 3 as may be appropriate
Liquid immersion	k		Ga, Gb and Gc as may be appropriate		1, 2 and 3 as may be appropriate

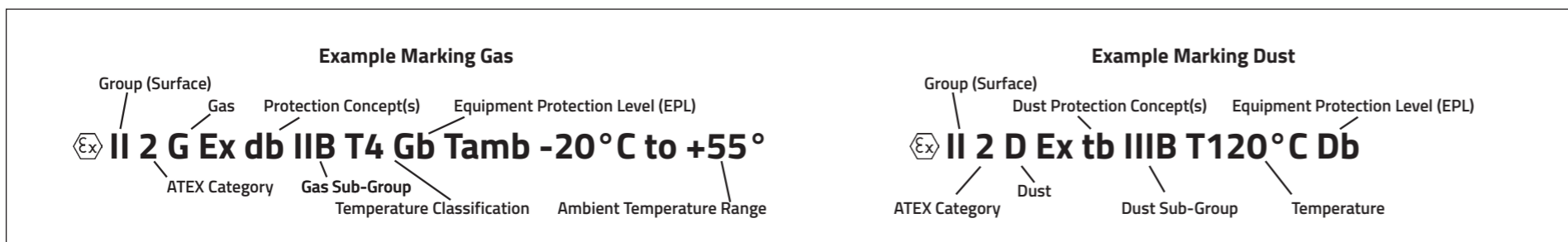
Cable Gland, adaptors and accessories, Selection Chart IEC 60079-14:2013 Table 10			
Protection Technique	Glands, adaptors and blanking elements		
<b>Gases and Vapours (Group II)</b>			
	Ex d	Ex e	Ex n
Ex d	•	x	x
Ex e	•	•	x
Ex i and nL	•	•	•
Ex n except nL	•	•	•
Ex p	•	•	• (Gc only)
<b>Combustible Dust (Group III)</b>			
	Ex t		
Ex t	•		
Ex p	•		
Ex i	•		

Minimum IP Rating for equipment used in Group III Hazardous locations			
Level of Protection	Group IIC	Group IIB	Group IIIA
ta	IP6X	IP6X	IP6X
tb	IP6X	IP6X	IP5X
tc	IP6X	IP5X	IP5X

Pressurized Enclosures used in Group II Hazardous locations. Determination of type of protection (no internal release)			
EPL	ATEX Category	Enclosure contains equipment not meeting "Gc" requirements	Enclosure contains equipment meeting "Gc" requirements
Gb	2G	Type "pxb"	Type "pyb"
Gc	3G	Type "pxb" or "pxc"	Type pyb "no pressurization"

Protection Concepts Dusts: Electrical					
Type of Protection	Symbol	ATEX Category	EPL	IEC/ CENELEC (EN) Standard	Basic concept of protection
Protection by enclosure	t	1,2,3	Da,Db,Dc	60079-31	Keeps the combustible dust out and avoids hot surfaces
Intrinsic Safety	i			60079-11	Limits the energy of the spark and the surface temperatures
Encapsulation	m			60079-18	Keeps the combustible dust out and avoids hot surfaces
Pressurization	p	2,3	Db, Dc	60079-2	

Data for Flammable Gases and Vapours (ISO/IEC 80079-20-1:2017)												
Listed below are the flammability values for a number of common gases and vapours used in industry. There are more than 300 gases and vapours. Refer to ISO/IEC 80079-20-1:2017 for further details.												
CAS No	Substance	Density relative to air (Air = 1)	Flash point °C	Melting point °C	Boiling point °C	Flammable Limits Volume %		Ignition Temperature °C	Maximum Experimental Safe Gap (MESG) mm	Temperature Class	Group	Minimum Ignition Current Ratio
						LEL	UEL					
74-86-2	Acetylene	0.90	gas			2.3	100	305	0.37	T2	IIC	0.28
106-97-8	Butane	2.05	gas	-138	-1	1.4	9.3	372	0.98	T2	IIA	0.94
75-15-0	Carbon Disulphide	2.64	-30	-112	46	0.6	60.0	90	0.34	T6	IIC	0.39
142-96-1	Dibutyl Ether	4.48	25	-95	141	8.5	48	175	0.86	T4	IIB	
64-17-5	Ethanol	1.59	12	-114	78	3.1	19.0/27.7	400	0.89	T2	IIB	0.88
141-78-6	Ethyl Acetate	3.04	-	-83	77	2.0	12.8	470	0.99	T1	IIA	
74-85-1	Ethylene	0.97	gas	-169	-104	2.3	36.0	440	0.65	T2	IIB	0.53
50-00-0	Formaldehyde	1.03	60	-92	-6	7.0	73.0	424	0.57	T2	IIB	
142-82-5	Heptane	3.46	-7	-91	98	0.85	6.7	204	0.91	T3	IIA	0.88
1333-74-0	Hydrogen	0.07	gas	-259	-253	4.0	77.0	560	0.29	T1	IIC	0.25
8008-20-6	Kerosene			38 to 72°		0.70	5.0	210		T3	IIA	
74-82-8	Methane (Firedamp)	0.55	gas			4.4	17.0	595	1.14	T1	I	
74-82-8	Methane		gas	-182	-162	4.4	17.0	600	1.12	T1	IIA	1.00
111-65-9	Octane	3.93	13	-57	126	0.80	6.5	206	0.94	T3	IIA	
8006-61-9	Petrol (Gasoline)	3.0	-46			1.4	7.6	280		T3		
74-98-6	Propane	1.56	gas	-188	-42	1.7	10.9	450	0.92	T2	IIA	0.82
108-88-3	Toluene	3.2	4	-95	111	1.10	7.8	530	1.06	T1	IIA	
8006-64-2	Turpentine		35	-50 to -60°	154 to 170°	0.80		253		T3	IIA	
95-47-6	Xylene	3.66	30			1.0	7.6	470	1.09	T1	IIA	



Equipment Selection by ATEX Category			
Equipment Category	Hazardous Area Classification (Zones)		
	0/20	1/21	2/22
1	•	•	•
2	x	•	•
3	x	x	•

Equipment Selection by Group			
Equipment Group	Gas Area (Location)		
	IIC	IIB	IIA
IIC	•	•	•
IIB	x	•	•
IIA	x	x	•
Equipment Group	Dust Area (Location)		
	IIC	IIB	IIA
IIC	•	•	•
IIB	x	•	•
IIA	x	x	•

Equipment Selection by Temperature Class							
Equipment Class	Area						
	T6	T5	T4	T3	T2	T1	
T6	•	•	•	•	•	•	
T5	x	•	•	•	•	•	
T4	x	x	•	•	•	•	
T3	x	x	x	•	•	•	
T2	x	x	x	x	•	•	
T1	x	x	x	x	x	•	



Accomplished Energy Personnel



### Ingress Protection (IP) ratings guide

Solids	Water
<p><b>1</b> Protected against a solid object greater than 50mm such as a hand.</p>	<p><b>1</b> Protected against vertically falling drops of water. Limited ingress permitted.</p>
<p><b>2</b> Protected against a solid object greater than 12.5mm such as a finger.</p>	<p><b>2</b> Protected against vertically falling drops of water with enclosure tilted up to 15 degrees from the vertical. Limited ingress permitted.</p>
<p><b>3</b> Protected against a solid object greater than 2.5mm such as a screwdriver.</p>	<p><b>3</b> Protected against vertically falling drops of water. Limited ingress permitted.</p>
<p><b>4</b> Protected against a solid object greater than 1mm such as a wire.</p>	<p><b>4</b> Protected against sprays of water up to 60 degrees from the vertical. Limited ingress permitted for three minutes.</p>
<p><b>5</b> Dust protected. Limited ingress of dust permitted. Will not interfere with operation of the equipment. Two to eight hours.</p>	<p><b>5</b> Protected against jets of water. Limited ingress permitted.</p>
<p><b>6</b> Dust tight. No ingress of dust. Two to eight hours.</p>	<p><b>6</b> Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.</p>
	<p><b>7</b> Protection against the effects of immersion in water between 15cm and 1m for 30 minutes.</p>
	<p><b>8</b> Protection against the effects of immersion in water under pressure for long periods.</p>
	<p><b>9</b> Protection against the effects of high pressure and temperature water jet.</p>