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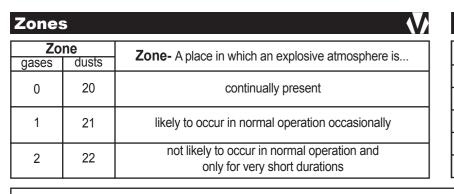
Test None

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

2nd Figure Protection against Water

No protection

Protected against vertically falling

drops of water (condensation)

Protected against drops of water falling up to 15° from the vertical

Protected against water sprayed up to 60° from the vertical

Protected against splashing water from all directions

Protected against jets of water from all directions

Protected against powerful jets of

water from all directions

Protected against the effects of

temporary immersion in water

Protected against the continuous effects of immersion in water having regard to specific

conditions

Protected against high pressure and temperature water jets

IEC (International Electrotechnical Commission) Publication IEC 60529 Classification of Degrees of Protection Provided by Enclosures provides a system for specifying the enclosures of equipment on the basis of the degree of protection provided by the enclosure.

Zo	ne	Zone- A place in which an explosive atmosphere is	Equipment Group	Category	Environment	Zone of use		Maximum Surface
ases	dusts	ZOTIE- A place in which an explosive authosphere is				T-Class Temper	Temperature in °C	
^	20	continually propert		M1	Methane and	N/A	T1	450
0	20	continually present	I	M2	Coal Dust	N/A	T2	300
1	21	likely to occur in normal operation occasionally	l II	1		0/20	T3	200
'	21	likely to occur in normal operation occasionally			Gas, Vapour		T4	135
		not likely to occur in normal operation and	II	2	Mists and Dusts	1/21	T5	100
2	22	only for very short durations	l II	3		2/22	T6	85

Group	Environment	Location	Typical Substance
I		Coal Mining	Methane (Fire Damp)
IIA	Gases, Vapours		Methane, Propane etc
IIB	and mists	Surface	Ethylene
IIC		and other mines	Hydrogen, Acetylene etc.
IIIA			Combustible flying's
IIIB	Combustible Dust	Surface	Non-conductive
IIIC	1		Conductive

Useful Standards for the electrical designer and/or installer					
Topic	IEC (CENELEC) Standard				
Area Classification- Gases, Vapours and Mists	IEC (EN) 60079-10-1:2015				
Area Classification - Combustible Dusts	IEC (EN) 60079-10-2:2015				
Electrical Equipment Installation	IEC (EN) 60079-14:2013				
Electrical Equipment Inspection and maintenance	IEC (EN) 60079-17:2013				
Electrical Equipment Repair and Overhaul	IEC (EN) 60079-19:2011				
Material Characteristics of Gases and Vapours	ISO/IEC 80079-20-1:2017				
Material Characteristics of Combustible Dusts	ISO/IEC 80079-20-2:2016				

	1st l	Figure Protection against Solids	
ΙP	Test	Comment	ΙP
0	None	No protection	0
1	30 mm	Protected against solid bodies greater than 50mm diameter. (e.g. accidental contact with the hand	1
2	122 000	Protected against solid bodies greater than 12.5mm diameter. (e.g. finger)	2
3	9m	Protected against solid bodies greater than 2.5mm diameter (e.g. tools, wires)	3
4		Protected against solid bodies greater than 1.0mm diameter (e.g. thin tools and fine wire)	4
5		Protected against dust (no harmful deposit) Dust Proof	5
6		Completely protected against dusts Dust Tight	6

Zones/ATEX	Categories/EPL's	\
Zone	ATEX Categories (Levels 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 E	quipment Ma	rking: IEC Markin	g				V
Ex	db	IIC	T *	Gb	Db	+	/
Explosive	Concept letter	IEC Equipment group	Temperature	Enviro	nment	IEC 60	079-26
Atmosphere	+ EPL	Gas (IIA, IIB or IIC) or Combustible Dusts IIIA, IIIB or IIIC	*For dust equipment this is the surface temperature and would be in °C.	Gas EPL	Dust EPL	Two concepts together allowed in a higher EPL location	Equipment in a boundary wall

0

Type of Protection	Symbol	ATEX Category	EPL	IEC /CENELEC (EN) Standard	Basic concept of protection
Increased Safety Non-Sparking	e nA	2 & 3	Gb, Gc Gc	60079-7 60079-15	No arcs, sparks or hot surfaces
Flameproof	d	1,2 & 3	Ga,Gb, Gc	60079-1	Contain the explosion, prevents propagation.
Enclosed Break	nC	3	Gc	60079-15	
Quartz/Sand Filled	q	2 & 3	Gb ,Gc	60079-5	
Intrinsic Safety	i	1,2 & 3	Ga,Gb,Gc	60079-11	Limits the energy of the spark and the surface temperatures
Energy Limitation	nL	3	Gc	60079-15	
Optical Radiation	op	1,2 & 3	Ga,Gb,Gc	60079-28	
Pressurized	p	2,3	Gb,Gc	60079-2	Exclusion: keeps the flammable gas out
Restricted Breathing	nR	3	Gc	60079-15	
Encapsulation	m	1,2 & 3	Ga,Gb,Gc	60079-18	
Oil Immersion	o	2 & 3	Gb,Gc	60079-6	
Special	S	1, 2 & 3	Ga,Gb,Gc	60079-33	Risk Assessment

ype of Protection	Symbol	ATEX	IS	SO Standards	Basic concept of protection
		Category		(Proposed)	
General Requirements				80079-36	
Constructional Safety	С	2		80079-37	Ignition sources cannot arise
Flow restriction Pressurization Liquid immersion	fr p k	3 2 2		80079-37	Keeps the flammable gas out
Flameproof	d	2			Contain the explosion, prevents propagation.
Control of ignition sources	b	2		80079-37	Ignition sources cannot become active

Protection Concepts Dusts: Electrical								
Type of Protection	Symbol	ATEX Category	EPL	IEC/CENELEC (EN) Standard	Basic concept of protection			
Protection by enclosure	t	400	Do Dh Do	60079-31	Keeps the combustible dust out and avoids hot surfaces			
Intrinsic Safety	i	1,2,3	Da,Db,Dc	60079-11	Limits the energy of the spark and the surface temperatures			
Encapsulation	m	1		60079-18	Keeps the combustible dust out and			
Pressurization	р	2, 3	Db, Dc	60079-2	avoids hot surfaces			

Тур	Typical Equipment Marking: ATEX (Europe) Marking								
C	ϵ	2585	⟨£x⟩	II	2	G	D		
1	plies	Notified Body	EC Mark	Equipment group	Equipment	Enviro	nment		
Euro	ith pean ctives	Number (Exveritas)			Category	Gas	Dust		

Location gas/vapour or dust subgroup	Permitted equipment group		ocation s Group	Permitted Distar mm	ice
Relationship betw or Dust and Equip	-		lange equuction Dist	-	V
Material Charact	eristics of Combustible Dus	ISO/IEC 80079-20-2:2016			
Material Characte	eristics of Gases and Vapor	ISO/IE	C 80079-20-1:2017		
Electrical Equip	oment Repair and Overhau	IEC (E	EN) 60079-19:2011		
Electrical Equipme	nt Inspection and maintena	IEC (E	EN) 60079-17:2013		
Electrical	Equipment Installation	IEC (E	EN) 60079-14:2013		

IIB

IIIA	١		IIIA, IIIE	3 or IIIC
IIIB	}		IIIB o	r IIIC
IIIC	,		III	С
Equipme by ATEX			on	√
		Hazardou	ıs Area Clas (Zones)	ssification
		Hazardou 0/20		ssification 2/22
Equipment	1		(Zones)	
Equipment Category	1 2		(Zones)	

II, IIA, IIB or IIC

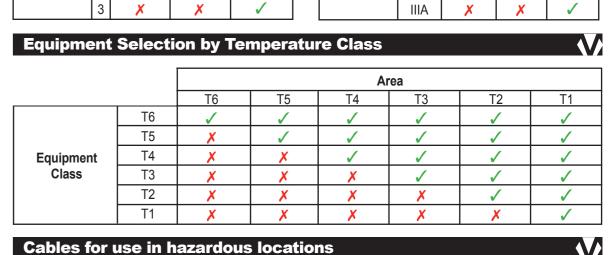
II, IIB or IIC

II or IIC

IIC

IIC			40							
Equipment Selection by Group										
		Ga	ıs Area							
	Ī	IIC	IIB	IIA						
	IIC	✓	/	1						
	IIB	X	✓	1						
	IIA	X	X	1						
Equipment		Du	st Area							
Group		IIIC	IIIB	IIIA						
	IIIC	/	/	1						

30



	Fixed installations; Cable shall be
	 a) Sheathed with thermoplastic, thermosetting or elastonmeric material, round and compact, the bedding or sheath shall be extruded. Fillers shall be non-hygoscopic; or
	b) Mineral insulated metal sheathed (MIMS)
	c) Special cable, compact, the bedding or sheath shall be extruded and fillers if any shall be non-hygroscopic
	Flexible cables for fixed installation shall be;
	a) Ordinary tough rubber sheathed
	b) Ordinary prolychloreoprene sheathed
	c) Heavy tough rubber sheathed
	d) Heavy prolychloreoprene sheathed
	e) Plastic insulated
	Flexible cables for transportable and portable equipment shall be
	a) Minmum cross sectional area 1.0mm2
	b) Separte earth conductor within the cable
	c) Outer metallic sheath shall not be the only protective conductor
	Flexible cables for portable equipment <250v <6A
i	a) Ordinary prolychloreoprene sheathed
	b) Ordinary tough rubber sheath

Cable Gland, adapters and accessories, Selection Chart IEC 60079-14:2013 Table 10

Protection Technique	Glands, adapters and blanking elements									
Gases and Vapours (Group II)										
	Ex d	Ex e	Ex n							
Ex d	✓									
Ex e	✓	✓								
Ex i and nL	√	1	1							
Ex n except nL	√	1								
Ex p	/	√	✓ (Gc only)							
Combustible Dust (Group III)									
	-	Ext								
Ext		✓								
Ex p		✓								
Exi		1								

· · · · · · · · · · · · · · · · · · ·
NB .If only one intrinsically safe circuit is applied then there are no specified
requirements for cable glands. IEC 60079-14:2013 table 10. To meet IP
requirements it may be necessary to use an IP washer or thread sealant
between the entry device and the enclosure.

Minimum IP Rating for equipment used in **Group III Hazardous locations**

Level of Protection	Group IIIC	Group IIIB	Group IIIA					
ta	IP6X	IP6X	IP6X					
tb IP6X IP6X IP5X								
tc	IP6X	IP5X	IP5X					
IP seal washers may be used on parallel threads. If no IP seal washer is used then thread engagement shall be five full threads								

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"					

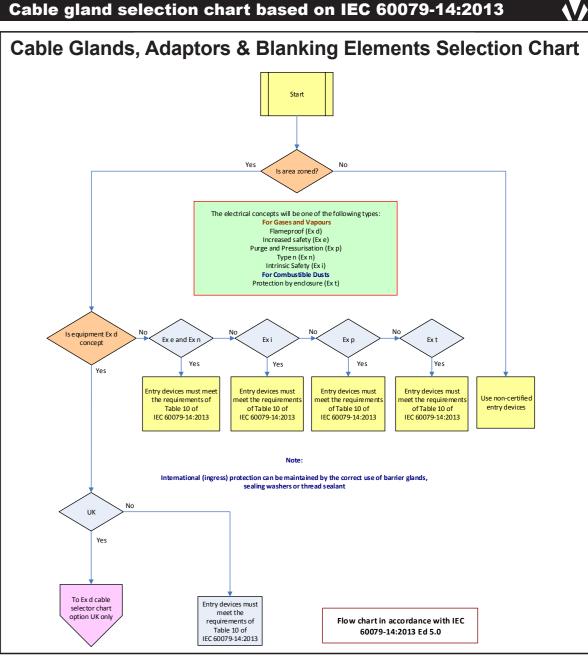
IEC 60079-2 require that equipment of type of protection "py" will only contain equipment of type of protection "d", "e", "i", "m", "nA"," nC", "o" or "q"

Data for Flammable Gases and Vapours (ISO/IEC 80079-20-1:2017) For the list of materials download the FREE Flamcal app (iOS, Android and PC), visit www.exveritas.com

	ressurized Enclosures used in Group II Hazardous locations. ummary of protection requirements (no internal release)								
EPL	ATEX Category	Enclosure contains equipment not meeting "Gc" requirements	Enclosure contains equipment meeting "Gc" requirements without pressurization						

		closures used in Group III Hazard otection requirements (no interna	
	1	Immediate action should be taken to restore the integrity	of the system
Gc	3G	Alarm	no pressurization required
Gb	2G	Alarm and switch-off	Alarm¹

			· · · · · · · · · · · · · · · · · · ·
EPL	ATEX Category	Ignition capable equipment	Non-ignition capable equipment
Db	2D	Alarm and switch-off	Alarm
Dc	3D	Alarm	no pressurization required



		Density relative	Flash point	Melting Point	Boiling Point	Flammable Li	mits Volume %	Ignition Temperature	Maximum Experimental Safe	Temperature		Minimum Ignitio
CAS No	Substance	to air (Air =1)	°C	°C	°C	LEL	UEL	°c	Gap (MESG) mm	Class	Group	Current Ratio
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	Т3	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		Т3	IIA	
74-82-8	Methane (Firedamp)	0.55	gas			4.4	17.0	595	1.14	T1	ı	
74-82-8	Methane		gas	-182	-162	4.4	17.0	600	1.12	Т3	IIA	1.00
111-65-9	Octane	3.93	13	-57	126	0.80	6.5	206	0.94	Т3	IIA	
8006-61-9	Petrol(Gasoline)	3.0	-46			1.4	7.6	280		Т3		
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		Т3	IIA	
95-47-6	Xylene	3.66	30			1.0	7.6	470	1.09	T1	IIA	

