FLAMMABLE FACTS

AREA CLASSIFICATION

	Guideline figures	Flammable atmosphere present continuously >1000hrs/annum	Flammable atmosphere present intermittently >10<1000hrs/annum	Flammable atmosphere present abnormally <10hrs/annum	Standard
IEC/CENELEC/EUROPE	Gas	Zone 0	Zone 1	Zone 2	IEC 60079-10
	Dust	Zone 20	Zone 21	Zone 22	IEC 61241-3
NORTH AMERICA	NEC 505 Gas	Zone 0	Zone 1	Zone 2	Listed in NEC 505-5
	NEC 500 Gas & Dust	Division 1		Division 2	Listed in NEC 500-3(c)

No catalogue? Contact MTL

GAS GROUPING

Typical gas hazard	IEC 60079-0 CENELEC EN50014	North America NEC Article 500 (Class I)*	Minimum ignition energy (microjoules)
ACETYLENE	IIC	A	20
HYDROGEN	IIC	B	20
ETHYLENE	IIB	C	60
PROPANE	IIA	D	180

*North American hazard categories: Class I (Gases & Vapours); Class II (Dusts); Class III (Fibres)

Certification Code

[E Ex ia] IIC T4

- Temperature classification**
- Apparatus group (gas group)
- Protection concept (IS)
- Explosion protected
- Certified to the CENELEC standard
- Associated apparatus*

* Located in non-hazardous area and may be connected to hazardous area
**Hazardous-area apparatus

Application notes Technical papers Textbooks etc

Training & education on hazardous area instrumentation

SIMPLE APPARATUS

- Passive components
- Well defined sources of stored energy considered in safety analysis
- Sources of generated energy not more than * 1,5V, 100mA & 25mW
- NOT piezoelectric crystal protected components voltage or current enhancement

*Note: North America still uses 1,2V and 20 microjoules

APPARATUS TEMPERATURE CLASSIFICATION (T CLASS)

	°C
IIA T1 AMMONIA 630°	700°
IIC T1 HYDROGEN 560°	600°
IIA T1 METHANE 537°	500°
IIA T1 PROPANE 470°	400°
IIB T2 ETHYLENE 425°	300°
IIA T2 BUTANE 372°	200°
IIC T2 ACETYLENE 305°	100°
IIA T3 CYCLOHEXANE 259°	
IIA T3 KEROSENE 210°	
IIB T4 DIETHYL ETHER 160°	
IIC T6 CARBON DISULPHIDE 95°	

T1 450° T2 300° T3 200° T4 135° T5 100° T6 85°

Small component relaxation

SURFACE AREA	T4 CLASSIFICATION
<20mm² >20mm² <10cm² >20mm²	Surface temperature <275°C Surface temperature <200°C Power dissipation < 1,3 W* at 40°C ambient

*Reduced to 1,2 W with 60°C ambient or 1,0 W with 80°C ambient

STANDARDS FOR METHODS OF PROTECTION

	Code	CENELEC EN	IEC 60079	Permitted Zone ATEX category 0 / 1	1 / 2	2 / 3	Remarks
Explosion prevention & protection-pt. 1		1127-1					Basic concepts and methodology. Further sections imminent
Category M1		50303					Mining equipment operated in gas atmosphere
Electrical equipment for dusts (D)		50281-1-1					Enclosure protected - construction and testing
Electrical equipment for dusts (D)		50281-1-2					Enclosure protected - selection, installation & maintenance
GROUP II ELECTRICAL APPARATUS for gas atmospheres							
Category 1G		50284	-26				Permits combined methods of protection
General requirements		50014	-0				Basic electrical requirements
Oil immersion	o	50015	-6				Protection by gas exclusion - transformers
Pressurised	p	50016	-2				Protection by gas exclusion - analysers
Powder filled	q	50017	-5				Protection by gas exclusion - weighing machines
Flameproof	d	50018	-1				Prevention of propagation of internal explosion - dc motors
Increased safety	e	50019	-7				Prevention by design - induction motors
Intrinsic safety ia	ia	50020	-11				Low energy. Safe with two faults - level measurement
Intrinsic safety ib	ib	50020	-11				Low energy. Safe with one fault - displays
Intrinsically safe systems		50039	-25				Considers combination of intrinsically safe apparatus
Encapsulated	m	50028	-18				Protection by gas exclusion - solenoid valves
Type of protection 'n'	n	50021	-15				

Codes of Practice

SUBJECT	STANDARD IEC 60079-	BS/EN 60079-
Classification of hazardous areas	-10	-10
Electrical installations	-14	-14
Inspection and maintenance	-17	-17
Repair and overhaul	-19	-19
Data for flammable gases	-20	

CENELEC Marking / IEC Marking / SUB DIVISIONS OF TYPE n

CENELEC Marking	IEC Marking	SUB DIVISIONS OF TYPE n
R	A	Restricted breathing enclosures
L	Z	Energy limited apparatus
P	C	Simplified pressurised enclosure
C	A	Otherwise protected sparking apparatus
A		Non-sparking apparatus

INGRESS PROTECTION (IP) CODES

(IEC/EN 60529)

FIRST NUMERAL Protection against solid bodies		SECOND NUMERAL Protection against liquid
NO PROTECTION	0	NO PROTECTION
OBJECTS GREATER THAN 50mm	1	VERTICALLY DRIPPING WATER
OBJECTS GREATER THAN 12mm	2	ANGLED DRIPPING WATER -75° to 90°
OBJECTS GREATER THAN 2.5mm	3	SPRAYED WATER
OBJECTS GREATER THAN 1.0mm	4	SPLASHED WATER
DUST-PROTECTED	5	WATER JETS
DUST-TIGHT	6	HEAVY SEAS
	7	EFFECTS OF IMMERSION
	8	INDEFINITE IMMERSION

Example: IP65 equipment is dust-tight and protected against water jets

US ENCLOSURE RATINGS

NEMA 7 to 10 Hazardous Area Enclosures

NEMA, UL, & CSA type rating	Approximate IEC/IP classification	Abbreviated protection description
1	IP30	Indoor, from contact with contents
2	IP31	Indoor, limited, from dirt & water
3	IP64	Outdoor, from rain, sleet, windblown dust & ice damage
3R	IP32	Outdoor, from rain, sleet & ice damage
4	IP66	Indoor & outdoor, from windblown dust, rain, splashing & hose directed water & ice damage
4X	IP66	Indoor & outdoor, from corrosion, windblown dust, rain, splashing & hose directed water & ice damage
6	IP67	Indoor & outdoor, from hose-directed water, water entry during sub-mersion & ice damage
12	IP55	Indoor, from dust, falling dirt & dripping non-corrosive liquids
13	IP65	Indoor, from dust, spraying water, oil & non-corrosive liquids

BSI for standards
+44 (0) 0208 996 9001
Web site: bsonline.techindex.co.uk

Lightning & surge protection? consult TELEMATIC

Have you received the companion ATEX poster? +44 (0) 1582 407435

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