

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	Zone 0	Zone 1	Zone 2	IEC 60079-10:2002 IEC 61241-3:1997
Gas Dust	Zone 0 Zone 20	Zone 1 Zone 21	Zone 2 Zone 22	
NORTH AMERICA	Zone 0	Zone 1	Zone 2	Listed in NEC® Article 505-5 Listed in NEC® Article 500-3(c)
NEC 505 Gas	Zone 0	Zone 1	Zone 2	
NEC 500 Gas & Dust	Division 1		Division 2	

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 America hazard categories: Class I (Gases & Vapours); Class II (Dusts); Class III (Fibres)

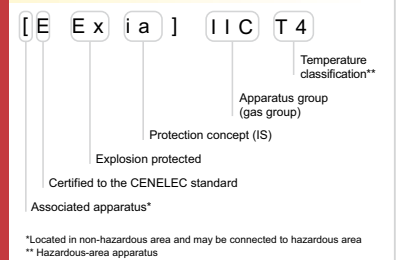
INGRESS PROTECTION (IP) CODES (IEC/EN 60529)

FIRST NUMERICAL	SECOND NUMERICAL
Protection against solid bodies	Protection against liquid
NO PROTECTION	NO PROTECTION
OBJECTS GREATER THAN 50mm	VERTICALLY DRIPPING WATER
OBJECTS GREATER THAN 12mm	ANGLED DRIPPING WATER -75° TO 90°
OBJECTS GREATER THAN 2.5mm	SPRAYED WATER
OBJECTS GREATER THAN 1.0mm	SPLASHED WATER
DUST PROTECTED	WATER JETS
DUST TIGHT	HEAVY SEAS
EXAMPLE IP65	EFFECTS OF IMMERSION
Equipment is dust-tight and protected against water jets.	INDEFINITE IMMERSION

Group II Electrical Apparatus for gas atmospheres 'G'

Code	CENELEC EN	IEC 60079	Permitted Zone ATEX category			REMARKS
			0	1	2	
Category 1G	50284		1	2	3	Permits combined methods of protection
General requirements	50014	-0				Basic electrical requirements
Oil immersion	50015	-6				Protection by gas exclusion - transformers
Pressurised	50016	-2				Protection by gas exclusion - analysers
Powder filled	50017	-5				Protection by gas exclusion - weighing machines
Flameproof	50018	-1				Prevention of propagation of internal explosion - dc motors
Increased safety	50019	-7				Prevention by design - induction motors
Intrinsic safety	50020	-11				Low energy. Safe with two faults - Level measurement
Intrinsic safety	50020	-11				Low energy. Safe with one fault - displays
Intrinsically safe systems	50039	-25				Considers combinations of intrinsically safe apparatus
Fieldbus Intrinsically safe concept FISCO		-27				Technical specification. Will move to 'Standard' status. Zone 2 'nL' addition will be proposed (see below FNICO)
Encapsulated	50028	-18				Protection by gas exclusion
Type of protection 'n'	50021	-15				Prevention by design

Certification Code



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

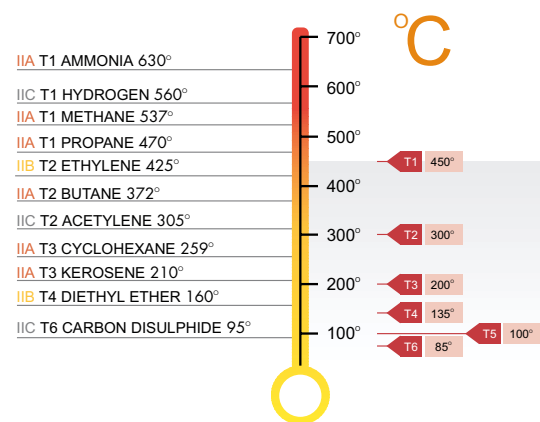
Codes of Practice for gas atmospheres

	CENELEC EN 60079	IEC 60079	REMARKS
Classification of hazardous areas	-10	-10	New IEC version published 2002
Electrical Installations	-14	-14	New IEC version published 2002
Inspection and maintenance	-17	-17	New IEC version published 2002
Repair and overhaul	-19	-19	
Data for flammable gases		-20	

Explosion Protection - Europe

	CEN	REMARKS
Explosion prevention & protection	EN 1127-1 Part 1 -	Basic concepts & methodology for all industries except mining
Explosion prevention & protection	EN 1127-2 Part 2 -	Basic concepts & methodology for mining

IGNITION TEMPERATURE/TEMPERATE CLASS (T CLASS)



SMALL COMPONENT RELAXATION

SURFACE AREA	T4 CLASSIFICATION
<20mm²	Surface temperature <275°C
>20mm² <10mm²	Surface temperature <200°C
>20mm²	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

Mechanical Impacts (IK) Code EN50102

IK code	IK00	IK01	IK02	IK03	IK04	IK05	IK06	IK07	IK08	IK09	IK10
Impact energy (Joules)	*	0.14	0.2	0.35	0.5	0.7	1	2	5	10	20

Degrees of protection provided by enclosures for electrical equipment against mechanical impacts

US ENCLOSURE RATINGS

NEMA, UL & CSA type rating	Approximate IEC/IP classification	Abbreviated protection description
1	IP20	Indoor, from contact with contents
2	IP22	Indoor, limited, falling dirt & water
3	IP55	Outdoor, from rain, sleet windblown dust & ice damage
3R	IP24	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	IP54	Indoor, from dust, falling dirt & dripping non-corrosive liquids
13	IP54	Indoor, from dust, spraying water, oil & non-corrosive liquids

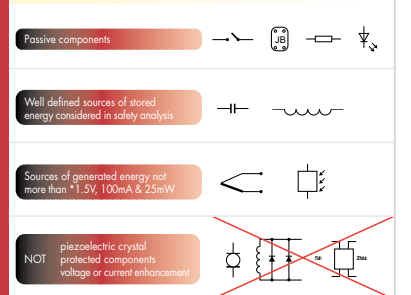
Group II Electrical Apparatus for combustible dusts 'D'

Code	CENELEC EN	IEC 61241	Permitted Zone ATEX category			REMARKS
			20	21	22	
Electrical apparatus for dusts	50281-1-1	-1-1 : 1999				Enclosure protected - construction and testing
Electrical apparatus for dusts	50281-1-2	-1-2 : 1999				Enclosure protected - selection, installation and maintenance
Electrical apparatus for dusts	50281-2-1	-2-1 : 1994				Method for determining minimum ignition temperatures for dust
Electrical apparatus for dusts	50281-3	-3 : 1997				Classification of areas where combustible dusts present
Electrical apparatus for dusts	'pD'	-4 : 2001				Type of protection 'pD' - pressurised

Note: IEC are currently working on a programme to introduce a parallel series of standards for combustible dusts reflecting the IEC 60079 - gas atmosphere standards. They have agreed to re-number the parts as shown below. It is anticipated that a number of these will be published by the end of 2003

NEW IEC PROPOSED STANDARD NUMBER	TITLE	PROPOSED CODE	STATUS	IEC STANDARD NUMBER	TITLE
61241-0	General requirements for electrical apparatus for use in presence of combustible dusts	-	WORK IN PROGRESS	61241-1-1	Enclosure protected, temperature limitation - construction and testing
61241-1	Protection by enclosure	iD		61241-4	Type of protection 'pD'
61241-2	Type of protection 'pD' - pressurisation	pD		61241-3	Area classification
61241-10	Area classification	-		-	-
61241-11	Intrinsically safe apparatus	iD		61241-1-2	Selection, installation and maintenance of apparatus meeting IEC61241-1-1 above
61241-14	Selection and installation for electrical apparatus for dusts	-		-	-
61241-17	Inspection and maintenance requirements	-		-	-
61241-18	Apparatus protected by encapsulation	mD		-	-
61241-20-1	Test methods for dust other parts will also be generated	-		61241-2-1	Methods for determining minimum ignition temperatures of dust

Simple Apparatus



*Note: North America still uses 1.2V and 20 microjoules

Fieldbus in hazardous areas

The Fieldbus Intrinsically safe Concept (FISCO) IEC60079-27 Technical Specification will move to 'Standard' status in the near future. The benefits from FISCO will be extended to include similar levels of flexibility in Zone 2 and Division 2. Further details are contained in MTL Application Notes AN9026 FISCO and AN9027 FNICO (Fieldbus Non-Incendive Concept)