

# 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
<b>IEC/CENELEC/EUROPE</b>	Zone 0	Zone 1	Zone 2	IEC 60079-10:2002 IEC 61241-3:1997
<b>Gas</b> <b>Dust</b>	Zone 20	Zone 21	Zone 22	
<b>NORTH AMERICA</b>	Zone 0	Zone 1	Zone 2	Listed in NEC® Article 505-5 Listed in NEC® Article 500-3(c)
<b>NEC 505 Gas</b> <b>NEC 500 Gas &amp; Dust</b>	Division 1	Division 2	Division 2	

## APPARATUS/GAS GROUPING

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

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

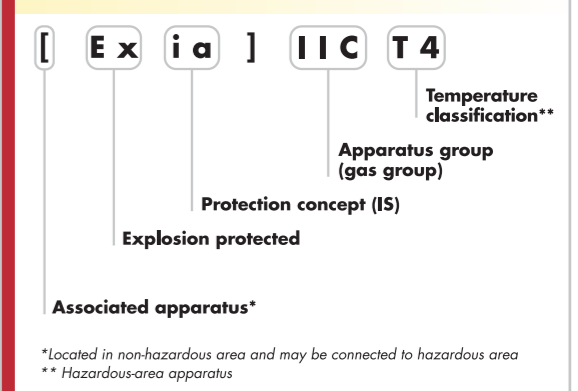
## INGRESS PROTECTION (IP) CODES (IEC/EN 60529)

FIRST NUMERAL	SECOND NUMERAL
Protection against solid bodies	Protection against liquid
NO PROTECTION	NO PROTECTION
OBJECTS GREATER THAN 50mm	VERTICALLY DRIPPING WATER
OBJECTS GREATER THAN 12mm	DRIPPING WATER - ENCLOSURE TILT +/- 15°
OBJECTS GREATER THAN 2.5mm	SPRAYED WATER
OBJECTS GREATER THAN 1.0mm	SPLASHED WATER
DUST PROTECTED	WATER JETS
DUST TIGHT	HEAVY SEAS
<b>EXAMPLE IP65</b>	TEMPORARY 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	
<b>Category 1G</b>	50284					Permits combined methods of protection
<b>General requirements</b>	50014	-0				Basic electrical requirements
<b>Oil immersion</b>	50015	-6				Protection by gas exclusion - transformers
<b>Pressurised</b>	60079-2	-2				Protection by gas exclusion - analysers
<b>Powder filled</b>	50017	-5				Protection by gas exclusion - weighing machines
<b>Flameproof</b>	60079-1	-1				Prevention of propagation of internal explosion - dc motors
<b>Increased safety</b>	60079-7	-7				Prevention by design - induction motors
<b>Intrinsic safety</b>	60079-11	-11				Low energy. Safe with two faults - Level measurement
<b>Intrinsic safety</b>	60079-11	-11				Low energy. Safe with one fault - displays
<b>Intrinsic safety</b>	60079-11	-11				'NEW' Low energy. Safe in normal operation
<b>Intrinsically safe systems</b>		-25				Considers combinations of intrinsically safe apparatus
<b>Fieldbus intrinsically safe concept FISCO</b>		-27				FISCO and FNICO. Details of apparatus, systems and installation
<b>Encapsulated</b>	ma mb	60079-18				Protection by gas exclusion
<b>Type of protection 'n'</b>	n	60079-15				Prevention by design

## Certification Code



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

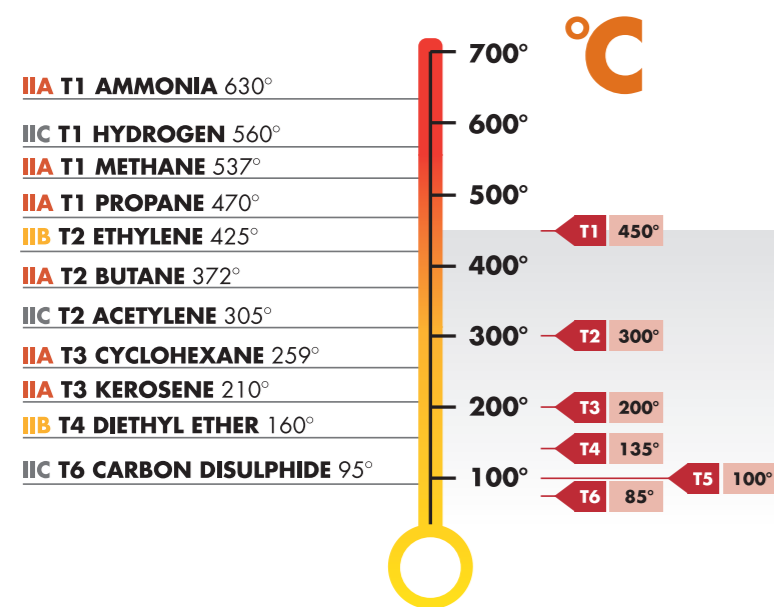
## Codes of Practice for gas atmospheres - Selection, installation, inspection, maintenance

	CENELEC EN 60079	IEC 60079	REMARKS
<b>Classification of hazardous areas</b>	-10	-10	New IEC version published 2002
<b>Electrical Installations</b>	-14	-14	New IEC version published 2002
<b>Inspection and maintenance</b>	-17	-17	New IEC version published 2002
<b>Repair and overhaul</b>	-19	-19	New IEC version published 2006
<b>Data for flammable gases</b>		IEC79 -20	Technical Report

## Explosion Protection - Europe

	CEN	REMARKS
<b>Explosion prevention &amp; protection</b>	EN 1127-1 Part 1 -	Basic concepts & methodology for all industries except mining
<b>Explosion prevention &amp; protection</b>	EN 1127-2 Part 2 -	Basic concepts & methodology for mining

## IGNITION TEMPERATURE/TEMPERATURE 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	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 7 TO 10 HAZARDOUS AREA ENCLOSURES

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 submersion & ice damage
12	IP54	Indoor, from dust, falling dirt & dripping non-corrosive liquids
13	IP54	Indoor, from dust, spraying water, oil & non-corrosive liquids

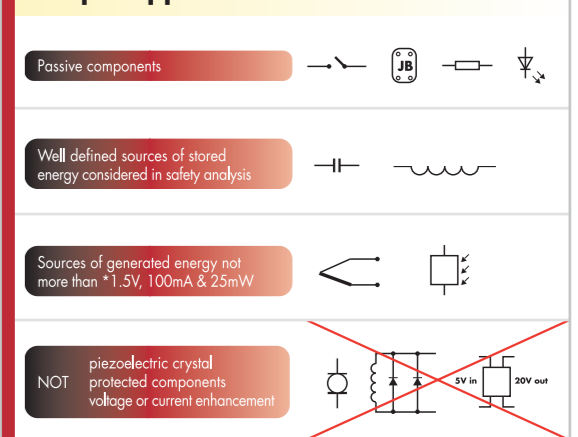
## Group II Electrical Apparatus for combustible dusts 'D'

Code	CENELEC EN	IEC 61241	Permitted Zone ATEX category			REMARKS
			20	21	22	
<b>Electrical apparatus for dusts</b>	50281-1-1	-1-1 : 1999				Enclosure protected - construction and testing
<b>Electrical apparatus for dusts</b>	50281-1-2	-1-2 : 1999				Enclosure protected - selection, installation and maintenance
<b>Electrical apparatus for dusts</b>	50281-2-1	-2-1 : 1994				Method for determining minimum ignition temperatures for dust
<b>Electrical apparatus for dusts</b>	50281-3	-3 : 1997				Classification of areas where combustible dusts present
<b>Electrical apparatus for dusts</b>	'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. Work continues.

NEW IEC PROPOSED STANDARD NUMBER	TITLE	PROPOSED CODE	EARLY IEC STANDARD NUMBER	TITLE
61241-0	General requirements for electrical apparatus for use in presence of combustible dusts	-	61241-1-1	Published 2004
61241-1	Protection by enclosure	iD	61241-1-1	Enclosure protected, temperature limitation - construction and testing. Published 2004
61241-2	Type of protection 'pD' - pressurisation	pD	61241-4	Type of protection 'pD'. Published 2001
61241-10	Area classification	-	61241-3	Published 2004
61241-11	Intrinsically safe apparatus	iD	-	Published 2005
61241-14	Selection and installation for electrical apparatus for dusts	-	61241-1-2	Published 2004
61241-17	Inspection and maintenance requirements	-	-	Published 2005
61241-18	Apparatus protected by encapsulation	mD	-	Published 2004
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) IEC60079-27:2005 has now moved to 'Standard' status. The benefits from FISCO have been extended to include similar levels of flexibility in Zone 2 and Division 2 known as Fieldbus non-incendive concept (FNICO). Further details are contained in MTL Application Notes AN9026 FISCO and AN9027 FNICO (Fieldbus Non-Incendive Concept)