

## HAZARDOUS AREA REFERENCE CHART

### NORTH AMERICAN HAZARD CATEGORY

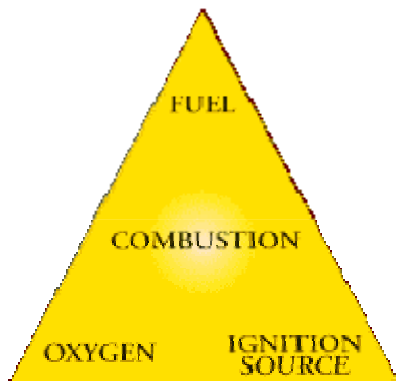
	Example	NEC 500-503	NEC 505
CLASS I (Gases and Vapors)	Acetylene Hydrogen Ethylene Propane	Group A Group B Group C Group D	IIC IIC or IIB+H <sub>2</sub> IIB IIA
CLASS II (Dusts)	Metal dust Coal dust Grain dust	Group E Group F Group G	
CLASS III (Fibers & Flyings)	Wood,paper or cotton processing.	No sub-groups	

### GAS GROUPING

Typical gas hazard	North America NEC Article 500 (Class I)	CENELEC EN 50 014 IEC
ACETYLENE	A	IIC
HYDROGEN	B	IIC or IIB +H <sub>2</sub>
ETHYLENE	C	IIB
PROPANE	D	IIA

Gas classification and ignition temperatures relate to mixtures of gas and air at ambient temperature and atmospheric pressure.

## COMBUSTION TRIANGLE



## AREA CLASSIFICATION

	Continuous hazard	Intermittent hazard	Hazard under abnormal conditions
NORTH AMERICA /NEC500-503	Division 1	Division 1	Division 2
IEC/CENELEC/EUROPE /NEC505 <sup>+</sup>	Zone 0 (Zone 20 dust)	Zone 1 (Zone 21 dust)	Zone 2 (Zone 22 dust)
SAFETY CATEGORIES VAPORS*	G1	G2	G3
SAFETY CATEGORIES DUSTS*	D1	D2	D3

Zones and Divisions and safety categories: a measure of the likelihood of the hazard being present. This defines the method of protection which may be used. NEC - National Electrical Code is a registered trademark, National Fire Protection Association NEC 505 covers explosive gases and vapors only \* according EU directive 94/9 EU (ATEX)

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## TEMPERATURE CLASSIFICATION

Max. surface temp.(°C)	NEC Table500-3(d)	IEC79-8 T Class	EN 50 014
450°C	T1	T1	T1
300°C	T2	T2	T2
280°C	T2A	--	--
260°C	T2B	--	--
230°C	T2C	--	--
215°C	T2D	--	--
200°C	T3	T3	T3
180°C	T3A	--	--
165°C	T3B	--	--
160°C	T3C	--	--
135°C	T4	T4	T4
120°C	T4A	--	--
100°C	T5	T5	T5
85°C	T6	T6	T6

A full list of gases and temperature classifications is published in the Crouse-Hinds Code Digest.

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## METHODS OF EXPLOSION PROTECTION

Method of protection	Permitted in Division	Permitted in Zone	IEC Standard 79-	CENELEC Standard EN 50...	Code letter IEC Ex... CENELEC EEx...
GENERAL REQUIREMENTS	-	-	0	014	-
OIL IMMERSION	1 or 2	1 or 2	6	015	o
PRESSURIZATION	1 or 2	1 or 2	2	016	p
POWDER /SAND FILLING	2	1 or 2	5	017	q
FLAMEPROOF	-	1 or 2	1	018	d
INCREASED SAFETY	2	1 or 2	7	019	e
INTRINSIC SAFETY	1 or 2	0*,1 or 2	11	020(apparatus) 039(systems)	ia or ib
FACTORY SEALING	1 or 2	1 or 2	-	-	-
ELECTRICAL APPARATUS with type of protection "n" ^	2	2	15	021(pending)	n
ENCAPSULATION	-	1 or 2	18	028	m
SPECIAL	-	1 or 2	None**	None	s

\*ia: Zone 0,1,2; ib: Zone 1,2, not Zone 0 \*\* mentioned in IEC 79-0

^ includes non-sparking, restricted breathing, hermetically-sealed, non-incendive, etc.

## NORTH AMERICAN AND EU TESTING AUTHORITIES

Country	Testing Authority	Country	Testing Authority
USA	Underwriters Laboratories	USA	Factory Mutual
USA	ETL	Canada	CSA
Mexico	ANCE	Austria	TÜV-A
Austria	BVFA	Belgium	ISSEP
Denmark	DEMKO	Finland	VTT
France	INERIS	France	LCIE
Italy	CESI	Netherlands	KEMA
Norway	NEMKO	Spain	LOM
Sweden	SP	United Kingdom	BASEEFA/EECS
United Kingdom	SCS	Germany	PTB

Germany	BVS		
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### INGRESS PROTECTION: (IP) CODES AND NEMA TYPES

FIRST NUMERAL Protection against solid bodies	SECOND NUMERAL Protection against liquid
0 - NO PROTECTION	0 - NO PROTECTION
1- OBJECTS EQUAL TO OR GREATER THAN 50 mm	1 - VERTICALLY DRIPPING WATER
2 - OBJECTS EQUAL TO OR GREATER THAN 12.5 mm	2 - 75 TO 105°-ANGLED DRIPPING WATER
3 - OBJECTS EQUAL TO OR GREATER THAN 2.5 mm	3 - SPRAYING WATER
4 - OBJECTS EQUAL TO OR GREATER THAN 1.0 mm	4 - SPLASHING WATER
5 - DUST-PROTECTED	5 - WATER JETS
6 - DUST-TIGHT	6 - HEAVY SEAS, POWERFUL WATER JETS
	7 - EFFECTS OF IMMERSION
	8 - INDEFINITE IMMERSION

#### Example: **IP56**

FIRST NUMERAL Protection against solid bodies	SECOND NUMERAL Protection against liquid
0 - NO PROTECTION	0 - NO PROTECTION
1- OBJECTS EQUAL TO OR GREATER THAN 50 mm	1 - VERTICALLY DRIPPING WATER
2 - OBJECTS EQUAL TO OR GREATER THAN 12.5 mm	2 - 75 TO 105°-ANGLED DRIPPING WATER
3 - OBJECTS EQUAL TO OR GREATER THAN 2.5 mm	3 - SPRAYING WATER
4 - OBJECTS EQUAL TO OR GREATER THAN 1.0 mm	4 - SPLASHING WATER
<b>5 - DUST-PROTECTED</b>	5 - WATER JETS
6 - DUST-TIGHT	<b>6 - HEAVY SEAS, POWERFUL WATER JETS</b>
	7 - EFFECTS OF IMMERSION
	8 - INDEFINITE IMMERSION

**Conversion of Enclosure Type numbers to IEC Classification Designations**  
**(Cannot be used to convert IEC Classification Designations to NEMA Type numbers)**

NEMA ENCLOSURE TYPE NUMBER	IEC ENCLOSURE CLASSIFICATION DESIGNATION
3	IP54
3R	IP54
3S	IP54
4 and 4X	IP56
5	IP52
6 and 6P	IP67
12 and 12K	IP52

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## **NEMA and UL Types of Enclosures**

### **Type 3 Enclosure**

Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet and external ice formation.

### **Type 3R Enclosure**

Type 3R enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain and external ice formation.

### **Type 3S Enclosure**

Enclosures are intended for outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust, and to provide for operation of external mechanisms when ice laden.

### **Type 4 Enclosure**

Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and external ice formation.

### **Type 4X Enclosure**

Type 4X enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and external ice formation.

### **Type 7 Enclosure**

Type 7 enclosures are for use indoors in locations classified as Class I, Groups A, B, C or D, as defined in the National Electrical Code®.

### **Type 9 Enclosure**

Type 9 enclosures are for use in indoor locations classified as Class II, Groups E, F or G, as defined in the National Electrical Code®.

### **Type 12 Enclosure**

Type 12 enclosures are intended for indoor use primarily to provide degree of protection against dust, falling dirt and dripping noncorrosive liquids.