



## Larson Electronics LLC WWW.MAGNALIGHT.COM

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

### II. NEC Hazardous Location Classification and Ignition Temperatures

A Hazardous Location is an area where a fire and/or explosion hazard may exist due to flammable gasses or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings. The area is classified in accordance with properties of the material responsible for the potential hazard and with the likelihood of the hazard actually being present.

The following explains the significance of Class, Group, Division and Ignition Temperature.

Class is used to provide a general definition of the physical characteristics of the hazardous material with which we are dealing. The three classes are:

#### **Class I**

Gasses, vapors and liquids that can be present in explosive or ignitable mixtures. For example: Gasoline - As a vapor (or liquid) is ignitable and/or explosive; therefore, it is a Class I material.

#### **Class II**

Dust, Combustible dust that can be present in amounts that could produce potentially explosive mixtures, or dust of an electrically conductive nature.

Examples: Flour or cornstarch. As a compact mass these products may only burn or smolder but when finely distributed in air. The mixture becomes explosive.

Metallic dust such as aluminum or magnesium have several dangerous properties.

- A. They are electrically conductive.
- B. They can burn very violently even when not finely distributed in air.
- C. When finely distributed in air they can be violently explosive.

All fall into Class II - Dust.

**Class III** - Fibers or flyings that are easily ignitable but are not apt to be suspended in air in such amounts to produce ignitable mixtures.

Example: Rayon, Nylon, Cotton, Sawdust or Wood Chips, etc.

Group designations are used to selectively group the material by relatively similar hazardous characteristics.

For Example: Both gasoline and hydrogen are explosive when mixed with and ignited, but the explosive effect and violence of the resulting explosion will be substantially different.

Groups are designed by the letters A through G. A through D are Groups for Class I and E through G are Groups for Class II.

#### **A, B, C, D - Gases/vapors are grouped by:**

- Severity of explosion pressure expected.
- Extent of flame propagation between parts.

#### **E, F, G, - Dusts are grouped by:**



## Larson Electronics LLC WWW.MAGNALIGHT.COM

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

- Combustibility
- Penetrability between parts
- Ability to contribute to creation of an ignition source (abrasiveness, electrical conductiveness).
- Blanketing effect
- Ignition temperatures

### Classification of Gases, Vapors and Dusts for Electrical Equipment

(NFPA-497M) can be used by authorities having jurisdiction as a guide for determining the Class and Group of a particular material. It includes materials classified by test and materials classified by analogy to tested materials. Authorities should consider verifying classifications by test if the material of concern has only been classified by analogy.

### Division

Divisions are used to evaluate the possibility of the hazardous material being present at a particular location in ignitable mixtures. Two Division classifications are utilized, Division 1 and Division 2.

### Ignition Temperature

In addition to having physical properties that make them different from each other (Class) and different explosive characteristics once they are ignited (Group), hazardous substances also have one other characteristic that must be dealt with. This characteristic is the ignition temperature. The minimum ignition temperature is the minimum temperature at which the substance will start to burn or explode.

**Example:** Virtually every car is equipped with an electric cigarette lighter. Obviously this lighter will not light a cigarette when the lighter is *cold*. Similarly when it is heated to the point where the element glows, it will light a cigarette. At some point in the range between cold and glowing hot, there is a temperature where it would not light the cigarette, but an increase of only one degree would make it hot enough to ignite the tobacco. The temperature at which ignition is possible would be the *ignition temperature* of the cigarette.

Materials can have the same physical properties (Class) and similar explosive properties (Group), but substantially different ignition temperatures. There is no consistent relationship between explosion properties and ignition temperature.

**For example:** A common Class I, Group D solvent, acetone, has an approximate ignition temperature of 465°C. Gasoline, also Class I, Group D, has an approximate ignition temperature of 280°C. Therefore, Class I, Group D equipment with a maximum surface temperature at 350°C could be used in an acetone environment, but the same equipment operated in gasoline vapors could cause ignition or explosion due to the 280°C ignition temperature of gasoline.

Some Group C gasses have higher ignition temperature than certain Group D gasses, and some have lower. The same can be said for any two Groups.

### Ignition Temperature Determination

Due to effects of various conditions on ignition temperatures, USEM cannot assume responsibility for determining the required ignition temperature.

**Fire Hazard Properties of Flammable Liquids, Gasses and Volatile Solids** (NFPA-325M) can be used as a guide, but in that it is not a standard and that it qualifies itself with the fact that ignition temperatures can vary with



**Larson Electronics LLC WWW.MAGNALIGHT.COM**

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

conditions, and therefore, "ignition temperatures should be looked upon only as approximations", user and authorities having jurisdiction must bear the responsibility for ignition temperature determination.

**Summary**

- o Class: Denotes physical characteristics of the materials.
- o Group: Categorizes the materials by relatively similar hazardous characteristics.
- o Division: Classifies the likelihood of the presence of the hazardous condition.
- o Ignition Temperature: Temperature at which material will ignite (independent of GROUP classification).

**III. Ignition Temperature vs. Temperature Markings**

In general, the NEC stipulates that an operating temperature or temperature range marking appears on equipment approved for Division 1 Hazardous Locations. For motors, U.L. further clarifies that this marking is to indicate the maximum temperature for all conditions including overload, locked rotor and single-phasing.

Per the NEC, the temperature range marking is in the form of an Identification Number shown in the below. U.L. calls this a Code Number.

T-Codes and Associated Temperature		
Identification Numbers	Maximum Temperature	
T1	450°C	842°C
T2	300	572
T2A	280	536
T2B	260	500
T2C	230	446
T2D	215	419
T3	200	392
T3A	180	356
T3B	165	329
T3C	160	320
T4	135	275
T4A	120	248
T5	100	212
T6	85	185

The user should make sure the temperature marking on approved equipment does not designate a temperature greater than the ignition temperature of the hazardous dust, fiber, gas or vapor of concern, even if the marked Class and Group meet the location requirements.

**HAZARDOUS (CLASSIFIED) LOCATIONS — GENERAL INFORMATION**

Hazardous (classified) locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors or flammable liquids, combustible dusts, or ignitable fibers or flyings.

There are two independent classification systems. One system, found in Article 500 of the NEC, divides all hazardous (classified) locations into Classes, Divisions and Groups. A Division 1 location is a location where an ignitable concentration of a flammable or combustible material is present under normal operating conditions. A Division 2 location is a location where an ignitable



**Larson Electronics LLC WWW.MAGNALIGHT.COM**

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

concentration of a flammable or combustible material is present only under abnormal operating conditions.

The other classification system is found in Articles 505 and 506 of the NEC:

Article 505 divides locations having gases and vapors into Class I, Zones and Gas Groups. A Zone 0 location is a location where ignitable concentrations are present continuously or for long period of time. A Zone 1 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 2 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

Article 506 divides locations having dusts, fibers or flyings into Zones. A Zone 20 location is a location where ignitable concentrations are present continuously or for long periods of time. A Zone 21 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 22 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

Protection against explosion in hazardous (classified) locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself. In addition, intrinsically safe circuit wiring terminals and intrinsically safe equipment is marked "Intrinsically Safe."

### **Gas, Vapor and Dust Groups**

The following paragraphs group flammable and explosive mixtures of specific gases, vapors and dusts in accordance with the NEC classifications noted in Article 500. For a complete list of group classifications for Class I and II materials where used within Divisions 1 or 2, see ANSI/NFPA 497, "Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas," and ANSI/NFPA 499, "Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas."

### **Class I Equipment**

Equipment for use in Class I hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of location classification for Divisions 1 and 2, such mixtures have been grouped on the basis of their characteristics as follows:



**Larson Electronics LLC WWW.MAGNALIGHT.COM**

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

**Class I, Group A** — Atmospheres containing acetylene.

**Class I, Group B** — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.45 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.40. Examples of Group B materials are acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, and fuel and combustible process gases containing more than 30% hydrogen by volume.

**Class I, Group C** — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.45 mm and less than or equal to 0.75 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.40 and less than or equal to 0.80. Examples of Group C materials are ethyl ether and ethylene.

**Class I, Group D** — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.75 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80. Examples of Group D materials are acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha and propane.

Equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations, as defined in Article 505 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of location classification, such mixtures have been grouped on the basis of their characteristics as follows:

**Class I, Group IIC** — Atmospheres containing hydrogen, acetylene, or gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.50 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.45.

**Class I, Group IIB** — Atmospheres containing acetaldehyde, ethylene, or gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.50 mm and less than or equal to 0.90 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.45 and less than or equal to 0.80.

**Class I, Group IIA** — Atmospheres containing acetone, ammonia, ethyl alcohol, gasoline, methane, propane, or gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.90 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1 and 2 Gas Groups. The gases shown are representative of others in the Group.

	<b>Division 1 &amp; 2</b>	<b>Zone 0, 1 &amp; 2</b>	
--	---------------------------	--------------------------	--



**Larson Electronics LLC WWW.MAGNALIGHT.COM**

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

	A (acetylene)	IIC (acetylene and hydrogen)	
	B (hydrogen)	IIC (acetylene and hydrogen)	
	C (ethylene)	IIB (ethylene)	
	D (propane)	IIA (propane)	

**Class I Equipment in Class II and III Locations**

Equipment Listed or Classified for use in Class I locations is not necessarily acceptable for Class II or III locations as it may not be dust-tight or operate at a safe temperature when blanketed with dust, fibers or flyings.

**Class II Equipment**

Equipment for use in Class II hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of location classification, the NEC groups combustible dust-air mixtures as follows:

**Class II, Group E** — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present an equivalent hazard.

**Class II, Group F** — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8% total volatile material, or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

**Class II, Group G** — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

There are no dust groups for Zone 20, 21 or 22. In addition, Article 506 of the NEC does not cover locations where metal dusts are present.

**Class II Equipment in Class III Locations**

Equipment Listed or Classified for Class II, Group G hazardous (classified) locations is also suitable for use in Class III locations, except for 1) those products marked for Division 2 only, and 2) fan-cooled-type motors where there is a very large amount of lint or combustible flyings that are likely to choke or clog the air passages of the motor.



## Industry Standards and Definitions

Three popular methods of protection which exist in North America for hazardous electrical locations:

Type of Protection	Method of Protection
1. Explosionproof	Containment
2. Increased Safety	Mechanical
3. Intrinsically Safe	Electrical

### North American Classification System for Hazardous Locations

North American hazardous locations are categorized by three criteria: Class - nature of hazardous substance present; Division - frequency of presence; Group - specific type of hazardous material.

**Class I** Potentially explosive gas or vapor

**Class II** Potentially explosive dust

**Class III** Potentially explosive fiber

**Division 1** Potentially explosive substance present under normal operating conditions

**Division 2** Potentially explosive substance present under abnormal operating conditions

## HAZARDOUS (CLASSIFIED) LOCATIONS or Selected Gases, Vapors and Dusts

<b>Group A - Atmospheres</b> acetylene	ethylenimine ethyl mercaptan ethyl sulfide	ethyl acrylate (inhibited) ethylene diamine (anhydrous) ethylene dichloride	propane 1-propanol (propyl alcohol) 2-propanol (isopropyl alcohol)
<b>Group B - Atmospheres</b> acrolein (inhibited) (2) arsine butadiene (1) ethylene oxide (2) hydrogen manufactured gases containing more than 30% H <sub>2</sub> (by volume) propylene oxide (2) propylnitrate	hydrogen cyanide hydrogen sulfide morpholine 2-nitropropane tetrahydrofuran unsymmetrical dimethyl hydrazine	ethylene glycol monomethyl ether gasoline heptanes hexanes isoprene isopropyl ether mesityl oxide methane (natural gas) methanol (methyl alcohol) 3-methyl-1 butanol (isoamyl alcohol) methyl ethyl ketone methyl isobutyl ketone 2-methyl-1-propanol (isobutyl alcohol) 2-methyl-2-propanol (tertiary butyl alcohol) petroleum naphtha (4) pyridine octanes pentanes 1-pentanol (amyl alcohol)	propylene styrene toluene vinyl acetate vinyl chloride xylenes
<b>Group C - Atmospheres</b> acetaldehyde allyl alcohol n-butyraldehyde carbon monoxide crotonaldehyde cyclopropane diethyl ether diethylamine epichlorohydrinn ethylene	<b>Group D - Atmospheres</b> acetic acid (glacial) acetone acrylonitrile ammonia (3) benzene butane 1-butanol (butyl alcohol) 2-butanol (secondary butyl alcohol) n-butyl acetate isobutyl acetate di-isobutylene ethane ethanol (ethyl alcohol) ethyl acetate		<b>Group E - Atmospheres</b> containing metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics
			<b>Group F - Atmospheres</b> containing carbon black, coal or coke dust
			<b>Group G - Atmospheres</b> containing flour, starch or grain dust
			<b>Note:</b> Carbon disulfide must be treated in a special manner.

**Example:** An area where hydrogen was present under normal operating conditions would require a product suitable for Class I, Division 1, Group B applications.



## Industry Standards and Definitions

	NEMA Designation	Underwriters Laboratories Inc. UL 50 and UL 508	Canadian Standards Association CSA Standard C22.2 No 94
<b>Type 1</b>	Indoor use to provide a degree of protection against contact with the enclosed equipment; in locations where unusual service conditions do not exist	Indoor use to provide a degree of protection against contact with the enclosed equipment and against a limited amount of falling dirt	General purpose enclosure; protects against accidental contact with live parts
<b>Type 2</b>	Indoor use to provide a degree of protection against contact with the enclosed equipment and against limited amounts of falling water and dirt	Indoor use to provide a degree of protection against limited amounts of falling water and dirt	Drip proof enclosure same as Type 1; indoor use to provide a degree of protection against dripping and light splashing of non-corrosive liquids and falling dirt
<b>Type 3</b>	Indoor or outdoor use to provide a degree of protection against windblown dust, rain and sleet; undamaged by the formation of ice on the enclosure (not sleet proof)	Indoor or outdoor use to provide a degree of protection against windblown dust, rain and sleet; undamaged by the formation of ice on the enclosure	Weatherproof enclosure; indoor or outdoor use to provide a degree of protection against rain, snow and blown dust; undamaged by the external formation of ice on the enclosure
<b>Type 3R</b>	Indoor or outdoor use to provide a degree of protection against falling rain and sleet; undamaged by the formation of ice on the enclosure	Indoor or outdoor use to provide a degree of protection against falling rain and sleet; undamaged by the formation of ice on the enclosure	Weather proof enclosure; indoor or outdoor use to provide a degree of protection against rain or snow; undamaged by the external formation of ice on the enclosure (CSA does not specify sleet resist)
<b>Type 3S</b>	Indoor or outdoor use to provide a degree of protection against windblown dust, rain and sleet; provides for operation of external mechanisms when ice laden	Indoor or outdoor use to provide a degree of protection against windblown dust, rain and sleet; external mechanisms remain operable while ice laden	Weather proof enclosure; indoor or outdoor use to provide a degree of protection against rain or snow; undamaged by the external formation of ice on the enclosure surface (CSA does not specify sleet proof)
<b>Type 4</b>	Indoor or outdoor use to protect the enclosed equipment against splashing water, seepage of water, falling or hose-directed water, and severe external condensation; these enclosures are sleet resistant but not sleet proof	Indoor or outdoor use to provide a degree of protection against splashing water, windblown dust and rain, and hose directed water; undamaged by the formation of ice on the enclosure	Watertight enclosure; indoor or outdoor use to provide a degree of protection against rain, snow, blown dust, splashing and hose directed water; undamaged by the external formation of ice on the enclosure
<b>Type 4X</b>	Indoor or outdoor use to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure	Indoor or outdoor use to provide a degree of protection against splashing water, windblown dust and rain, and hose directed water; undamaged by the formation of ice on the enclosure; resists corrosion	Watertight enclosure; indoor or outdoor use to provide a degree of protection against rain, snow, blown dust, splashing and hose directed water; undamaged by the external formation of ice on the enclosure; resists corrosion
<b>Type 5</b>	Indoor use to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids	Not typically used by UL.	Indoor use, so constructed that dust, readily ignitable fibers or combustible flyings cannot enter the enclosure



## Industry Standards and Definitions

	NEMA Designation	Underwriters Laboratories Inc. UL 50 and UL 508	Canadian Standards Association CSA Standard C22.2 No 94
<b>Type 6</b>	Indoor or outdoor use to provide a degree of protection against the entry of water during occasional temporary submersion at a limited depth	Indoor or outdoor use to provide a degree of protection against the entry of water during temporary submersion at a limited depth; undamaged by the formation of ice on the enclosure	No CSA equivalent
<b>Type 6P</b>	Indoor or outdoor use to provide a degree of protection against the entry of water during prolonged submersion at a limited depth	Indoor or outdoor use to provide a degree of protection against the entry of water during prolonged submersion at a limited depth	No CSA equivalent
<b>Type 7</b>	For use in indoor locations classified as Class I, Groups A, B, C and D, as defined in the National Electrical Code	Not typically used by UL	Similar to NEMA designation; refer to Canadian Electric Code C22.1 Sec. 18 (C22.2 No. 30)
<b>Type 8</b>	For use in indoor or outdoor locations classified as Class I, Groups A, B, C and D, as defined in the National Electrical Code – oil immersed	Not typically used by UL	Similar to NEMA designation; refer to Canadian Electric Code C22.1 Sec. 18 (C22.2 No. 30)
<b>Type 9</b>	For use in indoor locations classified as Class II, Groups E, F and G, as defined in the National Electrical Code	Not typically used by UL	Similar to NEMA designation dust tight (hazardous dust); refer to Canadian Electric Code C22.2 No. 25
<b>Type 10</b>	Mining enforcement safety administration approved	Not typically used by UL	No CSA equivalent specified for industrial control applications (See C22.5 for use of electricity in mines)
<b>Type 11</b>	Indoor use to provide, by oil immersion, a degree of protection to enclosed equipment against corrosive effects of liquids and gases	Indoor use to provide, by oil immersion, a degree of protection of the enclosed equipment against corrosive effects of corrosive liquids and gases	No CSA equivalent; similar to Type 4
<b>Type 12</b>	Indoor use to provide a degree of protection against dust, falling dirt and dripping non-corrosive liquids No knockouts	Indoor use to provide a degree of protection against dust, falling dirt and dripping non-corrosive liquids No knockouts	Indoor use to provide a degree of protection against circulating dust, lint, fibers, dripping and light splashes of non-corrosive liquids
<b>Type 12K</b>	Indoor enclosure with knockouts to provide a degree of protection against dust, falling dirt and dripping non-corrosive liquids other than at knockouts	Indoor use to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids With knockouts	No CSA equivalent
<b>Type 13</b>	Indoor use to provide a degree of protection against lint, dust, seepage, external condensation and spraying of water, oil and non-corrosive coolant	Indoor use to provide a degree of protection against dust and spraying of water, oil and non-corrosive coolants	Indoor use to provide a degree of protection against circulating dust, lint, fibers, seepage and spraying of non-corrosive liquids including oils and coolants



## Industry Standards and Definitions

### EUROPEAN STANDARDS

Type of Protection	Method of Protection	CENELEC Designation
Flameproof Enclosure	Containment	'd'
Increased Safety	Mechanical	'e'
Intrinsically Safe	Electrical	'i'

These designations are typically preceded by EEx, the designation indicating an apparatus built to a European standard.

#### European Classification of Hazardous Locations

- Zone 0** Explosive gas present continuously
- Zone 1** Explosive gas present occasionally under normal operating conditions
- Zone 2** Explosive gas present for short period
- Zone 20** Explosive dust present continuously
- Zone 21** Explosive dust present occasionally under normal operating conditions
- Zone 22** Explosive dust present for short period

#### Explosion Groups

- Group I Electrical equipment for mining applications
- Group II Electrical equipment for all remaining hazardous areas

Ingress Protection (IP rating) defines the degree of protection

#### Scope of Protection for the IP protection classes

Digit	First Digit		Digit	Second digit Water protection
	Physical protection	Foreign body protection		
0	No protection	No protection	0	No protection
1	Protection against back of hand contact	Protection against solid foreign bodies 50 mm diameter	1	Protection against water drops falling vertically
2	Protection against finger contact	Protection against solid foreign bodies 12.5 mm diameter	2	Protection against water drops falling at an angle (15°)
3	Protection against contact from tools	Protection against solid foreign bodies 2.5 mm diameter	3	Protection against water-spray at an angle up to 60°
4	Protection against contact with a wire	Protection against solid foreign bodies 1.0 mm diameter	4	Protection against water-spray from all directions
5	Protection against contact with a wire	Protection against dust	5	Protection against water jets
6	Protection against contact with a wire	Dust-tight	6	Protection against strong water jets
7			7	Protection against intermittent immersion in water
8			8	Protection against continuous immersion in water



Larson Electronics LLC WWW.MAGNALIGHT.COM

9419 E US HWY 75, Kemp, TX 75143 - P: 903-498-3363 F: 903-498-3364 E: [sales@magnalight.com](mailto:sales@magnalight.com)

## Industry Standards and Definitions

---

Area	Category of Equipment	Presence or Duration of Explosive Atmosphere	Inflammable Substances	Level of Protection Faults to Allow for	Comparison with Present Practice
Equipment Group II (surface)	1	Continuous Presence Long Periods Frequent	Gas, Vapors, Mist, Dust	<b>Very High Level of Protection</b> 2 types of protection or 2 Independent faults	Group II <b>Zone 0</b> (gas) Zone 20 (dust)
	2	Likely to Occur	Gas, Vapors, Mist, Dust	<b>High Level of Protection</b> 1 Type of Protection Habitual frequent malfunction	Group II <b>Zone 1</b> (gas) Zone 21 (dust)
	3	Unlikely to Occur Present for a Short Period	Gas, Vapors, Mist, Dust	<b>Normal Protection</b> Required Level of Protection	Group II <b>Zone 2</b> (gas) Zone 22 (dust)

## Industry Standards and Definitions

### TEMPERATURE RATING

The maximum surface temperature of the exposed surface of electrical apparatus must always be lower than the ignition temperature of the gas or vapor mixture.

Temperature Class	Maximum Surface Temperature	Ignition Temperature of Combustible Material
T1	450 C	>450 C
T2	300 C	>300 C
T3	200 C	>200 C
T4	135 C	>135 C
T5	100 C	>100 C
T6	85 C	>85 C

### Safety characteristics of flammable gases and vapors

Medium	Ignition temperature °C	Temperature class	Explosion group
Acetaldehyde	140	T 4	II A
Acetic acid	485	T 1	II A
Acetic anhydride	330	T 2	II A
Acetone	540	T 1	II A
Acetylene	305	T 2	II C
Ammonia	630	T 1	II A
Amylacetate	380	T 2	II A
Benzene	220	T 3	II A
Benzol	555	T 1	II A
Carbon disulfide	95	T 6	II C
Carbon monoxide	605	T 1	II A
Cyclohexene	430	T 2	II A
1,2-Dichlorethane	440	T 2	II A
Diesel fuel	220 up to 300	T 3	II A
Ethane	515	T 1	II A
Ethylacetate	460	T 1	II A
Ethylalcohol	425	T 2	II B
Ethylchloride	510	T 1	II A
Ethylene	425	T 2	II B
Ethylenoxide	440	T 2	II B
Ethylether	180	T 4	II B
Ethyl glycol	235	T 3	
Fuel oil	220 up to 300	T 3	II A
Hydrogen	560	T 1	II C
Hydrogen disulfide	270	T 3	II B
Methane	595 (650)	T 1	II A
Methanol	455	T 1	II A
Methyl chloride	625	T 1	II A
n-Butane	365	T 2	II A
n-Butylalcohol	340	T 2	II A
n-Hexane	240	T 3	II A
n-Propylalcohol	405	T 2	
Naphthaline	520	T 1	II A
Oleic acid	360	T 2	
Phenol	595	T 1	II A
Propane	470	T 1	II A
Tetraline	425	T 2	
Toluole	535	T 1	II A