

# HAZARDOUS LOCATION CLASSIFICATION

## WHAT CONSTITUTES A HAZARDOUS LOCATION?

The classification of a given area as to Class, Division, and Group is solely the judgment of **THE OWNER, INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION.**

Articles 500-517 of the National Electrical Code define, categorize and provide the basic ground rules of the application and installation of lighting fixtures in hazardous locations.

Hazardous locations are defined in terms of Class, Division and Group, per the NEC. The definition of each is as follows:

"CLASS I locations are those in which **flammable Gases or Vapors** are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures."

"CLASS II locations are those that are hazardous because of the presence of **Combustible Dust.**"

"CLASS III locations are those that are hazardous because of the presence of **easily ignitable Fibers or Flyings**, but in which such fibers or flyings are

not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures."

Each "CLASS" is further defined as either Division 1 or Division 2.

DIVISION 1 is an environment that is **Normally Hazardous.**

DIVISION 2 is an environment that is **Not Normally Hazardous.**





Each Division may be further classified according to the particular gas, vapor or dust, by defining the areas by groups, see table below.

Don't confuse UL844 with UL1598 which meets the standards for those locations which require **only** enclosed and gasketed products.

You can't readily differentiate between UL1598 and UL844 listed luminaires by examining the product. So how do you tell one from the other? THE BEST WAY TO BE SURE OF A UL844 LISTING IS TO EXAMINE THE LABEL AND SEE THE WORDS "LISTED ELECTRIC LIGHTING FIXTURES FOR HAZARDOUS LOCATIONS" OR "LISTED ELECTRIC LIGHTING FIXTURES FOR HAZARDOUS LOCATIONS" IN CLOSE PROXIMITY TO THE CIRCULAR UL LOGO.

**UL844 IS THE ONLY UL STANDARD FOR HAZARDOUS LOCATION LIGHTING**

## SUMMARY OF HAZARDOUS ATMOSPHERES\*

NEC CLASS	DIVISION	GROUP	TYPICAL ATMOSPHERE AND AUTOIGNITION TEMPERATURES	TEMPERATURE MEASURED	LIMITING VALUE	GE TYPE ORDERING NUMBER
I GASES, VAPORS	1 Normally hazardous	A	Acetylene (305°C, 581°F)	Maximum exterior temperature in 40°C ambient. H8 is in 25°C ambient	280°C (536°F) and Articles 500-503 of NEC	Not Available
		B	Hydrogen (502°C, 986°F) manufactured gases containing more than 30% hydrogen (by volume)		280°C (566°F) and Articles 500-503 of NEC	
		C	ethylene (450°C, 842°F) cyclopropane (503°C, 938°F)		180°C (356°F) and Articles 500-503 of NEC	
		D	hexanes (225°C, 437 °F) butane (288°C, 550°F) propane (450°C, 842°F) acetone (465°C, 869°F) benzene (420°C, 788°F) gasoline (280-471°C, 536-880°F)		280°C (526°F) and Articles 500-503 of NEC	
II COMBUSTIBLE DUSTS	2** Not normally hazardous	A	Same as Division 1	Max interior temperature in 40°C ambient. P54H is in 25°C ambient	Max temp of luminaire not to exceed the auto- ignition temp (°C) of gas or vapor involved. Ref. Articles 500-503 of NEC	
		B	Same as Division 1			
		C	Same as Division 1			
		D	Same as Division 1			
II COMBUSTIBLE DUSTS	1 Normally hazardous	E	Metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics	Max exterior temperature in 40°C ambient with a dust blanket. H8 is in 25°C ambient.	200°C (392°F) and Articles 500-503 of NEC	
		F	Carbon black, coal, coke dust		200°C (392°F) and Articles 500-503 of NEC	
		G	Flour, starch, grain dusts.		165°C (329°F) and Articles 500-503 of NEC	
II COMBUSTIBLE DUSTS	2** Not normally hazardous	G	Same as Division 1	Max exterior temp under conditions of use	165°C (329°F) and Articles 500-503 of NEC	
III EASILY IGNITIBLE FIBERS AND FLYINGS	1, 2		Same as Class II, Division 2	Same as Class II, Div. 2	165°C (329°F) and Articles 500-503 of NEC	

\* Information for this table is extracted from the National Electrical Code (NEC), Article 500, and from the National Fire Prevention Association's "National Electrical Code Handbook," (reference to NFPA 497M).

\*\* Not normally hazardous means that the gases or dusts are not normally present.

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# HAZARDOUS MATERIAL COMMONLY ENCOUNTERED

As a guide for **THE OWNER, RESPONSIBLE INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION** in determining the proper NEC Group classification for a flammable gas, to use the following table is reprinted from the "Manual for Classification of Gases, Vapors and Dusts for Electrical Equipment in Hazardous (Classified) Locations" NFPA 497M and lists the Autoignition Temperature (AIT) of gases and vapors of liquids with Flash Points below 100°F (37°C). It also lists Group Classifications for the gases as determined by tests (indicated by \*) or based on analogy with tested materials and on chemical structure. While the classification of the untested materials represents the best judgement of two groups of experts, it is conceivable that the Group Classification of any particular untested material may be incorrect.

In certain instances, therefore, it may be advisable to submit untested materials to a qualified testing laboratory for verification of the assigned Group Classification.

NOTE: The temperature and Group Classifications are subject to change. Consult the latest edition of NFPA 497M for the most recent information.

NOTE: Reprinted with permission from NFPA 497M, Classification of Class I Hazardous Locations for Electrical Installations, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the NFPA on the referenced subject which is represented only by the standard in its entirety.

## GROUP CLASSIFICATION AND AUTOIGNITION TEMPERATURE (AIT) OF SELECTED FLAMMABLE GASES AND VAPORS OF LIQUIDS HAVING FLASH POINTS BELOW 100°F (37.8°C).

MATERIAL	GROUP	AIT		MATERIAL	GROUP	AIT		MATERIAL	GROUP	AIT	
		°F	°C			°F	°C			°F	°C
ACETALDEHYDE	C*	347	175	ETHYL ACETATE	D*	800	427	METHYL ETHYL KETONE	D*	759	404
ACETONE	D*	869	465	ETHYL ACRYLATE (INHIBITED)	D*	702	372	METHYL FORMAL	C*	460	238
ACETONITRILE	D	975	524	ETHYLAMINE	D*	725	385	METHYL FORMATE	D	840	449
ACETYLENE	A*	581	305	ETHYL BENZENE	D	810	432	METHYL ISOBUTYL KETONE	D*	840	449
ACROLEIN (INHIBITED)	B(C)*1	455	235	ETHYL CHLORIDE	D	966	519	METHYL ISOCYANATE	D	994	534
ACRYLONITRILE	D*	898	481	ETHYLENE	C*	842	450	METHYL MERCAPTAN	C	-	-
ALLYL ALCOHOL	C*	713	378	ETHYLENEDIAMINE	D*	725	385	METHYL METHACRYLATE	D	792	422
ALLYL CHLORIDE	D	905	485	ETHYLENE DICHLORIDE	D*	775	413	2-METHYL-1-PROPANOL	D*	780	416
AMMONIA	D*2	928	498	ETHYLENIMINE	C*	608	320	2-METHYL-2-PROPANOL	D*	892	478
N-AMYL ACETATE	D	680	360	ETHYLENE OXIDE	B(C)*1	804	429	MONOETHYL HYDRAZINE	C	382	194
SEC-AMYL ACETATE	D	-	-	ETHYL FORMATE	D	851	455	NAPHTHA (PETROLEUM)	D*4	550	288
BENZENE	D*	928	498	ETHYL MERCAPTAN	C*	572	300	NITROETHANE	C	778	414
1,3-BUTADIENE	B(D)*1	788	420	N-ETHYL MORPHOLINE	C	-	-	NITROMETHANE	C	785	418
BUTANE	D*	550	288	FORMALDEHYDE (GAS)	B	795	429	1-NITROPROPANE	C	789	421
1-BUTANOL	D*	650	343	GASOLINE	D*	536-880	280-471	2-NITROPROPANE	C*	802	428
2-BUTANOL	D*	761	405	HEPTANE	D*	399	204	NONANE	D	401	205
N-BUTYL ACETATE	D*	790	421	HEPTENE	D	500	260	NONENE	D	-	-
ISO-BUTYL ACETATE	D*	790	421	HEXANE	D*	437	225	OCTANE	D*	403	206
SEC-BUTYL ACETATE	D	-	-	2-HEXANONE	D	795	424	OCTENE	D	446	230
BUTYLAMINE	D	594	312	HEXENES	D	473	245	PENTANE	D*	470	243
BUTYLENE	D	725	385	HYDROGEN	B*	968	520	1-PENTANOL	D*	572	300
BUTYL MERCAPTAN	C	-	-	HYDROGEN CYANIDE	C*	1000	538	2-PENTANONE	D	846	452
N-BUTYRALDEHYDE	C*	425	218	HYDROGEN SELENIDE	C	-	-	1-PENTENE	D	527	275
CARBON DISULFIDE	-*3	194	90	HYDROGEN SULFIDE	C*	500	260	PROPANE	D*	842	450
CARBON MONOXIDE	C*	1128	609	ISOAMYL ACETATE	D	680	360	1-PROPANOL	D*	775	413
CHLOROBENZENE	D	1099	593	ISOBUTYL ACRYLATE	D	800	427	2-PROPANOL	D*	750	399
CHLOROPRENE	D	-	-	ISOBUTYRALDEHYDE	C	385	196	PROPRIONALDEHYDE	C	405	207
CROTONALDEHYDE	C*	450	232	ISOPRENE	D*	428	220	N-PROPYL ACETATE	D	842	450
CUMENE	D	795	424	ISOPROPYL ACETATE	D	860	460	PROPYLENE	D*	851	455
CYCLOHEXANE	D	473	245	ISOPROPYLAMINE	D	756	402	PROPYLENE DICHLORIDE	D	1035	557
CYCLOHEXENE	D	471	244	ISOPROPYL ETHER	D*	830	443	PROPYLENE OXIDE	B(C)*1	840	449
CYCLOPROPANE	D*	938	503	ISOPROPYL GLYCIDYL ETHER	C	-	-	N-PROPYL ETHER	C*	419	215
1,1-DICHLOROETHANE	D	820	438	LIQUEFIED PETROLEUM GAS	D	761-842	405-450	PROPYL NITRATE	B*	347	175
1,2-DICHLOROETHYLENE	D	860	460	MANUFACTURED GAS (CONTAINING MORE THAN 30% H <sub>2</sub> BY VOLUME)	B*	-	-	PYRIDINE	D*	900	482
1,3-DICHLOROPROPENE	D	-	-	MESITYL OXIDE	D*	652	344	STYRENE	D*	914	490
DICYCLOPENTADIENE	C	937	503	METHANE	D*	999	537	TERTAHYDROFURAN	C*	610	321
DIETHYL ETHER	C*	320	160	METHANOL	D*	725	385	TOLUENE	D*	896	480
DIETHYLAMINE	C*	594	312	METHYL ACETATE	D	850	454	TRIETHYLAMINE	C*	-	-
DI-ISOBUTYLENE	D*	736	391	METHYLACETYLENE	C*	-	-	TURPENTINE	D	488	253
DI-ISOPROPYLAMINE	C	600	316	METHYLACETYLENE-PROPADIENE (STABILIZED)	C	-	-	UNSYMMETRICAL DIMETHYL HYDRAZINE (UDMH)	C*	480	249
DIMETHYLAMINE	C	752	400	METHYL ACRYLATE	D	875	468	VALERALDEHYDE	C	432	222
1,4-DIOXANE	C	356	180	METHYLAMINE	D	806	430	VINYL ACETATE	D*	756	402
DI-N-PROPYLAMINE	C	570	299	METHYLCYCLOHEXANE	D	482	250	VINYL CHLORIDE	D*	882	472
EPICHLOROHYDRIN	C*	772	411	METHYL ETHER	C*	662	350	VINYLDIENE CHLORIDE	D	1058	570
ETHANE	D*	882	472					XYLENES	D*	867-984	464-529
ETHANOL	D*	685	363								

### NOTES TO TABLE

\*Material has been classified by test.

1 If equipment is isolated by sealing out conduit 1/2-in. (12.7mm) or larger, in accordance with Article 501-5(a) of NFPA 70, *National Electrical Code*, equipment for the group classification shown in a parenthesis is permitted.

2 For Classification of areas involving ammonia, see *Safety Code for Mechanical Refrigeration*, ANSI/ASHRAE 15, and *Safety Requirements for the Storage and Handling of Anhydrous Ammonia*, ANSI/CGA G2.1

3 Certain chemicals may have characteristics that require safeguards beyond those required for any of the above groups. Carbon Disulfide is one of these chemicals because of its low autoignition temperature and small joint clearance to arrest flame propagation.

4 Petroleum Naptha is a saturated hydrocarbon mixture whose boiling range is 20° to 135°C. It is also known as benzine, ligroin, petroleum ether, and naptha.

References: Autoignition temperatures listed above are the lowest value for each material as listed in NFPA 325M, *Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*, or as reported in an article by Hilado, C.J. and Clark, S.W., in *Chemical Engineering*, September 4, 1972.