

Hazardous locations

Classification

Areas where the possibility of explosion and fire is created by the presence of flammable gases, vapors, liquids, dust, fibers or flyings.

Class I – Gases, vapors or liquids

Class I locations are those in which flammable gases, flammable liquid-produced vapors or combustible liquid-produced vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Typical class I locations

- Petroleum refineries and gasoline storage and dispensing areas
- Industrial firms that use flammable liquids in dip tanks for parts cleaning or other operations
- Petrochemical companies that manufacture chemicals from gas and oil
- Dry cleaning plants where vapors from cleaning fluids can be present
- Companies that have spraying areas where they coat products with paint or plastics
- Aircraft hangars and fuel serving areas
- Utility gas plants and operations involving storage and handling of liquified petroleum gas or natural gas

Class II – Combustible dusts

Class II locations are those that are hazardous because of the presence of combustible dust.

Typical class II locations

- Grain elevators, flour and feed mills
- Plants that manufacture, use or store magnesium or aluminum powders
- Plants that have chemical or metallurgical processes: producers of plastics, medicines and fireworks, etc.
- Producers of starch or candies
- Spice-grinding plants, sugar plants and cocoa plants
- Coal preparation plants and other carbon handling or processing areas

Class III – Fibers and flyings

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or where materials producing combustible flyings are handled, manufactured or used, but in which such fibers/flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Typical class III locations

- Textile mills, cotton gins, cotton seed mills and flax processing plants
- Any plant that shapes, pulverizes or cuts wood and creates sawdust or flyings

Fibers and flyings are not likely to be suspended in the air but can collect around machinery or on lighting fixtures and where heat, a spark or hot metal can ignite them.

Division 1 – Normally hazardous

Hazardous gases, vapors or dusts are present under normal operation conditions or during frequent repair and maintenance activity.

Groups A, B, C, D

The gases and vapors of Class I locations are broken into four groups by the code A, B, C and D. These materials are grouped according to the ignition temperature of the substance, its explosion pressure and other flammable characteristics.

Groups E, F, G

Class II dust locations groups E, F and G are classified according to the ignition temperature and the conductivity of the hazardous substance.

Division 2 – Not normally hazardous

Hazardous gases, vapors or dusts are not present under normal operating conditions.

Area classification | Divisions versus zones

Continuous hazard	Intermittent hazard	Hazard under abnormal conditions
Zone 0	Zone 1	Zone 2
	Division 1	Division 2

These are simplified definitions. Complete data is in the U.S. National Electrical Code (NEC) and the Canadian Electrical Code (CEC).

Ignition temperatures

Group classifications

Ignition temperatures and group classifications for flammable gases and vapors

Material	Autoignition temperature			Material	Autoignition temperature		
	Group	° F	° C		Group	° F	° C
Acetaldehyde	C	347	175	Di-N-Propylamine	C	570	299
Acetic acid	D	867	464	Diacetone alcohol	D	1118	603
Acetic anhydride	D	600	316	O-Dichlorobenzene	D	1198	647
Acetone	D	869	465	1.1-Dichloroethane	D	820	438
Acetone cyanohydrin	D	1270	688	1.2-Dichloroethylene	D	860	460
Acetonitrile	D	975	524	Dicylopentadiene	C	937	503
Acetylene	A	581	305	Diethyl benzene	D	743–842	395–450
Acrolein (inhibited)	B (c)	455	285	Diethyl ether	C	320	160
Acrylic acid	D	820	438	Diethylamine	C	594	312
Acrylonitrile	D	898	481	Diethylene glycol monobutyl ether	C	442	228
Allyl alcohol	C	713	378	Diethylene glycol monomethyl ether	C	465	241
Allyl chloride	D	905	485	N-N-Dimethyl aniline	C	700	371
Alpha-methyl styrene	D	1066	574	Dimethyl formamide	D	833	455
Ammonia	D	928	498	Dimethyl sulfate	D	370	188
N-Amyl acetate	D	680	360	Dimethylamine	C	752	400
Aniline	D	1139	615	1,4-Dioxane	C	356	180
Benzene	D	928	498	Dipentene	D	458	237
Benzyl chloride	D	1085	1085	Dodecene	D	491	255
1.3-Butadiene	B (d)	788	420	Du-isopropylamine	C	600	316
Butane	D	550	288	Epichlorohydrin	C	772	411
1-Butanol	D	650	343	Ethane	D	882	472
2-Butanol	D	761	405	Ethanol	D	685	363
N-Butyl acetate	D	790	421	Ethyl acetate	D	800	427
N-Butyl acrylate (inhibited)	D	559	293	Ethyl acetate (inhibited)	D	702	372
Butylamine	D	594	312	Ethyl benzene	D	810	432
Butylene	D	725	385	Ethyl chloride	D	966	519
N-Butyraldehyde	C	425	218	Ethyl formate	D	851	455
N-Butyric acid	D	830	443	2-Ethyl hexanol	D	448	231
Carbon disulfide	*	194	90	2-Ethyl hexyl acrylate	D	485	252
Carbon monoxide	C	1128	609	Ethyl mercaptan	C	572	300
Chlorobenzene	D	1099	593	Ethylamine	D	725	385
Cresol	D	1038–1110	559–599	Ethylene	C	842	450
Crotonaldehyde	C	450	232	Ethylene chlorohydrin	D	797	425
Cumene	D	795	424	Ethylene dichloride	D	775	413
Cyclohexane	D	473	245	Ethylene glycol monobutyl ether	C	460	238
Cyclohexanol	D	572	300	Ethylene glycol monobutyl ether acetate	C	645	340
Cyclohexanone	D	473	245	Ethylene glycol monoethyl ether	C	455	235
Cyclohexene	D	471	244	Ethylene glycol monoethyl ether acetate	C	715	379
Cyclopropane	D	938	503	Ethylene glycol monomethyl ether	D	545	285
P-Cymene	D	817	436	Ethylene oxide	B (C)	804	429
N-Decanol	D	550	288	Ethylenediamine	D	725	385
Decene	D	455	235	Ethylenimine	C	608	320
Di-isobutyl ketone	D	745	396	2-Ethylehexaldehyde	C	375	191
Di-isobutylene	D	736	391	Formaldehyde (gas)	B	795	429

*Carbon Disulfide has characteristics which require safeguards beyond those required for any of the above groups

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Material	Autoignition temperature			Material	Autoignition temperature		
	Group	° F	° C		Group	° F	° C
Fuel oils	D	410–765	210–407	Monoethanolamine	D	770	410
Furfural	C	600	316	Monoisopropanolamine	D	705	374
Furfuryl alcohol	C	915	490	Monomethyl aniline	C	900	482
Gasoline	D	536–880	280–471	Monomethyl hydrazine	C	382	194
Heptane	D	399	204	Morpholine	C	590	310
Heptene	D	500	260	Naphtha (coal tar)	D	531	277
Hexane	D	437	225	Naphtha (petroleum)	D	550	288
2-Hexanone	D	795	424	Nitrobenzene	D	900	482
Hexenes	D	473	245	Nitroethane	C	778	414
Hydrazine	C	74–518	23–270	Nitromethane	C	785	418
Hydrogen	B	968	520	2-Nitropropane	C	802	428
Hydrogen cyanide	C	1000	538	1-Nitropropane	C	789	421
Hydrogen sulfide	C	500	260	Nonane	D	401	205
Iso-Butyl acetate	D	790	421	Octane	D	403	206
Iso-Octyl aldehyde	C	387	197	Octene	D	446	230
Isoamyl acetate	D	680	360	Pentane	D	470	243
Isoamyl alcohol	D	662	350	1-Pentanol	D	572	300
Isobutyl acrylate	D	800	427	2-Pentanone	D	846	452
Isobutyraldehyde	C	385	196	1-Pentene	D	527	275
Isophorone	D	860	460	Propane	D	842	450
Isoprene	D	428	220	2-Propanol	D	750	399
Isopropyl acetate	D	860	460	1-Propanol	D	775	413
Isopropyl ether	D	830	443	Propionaldehyde	C	405	207
Isopropylamine	D	756	402	Propionic acid	D	870	466
Kerosene	D	410	210	Propionic anhydride	D	545	285
Liquified petroleum gas	D	761–842	405–450	N-Propyl acetate	D	842	450
Mesityl oxide	D	652	344	N-Propyl ether	C	419	215
Methane	D	999	537	Propyl nitrate	B	347	175
Methanol	D	725	385	Propylene	D	851	455
Methyl acetate	D	850	454	Propylene dichloride	D	1035	537
Methyl acrylate	D	875	468	Propylene oxide	B (C)	840	449
Methyl ether	C	662	350	Pyridine	D	900	482
Methyl ethyl ketone	D	759	404	Styrene	D	914	490
Methyl formal	C	460	238	Tetrahydrofuran	C	610	321
Methyl formate	D	840	449	Tetrahydronaphthalene	D	725	385
Methyl isobutyl ketone	D	840	449	Toluene	D	896	480
Methyl isocyanate	D	994	534	Turpentine	D	488	253
Methyl methacrylate	D	792	422	Unsymmetrical dimethyl hydrazine (UDMH)	C	480	249
Methyl N-Amyl ketone	D	740	393	Valeraldehyde	C	432	222
2-Methyl-1-Propanol	D	780	416	Vinyl acetate	D	756	402
2-Methyl-2-Propanol	D	892	478	Vinyl chloride	D	882	472
Methylamine	D	806	430	Vinyl toluene	D	921	494
Methylcyclohexane	D	482	250	Vinylidene chloride	D	1058	570
Methylcyclohexanol	D	565	296	Xylenes	D	867–984	464–529