

APPENDIX F: HAZARDOUS GASES AND VAPOURS

The following pages contain excerpts from the National Fire Protection Association (NFPA) publication NFPA 497M *Classification of Gases, Vapours, and Dusts for Electrical Equipment in Hazardous (Classified) Locations 1994 Edition*. The list includes the ignition temperatures and group classifications for Class I gases. Class II dusts and Class III fibers and flyings are not listed.

Note that considerable skill and judgment must be applied when deciding to what degree an area contains hazardous concentrations of vapours, combustible dusts, or easily ignitable fibers and flyings. Many factors—such as temperature, barometric pressure, quantity of release, humidity, ventilation, and distance from the vapour source—must be considered. When information on every factor concerned is properly evaluated, a consistent classification of the selection and location of electrical equipment can be developed.

For the most current list of properties of flammable liquids, gases, and solids, see the latest edition of NFPA 497M, *Classification of Gases, Vapours, and Dusts for Electrical Equipment in Hazardous (Classified) Locations*.

Table F.1 Group Classification and Autoignition Temperature (AIT) of Selected Flammable Gases and Vapours

| MATERIAL | GROUP | °F | °C |
|------------------------------|-------|------|-----|
| Acetaldehyde | C* | 347 | 175 |
| Acetic acid | D* | 867 | 464 |
| Acetic anhydride | D | 600 | 316 |
| Acetone | D* | 869 | 465 |
| Acetone cyanohydrin | D | 1270 | 688 |
| Acetonitrile | D | 975 | 524 |
| Acetylene | A* | 581 | 305 |
| Acrolein (inhibited) | B* | 455 | 235 |
| Acrylic acid | D | 820 | 438 |
| Acrylonitrile | D* | 898 | 481 |
| Allyl alcohol | C* | 713 | 378 |
| Allyl chloride | D | 905 | 485 |
| Ammonia | D* | 928 | 498 |
| n-Amyl acetate | D | 680 | 360 |
| Aniline | D | 1139 | 615 |
| Benzene | D* | 928 | 498 |
| Benzyl chloride | D | 1085 | 585 |
| 1,3-Butadiene | B* | 788 | 420 |
| Butane | D* | 550 | 288 |
| 1-Butanol | D* | 650 | 343 |
| 2-Butanol | D* | 761 | 405 |
| n-Butyl acetate | D* | 790 | 421 |
| iso-Butyl acetate | D* | 790 | 421 |
| n-Butyl acrylate (inhibited) | D | 559 | 293 |
| Butylamine | D | 594 | 312 |
| Butylene | D | 725 | 385 |
| n-Butyraldehyde | C* | 425 | 218 |

* Material has been classified by test.

Table F.1 Group Classification and Autoignition Temperature (AIT) of Selected Flammable Gases and Vapours

| MATERIAL | GROUP | °F | °C |
|------------------------------------|-------|-----------|---------|
| n-Butyric acid | D | 830 | 443 |
| Carbon monoxide | C* | 1128 | 609 |
| Chlorobenzene | D | 1099 | 593 |
| Cresol | D | 1038-1110 | 559-599 |
| Crotonaldehyde | C* | 450 | 232 |
| Cumene | D | 795 | 424 |
| Cyclohexane | D | 473 | 245 |
| Cyclohexene | D | 471 | 244 |
| Cyclohexanol | D | 572 | 300 |
| Cyclohexanone | D | 473 | 245 |
| Cyclopropane | D* | 938 | 503 |
| p-Cymene | D | 817 | 436 |
| n-Decanol | D | 550 | 288 |
| Decene | D | 455 | 235 |
| Diacetone alcohol | D | 1118 | 603 |
| o-Dichlorobenzene | D | 1198 | 647 |
| 1,1-Dichloroethane | D | 820 | 438 |
| 1,2-Dichloroethylene | D | 860 | 460 |
| Dicyclopentadiene | C | 937 | 503 |
| Diethyl benzene | D | 743-842 | 395-450 |
| Diethylene glycol monobutyl ether | C | 442 | 228 |
| Diethylene glycol monomethyl ether | C | 465 | 241 |
| Diethylamine | C* | 594 | 312 |
| Diethyl ether | C* | 320 | 160 |
| N-N-Dimethyl aniline | C | 700 | 371 |
| Di-isobutylene | D* | 736 | 391 |
| Di-isobutyl ketone | D | 745 | 396 |
| Di-isopropylamine | C | 600 | 316 |
| Dimethylamine | C | 752 | 400 |
| Dimethyl formamide | D | 833 | 455 |
| Dimethyl sulfate | D | 370 | 188 |
| 1,4-Dioxane | C | 356 | 180 |
| Dipentene | D | 458 | 237 |
| Di-N-propylamine | C | 570 | 299 |
| Dodecene | D | 491 | 255 |
| Epichlorohydrin | C* | 772 | 411 |
| Ethane | D* | 882 | 472 |
| Ethanol | D* | 685 | 363 |
| Ethyl acetate | D* | 800 | 427 |
| Ethyl acrylate (inhibited) | D* | 702 | 372 |
| Ethylamine | D* | 725 | 385 |
| Ethyl benzene | D | 810 | 432 |

* Material has been classified by test.

Table F.1 Group Classification and Autoignition Temperature (AIT) of Selected Flammable Gases and Vapours

| MATERIAL | GROUP | °F | °C |
|---|-------|---------|---------|
| Ethyl chloride | D | 966 | 519 |
| Ethylene | C* | 842 | 450 |
| Ethylene chlorohydrin | D | 797 | 425 |
| Ethylene glycol monobutyl ether | C | 460 | 238 |
| Ethylene glycol monobutyl ether acetate | C | 645 | 340 |
| Ethylenediamine | D* | 725 | 385 |
| Ethylene dichloride | D* | 775 | 413 |
| Ethylene glycol monoethyl ether | C | 455 | 235 |
| Ethylene glycol monoethyl ether acetate | C | 715 | 379 |
| Ethylene glycol monomethyl ether | D | 545 | 285 |
| Ethylenimine | C* | 608 | 320 |
| Ethylene oxide | B* | 804 | 429 |
| Ethyl formate | D | 851 | 455 |
| 2-Ethylhexaldehyde | C | 375 | 191 |
| 2-Ethyl hexanol | D | 448 | 231 |
| 2-Ethyl hexyl acrylate | D | 485 | 252 |
| Ethyl mercaptan | C* | 572 | 300 |
| Formaldehyde (gas) | B | 795 | 429 |
| Formic acid (90%) | D | 813 | 434 |
| Fuel oils | D | 410-765 | 210-407 |
| Furfural | C | 600 | 316 |
| Furfuryl alcohol | C | 915 | 490 |
| Gasoline | D* | 536-880 | 280-471 |
| Heptane | D* | 399 | 204 |
| Heptene | D | 500 | 260 |
| Hexane | D* | 437 | 225 |
| 2-Hexanone | D | 795 | 424 |
| Hexene | D | 473 | 245 |
| Hydrazine | C | 74-518 | 23-270 |
| Hydrogen | B* | 968 | 520 |
| Hydrogen cyanide | C* | 1000 | 538 |
| Hydrogen sulfide | C* | 500 | 260 |
| Isoamyl acetate | D | 680 | 260 |
| Isobutyl acrylate | D | 800 | 427 |
| Isobutyraldehyde | C | 385 | 196 |
| Isophorone | D | 860 | 260 |
| Isoprene | D* | 428 | 220 |
| Isopropyl acetate | D | 860 | 460 |
| Isoamyl alcohol | D | 662 | 350 |
| Isopropylamine | D | 756 | 402 |
| Isopropyl ether | D* | 830 | 443 |
| Iso-octyl aldehyde | C | 387 | 197 |

* Material has been classified by test.

Table F.1 Group Classification and Autoignition Temperature (AIT) of Selected Flammable Gases and Vapours

| MATERIAL | GROUP | °F | °C |
|-------------------------|-------|---------|---------|
| Kerosene | D | 410 | 210 |
| Liquefied petroleum gas | D | 761-842 | 405-450 |
| Mesityl oxide | D* | 652 | 344 |
| Methane | D* | 999 | 630 |
| Methanol | D* | 725 | 385 |
| Methyl acetate | D | 850 | 454 |
| Methyl acrylate | D | 875 | 468 |
| Methylamine | D | 806 | 430 |
| Methyl n-amyl ketone | D | 740 | 393 |
| Methylcyclohexane | D | 482 | 250 |
| Methylcyclohexanol | D | 565 | 296 |
| Methyl ether | C* | 662 | 350 |
| Methyl ethyl ketone | D* | 759 | 404 |
| Methyl formal | C* | 460 | 238 |
| Methyl formate | D | 840 | 449 |
| Methyl isobutyl ketone | D* | 840 | 449 |
| Methyl isocyanate | D | 994 | 534 |
| Methyl methacrylate | D | 792 | 422 |
| 2-Methyl-1-propanol | D* | 780 | 416 |
| 2-Methyl-2-propanol | D* | 892 | 478 |
| alpha-Methyl styrene | D | 1066 | 574 |
| Monoethanolamine | D | 770 | 410 |
| Monoisopropanolamine | D | 705 | 374 |
| Monomethyl aniline | C | 900 | 482 |
| Monomethyl hydrazine | C | 382 | 194 |
| Morpholine | C* | 590 | 310 |
| Naphtha (coal tar) | D | 531 | 277 |
| Nitrobenzene | D | 900 | 482 |
| Nitroethane | C | 778 | 414 |
| Nitromethane | C | 785 | 418 |
| 1-Nitropropane | C | 789 | 421 |
| 2-Nitropropane | C* | 802 | 428 |
| Nonane | D | 401 | 205 |
| Octane | D* | 403 | 206 |
| Octene | D | 446 | 230 |
| Pentane | D* | 470 | 243 |
| 1-Pentanol | D* | 572 | 300 |
| 2-Pentanone | D | 846 | 452 |
| 1-Pentene | D | 527 | 275 |
| Propane | D* | 842 | 450 |
| 1-Propanol | D* | 775 | 413 |
| 2-Propanol | D* | 750 | 399 |

* Material has been classified by test.

Table F.1 Group Classification and Autoignition Temperature (AIT) of Selected Flammable Gases and Vapours

| MATERIAL | GROUP | °F | °C |
|---|-------|---------|---------|
| Propionaldehyde | C | 405 | 207 |
| Propionic acid | D | 870 | 466 |
| Propionic anhydride | D | 545 | 285 |
| n-Propyl acetate | D | 842 | 450 |
| Propylene | D* | 851 | 455 |
| Propylene dichloride | D* | 1035 | 557 |
| Propylene oxide | B* | 840 | 449 |
| n-Propyl ether | C | 419 | 215 |
| Propyl nitrate | B* | 347 | 175 |
| Pyridine | D* | 900 | 482 |
| Styrene | D* | 914 | 490 |
| Tetrahydrofuran | C* | 610 | 321 |
| Tetrahydronaphthalene | D | 725 | 385 |
| Toluene | D* | 896 | 480 |
| Turpentine | D | 488 | 253 |
| Unsymmetrical dimethyl hydrazine (UDMH) | C* | 480 | 249 |
| Valeraldehyde | C | 432 | 222 |
| Vinyl acetate | D* | 756 | 402 |
| Vinyl chloride | D* | 882 | 472 |
| Vinylidene chloride | D | 1058 | 570 |
| Vinyl toluene | D | 921 | 494 |
| Xylenes | D* | 867-984 | 464-529 |

* Material has been classified by test.