

The Protectoseal Company recommends that the National Electric Code (NEC) Article 500, rankings of various chemicals be used, whenever possible, to determine the suitability of a detonation arrester for use with a particular chemical. When no NEC rating of the particular chemical is available, the International Electrotechnical Commission (IEC) classification (Groups IIA, IIB and IIC) is recommended as a secondary source of information for determining the suitability of an arrester for its intended service. In general, the IEC Group IIA is equivalent to the NEC Group D; the IEC Group IIB is equivalent to the NEC Group C; and the IEC Group IIC includes chemicals in the NEC Groups A and B. In the event of a discrepancy between the NEC and the IEC ratings, Protectoseal recommends that the NEC groups be referenced.

Explanation for Classifications of Butadiene, Propylene Oxide and Carbon Disulphide:

The NEC chemical groupings are fairly straightforward except as they relate to a few specific common chemicals (Butadiene and Propylene Oxide). Underwriters Laboratories performed testing that led to the classification, by Group, of many of the chemicals in NEC Article 500. These test results are summarized in UL Bulletins of Research numbered 58, 58A and 58B. Excerpts from these bulletins, as they relate to the two referenced chemicals, are included. These excerpts state that the two chemicals may be considered to be a member of more than one Group. Bulletin 58 indicates that, strictly on the basis of its flame propagation characteristics, Propylene Oxide would be classified as a Group C material, while

Butadiene would qualify as a Group D material. In each of these cases, the chemicals were primarily listed in a higher category (Group B), because of relatively high pressure readings noted in one phase of the standard test procedure conducted by Underwriters Laboratories. These pressures were of concern when categorizing the chemicals because these NEC groupings are also used as standard indicators for the design strength requirements of electrical boxes, apparatus, etc. that must withstand the pressures generated by an ignition within the container. It should be noted that, in each of these cases, the test pressures recorded were significantly lower than those commonly encountered when testing a detonation arrester for its ability to withstand stable and over-driven detonations.

On the basis of the information presented in the referenced Bulletins, and on the basis of the "double listing" available in NEC Article 500 for each of these chemicals, Protectoseal recommends that, for purposes of specifying detonation arrester, they (Butadiene and Propylene Oxide) be treated as Group C materials. As a point of information, the IEC ratings of each of these two chemicals is IIB, which roughly corresponds to the NEC Group C ranking.

Carbon Disulphide is specified in NEC Article 500 as representing a special hazard requiring safeguards beyond those required for any of the standard chemical groups include Group B, Hydrogen, and Group A, Acetylene. Protectoseal will not offer bids or honor orders for flame or detonation arresters for use in Carbon Disulphide service.

CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Acetaldehyde	Group IIA	Group C	Assume Group C	
Acetic Acid	Group IIA			
Acetone	Group IIA	Group D		1.02mm
Acetonitrile	Group IIA	Group D		1.50mm
Acetyl Chloride	Group IIA			
Acetylacetone	Group IIA			
Acetylene	Group IIC	Group A	Assume Group A	.037mm
Acrolein	Group IIB	Group B	Assume Group B	
Acrylaldehyde	Group IIB			
Acrylonitrile	Group IIB	Group D	Assume Group D	0.87mm
Allyl Alcohol		Group C		
Allyl Chloride	Group IIA	Group D		
Aminoethanol	Group IIA			
Ammonia	Group IIA	Group D		3.17mm

Classification of Chemicals

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CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Amphetamine	Group IIA			
Amyl Acetate	Group IIA	Group D		0.99mm
Amyl Methyl Ketone	Group IIA			
Anilene	Group IIA			
Benzene	Group IIA	Group D		
Benzotrifluoride	Group IIA			
Benzyl Chloride	Group IIA			
Bromobutane	Group IIA			
Bromoethane	Group IIA			
Butadiene	Group IIB	Group B(C)	Assume Group C	0.79mm
Butane	Group IIA	Group D		0.98mm
Butanol	Group IIA	Group D		0.94mm
Butyl Acetate	Group IIA	Group D		1.02mm
Butyl Glycolate	Group IIB			0.88mm
Butyl Mercaptan		Group C		
Butyl Methyl Ketone	Group IIA			
Butylamine	Group IIA	Group D		
Butylene		Group D		
Butraldehyde		Group D		
Carbon Disulphide	Group IIC	None	No Quotation	0.34mm
Carbon Monoxide	Group IIA	Group C	Assume Group C	0.94mm
Chlorobenzene	Group IIA	Group D		
Chlorobutane	Group IIA			
Chloroethane	Group IIA			
Chloroethanol	Group IIA			
Chloroethylene	Group IIA			
Chloromethane	Group IIA			
Chloroprene		Group D		
Chloropropane	Group IIA			
Coal Tar Naptha	Group IIA			
Coke Oven Gas	Group IIB			

CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Cresol	Group IIA			
Crotonaldehyde	Group IIB	Group C		
Cumene	Group IIA	Group D		
Cyclobutane	Group IIA			
Cycloheptane	Group IIA			
Cyclohexane	Group IIA	Group D		0.94mm
Cyclohexanol	Group IIA			
Cyclohexanone	Group IIA			0.95mm
Cyclohexene		Group D		
Cyclohexylamine	Group IIA			
Cyclopentane	Group IIA			
Cyclopropane	Group IIB	Group D	Assume Group D	
Cymene	Group IIA			
Decahydronaphthalene	Group IIA			
Decane	Group IIA			1.02mm
Di-isobutylene		Group D		
Di-isopropylamine		Group C		
Di-n-propylamine		Group C		
Diacetone Alcohol	Group IIA			
Diaminethane	Group IIA			
Dibutyl Ether	Group IIB			0.86mm
Dichlorobenzene	Group IIA			
Dichloroethane	Group IIA	Group D		1.80mm
Dichloroethylene	Group IIA	Group D		
Dicyclopentadiene		Group C		
Diethyl Ether	Group IIB	Group C		0.87mm
Diethylamine	Group IIA	Group C	Assume Group C	
Diethylaminoethanol	Group IIA			
Dimethyl Ether	Group IIB			0.84mm
Dimethylamine	Group IIA	Group C	Assume Group C	
Dimethylaniline	Group IIA			

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CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Dioxane	Group IIB	Group C		0.70mm
Dioxolane	Group IIB			
Dipropylether	Group IIA			
Epichlorohydrin	Group IIB	Group C		
Epoxypropane	Group IIB			
Ethane	Group IIA	Group D		0.91mm
Ethanethiol	Group IIA			
Ethanol	Group IIA	Group D		0.89mm
Ethanolamine	Group IIA			
Ethyl Acetate	Group IIA	Group D		0.99mm
Ethyl Acetoacetate	Group IIA			
Ethyl Acrylate	Group IIB	Group D	Assume Group D	0.86mm
Ethyl Benzene	Group IIA	Group D		
Ethyl Chloride		Group D		
Ethyl Formate	Group IIA	Group D		
Ethyl Mercaptan	Group IIA	Group C	Assume Group D	
Ethyl Methacrylate	Group IIA			
Ethyl Methyl Ether	Group IIB			
Ethyl Methyl Ketone	Group IIA	Group D		
Ethyl Morpholine		Group C		
Ethyl Nitrate	Group IIC			
Ethyl Nitrite	Group IIA			0.96mm
Ethylamine		Group D		
Ethylbenzene	Group IIA	Group D		
Ethylcyclobutane	Group IIA			
Ethylcyclohexane	Group IIA			
Ethylcyclopentane	Group IIA			
Ethylene	Group IIB	Group C		0.65mm
Ethylene Dichloride		Group D		
Ethylene Oxide	Group IIB	Group B	Assume Group B	0.59mm
Ethylenediamine		Group D		

CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Ethylenimine		Group C		
Formaldehyde (gas)		Group B		
Furan	Group IIB			
Gasoline		Group D		
Heptane	Group IIA	Group D		0.91mm
Heptanol	Group IIA			0.94mm
Heptane		Group D		
Hexane	Group IIA	Group D		0.93mm
Hexanol	Group IIA			0.94mm
Hexanone		Group D		
Hexanes		Group D		
Hydroacetic Acid	Group IIB			
Hydrogen	Group IIC	Group B		0.29mm
Hydrogen Cyanide	Group IIB	Group C		
Hydrogen Selenide		Group C		
Hydrogen Sulfide		Group C		
Isomyl Acetate		Group D		
Isobutyl Acrylate		Group D		
Isobutyraldehyde		Group D		
Isoprene		Group D		
Isopropenylbenzene	Group IIA			
Isopropyl Acetate		Group D		
Isopropyl Ether		Group D		0.94mm
Isopropyl Glycidyl Ether		Group C		
Isopropyl Nitrate	Group IIB			
Isopropylamine		Group D		
Kerosene	Group IIA			
LPG Gas		Group D		
Mesityl Oxide		Group D		
Metaldehyde	Group IIA			
Methane	Group IIA	Group D		1.14mm

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CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Methanol	Group IIA	Group D		0.92mm
Methyl Acetate	Group IIA	Group D		0.99mm
Methyl Acrylate	Group IIB	Group D	Assume Group D	0.85mm
Methyl Ether		Group C		
Methyl Ethyl Ketone	Group IIA	Group D		0.92mm
Methyl Formal		Group C		
Methyl Formate	Group IIA	Group D		
Methyl Isobutyl Ketone		Group D		0.98mm
Methyl Isocyanate		Group D		
Methyl Mercaptan		Group C		
Methyl Methacrylate	Group IIA	Group D		
Methyl Propanol		Group D		
Methylacetylene		Group C		
Methylamine	Group IIA	Group D		
Methylcyclobutane	Group IIA			
Methylcyclohexane	Group IIA	Group D		
Methylcyclohexanol	Group IIA			
Methylcyclopentane	Group IIA			
Methylene Chloride	Group IIA			
Methylstyrene	Group IIA			
Monomethyl Hydrazine		Group C		
n-Propyl Ether		Group C		
Naphtha	Group IIA	Group D		
Naptha (Petroleum)	Group IIA	Group D		
Naphthalene	Group IIA			
Nitroethane	Group IIA	Group C	Assume Group C	
Nitromethane	Group IIA	Group C	Assume Group C	
Nitropropane		Group C		
NN-Dimethylaniline	Group IIA			
Nonane	Group IIA	Group D		
Nonanol	Group IIA			

CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Nonene		Group D		
Octane	Group IIA	Group D		0.94mm
Octanol	Group IIA			
Octene		Group D		
Pentane	Group IIA	Group D		0.93mm
Pentane-2.4-Dione	Group IIA			
Pentanol	Group IIA	Group D		0.99mm
Pentanone		Group D		
Pentene		Group D		
Petroleum Naphtha	Group IIA	Group D		
Phenol	Group IIA			
Propane	Group IIA	Group D		0.92mm
Propane-Thiol	Group IIA			
Propanol	Group IIA	Group D		
Propene	Group IIA			
Propionaldehyde		Group C		
Propyl Acetate	Group IIA	Group D		1.04mm
Propyl Ether		Group C		
Propyl Methyl Ketone	Group IIA			
Propyl-Mercaptan	Group IIA			
Propyl Nitrate		Group B		
Propylamine	Group IIA			
Propylene	Group IIA	Group D		0.91mm
Propylene Dichloride		Group D		
Propylene Oxide		Group B(C)	Assume Group C	0.70mm
Propyne	Group IIB			
Pyridine	Group IIA	Group D		
Styrene	Group IIA	Group D		
Tetrafluoroethylene	Group IIB			
Tetrahydrofuran	Group IIB	Group C		
Tetrahydrofurfuryl Alcohol	Group IIB			

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CHEMICAL	IEC GROUPING	NEC GROUPING	CONFLICT RESOLUTION	MESG IEC 79-1
Tetrahydrothiophene	Group IIA			
Thiophene	Group IIA			
Toluene	Group IIA	Group D		
Toluidine	Group IIA			
Triethylamine	Group IIA	Group C	Assume Group C	
Trifluorotoluene	Group IIA			
Trimethylamine	Group IIA			
Trimethylbenzene	Group IIA			
Trioxane	Group IIB			
Turpentine	Group IIA	Group D		
UDMH		Group C		
Unsym. Dimethyl Hydrazine		Group C		
Valeraldehyde		Group C		
Vinyl Acetate	Group IIA	Group D		0.94mm
Vinyl Chloride		Group D		0.99mm
Vinylidene Chloride		Group D		3.91 mm
Xylene	Group IIA	Group D		