



VEDOVELL Properties

The properties of any application are vital in considering the right seal. From atmospheric considerations to fluid pressure, elastomer hardness and other variables, Vedovell offers you the following information to assist you with the selection of your seal.

- General Elastomeric Properties
- Temperature Range Chart
- Durometer Chart
- Comparison of Properties Chart
- Fluid Compatibility Tables

GENERAL ELASTOMERIC PROPERTIES

Natural Rubber (NR)

Two types are most commonly used - smoked sheets and pale crepe. They are alike except in color and odor. Pale crepe is used for light colors and when odor is objectionable. Both possess exceptional elastic qualities and have good resistance to water and acids. They are compatible with synthetic rubbers and are often used in blends. Low compression set and stress relaxation, good electrical insulation and good resistance to abrasion, tear and fatigue. Best choice for applications requiring low heat build-up, such as tires, vibration, mounts springs and bearings. Other applications include hoses, conveyor belts, gaskets, seals, rolls and rubberized fabrics.

C.R. Chloroprene Rubber (CR)

(Neoprene) Resists fats, oils and petroleum products. Stands up well in sunlight. Low flammability - burns when exposed to flames, but self-extinguishes when flame is removed. Generally good ozone, aging and chemical resistance. It has good mechanical properties over a wide temperature range.

Polyisoprene (IR)

A substitute for natural rubber and has very similar characteristics. Can be used in lower temperature applications than natural rubber.

Styrene Butadiene Rubbers (SBR)

Synthetic substitutes for natural rubber. Cures more slowly than natural rubber. Resistant to non-petroleum based automotive brake fluids, silicone oils and greases, glycols, alcohols, water, solutions of acids, alkalis and salts.

Isoprene-Isobutylene Rubber (I.I.R., Butyl)

Has excellent resistance to aging, heat, sunlight and ozone. Low gas & moisture permeability; high damping, excellent electrical insulation; good resistance to dry heat and steam.

Chlorinated Butyl (Chlorobutyl)

Exceptional heat stability, low compression set, low permeability to gasses and good resistance to chemicals, oxidation and tearing. Used for O-rings, gaskets, vacuum seals, membranes, steam hoses and pharmaceutical closures.

Nitrile Butadiene Rubber (N.B.R., Buna N)

Nitrile, chemically, is a copolymer of butadiene and acrylonitrile. Acrylonitrile content is varied in commercial products from 18% to 48%. As the nitrile content increases, resistance to petroleum base oils and hydrocarbon fuels increases, but low temperature flexibility decreases.

Due to its excellent resistance to petroleum products, and its ability to be compounded for service over a temperature range of -65 to +275°F (-54 to +135°C), nitrile is the most widely used elastomer in the seal industry today.

Inherently nitrile does not possess good resistance to ozone, sunlight or weather, but this can be substantially improved through compounding.

Polyacrylic (ACM)

High oil resistance and dry heat resistance up to 350°F. Used primarily in applications requiring combined resistance to heat, oils, and oil additives such as O-rings, lip seals and gaskets.



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Epichlorohydrin (Hydrin) (CO, ECO, GECO)

Ozone resistance, broad temperature range and oil resistance. Typical applications include seals, gaskets, diaphragms, hoses, belting, wire and cable jackets, coated fabrics and printing rolls.

Thiokol Polysulfide (T)

More inert than most synthetics. High resistance to oil, gasoline and aromatic solvents-lacquer thinners. Applications include gasoline and aromatic fuel hoses, coating and printing rolls, gas meter diaphragms, O-rings, pulleys, sealants and coated paper gaskets.

Silicone and Fluoro-Silicone Rubber (Q, MQ, VMQ, FMQ, FVMQ)

High and low temperature stability, exceptional release from sticking, resistance to aging, ozone and sunlight, good dielectrics and outstanding water repellency. Applications include electrical insulators, ignition cables, gaskets, O-rings, static seals, oxygen masks, food and medical grade tubing and roll coverings.

Millable Urethanes (AU/EU)

Exceptional tensile strength. Abrasion and low temperature resistance. Typical applications include hydraulic seals, gaskets, diaphragms, hoses, and wheels for skate boards.

Hypalon®, Chlorosulfonated Polyethylene Rubber (CSM)

High ozone and corona resistance, heat resistance up to 300°F and good color stability. Widely used in electrical applications as protective jacketing when resistance to heat, flame, ozone, weather, corrosion, chemicals and oils are important. Other applications include coatings, weather resistant membranes, hoses and acid tank linings.

Fluoro Elastomers, fluorocarbon (Viton®, Fluorel) (FKM)

For extreme heat resistance-temperatures ranging to +500°F. Resistance to abrasion, oil and chemicals is outstanding. Good resistance to ozone, weathering and flame. Main uses are as O-rings, shaft seals, gaskets, fuel hoses, diaphragms, and cable sheathing for extreme conditions.

Polybutadiene (BR)

Excellent abrasion resistance. Good low temperature qualities. It is mainly used in blends with other rubbers to manufacture mechanical goods in order to increase resilience, to improve their low temperature flexibility, or to reduce their heat build-up on flexing.

Ethylene Propylene Copolymer (EPM)

Resistance to chemicals, chemical solutions, heat and ozone.

Ethylene Propylene Diene Terpolymer (EPDM)

Excellent in water, steam, heat, weather, detergents, ozone and many chemicals. Applications include O-rings, gaskets, window and door seals, wire and cable insulation, under-hood applications, hoses, and water-proofing sheets.

TFE Propylene (Aflas) Tetrafluoroethylene-Propylene Rubbers

This elastomer is a copolymer of Tetrafluoroethylene (TFE) and propylene. Its chemical resistance is excellent across a wide range of aggressive media.

PTFE (polytetrafluoroethylene) Teflon®

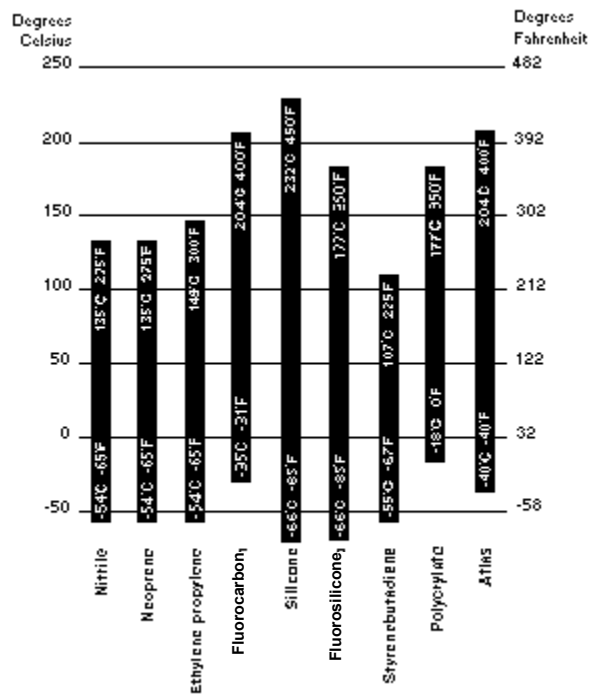
This compound is impervious to virtually all fluids and gasses ranging from -320°F to 450°F Only molten alkaline metals and certain halogenated compounds will attack it.



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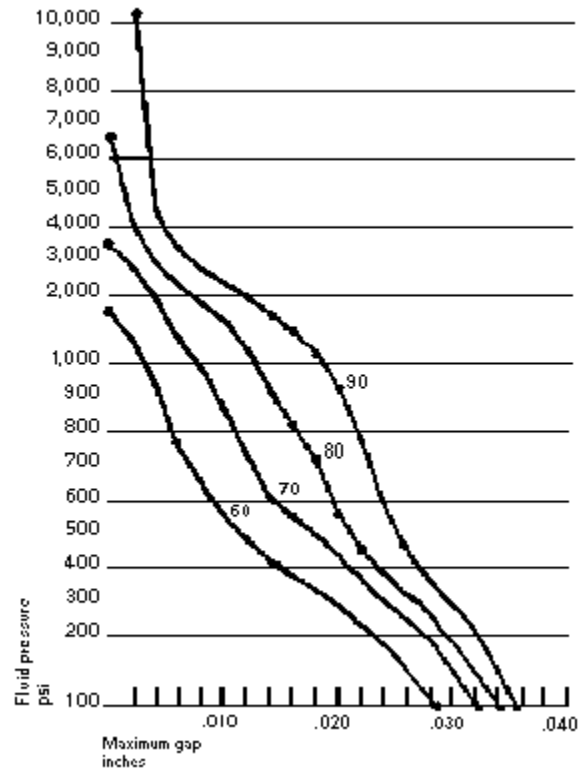
TEMPERATURE RANGE CHART

The temperature range for any compound is determined by the base elastomer used. This chart depicts the maximum temperature range for each elastomer. The temperature range for a specific compound may not reach these maximum limits. Higher temperatures may be considered if exposure is short term or intermittent.



DUROMETER CHART

The hardness of rubber compounds is measured by Shore A durometer; the higher the durometer number, the harder the compound. Wherever possible 70 durometer hardness should be used as it offers the best combination of properties for most O-ring applications. Softer compounds stretch easier and seal better on rough surfaces. Harder compounds offer greater abrasion resistance and resistance to extrusion. Extrusion must always be considered when high pressures are used. The proper hardness may be selected from this chart by matching the fluid pressure with the maximum extrusion gap.





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COMPARISON OF PROPERTIES CHART

This chart matches the general rubber properties required in most O-ring applications with the capabilities of commonly used elastomers. Since no one elastomer is rated “excellent” for all properties, compromises are sometimes necessary when selecting an elastomer for a specific O-ring application. Start with the most critical properties to narrow your choices.

	E = excellent G = good F = fair P = poor		(1) = Property (2) = Nitrile (3) = SBR (4) = Neoprene (5) = Ethylene Propylene			(6) = Fluorocarbon (7) = Fluorosilicone (8) = Polyacrylate (9) = Polyurethane (10) = Silicone				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ozone Resistance	P	P	GE	E	E	E	E	E	E	E
Weather Resistance	F	F	E	E	E	E	E	E	E	E
Heat Resistance	G	FG	G	E	E	E	E	F	E	E
Chemical Resistance	FG	FG	FG	E	E	E	P	F	GE	GE
Oil Resistance	E	P	FG	P	E	G	G	G	PG	PG
Impermeability	G	F	G	G	G	P	E	G	P	P
Cold Resistance	G	G	FG	GE	FP	GE	P	G	E	E
Tear Resistance	FG	FG	FG	GE	F	P	FG	GE	P	P
Abrasion Resistance	G	G	G	GE	G	P	G	E	P	P
Set Resistance	GE	G	F	GE	GE	GE	F	F	GE	GE
Dynamic Properties	GE	G	F	GE	GE	P	F	E	P	P
Acid Resistance	F	F	FG	G	E	FG	P	P	FG	FG
Tensile Strength	GE	GE	G	GE	GE	F	F	E	P	P
Electrical Properties	F	G	F	G	F	E	F	FG	E	E
Water/Steam	FG	FG	F	E	FG	F	P	P	F	F
Flame Resistance	P	P	G	P	E	G	P	P	F	F



VEDOVELL Fluid Compatibility Tables

The recommendations shown in this table are based on data supplied by Vedovell's polymer manufacturers and comparison made with similar materials. These are general guidelines, and users must conduct functional tests to determine the suitability of any compound for a particular application. To aid in your selection, materials are ranked in order of increasing cost, starting with Nitriles and ending with Aflas.

	R = recommended M = marginal U = unsatisfactory X = insufficient data			(1) = Fluid (2) = Nitrile (3) = SBR (4) = EPDM (5) = Neoprene (6) = Polyacrylate			(7) = Urethane (8) = Silicone (9) = Fluoroelastomer (10) = Fluorosilicone (11) = Aflas				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acetaldehyde	U	U	R	U	U	U	R	U	U	X	
Acetamide	R	U	R	R	U	U	M	U	R	R	
Acetic Acid	M	M	R	R	U	U	R	U	U	U	
Acetone	U	M	R	M	U	U	M	U	U	U	
Acetophenone	U	U	R	U	U	U	U	U	U	X	
Acetylene	R	R	R	R	X	X	R	R	X	X	
Ammonia	R	R	R	R	U	X	R	U	U	R	
Ammonium Hydroxide	R	R	R	R	U	U	R	R	R	R	
Amyl Acetate	U	U	M	U	U	U	U	U	U	U	
Anderol L-774	M	U	U	U	R	U	U	R	M	X	
Antifreeze	R	R	R	R	U	U	R	R	X	X	
Aniline	U	U	R	U	U	U	U	M	M	R	
Ansul Ether	M	U	M	U	U	R	U	U	M	U	
Aroclors	M	U	R	U	U	X	M	R	M	R	
Askarel	R	U	U	U	U	U	U	R	M	R	
ASTM #1	R	U	U	R	R	R	R	R	R	R	
ASTM #3	R	U	U	U	R	R	U	R	R	R	
ASTM Fuel A	R	U	U	R	R	R	U	R	R	M	
ASTM Fuel B	R	U	U	U	U	R	U	R	R	U	
ASTM Fuel C	R	U	U	U	U	R	U	R	M	U	
ASTM Fuel D	M	U	U	U	U	R	U	R	X	X	
Auto Transmission Fluid	R	U	U	M	R	R	M	R	X	R	
Beer	R	R	R	R	U	U	R	R	R	R	
Benzaldehyde	U	U	R	U	U	U	U	U	U	M	
Benzene	U	U	U	U	U	U	U	R	R	M	
Benzine	R	U	U	R	R	R	U	R	R	M	
Benzoic Acid	U	U	U	U	U	U	U	R	M	R	
Benzophenone	U	U	R	X	U	U	U	R	R	X	
Bezyl Alcohol	U	U	R	R	U	U	X	R	M	R	
Bleach	R	R	R	R	U	U	U	R	M	R	
Borax	R	R	U	R	R	R	R	R	M	R	
Boric Acid	R	R	R	U	R	R	R	R	R	R	
Brake Fluid (non Petroleum)	U	R	R	U	U	U	R	U	U	R	
Bromine	U	U	U	U	U	U	U	R	M	M	
Bromobenzene	U	U	U	U	U	U	U	R	R	U	
Bunker Oil	R	U	U	U	R	R	U	R	R	R	
Butane	R	M	U	R	R	U	U	R	R	M	
Butter	R	U	R	R	R	R	R	R	R	R	
Butyl Acetate	U	U	U	U	U	U	U	U	U	U	
Butyl Alcohol	R	R	R	R	U	U	R	R	R	R	



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Butyl Amine	M	U	U	U	U	U	U	R	U	U	M
Butyl Carbitol	U	U	R	M	U	X	U	M	U	M	
Butyl Cellosolve	M	U	R	M	U	U	X	U	U	X	
Butylaldehyde	U	U	R	U	U	U	U	U	U	X	
Carbitol	R	R	R	R	U	U	R	R	M	R	
Carbitol Acetate	U	U	U	U	U	U	U	R	X	R	
Carbon Disulfide	U	U	U	U	U	X	U	R	R	R	
Carbon Tetrachloride	R	U	U	U	U	U	U	R	M	M	
Carbonic Acid	R	R	R	R	R	R	R	R	R	R	
Castor Oil	R	R	R	R	R	R	R	R	R	R	
Cellosolve	U	R	U	U	U	U	U	U	U	M	
Chassis Grease	R	U	M	R	R	X	U	R	X	X	
Chloracetic Acid	U	U	R	U	U	U	X	U	U	X	
Chloracetone	U	U	R	X	X	X	U	R	X	U	
Chlordane	R	U	U	M	X	X	U	R	M	X	
Chlorine	U	U	R	U	U	U	X	R	R	X	
Chlorobenzol	U	U	U	U	U	U	U	R	X	X	
Chloroform	U	U	U	U	U	U	U	R	M	U	
Chorosulfonic Acid	U	U	U	U	U	U	U	U	U	M	
Chrome Plating Solution	U	U	R	U	U	U	R	R	U	R	
Chromic Acid	U	U	X	U	X	X	M	R	U	R	
Citric Acid	R	R	R	R	X	X	R	R	R	R	
Cod Liver Oil	R	U	R	R	R	U	R	R	R	R	
Coffee	R	R	R	R	U	U	R	R	R	X	
Corn Oil	R	U	U	U	R	U	R	R	R	R	
Creosote	R	U	U	R	R	M	U	R	R	R	
Creosote Oil	R	U	U	X	X	X	M	R	X	X	
Creosylic Acid	U	U	U	U	U	U	U	R	M	R	
Crude Oil	R	U	U	U	R	X	U	R	M	X	
Cyclohexane	R	U	U	M	R	R	U	R	R	M	
Cyclohexanol	R	U	U	R	X	X	U	R	R	R	
Decalin	U	U	U	U	U	U	U	R	R	M	
Denatured Alcohol	R	R	R	R	U	R	R	R	R	R	
Diacetone	U	U	R	U	U	U	U	U	U	M	
Dibutyl Amine	U	U	R	M	U	U	U	U	U	R	
Dibutyl Phthalate	U	U	U	U	U	X	X	M	U	M	
Dichloro Aniline	U	U	U	U	U	U	U	M	X	X	
Dichloro Butane	R	U	U	U	U	U	U	R	M	R	
Diesel Oil	R	U	U	M	U	U	U	R	R	R	
Diethylamine	R	R	R	R	U	M	R	U	U	M	
Diethyl Benzene	M	U	U	U	X	X	X	R	X	X	
Diethylene Glycol	R	R	R	R	U	U	R	R	R	R	
Dimrthyl Ether	U	U	U	M	M	R	U	U	U	U	
Dimethyl Formamide	U	X	R	X	X	X	R	U	X	M	
Dimethyl Phthalate	U	U	R	U	U	X	X	R	X	M	
Dimethyl Terephthalate	U	U	U	U	U	U	U	R	X	X	
Diocetyl Phthalate	U	U	R	U	U	U	M	R	M	M	
Dioxane	U	U	R	U	U	U	U	U	U	U	
Diphenyl	U	U	U	U	U	U	U	U	R	U	
Dow Corning 550	U	R	R	R	R	R	R	R	R	X	



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(1)	1 = Fluid 2 = Nitrile 3 = SBR 4 = EPDM 5 = Neoprene 6 = Polyacrylate					7 = Urethane 8 = Silicone 9 = Fluoroelastometer 10 = Fluorosilicone 11 = Aflas				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
R = recommended M= marginal U = unsatisfactory X = insufficient data										
Dow Gard	R	R	R	R	M	M	R	R	R	X
Dowtherm A&E	U	U	U	U	U	U	U	R	M	X
Elco 28	R	U	U	M	R	R	R	R	R	X
Epoxy Resins	X	X	R	R	X	X	X	U	X	X
Ethane	R	U	U	R	R	M	U	R	M	R
Ethanol	R	R	R	R	U	R	R	R	R	X
Ethanolamine	R	R	R	R	U	M	R	U	U	R
Ethyl Acetate	U	U	R	U	U	U	R	U	U	U
Ethyl Benzene	U	U	U	U	U	U	U	R	R	U
Ethyl Cellulose	R	R	R	R	U	R	R	U	U	R
Ethyl Chloride	R	R	R	R	M	R	U	R	R	M
Ethyl Ether	M	U	M	U	U	R	U	U	M	U
Ethyl Formate	U	U	R	R	X	X	X	R	R	R
Ethyl Hexanol	M	R	R	R	X	X	X	R	R	X
Ethyl mercaptan	U	U	X	M	X	X	M	R	X	M
Ethylene Chloride	U	U	U	U	U	U	U	R	X	R
Ethylene Oxide	U	U	R	U	U	U	U	U	X	U
Formaldehyde	M	M	R	M	U	U	R	U	U	M
Formic Acid	M	R	R	R	X	X	M	U	X	X
Freon 12	R	R	R	R	X	R	U	R	U	X
Fuel Oil	R	U	U	R	R	U	U	R	R	R
Furan	U	U	X	U	U	X	X	X	X	X
Furfural	U	U	R	U	U	X	U	U	X	X
Furfuryl alcohol	U	U	R	U	U	U	U	X	U	X
Fyrquel	U	U	R	U	U	U	R	R	U	X
Gallic Acid	R	R	R	R	U	U	X	R	R	R
Gasoline	R	U	U	U	U	R	U	R	R	M
Gelatin	R	R	R	R	U	U	R	R	R	R
Glucose	R	R	R	R	X	U	R	R	R	R
Glycerine	R	R	R	R	U	U	R	R	R	R
Heptane	R	U	U	R	R	R	U	R	R	X
Hexaldehyde	U	U	R	R	X	X	R	U	U	U
Hexane	R	U	U	R	R	R	U	R	R	M
Hexanol	R	R	M	R	U	U	R	R	X	X
Home Heating Oil	R	U	U	M	R	R	R	R	X	X
Hydrazine	R	R	R	R	X	X	R	X	X	X
Hydrochloric Acid	R	M	R	R	M	U	U	R	U	R
Hydrocyanic Acid	R	R	R	R	U	X	M	R	U	R
Hydrogen Peroxide	R	R	R	R	U	X	R	R	R	R
Hydrogen Sulfide	U	U	R	R	U	X	M	U	U	R
Hydroquinone	M	U	U	U	U	X	X	R	M	X
Hypoid Gear Lube	R	U	U	M	R	R	M	R	X	X
Iodine	R	R	R	U	X	X	X	R	R	X
Isocyanate	X	X	X	X	X	X	X	R	X	X
Isooctane	R	U	U	R	R	R	U	R	R	M



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)					
Iso Phorone	U	U	R	U	U	U	U	U	M	U						
Isopar	R	X	U	R	R	R	U	R	X	X						
Isopropanol	R	R	R	R	U	U	R	R	R	X						
Isopropyl Acetate	U	U	R	U	U	U	U	U	U	X						
JP-4(MIL-J5624)	R	U	U	U	R	R	U	R	M	X						
JP-5(MIL-5624)	R	U	U	U	R	R	U	R	M	X						
Kerosene	R	U	U	R	R	R	U	R	R	R						
Lactic Acid	R	R	R	R	U	X	X	R	R	R						
Lacquers	U	U	U	U	U	U	U	U	U	U						
Lard	R	U	R	R	R	R	R	R	R	R						
Linoleic Acid	R	U	U	R	X	X	R	R	X	R						
Linseed Oil	R	U	M	M	R	X	R	R	R	R						
Lye Solutions	R	R	R	R	U	U	R	R	M	R						
Malathion	R	U	U	X	X	X	U	R	M	X						
Maleic Acid	U	U	U	U	U	X	X	R	X	R						
Mercury	R	R	R	R	X	X	X	R	X	R						
Meter-Cresol	U	U	U	R	U	U	U	R	X	X						
Methane	R	U	U	R	R	M	U	R	M	R						
Methanol	R	R	R	R	U	U	R	U	R	X						
Methyl Acetate	U	U	R	R	U	U	U	U	U	U						
Methacrylic Acid	U	U	R	R	U	U	U	M	U	X						
Methyl Cellosolve	M	U	R	M	U	U	U	U	U	X						
Methylene Chloride	U	U	U	U	U	U	U	R	M	X						
Methyl Ethyl Ketone	U	U	R	U	U	U	U	U	U	U						
Methyl Mercaptan	X	X	R	X	X	X	X	X	X	X						
Milk	R	R	R	R	U	U	R	R	R	R						
Mineral Oil	R	U	M	R	R	R	R	R	R	R						
Mineral Spirits	R	U	U	U	R	R	U	R	X	X						
Monovinyl Acetylene	R	R	R	R	X	X	R	R	X	R						
Mustard	X	E	R	X	X	X	R	R	X	X						
Naphtha	R	U	U	U	R	R	U	R	M	M						
Naphthalene	U	U	U	U	X	X	U	R	R	M						
Naphthenic Acid	R	U	U	U	X	X	U	R	R	M						
Natural Gas	R	R	U	R	R	R	R	R	M	R						
Neatsfoot Oil	R	U	R	U	R	R	R	R	R	R						
Nitric Acid	U	M	R	U	U	U	U	M	U	R						
Nitrobenzene	U	U	U	U	U	U	U	R	U	X						
Nitropropane	U	U	R	U	U	U	U	U	U	X						
Octane	R	U	U	U	U	U	U	R	M	M						
Octanol	R	R	R	R	U	U	R	R	X	X						
Oleic Acid	M	U	U	M	X	X	U	R	X	R						
Oleum	R	U	U	M	X	X	U	R	X	R						
Oronite 8200	R	U	U	R	X	R	U	R	R	X						
Oxalic Acid	R	R	R	R	X	X	R	R	R	R						
Peanut Oil	R	U	M	M	R	X	R	R	R	R						



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Pentane	R	M	U	R	R	U	U	R	M	X	
Perchlorethylene	R	U	U	U	U	U	U	R	M	X	
Petroleum Ether	U	U	U	U	U	U	U	R	X	X	
Phenol	U	U	U	U	U	U	U	R	M	X	
Phenylhydrazine	U	M	U	U	U	X	X	R	X	R	
Phosphoric Acid	R	R	R	R	M	U	R	R	M	R	
Pine Oil	R	U	U	U	X	X	U	R	R	R	
Potassium Hydroxide	R	R	R	R	U	U	M	U	M	R	
Propane	R	U	U	R	R	M	U	R	M	R	
Propanol	R	R	R	R	U	U	R	R	X	X	
Propyl Acetate	U	U	R	R	U	U	U	U	U	U	
Pydraul	U	U	R	R	U	U	U	R	U	R	
Pyranol	R	U	U	R	R	R	U	R	X	R	
Pyridine	U	R	U	U	U	X	U	U	X	R	
Rapeseed Oil	R	U	R	R	R	R	U	R	R	R	
Resorcinol	X	R	R	X	X	X	X	X	X	X	
SAE 10W30	R	U	U	M	R	R	R	R	X	X	
Seawater	R	R	R	R	U	U	R	X	R	R	
Silicone Grease	R	R	R	R	R	R	R	R	R	R	
Silver Nitrate	R	R	R	R	R	R	R	R	R	R	
Skelly Solvent	R	U	U	U	X	X	X	R	R	X	
Skydrol	U	U	R	U	U	U	U	R	X	R	
Skydrol 500	U	U	R	U	U	U	U	U	M	R	
Sodium Hydroxide	R	R	R	R	U	R	R	R	M	R	
Sovasol	R	U	U	R	R	R	U	R	R	X	
Soy Bean Oil	R	U	M	M	R	X	R	R	R	R	
Stearic Acid	R	R	R	R	X	X	R	X	X	R	
Stoddard Solvent	R	U	U	R	R	R	U	R	R	M	
Sucrose	R	R	R	R	U	U	R	R	R	R	
Sulfuric Acid	R	R	R	R	R	U	U	R	U	R	
Tail Oil	R	U	U	M	R	U	X	R	X	X	
Tannic Acid	R	R	R	R	U	X	R	R	X	R	
Tar	R	U	U	M	U	X	R	R	R	R	
Tartaric Acid	R	R	R	R	X	X	R	R	R	R	
Tetrachloro Ethane	U	U	U	U	U	U	U	R	M	X	
Tetralin	U	U	U	U	U	U	U	R	R	X	
Tidewater Oil	R	U	U	R	R	R	R	R	R	X	
Toluene	U	U	U	U	U	U	U	R	M	U	
Trichloroethylene	M	U	U	U	U	U	U	R	M	X	
Triethanol amine	M	R	R	R	U	U	X	U	U	X	
Turbine Oil	R	U	U	U	R	R	U	R	R	R	
Turpentine	R	U	U	U	R	U	U	R	M	R	
UCDN 50HB280X	R	R	R	R	X	X	R	R	X	X	
Univs J-43	R	U	U	R	R	R	U	R	X	X	
Varnish	R	U	U	U	U	M	U	R	M	X	
Vinegar	R	R	R	R	U	U	R	R	M	R	
Water	R	R	R	R	U	U	R	R	R	R	
Wheat Germ Oil	R	U	U	M	R	R	R	R	X	X	
Whiskey & Wine	R	R	R	R	U	U	R	R	R	R	
Wood Oil	R	U	U	R	X	M	U	R	M	R	



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CONVERSION FROM ASTM D735-DSAE J14 TO ASTM D2000-SAE J200

Equivalents for Conversion		
ASTM D735-SAE J14 Material Designation (Type and Class)	ASTM D2000-SAE J200 Material Designation (Type and Class)	Type of Polymer Normally Used
R	AA	Natural rubber, reclaimed rubber, SBR butyl
R	BA	High temperature SBR and butyl compounds
SC	BC	Chloroprene polymers (neoprene)
...	BE	Chloroprene polymers (neoprene)
...	BF	NBR polymers
SB	BG	NBR polymers, urethanes
SA	BK	Organic dihalide polymers (Thiokol), NBR
...	CA	Ethyl propylene
...	CE	Chlorosulfonated polyethylene (Hypalon®)
...	CH	NBR Polymers
...	DF	Polyacrylic (butyl-acrylate type)
TB	DH	Polyacrylic polymers
TA	FC	Silicones (high strength)
...	FE	Silicones
...	FK	Fluorinated silicones
TA	GE	Silicones
...	HK	Fluorinated elastomers (Viton®)

ASTM COMPOUND CONVERSION KEYS

Natural and Synthetic Rubber Compounds Identification				
Prefix-Type	1st Number "A" Durometer Hardness	Next 2 Numbers Tensile Strength	Suffix - Characteristics	
RN - Natural Rubber	3=30±5	05=500	A - Heat Aging	H - Flexing
S - Synthetic non-oil resistance Usually GRS	4=40±5	10=1000	B - Compression set	J - Abrasion
SA - Very low oil swell Usually Thiokol	5=50±5	15=1500	C - Weather resistance	K - Adhesion
SB - Low oil swell Usually Buna N	6=60±5	20=2000	D - Load deflection	L - Moisture absorption
SC - Medium oil swell Usually Neoprene	7=70±5	25=2500	E - Oil immersion	M - Flame resistance
TA - Heat and cold resistance	8=8±5	30=3000	F1 or F -40°F cold	N - Impact P - Staining
TB - Heat and oil resistance Usually Polyacrylate	9=90±5	35=3500	F2 or FF -60°F cold G-Tear	R - Resilience Z - Special requirements as noted



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CONVERSION FROM ASTM D735 D-SAE J114 TO ASTM D2000-SAE J200

Conversion of Suffix Letters	
ASTM D735-SAE J14	ASTM D2000-SAE J200
A1	A14
B	B13, B14, B36, OR B17
C	C20
D	D11
E1	E14 OR E16
E3	E34 OR E36
F1	F17
F2	F19
G	G11 org21
H	H
K1	K11
K2	K31
L	L14
M	M
N	N
P	P
R	R
Z	Z

Examples of Specification Conversions	
ASTM D735-SAE	ASTM D2000-SAE J200
R420B	4AA420A13B13
SB620B	2BG620B14
SB620E3	2BG620E34
R515	4AA515A13
SC520	2BC520A14
SB510	BG510

S.A.E. (Society Automotive Engineers) A.S.T.M. D735-S.A.E. J14 (American Society Testing Materials)



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SHELF LIFE

Maximum (Up to 20 Years)				
Type of Rubber	Common or Trader Name	ASTM D1418 Abbreviation	ASTM D2000 Designation	MIL-STD-417
Silicone	Silicone	Q	FE	TA
Fluorosilicone	Silastic LS	FVMQ	FK	TA
Polysulfide	Thickol	T	BK	SA
Fluorocarbons	Flurel, Viton®	FKM	HK	...
Polyacrylate	Acrylic	ACM, ANM	DF, DH	TB

Average (5 to 10 years)				
Type of Rubber	Common or Trader Name	ASTM D1418 Abbreviation	ASTM D2000 Designation	MIL-STD-417
Chlorosulfonated polyethylene Isobutylene/ Isoprene	Hypalon®	CSM	CE	...
Polypropylene	Butyl	IIR	AA, BA	RS
Polyether Urethane	Neoprene	CR	BC, BE	SC
Polypropylene Oxide	Urethane	EU	BG	...
Ethylene/propylene diene	Propylene oxide	GPOO
Ethylene/propylene copolymer	Ethylene propylene terpolymer	EPDM	BA, CA	...
Epichlorohydrin homopolymer	Ethylene propylene	EPM	BA, CA	...
Epichlorohydrin ethylene oxide	Hydrin 100, Herclor H	CO
	Hydrin 200, Herclor C	ECO

Minimum (2 to 5 Years)				
Type of Rubber	Common or Trader Name	ASTM D1418 Abbreviation	ASTM D2000 Designation	MIL-STD-417
Butadiene/acrylonitrile ¹	Nitrile, NBR	NBR	BF, BG, BK, CH	SB
Butadiene/styrene	SBR	SBR	AA, BA	RS
Cis-polyisoprene	Butadiene	BR	AA	RN
Cis 1, 4, polyisoprene	Natural, pale crepe	NR	AA	RN
Cis 1, 4, polyisoprene	Synthetic natural	IR	AA	RN
Polyester urethane	Urethane	AU

¹ NBR, when compounded for O-ring seals, may have a shelf life as high as 10 years when aging resistance requirements are specified in the specification.



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GLOSSARY

AF: Air Force

AMS: Aerospace Material Specification

AN: Air Force-Navy

AS-568A: Aerospace Standard Uniform Dash Numbering system for O-rings

Clearance, Diametral: The difference in diameters of two surfaces to be sealed

Cross-Sectional Dia (C/S): One half the difference between the ID and OD of an O-ring (W)

Dynamic Seal: An application where an O-ring is to seal two parts which are in motion

Elongation: Percent of stretch before breaking

Extrusion: The extension, under pressure, of a portion of an O-ring into the clearance between mating parts

Face Seal: An application where an O-ring seals in a plane perpendicular to its axis

Flash: Excess rubber left around an O-ring at mold parting lines

Gland: Seal assembly, including O-ring, groove and contacting surfaces

Groove: The recess into which an O-ring is fitted

Hardness: Property usually measured with a Shore A Durometer. A reading of 40 is soft, 90 is hard

ID: The inside diameter of an O-ring

MIL: Military

Modulus: Stress at 100% elongation

MS: Military Standard

OD: The outside diameter of an O-ring

SAE: Society of Automotive Engineers

Seal: An O-ring that prevents fluid flow

Set, Compression: Permanent distortion of an O-ring after compression

Squeeze: Cross-sectional compression of an O-ring

Static Seal: An O-ring designed to function between parts having no relative motion, a gasket

Tensile: The pulling strength before breaking, measured in pounds per square inch

W: The cross-sectional diameter of an O-ring(C/S)

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