AERO
RUBBER COMPANY®, INC.

How to Choose Elastomers: *When You Do Not Have a Specification Already*

While there are many formulations or recipes of rubber available, the following text contains essential information to assist you in choosing the elastomer that will work best for your project. If you have a material specification, ASTM specification or Military specifications (Milspec), it is important to share them with your Aero sales engineer so that he can quote the proper material that meets your specifications. Aero also provides specification certifications upon request at no additional charge.

Aero's experienced sales engineers stand ready to guide you towards the best solution for your specific requirements.

The following information is important to understand about elastomer selection:

- All of the attributes of rubber are trade-offs. If an elastomer is good for something, it is usually not good at something else. It is important to know what the rubber {aka "elastomer") will be used for and exposed to.
- The information presented herein should be used only as a general "guide". We cannot guarantee its completeness, nor accuracy, nor assume responsibility for its use due to the myriad of combinations and uses.
- Each rubber manufacturer has their own elastomer recipes. Each one is considered a trade secret.
- A rubber compound can be a blend of two or more elastomers (elastomers are major ingredients in different rubber compounds). This formulation recipe influences the finished part's function, service life and competitive pricing.
- The chosen elastomers' formulation (recipe) will affect the physical properties of the part, its function and service life. It is the user's responsibility to test a sample pan or lab sample to determine the performance characteristics and suitability of the compound for the specific function and service life.

Elastomer (Common Names)	General Description	Typical Temperature Range:	Advantages	Limitations
* Natural Rubber * Gum Rubber *Polyisoprene	An elastomer made from rubber tree latex.	-55 F to 200° F	High elongation & resilience. High tensile strength. Excellent abrasion resistance and good tear resistance. Low compression set. Good flexing qualities at low temperature	Deteriorates when exposed to oils, fuels, solvents & hydraulic fluids. Poor resistance to sunlight, ozone. Not recommended for outdoor applications. Poor high temperature resistance.
*Synthetic Natural *Synthetic Polyisoprene	The synthetic version of natural rubber. No rubber tree latex.	-55 F to 200° F	Very similar to natural rubber. Free of allergenic proteins of natural rubber (Non-latex).	Same limitations as natural rubber.
*Neoprene *Chloroprene *Polychloroprene	A popular elastomer considered by many as a "general purpose" rubber. Often misused as a generic term for "rubber".	-40 F to 220° F	Good resistance to moderate exposure to ozone, UV, weather as well as oils, greases & solvents.	Poor resistance to strong acids, solvents, esters, Ketones, chlorinated, aromatic and nitro hydrocarbons. See Note #2 below.

Note #1: The information provided above is for reference purposes only and is intended to be utilized as a "guide" when comparing the typical physical properties of different materials. Aero recommends that the buyer perform any tests required to determine the performance characteristics and suitability of a particular material for a specific application.
Note #2: A rubber compound can be a blend of two or more elastomers (when compatible) in order to influence the finished part's function and service life as well as competitive pricing.
Note#3: "Typical Temperature Range" is unrelated to any particular use or application. It is a general guideline to compare with other elastomers. Field tests or part samples by the user and ASTM Lab tests of compound slabs are necessary to determine functional acceptability and service life.

Elastomer (Common Names)	General Description	Typical Temperature Range:	Advantages	Limitations
*Nitrile *Buna `N' *NBR	A popular elastomer. Specified when gasoline, oil, greases are present.	-30 F to 250° F	Very good resistance to oils, solvents, fuels.	Poor resistance to UV, ozone, weathering. Poor resistance to Ketones and chlorinated hydrocarbons. See Note #2 below.
*Hydrogenated Nitrile *Butadiene Rubber (HNBR)	Higher temperature rating than NBR. Usually used for seals, o'rings and packings.	-20 F to 300° F	Widely known for its physical strength and retention of properties after long-term exposure to heat, oil, and chemicals. Excellent resistance to common automotive fluids and many industrial chemicals.	Poor resistance to ethers, esters, ketones or chlorinated hydrocarbons.
*SBR *Buna `S' *GRS	Was the first synthetic rubber and most widely used in the `old days'. Was the lowest cost.	-20 F to 212° F	Very good abrasion resistance. Similar to natural rubber. Relative low cost.	Poor resistance to oils, fuels, solvents, hydraulic fluids. Fair resistance to weathering, similar to natural.

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Elastomer (Common Names)	General Description	Typical Temperature Range:	Advantages	Limitations
*EPDM *EPT *EP	A popular elastomer for outdoor applications where weather and water resistance is required.	-60 F to 250° F	Very good resistance to ozone, UV, sunlight. Very good temperature resistance. Good resistance to steam, brake fluids and weak acids.	Poor resistance to oils and solvents, aromatic hydrocarbons and petroleum products. See Note #2 below.
*EPDM Peroxide Cured	Similar attributes as regular EPDM but higher temperature.	-60 F to 300° F	Very good resistance to ozone, UV, sunlight. Very good temperature resistance. Good resistance to steam, brake fluids and weak acids.	Poor resistance to oils and solvents, aromatic hydrocarbons and petroleum products. See Note #2 below.

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*Silicone	Used where high temperature is required. Used in the medical, food processing & pharmaceutical fields due to its purity when processed. Used in industrial applications due to its long service life.	-100 F to 450 F	Excellent high temperature resistance. Excellent weathering, UV and ozone resistance.	Poor resistance to solvents, oils, concentrated acids. Tensile strength & tear resistance poor. Poor resistance to steam.
*Fluorosilicone	Seldom used elastomer. Used as a substitute for silicone when improved chemical resistance is required.	-100 F to 400 F	Excellent high and low temperature resistance. Excellent resistance to moderate or oxidizing chemicals, ozone, aromatic chlorinated solvents and bases.	Poor resistance to brake fluids, Ketones. Moderate physical properties.

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Elastomer (Common Names)	General Description	Typical Temperature Range:	Advantages	Limitations
*Fluoroelastomer (FKM) *Viton (DuPont) *Fluorel (3-M)	Used when high temperature resistance as well as chemical resistance are required. Several grades available from DuPont & 3-M. There are also several grades of the FKM's for various functions.	-10 F to 400° F	Excellent high temperature resistance including acids if proper grade is selected. Very good weathering, ozone resistance.	Poor resistance to Ketones, low molecular weight esters and alcohols and nitro-containing compounds. Limited hardness range.
*Butyl	Developed during WWII for inner tubes and tires. Tank liners & gloves.	-60° to 250° F	Vacuum & pressure retention, low extractable, self-sealing, vibration damping.	Poor resistance to petroleum oils and fluids.
*Hypalon (trade name) (CSM) Chlorsulphonated Polyethylene	Commonly used as a high grade alternate to Neoprene.	-60° to 275° F	Very good resistance to chemicals, high temperature, UV & ozone. Good resistance to abrasion.	Poor resistance to steam, lacquer, solvents, ketones and organic liquids.
*Polyurethane (Ether or Ester Based)	Thermoplastic that has used for abrasion resistance & flexibility.	-90° to 225° F (175° max in hot water)	Excellent oil resistance High abrasive resistance High tensile & tear resistance.	Can be more expensive than regular rubber. Bad for citric acids & some solvents.

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