

Flexible Polyurethane Foam with Recycled Rubber and EPDM Comparison

Polyurethane -Flexible polyurethane foam (FPF), a two component system, is a chemically complex polymeric product having a broad range of load bearing capability and resiliency. FPF offers protective shock absorption performance, NVH, and long term sealing for use in automotive applications. The incorporation of recycled rubber from tires(≥25%) amplifies Indention Force Deflection(IFD) and static fatigue performance characteristics.

Ethylene-propylene diene monomers – EPDM is an elastomeric crosslinked(vulcanized) compound utilizing a free radical sulfur based curing system. This material exhibits excellent weatherability, ultraviolet, weathering and abrasion resistance as well as low gas permeability. EPDMs have poor resistance to petroleum based fluids and diester lubricants.

Common Properties

	Polyurethane (PUR)	EPDM
• Temperature Resistance	<ul style="list-style-type: none"> ○ Addition polymerization provides minimal dimensional reduction ○ Flexibility when exposed to temperatures extremes ○ Provides dimensional stability 	<ul style="list-style-type: none"> ○ Free radical polymerization causes shrinkage ○ Vehicle operating temperatures allow additional curing and IFD loss
• Chemical Resistance “Like dissolves like”	<ul style="list-style-type: none"> ○ PUR are polar molecules with resistance to non-polar engine fluids, i.e. oils, brake fluids 	<ul style="list-style-type: none"> ○ Non-polar EPDM is dissolved by petroleum based fluids
• Physical Properties	<ul style="list-style-type: none"> ○ Consistency of physical properties during life of product ○ 15lbs./ft³ density 	<ul style="list-style-type: none"> ○ Incremental increase in durometer ○ 25lbs./ft³ density

Inherent Characteristics

	Polyurethane (PUR)	EPDM
• Compression Deflection	<ul style="list-style-type: none"> ○ Static fatigue resistance 	<ul style="list-style-type: none"> ○ Degradation of compression set properties
• NVH	<ul style="list-style-type: none"> ○ Optimum NVH properties realized via uniform microcellular cell structure & micronized recycled rubber particles 	<ul style="list-style-type: none"> ○ Large voids and non-uniformity allow transmission of vibrations
• Biological Activity	<ul style="list-style-type: none"> ○ Naturally resistant to attack ○ Resistance boosted by EU approved biocide 	<ul style="list-style-type: none"> ○ Promotes fungal and bacteria growth ○ High temperature processing limits biocide use
• Environmental Impact	<ul style="list-style-type: none"> ○ >25% Recycled Rubber reduces landfill use ○ Weight reduction via lowering of the density ○ Minimization of energy consumed and subsequent emissions ○ Blowing agents are non-CFC 	

Additional Issue(s)

	Polyurethane (PUR)	EPDM
• Economics	<ul style="list-style-type: none"> ○ Minimization of utilities consumed via Manufacturing process ○ 20% cost advantage on average 	
• Safety		<ul style="list-style-type: none"> ○ Known carcinogen – crystalline silica is present on parts