

Tube and Cover Materials

INTRODUCTION

Choosing an appropriate high quality premium elastomer for the media and environmental conditions is critical for the expansion joint to properly function and achieve maximum service life.

ABRASIVE APPLICATIONS

Proven to reduce wear and extend service life, the Garlock Expansion Joint Family of Abrasion Resistant Products were developed specifically for highly abrasive applications. Together, ABRA-LINE®, ABRA-SHIELD®, and natural rubber provide superior performance and exceptional quality in Power Generation, Fertilizer, Mining, Pulp and Paper, Wastewater, Marine and other markets.

ABRA-LINE®

Developed for highly abrasive applications, Garlock's proprietary, millable urethane formula was designed to be the most abrasion-resistant rubber liner available in an expansion joint. Third-party testing revealed that ABRA-LINE® expansion joints last 2-3 times longer than traditional elastomers because even the most aggressive media slides over the liner rather than digging in and removing material. Plus, the ABRA-LINE® liner's unique yellow color takes the guesswork out of visual evaluations. As the liner wears down, the yellow color darkens as the black backing becomes more prominent.

Temperature Range: -94°F (-70°C) to 180°F (80°C)

NOTE: Previously referred to as Style 404, 404HP, 404EPS, 404MAX, 406, 4394

NATURAL RUBBER

A common industry solution for basic abrasion resistance, natural rubber is often seen in a soft, tan, gum form. Natural Rubber from Garlock is black in color and features carbon black and other additives designed to improve its innate abrasion resistance and other, key physical properties.

Temperature Range: -75°F (-24°C) to 180°F (80°C)

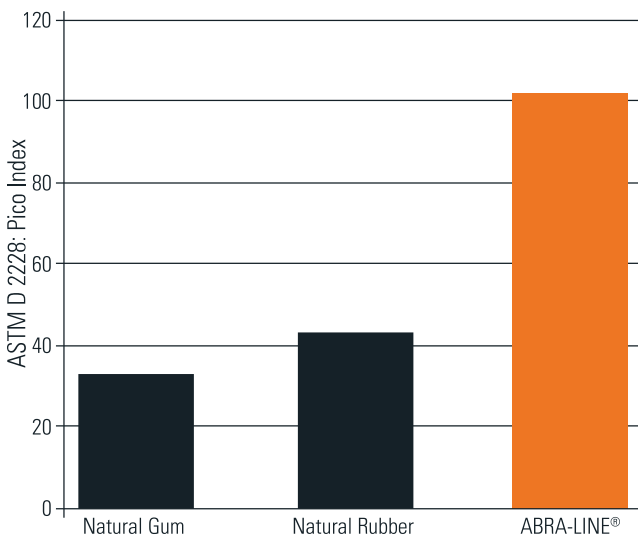


ABRA-SHIELD®

Our proprietary hydrogenated nitrile butadiene rubber formula was specifically engineered for highly abrasive applications above the temperature limit of ABRA-LINE®. With over 50% better abrasion resistance than standard materials, ABRA-SHIELD® has proven high performance in diverse, aggressive applications with short or long term heat exposure up to 300°F (150°C). Unlike natural rubber, ABRA-SHIELD® has superior resistance to attack by petroleum oils, ozone, and UV.

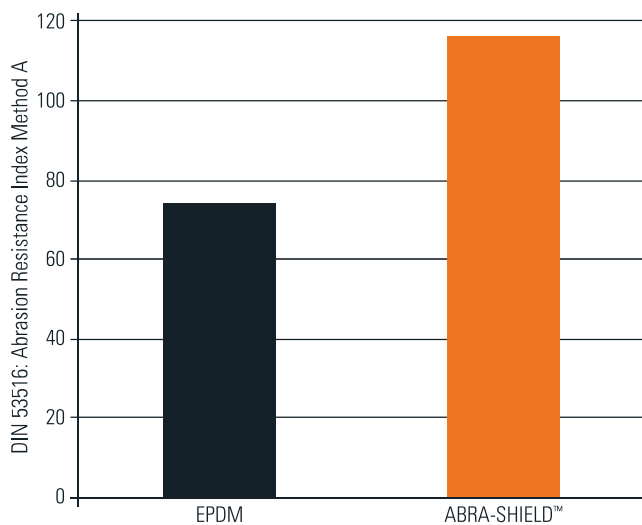
Temperature Range: -83°F (-64°C) to 300°F (150°C)

ABRASION RESISTANCE



NOTE: 180°F and under material options and test method

ABRASION RESISTANCE



NOTE: 300°F and under material options and test method

Tube and Cover Materials

CHEMICAL APPLICATIONS

The Garlock family of chemically resistant products was developed with safety in mind. Our proprietary process for GUARDIAN® FEP mechanically bonded liners results in the industry's safest sealing solution for hazardous and dangerous chemicals. With Garlock, you'll have the peace of mind knowing that our materials are always 100% of the polymer specified. Garlock's team of engineers formulate all the compounds used, eliminating the chance for catastrophic failures due to the presence of an unknown, incompatible polymer's presence in a blended compound.

GUARDIAN® FEP LINER

A chemically resistant FEP liner that is mechanically bonded to the rubber expansion joint. This high-density FEP liner reduces permeation and offers optimal chemical resistance in applications up to 400°F. Only GUARDIAN® FEP Liners have no glue to be vulnerable to chemical attack. Comparable PTFE/FEP glue-in liners are highly susceptible to delamination and failure. GYLON® 3545 gaskets are also available with GUARDIAN® FEP liners to help achieve a seal with raised face flange connections, but a gasket is not required on flat face flanges.

Temperature Range: -100°F (-70°C) to 400°F (205°C)

FDA Compliant to 21CFR 177.1550

NOTE: Available only in 204, 204HP and 206 Product Families. Only available as the tube material. Previously referred to as Styles G200, G200HP, G306

FLUOROELASTOMERS (FKM)

Commonly referred to as VITON® or 3M FLUOREL®, Garlock's fluoroelastomer compound provides excellent chemical resistance in applications requiring the highest temperature rating available for rubber. Also considered the nearest thing to a universal elastomer, this specialty compound is also impervious to gasoline and UV/Ozone attack. Though it is not ideal for hot water, steam, polar solvents, low molecular weight esters and ethers, Garlock offers other options with higher fluorine content for improved temperature and chemical resistance.

Temperature Range: -10°F (-23°C) to 400°F (205°C)

HYPALON (CSM)

Optimal elastomer for applications which require diluted acid and ozone resistance within a moderate temperature range. Excellent compatibility with most chemicals, ideal for cover materials where resistance to weather and ultraviolet light is critical.

Temperature Range: -30°C (-34°C) to 250°F (120°C)

EPDM

Resistance to water absorption makes this elastomer the leading tube choice for water handling applications. Its outstanding UV/Ozone resistance also makes EPDM the first choice for cover materials in outdoor applications. In addition, EPDM also exhibits good performance in mild heat aging and acid systems.

Temperature Range: -67°F (-55°C) to 300°F (150°C)

NOTES:

* VITON is a registered trademark of Chemours Company

GENERAL SERVICE

CHLOROBUTYL

This unique elastomer possess a variety of important qualities that make it the expansion joint industry standard material. Chlorobutyl has exceptionally low permeability to gases, excellent vibration dampening properties, and good heat, chemical, ozone, and oxidation resistance.

Temperature Range: -40°F (-40°C) to 250°F (120°C)

NEOPRENE (CHLOROPRENE)

Commonly used as a cover material for expansion joints, neoprene possesses the fire retardant properties needed for compliance with ASTM F-1123. It is a high performing solution in harsh weather conditions, low temperatures, and general outdoor service. Neoprene is also available as a tube liner; creating a solution for a range of media including chemical, oil, grease and fuel.

Temperature Range: -25°F (-32°C) to 250°F (120°C)

OIL & GAS APPLICATIONS

Garlock expansion joints offer a variety of materials that are ideal for oil and gas applications. Service life, reliability, and environmental safety highlight the advantages of Garlock's oil and gas resistant elastomers. Garlock expansion joints are installed in marine engines, backup generators, and offshore loading around the world. These applications deliver critical services and demand the highest around the clock reliability.

HNBR

HNBR is the premier elastomer for use in oil and gas applications. On average, HNBR is 5X more resistant to oil and fuel than Nitrile with greater ozone, heat, and aging resistance.

Temperature Range: -83°F (-64°C) to 300°F (150°C)

NITRILE (BUNA-N)

Nitrile is considered an industry standard material due to its reliability in oil and gas applications. Nitrile can be used in a wide variety of applications.

Temperature Range: -30°F (-34°C) to 250°F (120°C)

Tube and Cover Materials

FOOD & POTABLE WATER APPLICATIONS (FDA 21CFR177.2600)

At Garlock, our commitment to providing safe products for use in food applications starts by mixing FDA compliant elastomers in-house. This allows for full control over the use of correct ingredients. Batch traceability is available and food safety is ensured with Current Good Manufacturing Practices. Compliance test reports and statements are available on www.garlock.com.

DETECTOMER® FDA NITRILE (BLUE)

Avoid foreign material contamination with metal and X-Ray detectable, FDA compliant, Nitrile elastomer, tested and validated by third party laboratories. Compatible for most animal fat and vegetable oil food products with good resistance to abrasion and water absorption. The blue color allows for additional contamination detection with automated vision and manual systems.

Temperature Range: -30°F (-34°C) to 250°F (120°C)

SURE-TEC™ FDA/NSF-61 EPDM (BLUE)

Assure technical compliance to the stringent requirements of both NSF/ANSI/CAN-61 for products used in potable drinking water as well as the food contact requirements with the industry's safest premium grade blue EPDM rubber design. SURE-TEC™ supplies exceptionally good abrasion and outstanding water absorption resistance as well as good resistance to many alkaline chemical services. Recommended for aqueous (water-based) food services, but not for fatty-type foods or milk. Outstanding weather and UV resistance.

Temperature Range: -40°F (-40°C) to 250°F (120°C)

NOTE: NSF/ANSI/CAN-61 compliance available only in 204, 206, and 7250 Product Families with SURE-TEC™ tube.

Reinforcing Materials

POLYESTER

Garlock features polyester fabric reinforcement in many of the expansion joint styles available. Coupled with metal body rings, the tightly woven fabric of polyester resists strand separation under pressure due to its high bidirectional strength.

Temperature Range: to +250°F (120°C)

NYLON TIRE CORD

Garlock also utilizes a high tensile strength tire cord for pressure reinforcement on a variety of styles. The biased tire cord reinforcement plies are applied to the expansion joint at a specific bias angle to obtain the best balance of pressure retention and resistance to swelling/strand separation.

Temperature Range: to +250°F (120°C)

NOTES:

* KEVLAR is a registered trademark of E.I. Dupont de Nemours & Co.

FDA EPDM (WHITE)

Premium grade white EPDM rubber with good resistance to many alkaline chemical services. Non-oil-resistant elastomer with very good abrasion and outstanding water absorption resistance. Recommended for aqueous (water-based) foods services, but not for fatty-type foods or milk. Outstanding weather and UV resistance.

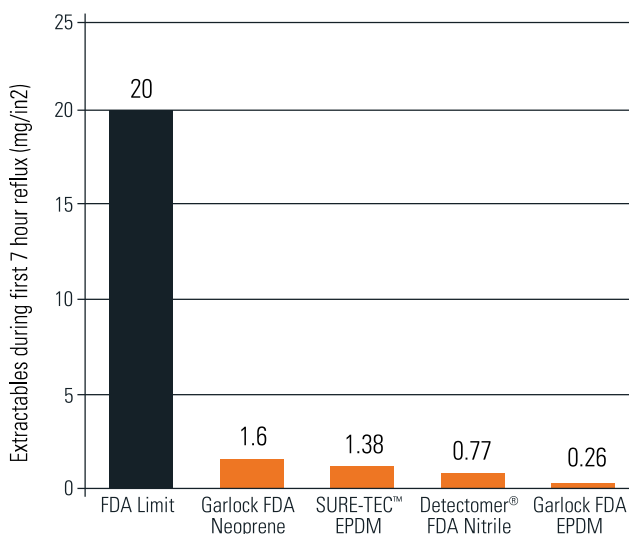
Temperature Range: -67°F (-55°C) to 250°F (120°C)

FDA NEOPRENE (WHITE)

General purpose and off-white in color, FDA Neoprene is resistant to moderate chemicals, acids, oils, fats, grease, many solvents, and ozone.

Temperature Range: -25°F (-32°C) to 250°F (120°C)

DEIONIZED WATER EXTRACTABLES PER FDA CFR-2100-177.2600



KEVLAR® TIRE CORD

Garlock makes use of high strength KEVLAR® Tire Cord as an alternative material for elevated temperature service. Styles using KEVLAR® Tire Cord can achieve a maximum of 300°F without impacting pressure rating.

Temperature Range: to +300°F (150°C)

FIBERGLASS/KEVLAR

Fiberglass/KEVLAR is utilized in Garlock expansion joints for maximum temperature service. Designed for flue gas or exhaust systems, this fabric offers high durability and pressure retention in extreme temperature applications.

Temperature Range: to +400°F (+205°C)

Typical Properties of Elastomers

Material Designation		Rating Scale Code	Elastomer Physical and Chemical Properties Comparison																															
ANSI / ASTM D1418-77	ASTM D-2000 D1418-77	7 - Outstanding 3 - Fair to Good	Water	Chemical	Animal & Vegetable Oil	Alkali, Condensed	Alkali, Dilute	Oil & Gasoline	Lacquers	Oxygenated Hydrocarbons	Aromatic Hydrocarbons	Aliphatic Hydrocarbons	Acid, Concentrated	Acid, Dilute	Swelling in Oil	Radiation	Water Absorption	Electric Insulation	Dielectric Strength	Tensile Strength	Compression Set	Rebound, Cold	Rebound, Hot	Dynamic	Impermeability	Abrasion	Tear	Flame	Cold	Heat	Oxidation	Sunlight	Weather	Ozone
		6 - Excellent 2 - Fair																																
		5 - Very Good 1 - Poor to Fair																																
		4 - Good 0 - Poor																																
		4* - good @ room temp, poor above 180°F (80°C)																																
		X - Contact manufacturer																																
		COMMON NAME																																
		Chemical Group Name																																
CR	BC BE	NEOPRENE chloroprene	4	3	4	0	4	4	0	1	2	3	4	6	4	5	4	3	5	4	2	4	5	2	4	5	4	4	4	4	5	5	6	5
NR	AA	NATURAL RUBBER polyisoprene, synthetic	5	3	X	X	X	0	0	4	0	0	3	3	0	6	5	5	6	6	4	6	6	6	2	7	5	0	5	2	4	0	2	0
CIIR	AA BA	CHLOROBUTYL chloro-isobutene-isoprene	5	6	5	4	4	0	3	4	0	0	4	6	0	4	5	5	5	4	3	0	5	2	6	4	4	0	4	5	6	5	5	6
NBR	BE BK CH	BUNA-N / NITRILE nitrile-butadiene	4	3	5	0	4	5	2	0	4	6	4	4	5	5	4	1	0	5	5	4	4	5	4	4	3	0	3	4	4	0	2	2
HNBR	DH	HNBR hydrogenated-nitrile-butadiene	4	3	5	0	4	6	2	0	4	6	4	4	6	5	4	1	0	5	6	4	4	5	4	7	6	0	3	6	4	0	2	2
CSM	CE	HYPALON chloro-sulfonyl-polyethylene	5	6	4	4	4	4	3	1	2	3	4	6	4	5	4	3	5	2	2	2	4	2	4	4	3	4	4	4	6	7	6	7
FKM	HK	VITON* / FLUOREL** fluorocarbon elastomer	5	6	6	0	4	6	1	0	6	6	6	5	6	5	5	3	5	5	6	2	4	5	5	5	2	6	2	7	7	7	7	7
EPDM	BA CA DA	EPDM ethylene-propylene-diene-terpolymer	5	6	5	6	6	0	3	6	0	0	4	6	0	7	6	6	7	5	4	6	6	5	4	5	4	0	5	6	6	7	6	7
AFMU		TEFLON* / TFE / FEP fluoro-ethylene-polymers	7	7	7	7	7	7	7	7	7	7	7	7	7	3	7	X	X	X	X	X	X	X	X	4	X	X	X	7	7	7	7	7
AU	AA BA	POLYURETHANE	4*	3	5	0	1	5	1	2	3	6	0	1	6	6	4*	3	5	7	3	3	4	6	4	7	6	2	6	4	5	4	6	6

* Viton and Teflon are registered trademarks of The Chemours Co.

** Fluorel is a registered trademark of 3M Companies.

Kevlar is a registered trademarks of E.I. DuPont de Nemours & Co.