

FANILO

AKRON®

Recycled Fluoroelastomer & PerFluoroelastomer

FANILO AKRON®

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For safety and details, please refer to the Safety datasheet on the official website.

The design of this product is intended solely for industrial use and is not suitable for medical purposes such as implantation in the human body, contact with bodily fluids, or bodily tissues. Fanilo has not conducted experiments regarding the suitability of the product for medical purposes.

Content may be updated without further notice.



VALIDATED



VALIDATED

AKRON FLUROELASTOMER
POLYMER FKM CONTAINS
RECYCLED FLUROELASTOMER
CONTENT

UL.COM/ECV

AKRON[®]

As a leading rubber recycling brand, We continuously introspects: What can we do to make society better while improving the Earth's environment?

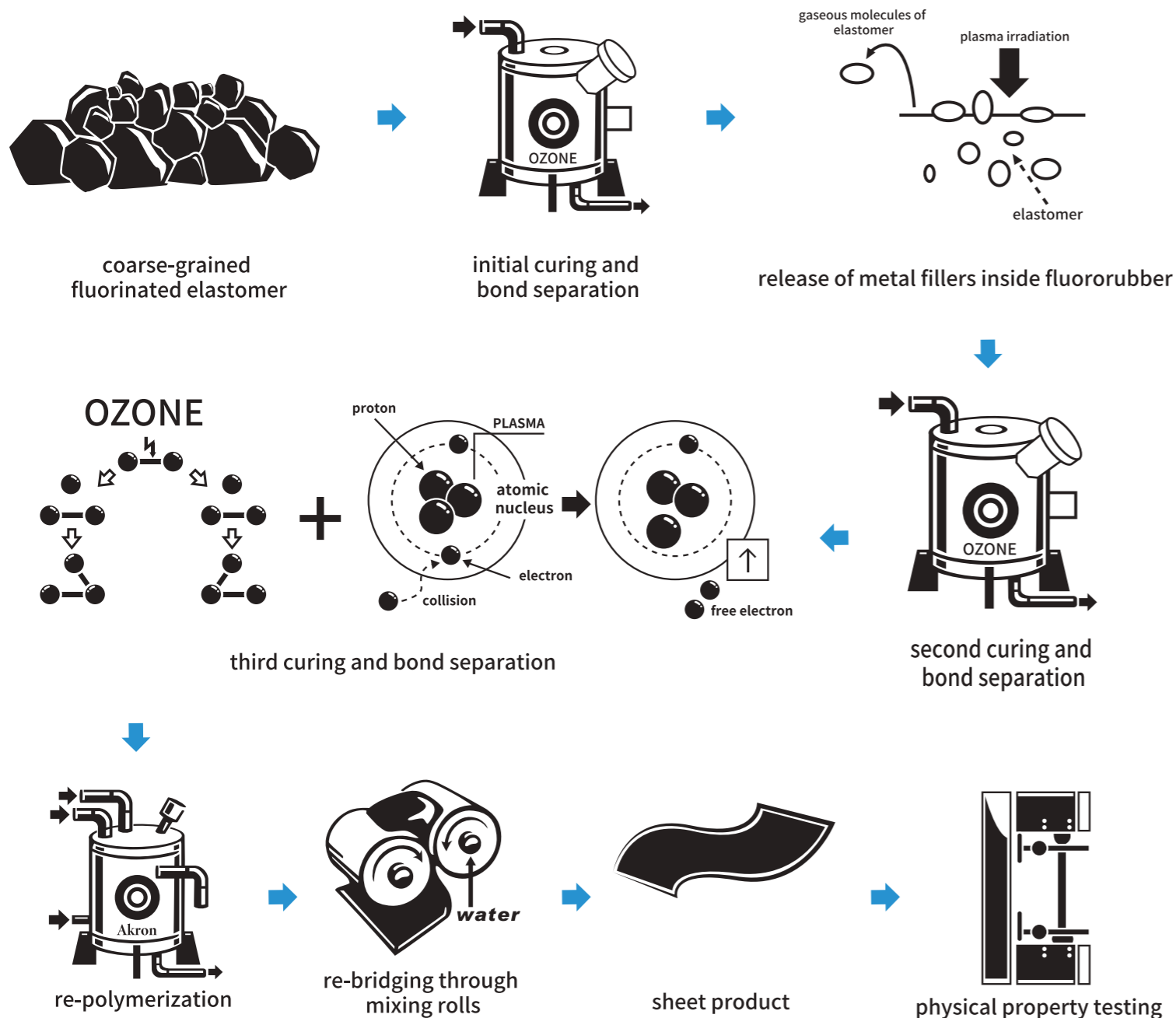
AKRON[®] offers a devulcanization process that's not only cost-effective but also environmentally friendly, boasting a significantly lower CO2e footprint—up to 80% less than virgin rubbers.

High-end rubber and its components are predominantly derived from petroleum, making rubber waste challenging to recycle. Although there are emerging biobased alternatives and recycling technologies, they remain difficult to source or adopt.

AKRON[®] found a way to tackle this challenge by pioneering a unique devulcanization process. This process makes it possible to recycle and reuse 100% of the high-end rubber materials, without compromising the quality and reliability.

Fluoroelastomer Recycle Production

The process of recycling fluorinated materials



Sustainable Environmental Trend: UL 2809 Recycled Content Validation

- Full Name: UL 2809 Recycled Content Verification
- Certification Item: ECVP 2809 Recycled Content - 5th Edition 2021 Revision
- Purpose: Aiding businesses in showcasing their commitment to environmental sustainability, UL 2809 certifies a specified percentage of post-consumer, pre-consumer/post-industrial recycled material content or a product's overall recycled content.
- By rigorously analyzing and verifying these claims, UL enhances the product's green competitiveness, aligning it with market expectations.
- We are proud to be the first rubber industry-related company in Taiwan to achieve UL-2809 certification.

Our 4 types business models



Business model 1

Recycle Scraps

If your company doesn't require recycled products, we assist in managing end-of-life waste, saving you high landfill costs, and fulfilling corporate responsibility.



Business model 3

Closed-loop recycling in industrial settings.

We offer processing and recycling methods tailored to the types and forms of your company's edge materials. Together, we collaborate to develop exclusive recycled products specifically for your company's use.



Business model 2

Selling Recycled products

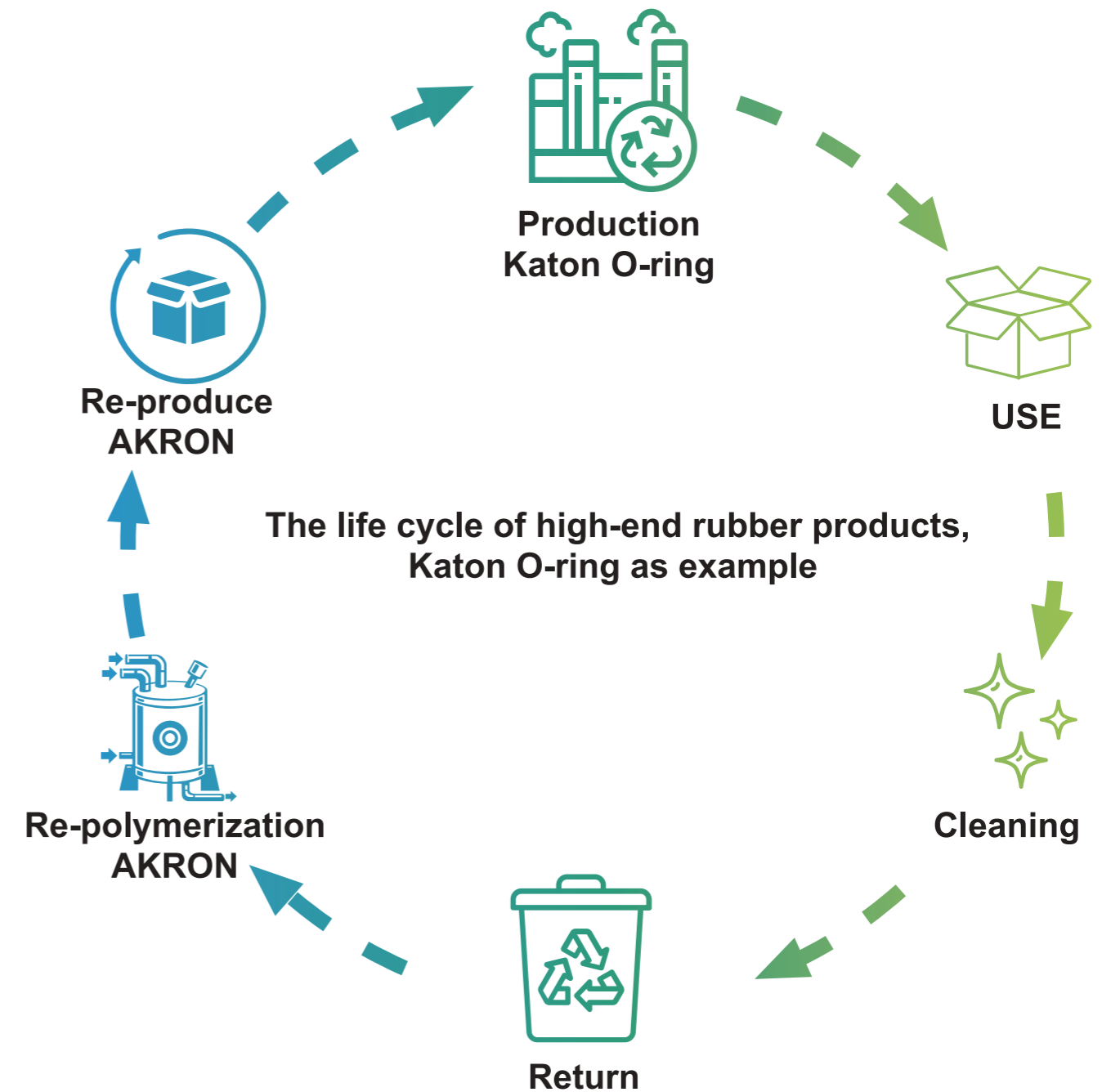
Purchasing our manufactured recycled products, we can further provide customization options such as types, sizes, hardness, colors, etc.



Business model 4

Industrial post-consumer recycling.

End-of-life products can be recycled to create recycled products, achieving maximum recycling and economic benefits through a circular economy.



Industrial Post-Recycling (Technical Cycles)

Industrial post-recycling entails the extraction of materials from end-of-life products via chemical processes, subsequently remanufacturing them into products of equivalent performance.

The Environmental Protection Agency is constant in its commitment to fostering a circular economy, taking cues from pertinent policies established in the European Union and the Netherlands. With an eye toward aligning with EU benchmarks, the agency is poised to craft a waste recycling strategy. Anticipated in the forthcoming years are targeted achievements, underpinned by initiatives addressing "production," "consumption," "waste management," and "secondary material markets." These concerted actions aim to enhance resource circulation efficiency and limit in excess resource reduction.

AKRON®

AKRON is the brand of high-performance recycled rubber products by Fanilo.

The Material reclaiming service we provide.

FKM | FFKM | FEPM | HNBR

What are the differences between 2175, 2275 and 2275UP Series?

Fluoroelastomer for example

FKR-2175 / FKR-2275 / FKR-2275UP

FK

Stands for FKM, Fluoroelastomer

R

R stands for recycled

2

Represents the second use, emphasizing reusability

1

Indicates direct production without the need for additional processing

2

Indicates the requirement for secondary processing, involving blending with virgin FKM compound in specific proportions, effectively serving as a substantial filler for FKM polymer

75

Indicates the SHORE A hardness, 75±5 degree

UP

UP signifies an upgrade, wherein the formula is refined to enhance performance and streamline the production blending process

2175 Advantage

- Low cost
- Alternative of new material
- Similar Performance as new material
- Direct Production, no additional steps

2275UP Advantage

- Adjustable Formulation Ratios
- Recommended Ratio: 2275UP 70% with Pre-compound 30%
- Could use a larger portion depending on formula.
- Reducing cost without affecting original performance

2275 Advantage

- More Flexible Adjusting Formulation Ratios
- Recommended Ratio: 2275 40% with Pre-compound 60%
- Reducing cost without affecting original performance



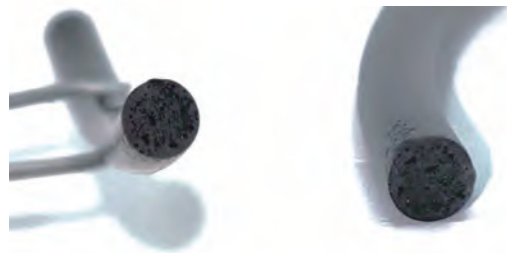
The difference between AKRON reclaimed FKM & ambient grinding powder.

The significant economic benefit arises from reducing costs associated with scrap disposal, an expenditure that provides no return and contributes to environmental pollution.

Currently, the common technology for recycling FKM involves ambient grinding into powder. However, based on extensive trials and global customer experiences, only up to 15% of this powder can be used without compromising basic properties. This presents a notable contrast to AKRON reclaimed FKM, where the cost difference between the two methods is minimal.

Our advanced technology facilitates the efficient recycling and reuse of FKM scraps, presenting a strategic opportunity to mitigate financial burdens and address environmental concerns simultaneously.

Traditional recycling methods



OTHER FKM

The unusable FKM is grinded into powder and then added back into the new material as a 40% filler.

AKRON's exclusive recycling technology



FKR-2275

The unusable FKMs is recycled by AKRON and then added back into the new material as a 40% filler.

Traditional recycling methods



OTHER FKM

The unusable FKM is grinded into powder and then added back into the new material as a 40% filler.

AKRON's exclusive recycling technology



FKR-2275UP

The unusable FKMs is recycled by AKRON and then added back into the new material as a 70% filler.

Recycled/ Reclaimed FKM

Suitable for high quality production

Material/Type	Comparison of Additive Differences							Percentage added to new material (%)	Description
	Plasma	Secondary Ion Crosslinking	Bisphenol	BPP (Benzyltriphenylphosphonium Chloride)	Peroxide	TAIC (Triallylisocyanurate)	Sulfur		
Fluoroelastomer 21XX Series	This series allows the selection of recycled products with either Bisphenol or peroxide cross-linking systems. Standard recycled products only use the Bisphenol cross-linking system.								
FKR-2165	V	V	V	V				<0 Use directly	Available for global market
FKR-2170	V	V	V	V				<0 Use directly	Available for global market
FKR-2175	V	V	V	V				<0 Use directly	Available for global market
FKR-2179	V	V	V	V				<0 Use directly	Available for global market
FKR-2190	V	V	V	V				<0 Use directly	Available for global market
Fluoroelastomer 22XXUP Series	This series allows the selection of recycled products with either Bisphenol or peroxide cross-linking systems. Standard recycled products only use the Bisphenol cross-linking system.								
FKR-2265UP	V	V	V	V				<70	Available for the global market, only accept customer-supplied materials for processing.
FKR-2270UP	V	V	V	V				<70	Available for global market
FKR-2275UP	V	V	V	V				<70	Available for global market
FKR-2180UP	V	V	V	V				<70	Available for global market
FKR-2290UP	V	V	V	V				<70	Available for global market
Fluoroelastomer 22XX Series	This series of recycled products does not have additional cross-linking agents added separately. These recycled products can be selected to be added to new materials with either a bisphenol or peroxide cross-linking system.								
FKR-2265	V	V						<40	Available for the global market, only accept customer-supplied materials for processing.
FKR-2270	V	V						<40	Available for global market
FKR-2275	V	V						<40	Available for global market
FKR-2280	V	V						<40	Available for global market
FKR-2290	V	V						<40	Available for global market
Perfluoroelastomer 22XX Series	This series of recycled products can only choose the peroxide cross-linking system.								
FFKM-R-2275	V	V						<40	Available for the global market, only accept customer-supplied materials for processing.
FFKM-R-2275UP	V	V			V	V		<70	Available for the global market, only accept customer-supplied materials for processing.
FEPM 22XX Series	This series of recycled products can only choose the peroxide cross-linking system.								
FEPM-R-2275	V	V						<40	Available for the global market, only accept customer-supplied materials for processing.
FEPM-R-2275UP	V	V			V	V		<70	Available for the global market, only accept customer-supplied materials for processing.
HNBR 22XX Series	This series of products can be selected for recycling with either a peroxide or sulfur cross-linking system. Standard recycled products only use a sulfur cross-linking system.								
HNBR-R-22XX	V	V						<40	Available for the global market, only accept customer-supplied materials for processing.

V= Means that there is a re-addition of cross-linking agents.

"blank" or "empty," refers to the absence of any additives or ingredients.

<0=100 Recycled material is no different from new material, use directly.

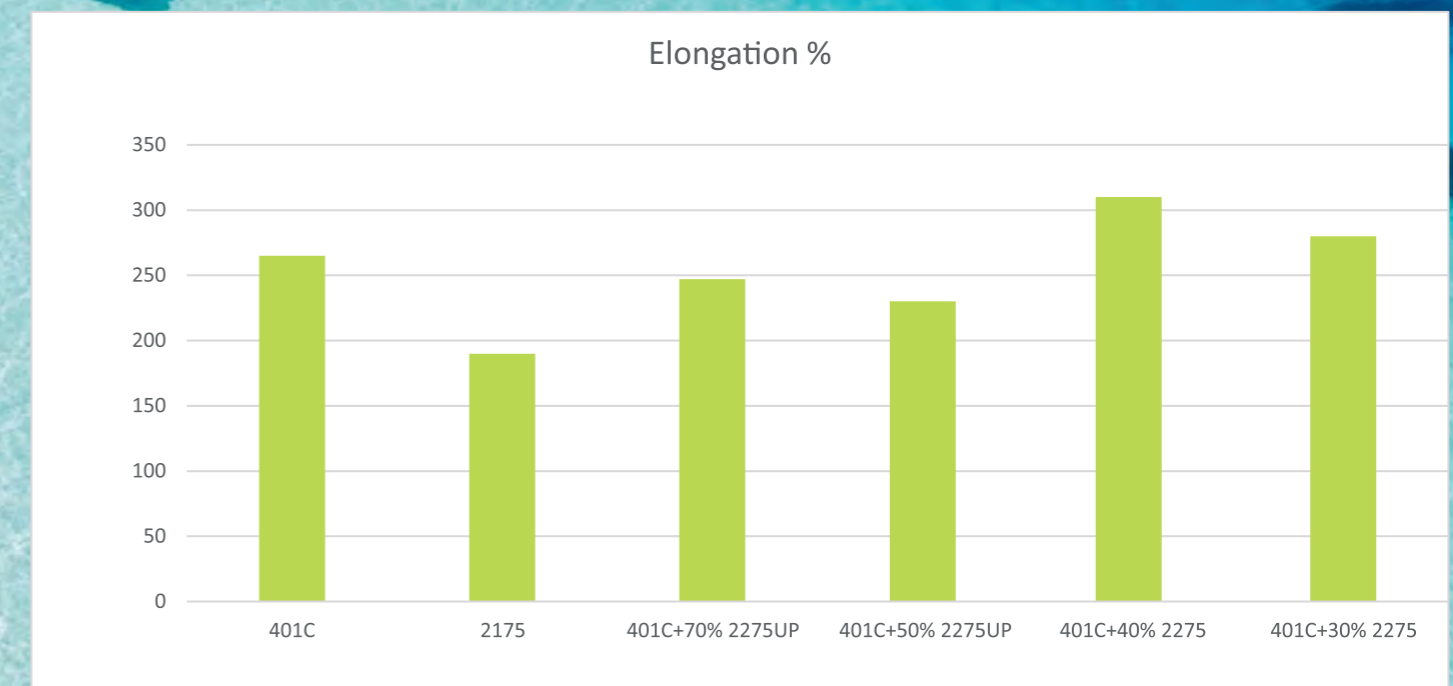
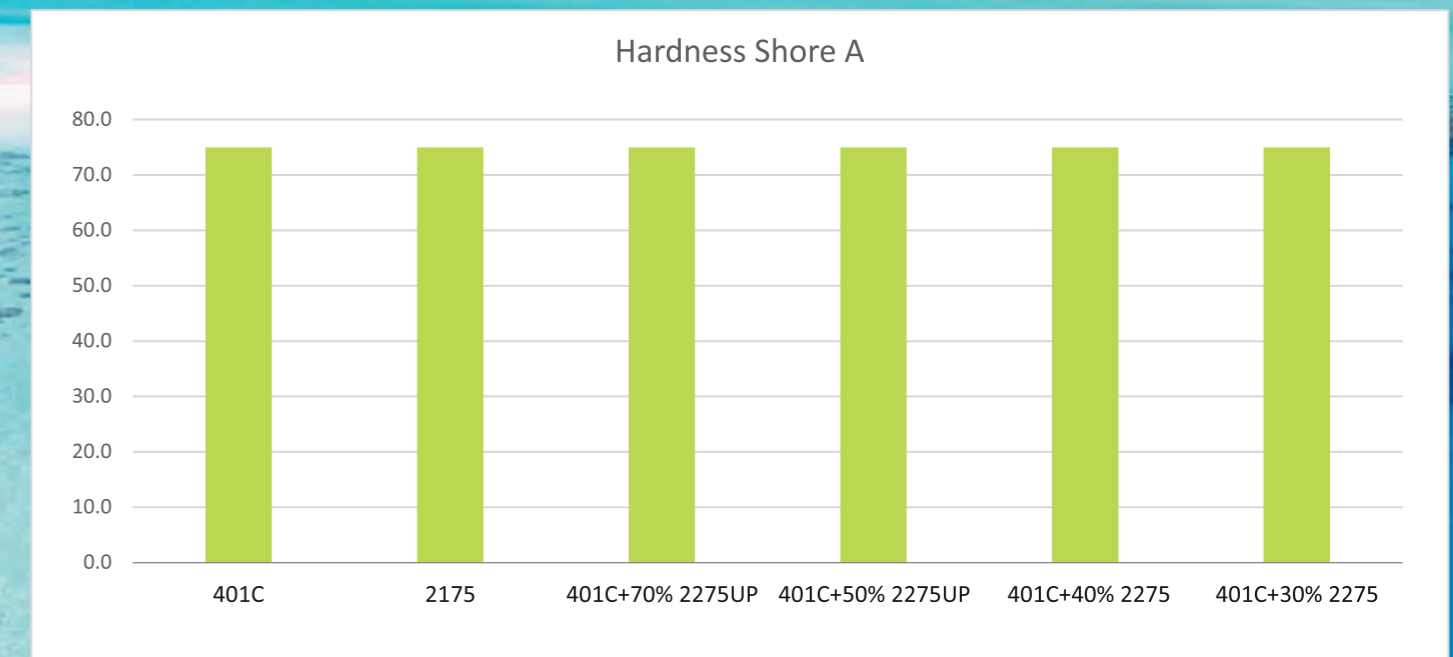
Test Data

Basic Compound Formulation

CONTENT	401C	2175	401C+70% 2275UP	401C+50% 2275UP	401C+40% 2275	401C+30% 2275
TOTAL Phr	139	100	463	278	232	199
FKM Polymer	100	0	100	100	100	100
Carbon Black	30	0	30	30	30	30
Ca(OH)2	6	0	6	6	6	6
Mgo	3	0	3	3	3	3
FKR-2175 (Phr)	0	100	0	0	0	0
FKR-2275 (Phr)	0	0	0	0	93	60
FKR-2275UP (Phr)	0	0	324	139	0	0
Hardness Shore A (before)	75	75	75	75	75	75
Hardness Shore A (after)	75	75	75	75	75	75
Tensile (MPa)	13.5	14	12	10.4	13	13.5
Elongation at Break (%)	265	190	247	230	310	280
Modulus at 100%	1235	1200	1106	1184	1055	1098
Compression Set (%)	21	20	18.8	19.5	17.5	17.9
ML (dNm)	42	40	37	35	39	40
MH (dNm)	135	125	115	113	118	120
DENESITY	1.82	1.84	1.93	1.89	2.01	1.96

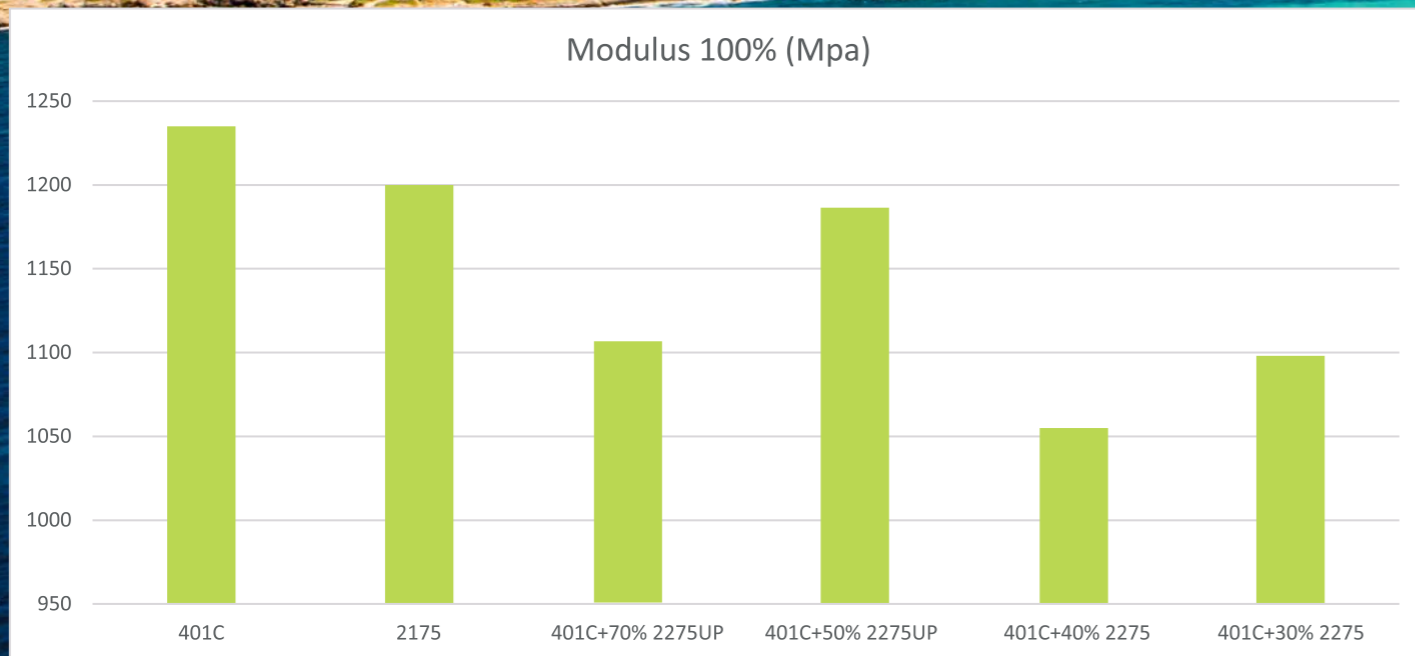
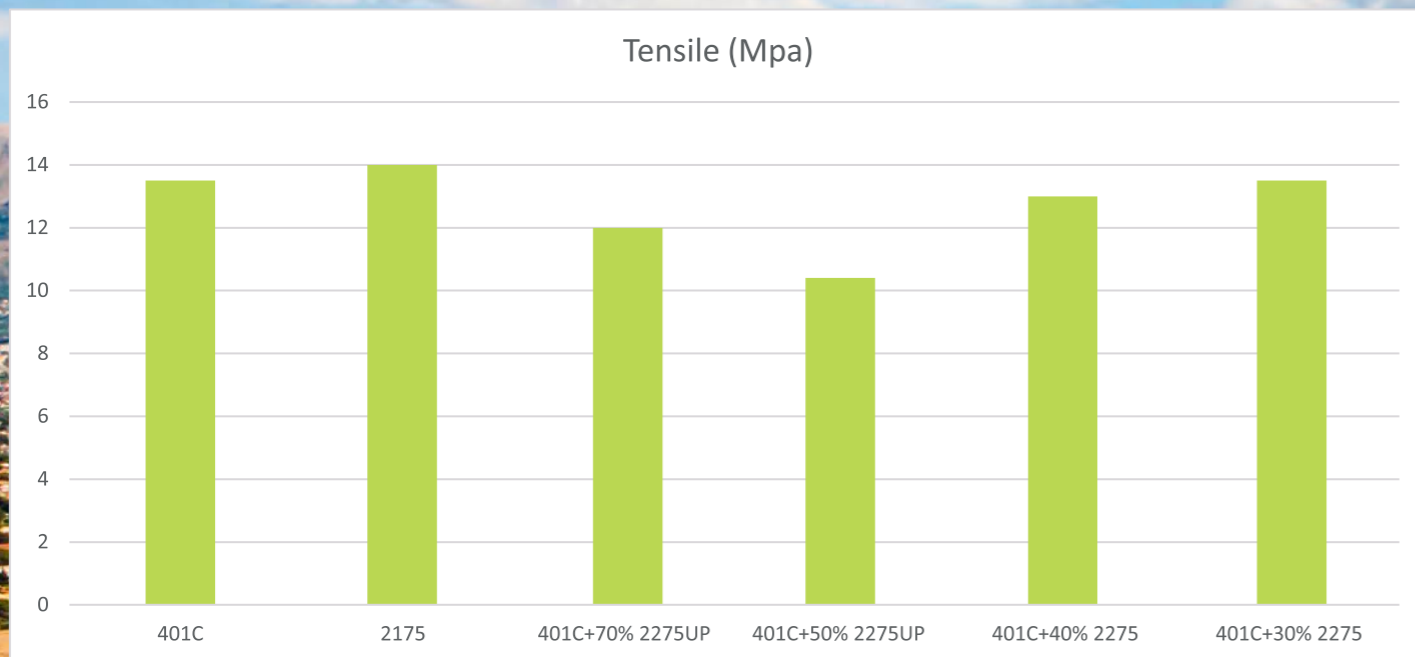
Test Data

Physical properties



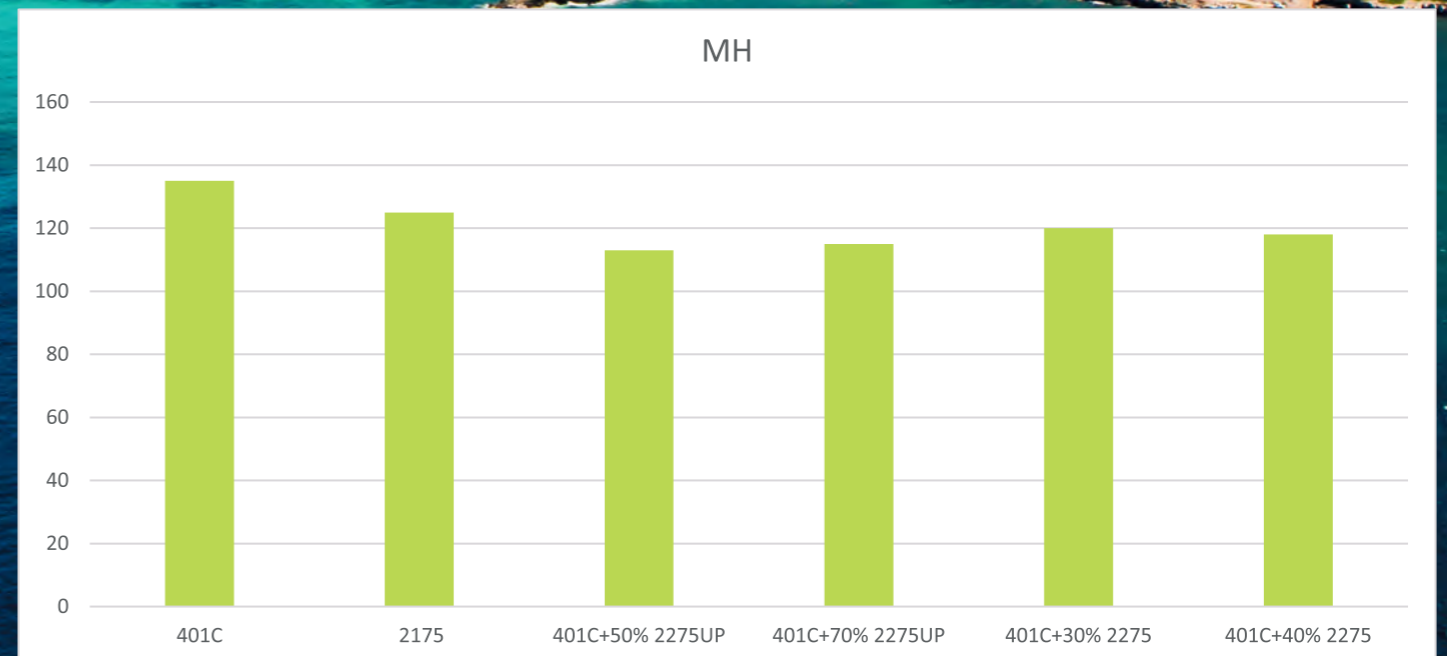
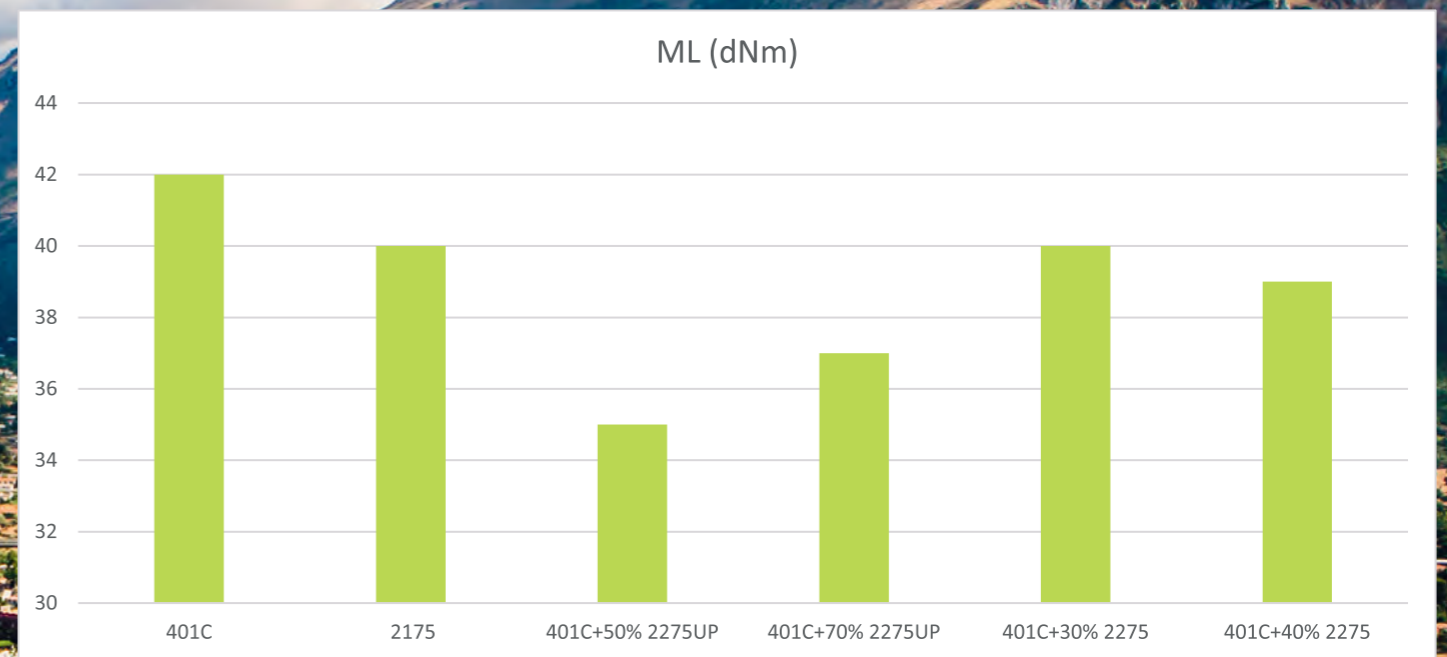
Test Data

Physical properties



Test Data

Processing characteristics





Fluoroelastomer (FKM)

Description

Fluoroelastomer (FKM/FPM) as a well-known high-performance rubber made from highly fluorinated hydrocarbon compounds. FKM possesses excellent properties such as high-temperature resistance, resistance to fuel and hydraulic oils, oxidation resistance, resistance to aromatic compounds, many chemicals, and aging. However, it's unstable with polar solvents such as MEK, acetone, and ethyl acetate. FKM typically refers to fluoroelastomers containing 66% fluorine. The general operating temperature range for FKM is between -25°C to 200°C for long-term use, with momentary temperatures reaching up to 250°C, though this might reduce the rubber's lifespan.

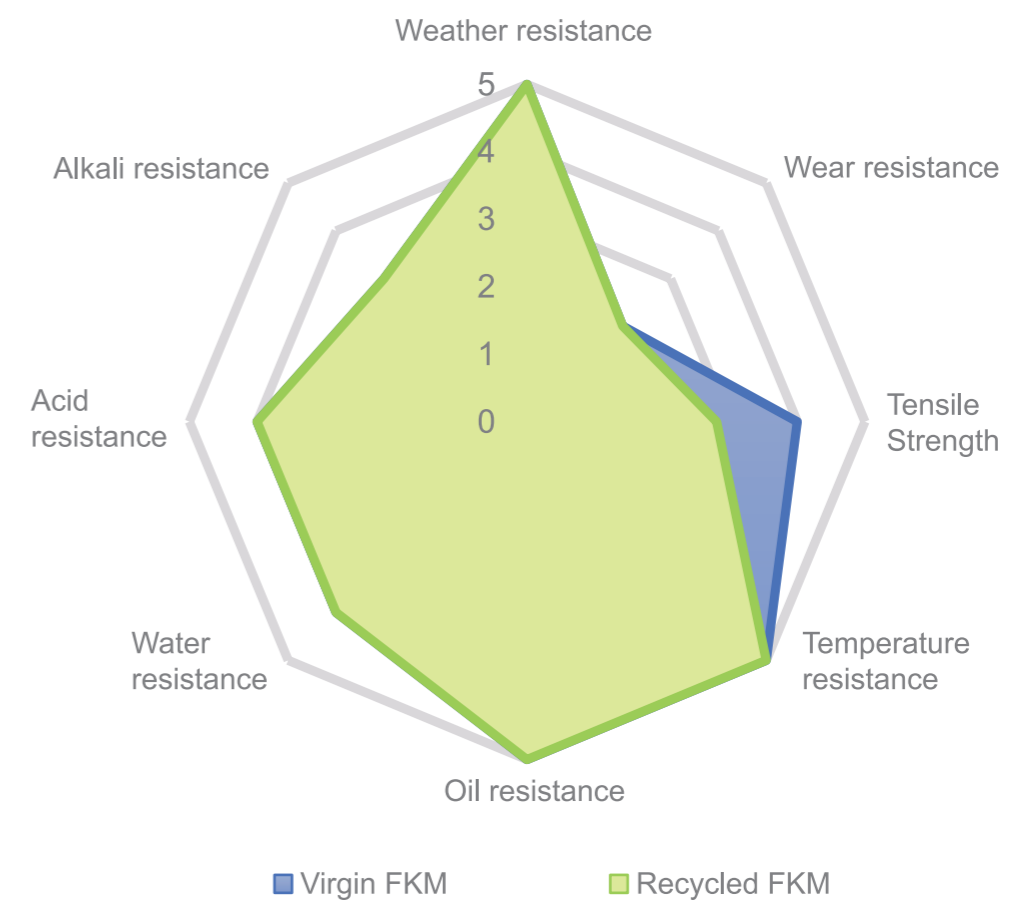
Characteristic

FKM as having excellent properties such as high-temperature resistance, ozone resistance, weather resistance, oxidation resistance, resistance to mineral oil, fuel oil, hydraulic oil, aromatic compounds, many organic solvents, and various chemicals. It mentions that FKM systems are available in different types based on fluorine content: standard type (66% fluorine content), medium fluorine content type (67-68.5% fluorine content), high fluorine content type (70% fluorine content), improved low-temperature elasticity type (64.5-67% fluorine content), and excellent chemical and solvent resistance type (66% fluorine content).

Working Temperature

For the standard type of FKM, the recommended standard operating temperature range in static conditions is ideally limited to approximately -26°C (-15°F) to 232°C (450°F). Although it can be used for a short duration at temperatures up to 275°C, its lifespan decreases when temperatures exceed 232°C. In dynamic conditions, the most suitable temperature range is between -15°C to 200°C.

Comparison of virgin FKM/ recycled FKM performance.





Perfluoroelastomer (FFKM)

Description

Perfluoroelastomers (FFKM) constitute an exceptional class of elastomers renowned for their supreme chemical and heat resistance. Originating from the evolution of fluoroelastomers (FKM) in the 1950s, a pressing demand arose for a polymer capable of withstanding harsh chemical environments and elevated temperatures. In response to this need, perfluoroelastomers were developed in the late 1960s, blending the chemical inertness of PTFE with the flexibility and elasticity characteristic of conventional FKMs.

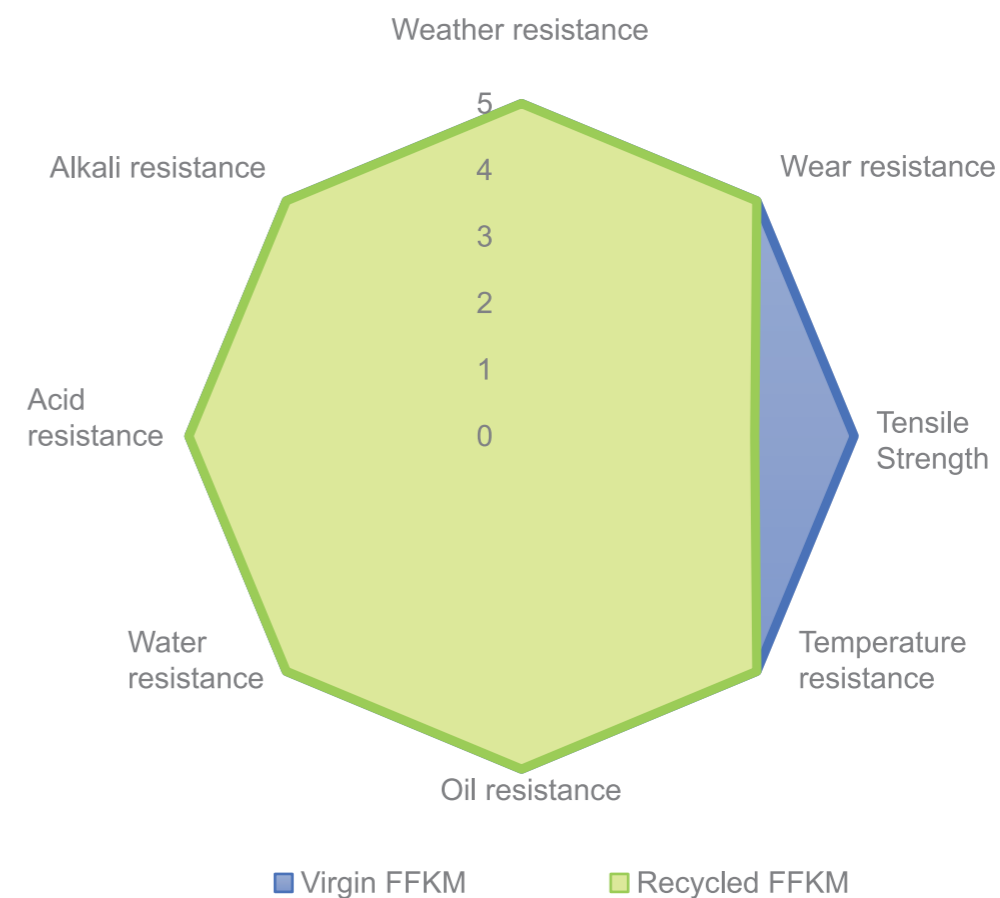
Characteristic

The distinctive properties of FFKM render them indispensable across various industries. Their exceptional chemical resistance and thermal stability make them ideal for applications in demanding environments such as chemical processing, oil and gas extraction, semiconductor fabrication, and aerospace engineering. FFKM O-rings stand out as high-performance sealing solutions, significantly reducing downtime and extending service life in critical processes. This versatility and durability have propelled FFKM into widespread adoption, revolutionizing industrial operations and ensuring enhanced performance and reliability across diverse sectors.

Working Temperature

Outstanding heat resistance characterizes FFKM, with temperature tolerances varying across different grades. Depending on the specific grade of FFKM, this resilience extends from as low as -10°C to as high as 318°C.

Comparison of virgin FFKM/ recycled FFKM performance.





Hydrogenated Nitrile Butadiene rubber (HNBR)

Description

Hydrogenated nitrile butadiene rubber (HNBR) is widely utilized in the automotive sector due to its unique properties. This variant of nitrile rubber, modified through hydrogenation to reduce double bonds, exhibits remarkable temperature and weather resistance post-treatment, surpassing conventional nitrile rubber. Notably, despite this enhancement, its oil resistance remains on par with standard nitrile rubber. HNBR's versatility extends to its mechanical strength, including impressive tensile strength and resistance to abrasion, making it an ideal material for automotive seals, hoses, and other critical components, ensuring enduring performance under demanding conditions.

Characteristic

Hydrogenated nitrile butadiene rubber (HNBR) offers a compelling set of attributes. Renowned for its robust temperature and weather resistance resulting from hydrogenation, HNBR stands out as a durable choice for automotive applications. Moreover, its oil resistance, akin to conventional nitrile rubber, ensures dependable performance in lubricated environments. With strengthened mechanical properties like impressive tensile strength and abrasion resistance, HNBR finds extensive utility in automotive seals, hoses, and various components, meeting the stringent demands of the industry with reliability and longevity.

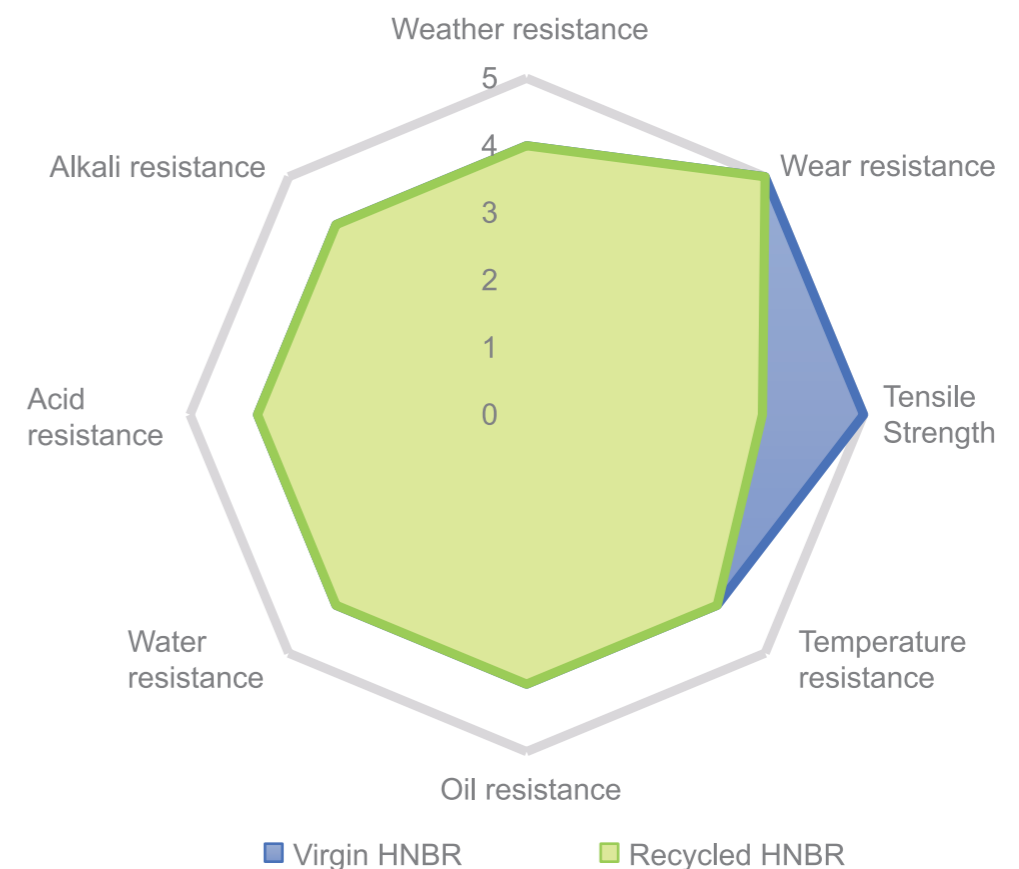
Working Temperature

The operating temperature for HNBR ranges between -40°C to 150°C, and with certain special formulations, it can reach up to 160°C.

Unsuitable environment

Not resistant to polar solvents - esters, ethers, ketones, anilines.
Not resistant to aromatic compounds and chlorinated hydrocarbons.

Comparison of virgin HNBR/ recycled HNBR performance.



ESG

United Nations' 17 Sustainable Development Goals



Comprising economic, social, and environmental protection aspects, the aim is to address various global issues. ESG serves as a measure of sustainability and operational strategies, with specific achievable goals and targets.

- Material recycling and regeneration.
- EU carbon emission requirements.
- Company's sustainable operation for long-term value.
- Developing innovative business opportunities.
- Assisting in reducing carbon emissions.
- Implementation of EU carbon tariffs.

The cost of rubber leftover



Clearance

The annual expenditure on rubber clearance often equals the purchasing cost.



Non-biodegradable

The rubber from replacements is a non-biodegradable item. Improperly disposing of it can lead to severe environmental pollution.



Burying/Incineration

If waste rubber materials are treated as waste and handled through incineration, dumping, or burial methods, it will cause severe environmental pollution. The burning will produce toxic gases harmful to human health.



Recycled rubber can save on raw material consumption and also reduce energy usage, minimizing environmental impact, enhancing industrial competitiveness, and providing economic benefits to businesses.