

ARKEMA

Food and Beverage Market Presentation

Kynar®

Rilsan®

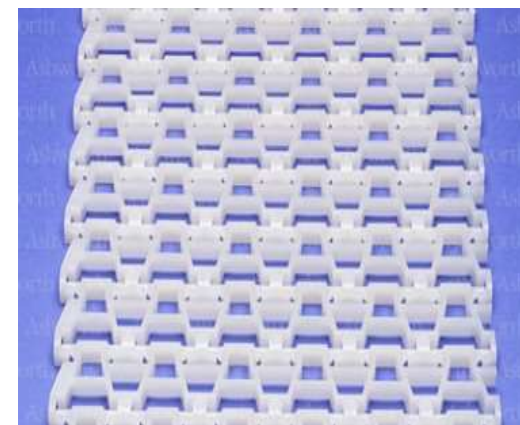
Pebax®

Food and Beverage

In 2017 the US employed **over 1.5 Million people** in the food manufacturing industry.*



*Source: BLS.gov



Continued market growth requires advances in **green** technology, **hygiene**, and materials that promote **efficiency, chemical resistance**, and a **high return on investment**.

Who is in the Food and Beverage Processing Market?



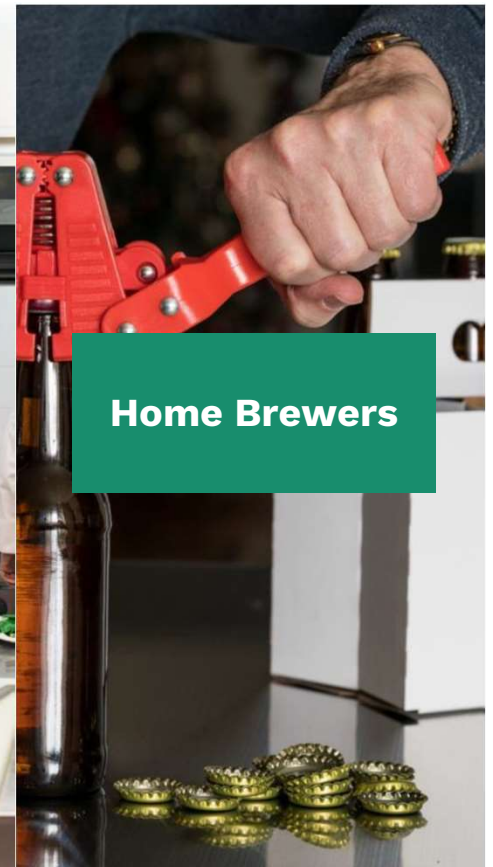
**Food
Manufacturers**



**Beer, Wine,
Juice, and Soft
Drink
Manufacturers
and Distributors**



**Restaurant
Owners**



Home Brewers

What are the Food and Beverage Industry Requirements?

Chemical Resistance

Chlorine,
Bromine, Acids,
Bases

Resistance to Heat and Cold

Steaming,
Boiling,
Freezing

Processability

Welding,
Forming,
Machinable

Flexibility

Ease of
Installation

Low Permeation

No
Contamination
of Food and
Beverages

Durability

Long Lasting –
High Wear
Resistance

High Purity

No Additives

Low Extractables

Preserve Taste
of Food and
Beverages – No
Metallic Taste

No Absorption

Readily
Cleanable

What does Arkema offer? **A Complete Solution**



Today's food and beverage processors require a **complete solution** for their processing needs. The materials they use need to be easily **weldable, formable, machinable, and joinable**. The pipes, tubes, connectors, valves, conveyors, wheels, wire insulations, housing, structural components, and rollers need to be able to fit seamlessly together as part of a **complete and efficient solution**.

High Performance Polymers – 3 Flagship Brand Families

RILSAN®

Rilsan®: World leader in
biobased PA11 and other flexible
long chain polyamides

PEBAX®

Pebax®: Polyether block amide
elastomers. Largest supplier in
the world.

KYNAR®

Kynar®: World leader in PVDF
and flexible fluoropolymers

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Focus on Applications and Grades

Kynar®

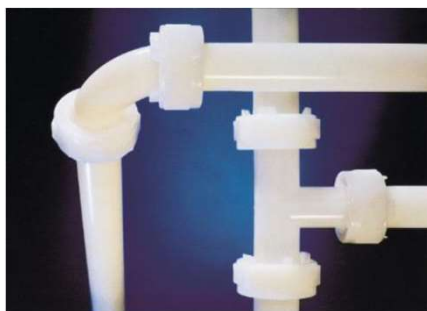
Rilsan®

Pebax®

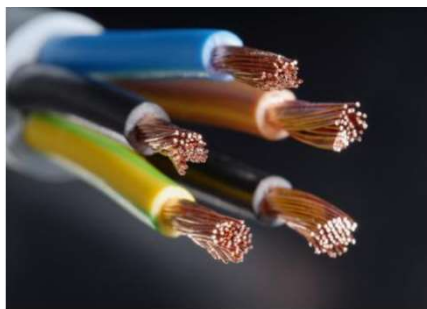
Kynar® PVDF Applications

Any grades of Kynar® PVDF can be fused together allowing a **complete solution** for your processing needs.

Pipes and Tubing – Pipes made from Kynar® PVDF can form a complete solution that can replace steel and other plastics. Varying flex moduli allow for tubing that can fit almost any situation.



Wire & Cable – High performance flexible materials which can withstand extreme chemical and temperature exposure while retaining their physical properties.



Pumps/Valves – The easy processing allows for complex injection molded parts that can be joined with various other materials.

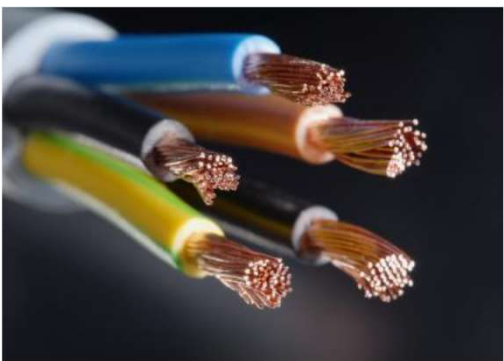
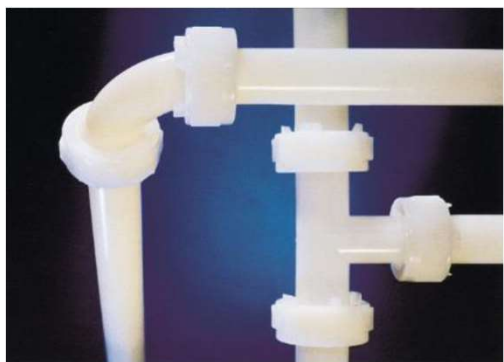


Fittings – Fittings made from Kynar® PVDF allow for a complete system with varying sizes of parts that still retain strength and chemical resistance.



Others – Contact an Arkema representative to discuss how Kynar® PVDF can be used for your application.

Kynar® PVDF Applications



What can Kynar® PVDF Handle?

Beverages:

- Fruit Juices (Cranberry, Lime, etc...)
- Dairy Products
- Tomato Juice
- Coffee
- Beer, Wine, and other Alcoholic Beverages

Food:

- Meat
- Poultry
- Frozen Foods
- Hot Sauces and Condiments

Rilsan® PA11 Applications

The **chemical intertness** of Rilsan® PA11 makes it a great solution for many applications.

Food Contact Appliances –

Rilsan® Clear G170 and Rilsan® Clear G850 Rnew®- are **certified food contact** approved grades by NSF/ANSI 51 making them acceptable for consumer appliances such as coffee makers and microwaves.



Frozen Food Trays –Excellent cold impact performance (-40°C) means trays can take abuse.

Food Display Trays –Can also be steamed and/or microwaved while staying transparent.



Bumpers –Low creep and durability give Rilsan®resins the ability to stand up to extreme abuse.

Others – Contact an Arkema representative to discuss how Rilsan® PA11 can be used for your application.

Rilsan® PA11 Applications



What can Rilsan® PA11 Handle?

Physical Abuse:

- Excellent impact and abrasion resistance

High and Low Temperatures:

- Rilsan®PA11 can be microwaved, steamed, and frozen all while retaining its physical and chemical characteristics

Regulatory Requirements:

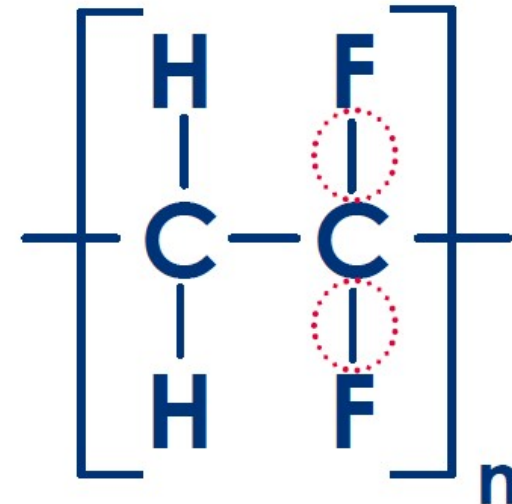
- Certain grades have NSF/ANSI 51 approval, or can be approved for various applications

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Focus on Kynar®
PVDF

Kynar® Polyvinylidene Fluoride (PVDF)

Ease of processing and extreme chemical resistance



Kynar® PVDF: A solution that can replace stainless steel



Kynar® PVDF



Stainless Steel

- Non-Corroding, No Rust (No Need to Pickle)
- Non-Wetting/Easy Release
- Chemically Inert
- Minimal Metallic Content = Minimal Leaching
- High Purity/No Metallic Taste
- Can Clean With Aggressive Chemicals
- Broad Range of Process Equipment Components

Kynar® PVDF: Its Many Uses

Kynar® and Kynar Flex® resins have been used to replace steel piping and other materials where **long-lasting durability and anti-corrosive** properties are needed.



Case studies include food manufacturing such as **mustard, barbeque sauce, and soy sauce** where the manufacturer experienced serious problems with corrosion and longevity of both steel and plastic components.



Kynar® PVDF linings (for pipes and tubing) are used in the production of many types of beverages such as **milk, beer, and juices**. They can also handle **lime and cranberry juice**, which can severely corrode metal.



Companies that manufacture metering devices for **saucers, pulps, ice cream, milk, sugar, egg yokes, and even baked beans** have used Kynar® PVDF in their critical injection molded parts.



Kynar®PVDF can be used for **meat and poultry** handling, which requires hot temperatures and harsh chemicals for cleaning between batches.

Kynar® PVDF: Important Listings and Compliances



**177.2510 repeated use for
PVDF Homopolymer;
177.2600 repeated use for
Copolymer**



**NSF 51- food equipment
materials
NSF 61 – potable water**



**FM 4910 – fire-safe
plastics for semiconductor
clean rooms**



**746B – weathering; (V0 – burning);
(723 –burning equivalent to ASTM
E84); (ULC S012.2 – burning); (RTI –
Relative Thermal Index 150C);
(2024 – plenum conduits burning);
(1887 – pipe burning)**



**E84 less than
25/50 – NFPA 255;
E162 & E662
burning**



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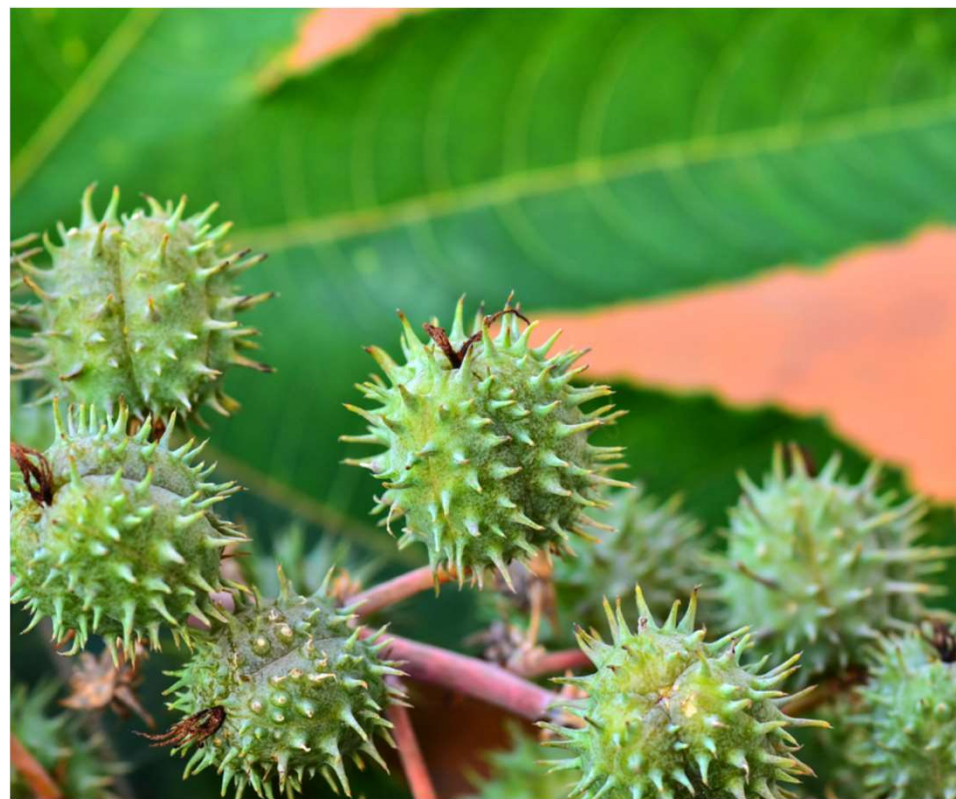
Focus on Specialty Polyamides

Rilsan®

Pebax®

Rilsan® Polyamide 11 Resins

- Derived from **castor beans**
- First polymerized in Serquigny, France in 1947
- Biobased, low global warming potential
- Flexible, **excellent chemical resistance**
- High melting point, low permeability, and strong impact properties
 - **Global and integrated**
- Low moisture pickup, good dimensional stability
- More than **50 year legacy** in extreme applications



Rilsan® PA11: Key Characteristics

The inert nature of Rilsan® PA11 allows it to be used safely and efficiently in the food and beverage market. Rilsan®- PA11 has characteristics which manufacturers, processors, and distributors prefer:



Beverage Dispensing

- **Low permeation** –Taste of beverage is not affected
- **Low extractables** –No contamination of beverages
- **Chemical resistance** –Easy to clean and maintain

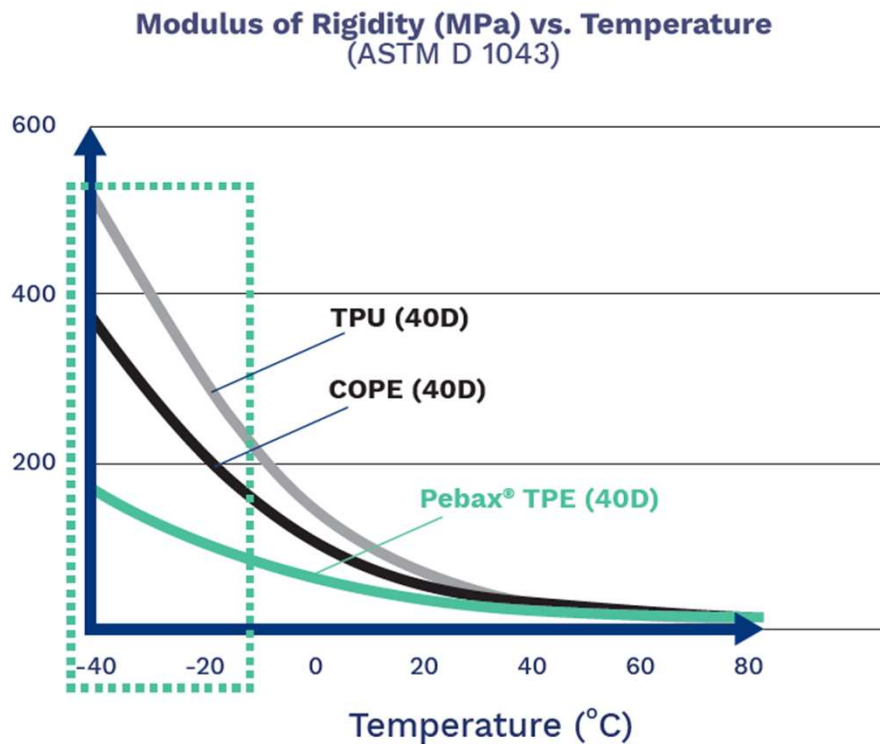


Food Processing

- **Light weight** –Allows for longer structures
- **Flexible**–Maintain flexibility at low and high temperatures
- **Inert to most chemicals** –Easy to clean and maintain
- **Durable**–Has lasting power for cost efficiency
- **Low creep** –Maintains its structural integrity

Focus on: Pebax® Elastomers

Pebax® elastomers are **light weight and flexible**, which allows food processors to create durable belts that **can withstand abuse and varying temperatures**.

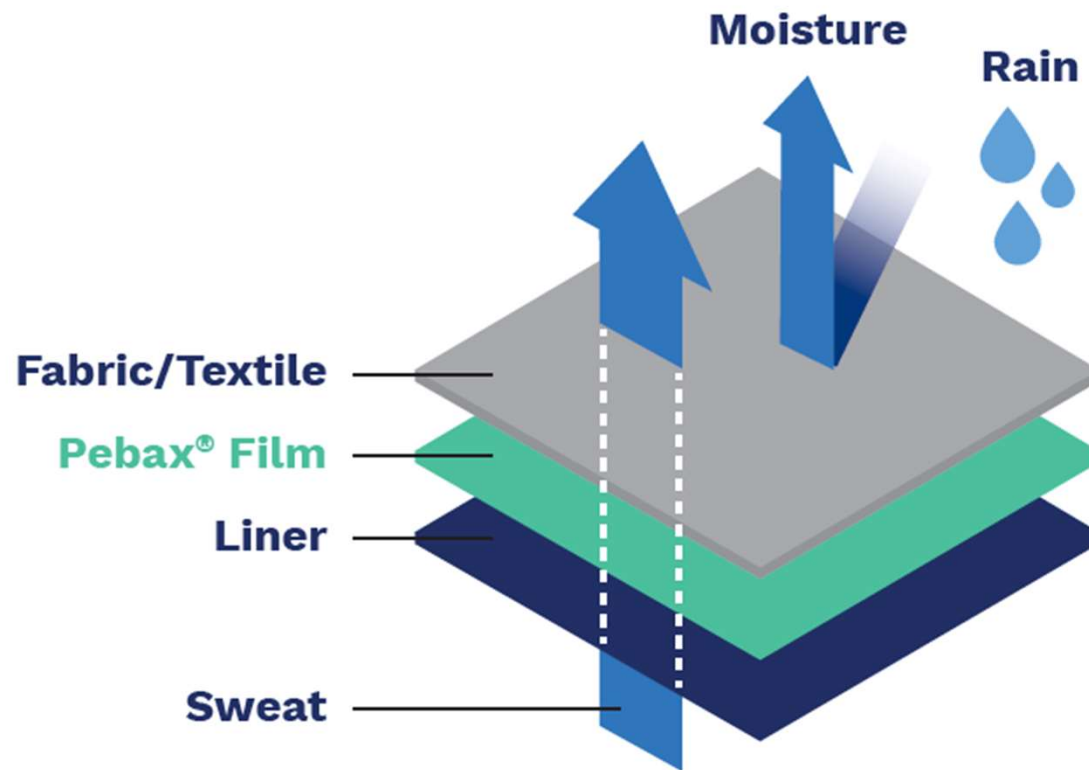


Sustained Flexibility at low temps



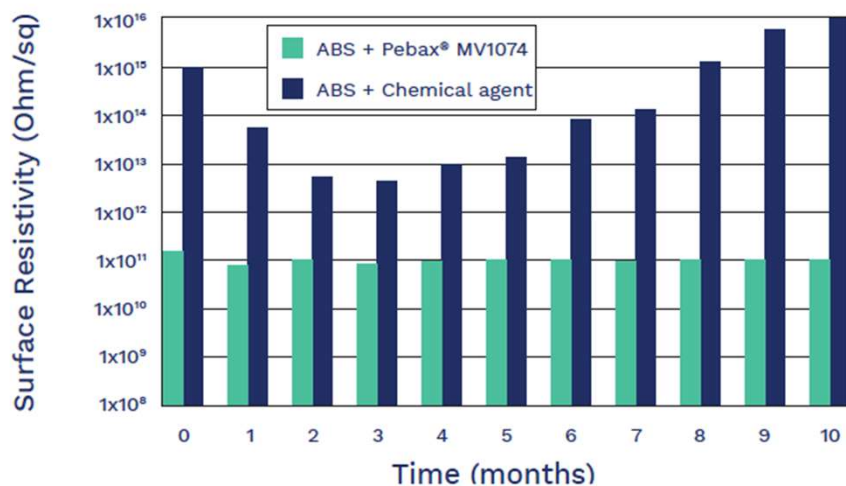
Avoid cold stiffening

Breatheable Pebax® Grades Available



Permanent antistatic Pebax® grades available

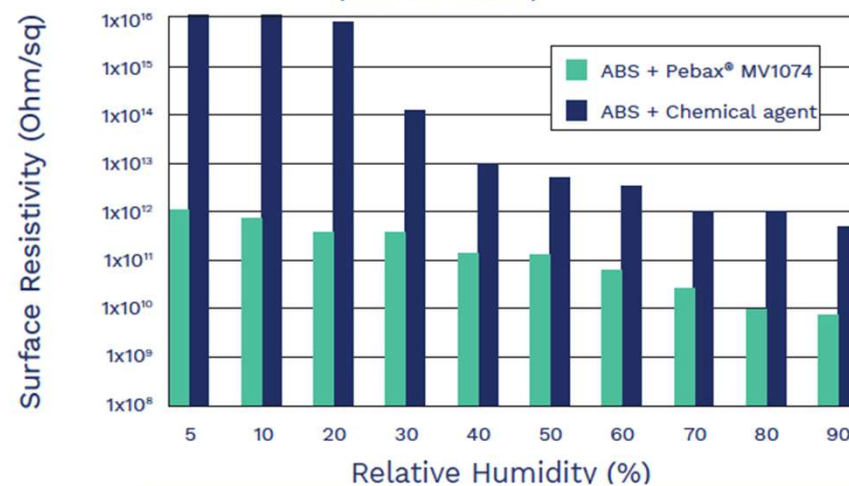
Surface Resistivity vs. Time (ASTM D257)



Pebax Additive:

- Forms 3D network in the matrix
- Does NOT migrate to surface
- Produces immediate & permanent antistatic effect

Surface Resistivity vs. Relative Humidity in the air (ASTM D257)



Pebax Additive:

- Maintains antistatic effect at high/low humidity
- Is much less sensitive to humidity than chemical agents (agents can be very inefficient)

Recommended Grades

KYNAR®

PEBAX®

RILSAN®

Kynar® Grades	Pebax® Grades	Rilsan® Grades
Kynar® 700 Series	Pebax® MH 1657	Rilsan® BESVOA FDA
Kynar® 1000 HD	Pebax® 5513 SA01	Rilsan® BESNO Grades
Kynar Superflex® 2500	Pebax® MV 3000 and 1074 SA01	
Kynar Flex® 2750 and 2800	Pebax® xx33 Series SA01 Grades	

The above grades are the most used for Food and Beverage applications, but **many other grades** are available for **unique customer situations**. Contact an Arkema Representative today by filling out the form at the bottom of our Food and Beverage Market webpage: ark.ma/tpa-food-and-beverage