FOOD AND BEVERAGE MARKET PRESENTATION

FOCUS ON TUBING, PIPING, CONNECTORS, CONVEYOR BELTS, WIRE & CABLE…
In 2017 the US employed over 1.5 Million people in the food manufacturing industry.*

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

The world is becoming more extreme™

*Source: BLS.gov
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, machineable, 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**.
World leader in biobased PA11 and other flexible long chain polyamides

Polyether block amide elastomers. Largest supplier in the world.

World leader in PVDF (polyvinylidene fluoride) and flexible fluoropolymers
FOCUS ON APPLICATIONS & GRADES
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.

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

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

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 inertness of Rilsan® PA11 makes 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
KYNAR® POLYVINYLIDENE FLUORIDE (PVDF)

Easy Processing and extreme Chemical Resistance
**KYNAR® PVDF: A SOLUTION THAT CAN REPLACE 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® 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 sauces, 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: CERTIFICATIONS AND LISTINGS

- FDA 177.2510 and 177.2600
- USDA Contact with Meat or Poultry
- CRC Kosher Certified
- USP Class VI
- 3A Serial No. 2000
- NSF-51 and NSF-61
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- 3A Serial No. 2000
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FOCUS ON SPECIALTY POLYAMIDES
RILSAN® POLYAMIDE RESINS

RILSAN PA11 was first polymerized in Serquigny, France in 1947

High melting point, low permeability and strong impact properties

BIOBASED, low global warming potential*

Flexible, excellent chemical resistance

Global & integrated

More than 50 year legacy in extreme applications

Low moisture pickup, good dimensional stability

Derived from Castor Beans

* Responsible Care
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.

![Graph showing modulus of rigidity vs. temperature for TPU, COPE, and Pebax® TPE](image)

- **Sustained flexibility at low T**
- **Avoid cold stiffening**
BREATHABLE PEBAX® GRADES AVAILABLE

Impervious to liquids but Permeable to gases

Moisture
Water
Fabric / Textile
Pebax® Film
Liner
PERMANENT ANTISTATIC PEBAX® GRADES AVAILABLE

**Pebax® additive...**
- Forms 3D network in the matrix
- Does NOT migrate to surface
- Produces immediate & permanent antistatic effect

**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

<table>
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<tr>
<th><strong>Kynar® grades</strong></th>
<th><strong>Pebax® grades</strong></th>
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<tr>
<td>Kynar® 700 Series</td>
<td>Pebax® MH 1657</td>
<td>Rilsan® BESVOA FDA</td>
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<td>Kynar® 1000 HD</td>
<td>Pebax® 5513 SA01</td>
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<tr>
<td>Kynar Superflex® 2500</td>
<td>Pebax® MV 3000 and 1074 SA01</td>
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<tr>
<td>Kynar Flex® 2750 and 2800</td>
<td>Pebax® xx33 Series SA01 Grades</td>
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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](ark.ma/tpa-food-and-beverage)

To view grade specific details and properties visit the **Technical Polymers Material Database** at: [ark.ma/tpamaterials](ark.ma/tpamaterials)
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