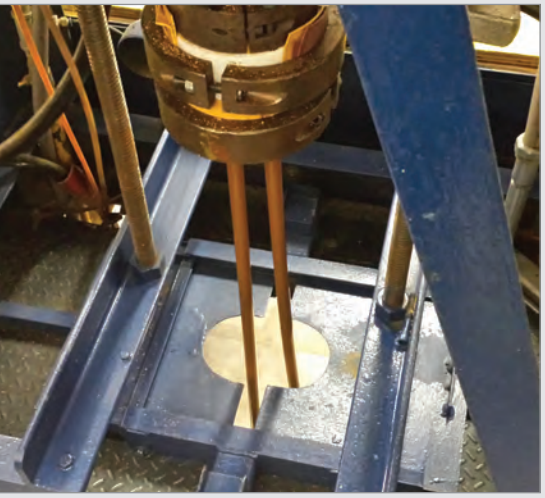
RULON® FLUOROPOLYMERS

# WEAR & FRICTION CONTROL MATERIALS SOLUTION HANDBOOK

Omniseal Solutions
SAINT-GOBAIN

BEYOND the boundaries of POSSIBLE

# Welcome to the Omniseal Solutions' World, Part of Saint-Gobain Group



Saint-Gobain has a rich tradition of excellence that dates back more than 360 years. Today, it is among the world's top 100 industrial corporations and a leader in the development of light and sustainable construction as well as in the manufacturing of engineered components and materials.

In 1665, King Louis XIV signed the letters patent, leading to the creation of Saint-Gobain on an industrial basis. Among the company's earlier and more notable projects was the manufacturing of 357 mirrors for the Hall of Mirrors in the Palace of Versailles. From these glassmaking origins, Saint-Gobain continues its long history of developing new and innovative materials and products through arduous research.

With more than 161,000 employees, operations in 80 countries, and eight major cross-business research centers that serve all activities, Saint-Gobain provides complete and thorough service to our customers, beginning with our experienced design engineering team, moving to our high-tech labs for testing and research and development, and continuing onto the manufacturing floor.

Much of our global resources are focused on creating strong research and development center and establishing partnerships with prestigious universities and laboratories. Our commitment to innovation has resulted in the rapid progression of new Saint-Gobain products that did not exist five years ago.

Saint-Gobain is among the global leaders in each of its businesses: construction products, building distribution and innovative materials, including high-performance seals and advanced materials. Our precision sealing and material solutions are manufactured throughout the world with sites located in the Americas, Europe and Asia.


Saint-Gobain Group Headquarters, France



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# The Rulon® Material: Proven In The Past, Prepared For The Future

Rulon® fluoropolymers are a trademarked family of PTFE-based (polytetrafluoroethylene) materials known for their exceptional low friction, chemical resistance, and wear performance. The origin story of this polymer solution begins in the late 1800s with Ezra Dixon, an inventor and entrepreneur in the textile industry. Dixon founded the Dixon Lubricating Saddle Company in 1876, which specialized in self-lubricating bearings for textile machinery.

In the late 1940s, Robert Rulon-Miller, who married into the Dixon family and later became president of Dixon Industries, began experimenting with PTFE to improve bearing performance. His work led to the development of a new material with superior wear resistance and low friction, which he named "Rulon". The first commercial version, Rulon® A material, was introduced in the early 1950s and later evolved into the Rulon® AR material.

Over the decades, the Rulon® product line expanded to include many specialized grades tailored for diverse applications—from industrial seals and bearings to FDA-compliant components for food and beverage and life science use. Dixon Industries was acquired by Furon, which was later absorbed by Saint-Gobain Performance Plastics, now operating under the Omniseal Solutions' brand portfolio.

Today, Rulon® solutions remain a cornerstone material for advanced engineering applications that demand durability, chemical resistance, and precise control of wear and friction. Building on our innovative legacy that spans more than a century, Rulon® materials are now making an impact in emerging technologies such as hydrogen environments.

DIXON CORPORATION
Bristol, Rhode Island, U.S.A.
Phone Clifford 3-7500

Dixon Lubricating Saddle Company employees: taken in the early 1950s at their headquarters on High Street in Bristol, Rhode Island.



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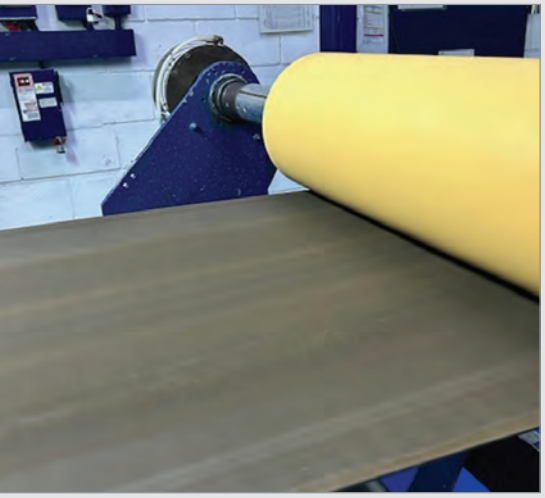





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# A Tour of Our Manufacturing Processes & Engineering Expertise

Omniseal Solutions SAINT-GOBAIN

Omniseal Solutions' global presence allows us to manufacture products in the Rulon® family throughout the world, with sites located in Saltillo, Mexico; Garden Grove, California, USA; Kolo, Poland; Kontich, Belgium; Willich, Germany; and Minhang, China.

Research, custom design and state-of-the-art testing are at the heart of Rulon® solutions and its longevity. Close collaboration with each customer, together with our expertise in engineering and customer service, help us deliver in the most demanding applications. Starting with custom blending, specialized processing and prototyping, all the way to maintaining tight tolerances and meeting stringent quality requirements, we have your needs covered.

Our sites in Saltillo, Mexico; Willich, Germany; and Kolo, Poland are also IATF 16949 certified. Additionally, our Garden Grove, California, USA, site is certified for AS9100 and the Kontich, Belgium, site is certified for EN9100.

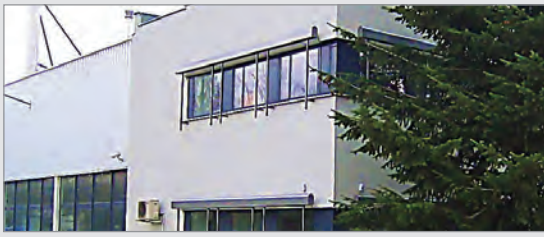
## Quality Standards & Certifications

ISO 9001:2015 · AS 9100 Rev.D · EN 9100:2016 · IATF 16949:2016

| Material Processes | Shape Types |
|---|---|
| Automatic Molding | Custom bearings<br>Components, near-net shape |
| Extrusion | Rods & tubes<br>Specialty profiles |
| Hand Molding | Rods, Tubes & Sheets |
| Skiving | Tapes<br>Thin Sheets |
| Stamping/Forming | Washers<br>Bearings & Glides |
| Machining | Custom machined parts |

Saltillo, Mexico


Garden Grove, CA, USA


Kolo, Poland


Kontich, Belgium

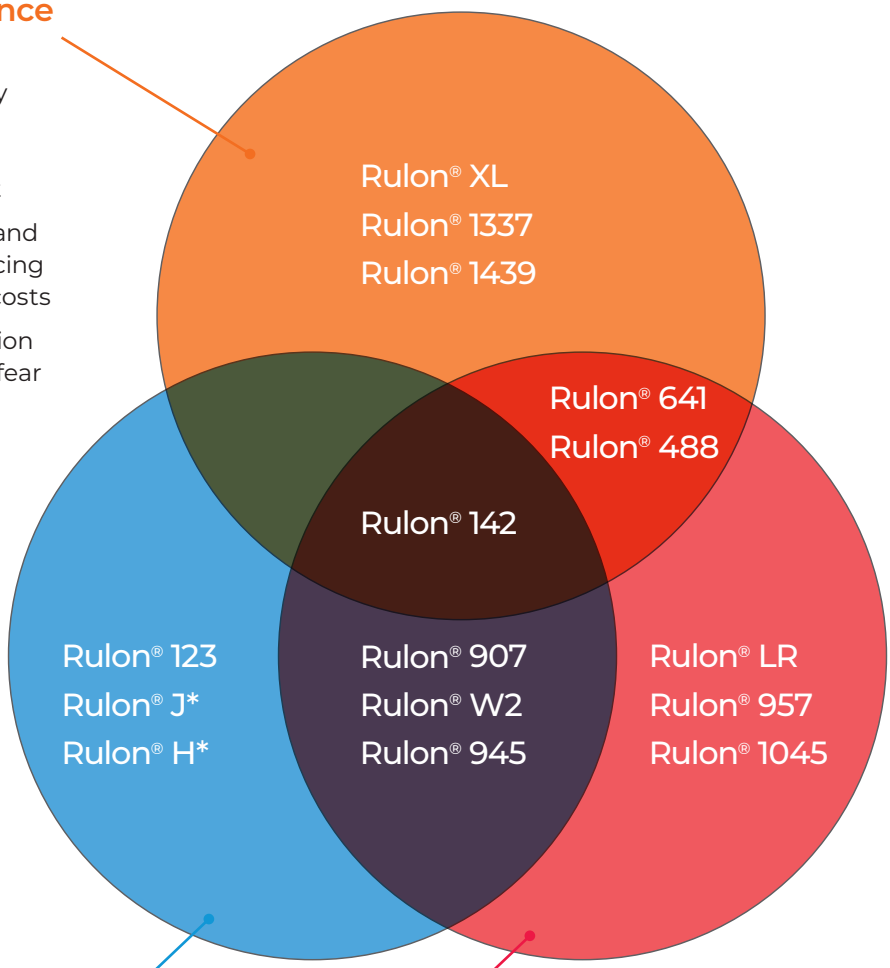

Willich, Germany


Minhang, China

# Our Rulon® Materials & Technical Properties

## Temperature Performance (High & Low)

- Engineered to perform reliably across extreme thermal environments going from cryogenic cold to intense heat
- Maintains structural integrity and functional performance, reducing downtime and maintenance costs
- Minimizes wear and deformation under thermal stress without fear of material failure




## Electrical Characterization (Insulation & Conductivity)

- Engineered to provide precise electrical properties to meet the demands of complex industrial systems (i.e., electrical insulation for safety or conductivity for functionality)

## Mechanical Strength (Stability & Rigidity)

- Typically higher reinforcements for improved compressive strength and dimensional stability under high loads

**Insulation property*



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# Our Wear & Friction Control Solutions

**Engineered for Performance. Trusted in Extremes.**

In today's high-demand industrial world, reducing wear and friction is key to improving efficiency, reliability, and lifespan. At Omniseal Solutions, we specialize in advanced tribological materials and low-friction fluoropolymers—engineered to perform under the most challenging conditions.

Our high-performance materials deliver excellence in temperature performance, mechanical strength and electrical characterization.

### Temperature Performance

Engineered to withstand both extreme heat and cold, our fluoropolymers are valued in sectors where thermal insulation, structural integrity, and stability are critical. For example, Rulon® XL or Rulon® 142 materials thrive in environments ranging from cryogenic temperatures to high heat—where conventional materials like elastomers often fail.

### Mechanical Strength

Our Rulon® materials offer outstanding mechanical properties: tensile strength; stiffness; toughness; flexural and impact resistance; and hardness. This combination makes them a lightweight yet durable alternative to metals, especially in high-demand industries and applications such as aerospace, industrial machinery, and medical devices. Rulon® 488 or Rulon® 945 provide longer component lifespan and reduced replacement frequency, leading to lower total cost of ownership. Customers benefit from enhanced durability in high-wear applications like conveyors or bushings.

### Electrical Characterization

Our high-performance polymers are often used in applications where insulation, conductivity, and signal integrity are critical. In aviation and oil & gas, they help prevent electrical failures in high-voltage systems, enhancing safety and reliability. In life science and space technology, conductive polymers support ultra-accurate power and data transmission—where even minor failures can compromise system performance.

Due to exceptional dielectric strength, thermal stability, and electrostatic discharge (ESD) resistance, customized Rulon® materials such as Rulon® J or Rulon® 142 outperform traditional plastics and ceramics, enabling innovation in next-generation electronics, medical technologies, and aerospace systems.

## Available Shapes

| Rod & Tube | Sheet & Tape | Custom |
|---|---|---|
| **Extruded** –<br>Up to 6 ft. long (2.43m)<br>2" (50.8mm) Max O.D. | **Tape** –<br>38" (965.2mm) width*<br>Skived Up to<br>0.25" (6.35mm) thick | Contact District Sales Manager |
| **Molded** –<br>Up to 12" long (304.8mm)<br>47" (1,193.8mm) Max O.D | **Molded** –<br>Up to 24"x3"<br>(609.6mm x 76.2mm) thick<br>Max thickness 3" (76.2mm) | Full machining capabilities available |
| Precision grinding or machining available for some sizes | Precision grinding or machining available on thickness<br>*Other sizes available upon request | |

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# Material Selection Guide

Temperature Performance · Mechanical Strength · Electrical Characterization

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | ● | ● | ●● | ●● | ● | ●● | ● |
| Rulon® Grades | Grade | **LR** | **J** | **641** | **W2** | **123** | **488** | **H** |
| | Color | Maroon | Dull Gold | White | Black | Black | Dull Turquoise | White |
| Performance | Max Load "P" (psi) (MPa) | 1,000<br>6.9 | 750<br>5.2 | 1,000<br>6.9 | 1,000<br>6.9 | 1,000<br>6.9 | 1,000<br>6.9 | 1,000<br>6.9 |
| | Max Speed "V" (fpm) (m/s) | 400<br>2.0 | 400<br>2.0 | 400<br>2.0 | 400<br>2.0 | 400<br>2.0 | 400<br>2.0 | 400<br>2.0 |
| | Max "PV" (psi-fpm) (MPa · m/s) | 10,000<br>0.35 | 7,500<br>0.26 | 10,000<br>0.35 | 10,000<br>0.35 | 10,000<br>0.35 | 10,000<br>0.35 | 10,000<br>0.35 |
| Mating Surface Steel & Stainless Steel | Rb 25 & higher | | X | X | X | X | X | |
| | Rc 35 & higher | X | | | | | | X |
| | Painted metal and porcelain | | | | | | X | |
| | Aluminum | | X | | | | | |
| Environment | FDA compliant | | | X | | X | | |
| | USP Class VI compliant | | X | X | | | | |
| | EU1935/2004 compliant | | | X | | | | |
| | Steam | X | | X | X | X | X | |
| | Wet | X | | X | X | X | X | X |
| | Dry | X | X | X | X | X | X | X |
| | Vacuum | X | X | X | | | X | |
| Relative Rating 1 = Low, 5 = High | Coefficient of friction | **4** | **1** | **1** | **2** | **2** | **3** | **2** |
| | Creep resistance | **4** | **3** | **4** | **4** | **4** | **4** | **5** |
| | Insulative properties (Elec & Temp) | Yes | Yes | Yes | No | No | Yes | Yes |
| Comments | | Standard Rulon® bearing grade. High creep & abrasion resistance. | Lowest coefficient of friction of Rulon® series. Excellent insulator. | Widely used in the food processing industry. | Very good operation in wet environments. | Good thermal and electrostatic dissipation. | Temperature (dry) ovens bearings. Excellent abrasion. | Abrasion resistance components and improve their performance. |


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The list below is only a partial list of available formulations of Rulon® P or V data may be exceeded based on specific application requirements. Ask to speak to a Saint-Gobain Application Engineer. RATINGS above are relative within Rulon® family ONLY. For Rulon® materials, coefficient of friction decreases with increasing load, and wear decreases with increasing surface hardness. For PTFE based materials, wear in steam and wet environments is higher than in dry environments. Saint-Gobain offers enhanced Rulon® grades, which minimize this effect. Most Rulon® products have excellent chemical compatability. Data available upon request.

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● Temperature Performance ● Mechanical Strength ● Electrical Characterization

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ● | ● | ● ● ● | ● ● | ● | ● | ● | ● ● |
| Rulon® Grades | Grade | **957** | **XL** | **142** | **945** | **1045** | **1337** | **1439** | **907** |
| | Color | Speckled Green | Tan | Turquoise | Black | Light Brown | Tan | White | Black |
| Performance | Max Load "P" (psi) (MPa) | 1,000 6.9 | 1,200 8.3 | 1,000 6.9 | 1,200 8.3 | 1,000 6.9 | 1,000 6.9 | 1,000 6.9 | 1,000 6.9 |
| | Max Speed "V" (fpm) (m/s) | 400 2.0 | 400 2.0 | 400 2.0 | 400 2.0 | 400 2.0 | 400 2.0 | 400 2.0 | 400 2.0 |
| | Max "PV" (psi-fpm) (MPa · m/s) | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 | 10,000 0.35 |
| Mating Surface Steel & Stainless Steel | Rb 25 & higher | X | X | | | X | X | X | |
| | Rc 35 & higher | | | X | X | | | | X |
| | Painted metal and porcelain | X | | | | | | | |
| | Aluminum | | X | | | | | | |
| Environment | FDA compliant | | | | | | X | X | |
| | USP Class VI compliant | | | | | | | X | X |
| | EU1935/2004 compliant | | | | | | X | X | |
| | Steam | X | X | X | X | | X | X | |
| | Wet | X | X | X | X | X | X | X | |
| | Dry | X | X | X | X | X | X | X | X |
| | Vacuum | X | X | X | | X | X | X | |
| Relative Rating 1 = Low, 5 = High | Coefficient of friction | **2** | **1** | **2** | **4** | **1** | **1** | **3** | **2** |
| | Creep resistance | **4** | **4** | **5** | **5** | **2** | **2** | **4** | **4** |
| | Insulative properties (Elec & Temp) | Yes | Yes | No | No | Yes | Yes | Yes | No |
| Comments | | Low friction/ wear against coated metal or porcelain surfaces. | The best Rulon® against aluminum surfaces. | Extensively used in machine tool guide ways. | Extremely low deformation under load, and high impact resistance. | A standard material for compressor piston flip seals. | FDA compliant; excellent chemical resistance. | Ideal for submerged applications. | Best for dynamic applications running on moderate to hard surfaces. Excellent all purpose high wear resistance material. |

# RULON® LR Material

● Mechanical Strength

Rulon® LR material is a maroon colored bearing material best known for its versatile design properties.

It is compatible with most hardened steel substrates. Mild steel is acceptable; harder running surfaces are better.

Rulon® LR has a practically universal chemical inertness. Of the chemicals encountered in commercial practice, only molten sodium and fluorine, at elevated temperatures and pressures, show any signs of attack.

For continuous non-lubricated service, Rulon® LR sleeve bearings are capable of operating up to 10,000 PV. Higher values are possible for intermittent service.

## Typical Product and Application Description

**Products**

- Automatically molded bearings & components
- Sleeve, flanged and thrust bearings
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Pumps
- Mixers
- Compressors
- Appliances
- Automotive
- Insulation
- Linear slides
- Pipe supports
- Wear bands
- Textile industry

## Design Criteria: Rulon® LR

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rc35 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.20 - 0.45 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.43 (0.35) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>11.6 (20.8) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>3.5 (6.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 180% |
| Tensile Strength ASTM D4894 (MPa) | 2,100 psi (14.5) |
| Deformation under load ASTM D621 | 3% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.25 |

*A more complete data sheet is available upon request.*



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# RULON® J Material

Electrical Characterization

Rulon® J material is an all-polymeric reinforced, dull gold colored PTFE compound that operates exceptionally well against soft mating surfaces such as 316 stainless steel, aluminum, mild steel, brass and other plastics.

The unique “shaft friendly” material is also low in friction and wear and is self-lubricating.

Rulon® J has one of the lowest coefficients of friction of most reinforced PTFE materials and is meeting the requirements for USP Class VI. This makes it ideally suited for start/stop applications where stick-slip must be eliminated. The tribological properties of this material also make it suitable for both bearing and wear component applications.

## Design Criteria: Rulon® J

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -450/+550 (-268/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 7,500 (0.26) |
| Maximum P - psi (static) (MPa) | 750 (5.2) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | 316 Stainless Steel and Non-Ferrous |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.20 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 1.87 (0.27) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.6 (13.6) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>5.3 (9.5) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 200% |
| Tensile Strength ASTM D4894 (MPa) | 2,500 psi (17.2) |
| Deformation under load ASTM D621 | 2.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 1.95 |

## Typical Product and Application Description

| Products |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| Applications |
|---|
| Printers |
| Satellites |
| Copiers |
| Air Compressors |
| Appliances |
| Automotive |
| Insulators |
| Liner slides |
| Anemometers |
| Wear bands |
| Solenoid valves |
| Refrigeration valves |
| Textile Industry |

*A more complete data sheet is available upon request.*

# RULON® 641 Material

● Temperature Performance ● Mechanical Strength

Rulon® 641 material is manufactured from FDA compliant materials possessing excellent load and wear characteristics while meeting the requirements for USP Class VI.

Rulon 641 is also meeting the requirements from the EU1935/2004 standard and is compliant to simulant A and D2. It offers excellent, continuous non-lubricated service up to 10,000 PV – higher for intermittent service. While the load capacity of Rulon® 641 is generally limited to 1,000 psi (6.9 MPa) at room temperature, deformation is a function of wall thickness, temperature and load.

Its compatibility with a wide array of mating surfaces, including mild steel, 303 and 316 stainless steels, as well as harder materials, makes it a good choice for most food and pharmaceutical bearing applications.

## Typical Product and Application Description

**Products**

- Automatically molded bearings & components
- Sleeve, flanged and thrust bearings
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Pumps
- Mixers
- Compressors
- Appliances
- Chute Liners
- Insulation
- Linear slides
- Shaft bearings
- Wear bands
- Seals

## Design Criteria: Rulon® 641

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Mild, 303 & 316 Stainless Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.30 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.91 (0.42) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>6.4 (11.5) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>5.4 (9.7) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 250% |
| Tensile Strength ASTM D4894 (MPa) | 3,100 psi (21.4) |
| Deformation under load ASTM D621 | 3.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.20 |

*A more complete data sheet is available upon request.*



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# RULON® W2 Material

Mechanical Strength  Electrical Characterization

Rulon® W2 material is a black PTFE-based material developed for use in fresh-water applications. It exhibits low friction and excellent wear characteristics (one of the lowest wear rates in fresh water) as well as good thermal dissipation, preventing shaft distress. Its properties are enhanced when wet.

It is compatible with most metal substrates and soft mating surfaces. Rulon® W2 is a good alternative to Rulon® J when superior chemical resistance is needed. However, it should not be used on very soft mating surfaces or where electrical insulation is desired.

## Design Criteria: Rulon® W2

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Hard, mild and stainless steels |
| **Engineering Information** | |
| Friction - static & dynamic | 0.20 - 0.50 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 4.5 (0.65) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.6 (13.6) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>6.6 (11.9) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 70% |
| Tensile Strength ASTM D4894 (MPa) | 2,100 psi (14.5) |
| Deformation under load ASTM D621 | 1.5% (1,500 psi) - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.10 |

## Typical Product and Application Description

| **Products** |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| **Applications** |
|---|
| Pumps |
| Mixers |
| Compressors |
| Appliances |
| Automotive |
| Fresh water submerged |
| Thrust bearings |
| Plating tanks |
| Wear bands |
| Ovens |

*A more complete data sheet is available upon request.*

# RULON® 123 Material

Electrical Characterization

Rulon® 123 material is a glossy black non-abrasive compound for softer mating surfaces, such as stainless steel. This material has excellent chemical resistance and is FDA compliant. It is less expensive than Rulon® J, but is slightly less flexible and higher in wear.

It has a high resistance to deformation, low coefficient of friction and good thermal and electrostatic dissipation. This material has a maximum operating temperature of 550˚F (288˚C).

Rulon® 123 releases black wear debris over time and should not be used in ultra-dry, vacuum applications, or where electrical insulation is desired.

## Typical Product and Application Description

**Products**

- Automatically molded bearings & components
- Sleeve, flanged and thrust bearings
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Pumps
- Mixers
- Compressors
- Appliances
- Automotive lip seals
- Liners
- Linear slides
- Pipe supports
- Wear bands
- Dust seals
- Solenoid valves
- TPS shaft seals
- EGR valves

## Design Criteria: Rulon® 123

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.30 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 6.24 (0.90) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>8.3 (15.0) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>4.3 (7.8) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 160% |
| Tensile Strength ASTM D4894 (MPa) | 3,000 psi (20.7) |
| Deformation under load ASTM D621 | 2.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.12 |

*A more complete data sheet is available upon request.*



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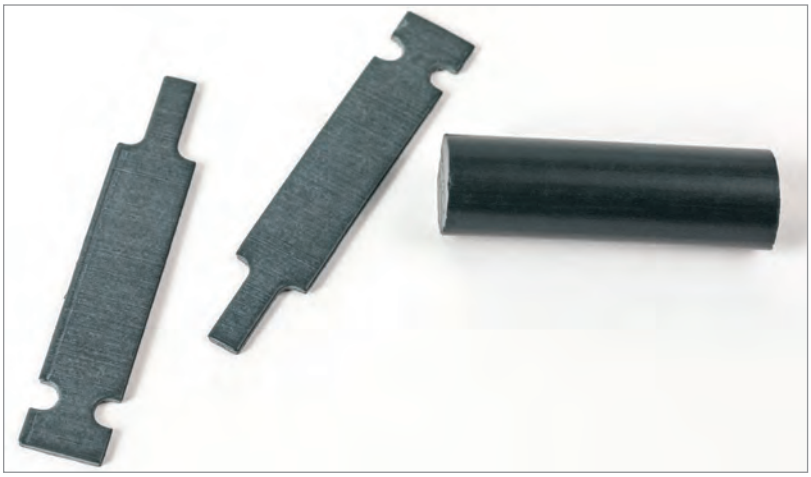
# RULON® 488 Material

Temperature Performance  Mechanical Strength



Rulon® 488 material is a dull turquoise material originally developed for use with painted surfaces. It has been used in veneer dryer bearings in the plywood industry.

Its excellent wear resistance, especially in extremely dry environments, makes it a material of choice in hydrogen and natural gas compressors. Its almost universal chemical resistance enables it to withstand corrosives and acids sometimes present in trace amounts in these environments.

It has a higher load capacity than Rulon® J and better abrasion resistance than both Rulon® J and Rulon® 123.

## Design Criteria: Rulon® 488

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Hard, mild and stainless steels |
| **Engineering Information** | |
| Friction - static & dynamic | 0.20 - 0.40 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 3.26 (0.47) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br><br>6.3 (11.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>6.3 (11.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 230% |
| Tensile Strength ASTM D4894 (MPa) | 3,000 psi (13.8) |
| Deformation under load ASTM D621 | 3.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.25 |

## Typical Product and Application Description

| Products |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| Applications |
|---|
| Pumps |
| Mixers |
| Compressors |
| Appliances |
| Automotive |
| Insulators |
| Linear slides |
| Pipe support |
| Wear bands |

*A more complete data sheet is available upon request.*

# RULON® 957 Material

● Mechanical Strength

Rulon® 957 material is a speckled green material that was developed specifically for noise dampening and abrasion resistance, such as in commercial or residential clothes dryers.

It provides low friction operation on softer mating surfaces at higher loads than the Rulon® J solution, this material also offers excellent performance on coated metals, particularly porcelain. Overall benefits include weight reduction of the finished product, vibration absorption, and cost reduction due to rapid manufacturing methods.

## Typical Product and Application Description

**Products**

- Automatically molded bearings & components
- Sleeve, flanged and thrust bearings
- Stamped glides
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Clothes Dryers
- Mixers
- Compressors
- Ovens and Dryers
- Automotive
- Insulators
- Linear slides
- Sanders
- Wear bands

## Design Criteria: Rulon® 957

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Hard, Mild and Stainless Steel and Porcelain coated |
| **Engineering Information** | |
| Friction - static & dynamic (Dynamic, 20 psi, 360 sfm) | 0.15 - 0.30 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.08 (0.30) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.3 (13.2) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>4.5 (8.2) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 230% |
| Tensile Strength ASTM D4894 (MPa) | 2,200 psi (15.2) |
| Deformation under load ASTM D621 | 0.7% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 1.96 |

*A more complete data sheet is available upon request.*



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# RULON® XL Material

Temperature Performance

Rulon® XL material is a tan colored material that is best for use against aluminum (including anodized) substrates. Rulon® XL exhibits very low wear as compared with other Rulon® grades.

Other advantages offered by this unique material are that it combines low deformation under load with exceptionally good chemical resistance.

It is compatible with a wide range of mating surfaces, but is not recommended for use with alkalis. Its non-abrasive character enhances the frictional performance to prevent galling of softer mating surfaces.

It is the best material for vacuum service.

## Design Criteria: Rulon® XL

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,200 (8.3) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | All Steels and aluminum |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.30 |
| Water Absorption ASTM D570 | 0% |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.22 (0.32) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.4 (13.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>6.7 (12.0) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 190% |
| Tensile Strength ASTM D4894 (MPa) | 1,700 psi (11.7) |
| Deformation under load ASTM D621 | 1.4% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 1.97 |

## Typical Product and Application Description

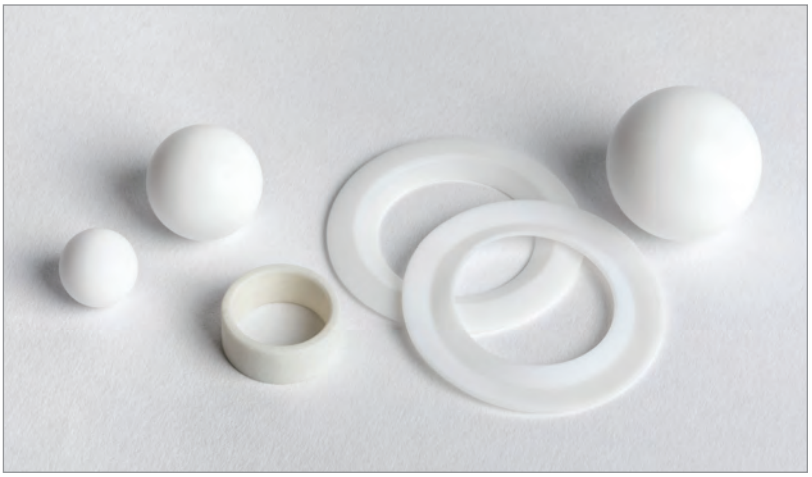
| Products |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| Applications |
|---|
| Vacuum pumps |
| Mixers |
| Compressors |
| Appliances |
| Automotive |
| Insulators |
| Linear slides |
| Shaft support |
| Wear bands |

*A more complete data sheet is available upon request.*

# RULON® H Material

Electrical Characterization



## Typical Product and Application Description

**Products**

- Sleeve, flanged and thrust bearings
- Stamped glides
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Insulators
- High power microwave and RF connectors
- UHF heat-sinking components
- High power electrical components
- Medical equipment
- Radar

Rulon® H material is a PTFE-based white composite material specifically designed for applications that demand superior thermal and electrical performance. The filler material significantly improves thermal conductivity while preserving the inherent chemical inertness and low friction characteristics of PTFE.

This combination makes our Rulon® H material particularly suitable for high frequency and high-power environments where heat dissipation and dielectric stability are critical. This material solution is particularly suitable for RF and microwave applications as a result of its low dissipation factor.

## Design Criteria: Rulon® H

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+600 (-240/+316) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rc35 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Stainless to Hardened Steel |
| **Engineering Information** | |
| Dissipation factor ASTM D150 | 0.0005 – 0.004 (frequency = 1MHz) |
| Dielectric constant ASTM D150 | 2.30 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 13.31 (1.92) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>9.9 (17.7) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>2.4 (4.3)x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D1708 | 5.0% |
| Tensile Strength ASTM D1708 (MPa) | 1,000 psi (6.8) |
| Specific Gravity ASTM D792 | 2.09 |
| Deformation under load ASTM D621 | 2.5% (1,500 psi - 24 hr. RT) |

*A more complete data sheet is available upon request.*



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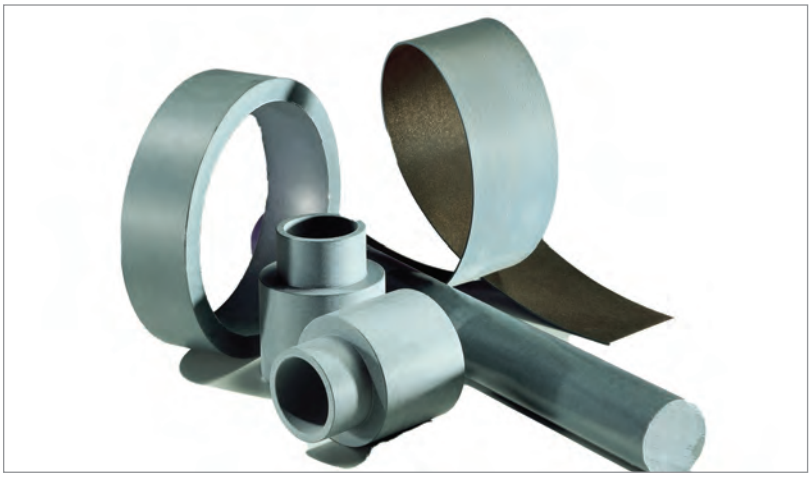
# RULON® 142 Material

Temperature Performance  Mechanical Strength  Electrical Characterization



Rulon® 142 material is a specially formulated turquoise linear bearing material that exhibits low wear, high thermal dissipation, and good dimensional stability characteristics.

Among its many benefits are the virtual elimination of stick-slip, vibration dampening, self-lubrication, uniform friction, long life, ease of application and design diversity.

Rulon® 142 has excellent mechanical properties and is the ideal material for machine tool applications. Its low deformation characteristics limit the amount of misalignment that can occur with other bearing materials.

Strong acids and bases should be avoided, as they may attack the fillers.

## Design Criteria: Rulon® 142

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rc35 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Mild/Hardened Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.15 - 0.30 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 3.05 (0.44) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>8.1 (14.6) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>6.4 (11.5) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 200% |
| Tensile Strength ASTM D4894 (MPa) | 3,100 psi (21.4) |
| Deformation under load ASTM D621 | 3% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 3.11 |

## Typical Product and Application Description

**Products**

- Packings
- Sleeve, flanged and thrust bearings
- Stamped parts
- Extruded parts
- Machined parts
- Molded shapes
- Wear bands
- Seal rings

**Applications**

- Lathes
- Gibs, guideways
- Compressors
- Appliances
- Rotary tables
- Motor mounts
- Linear slides
- Pipe supports
- Hydraulic presses

*A more complete data sheet is available upon request.*

# RULON® 907 Material

Mechanical Strength  Electrical Characterization

## Typical Product and Application Description

**Products**

- Sleeve, flanged and thrust bearings
- Stamped parts
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Pumps
- Compressors
- Linear slides
- Guide strips
- Wear bands
- Valves

Rulon® 907 material is a black PTFE-based composite material engineered for high performance applications in extreme environments. Combining the inherent chemical inertness and low friction of PTFE with proprietary fillers, this solution significantly improves wear resistance and load-carrying capability.

Due to its low coefficient of friction, smooth dynamic performance is achieved even under dry-running conditions, while its excellent chemical resistance handles aggressive media, e.g., acids, bases, hydrocarbons, and steam. The material is valued for its ability to withstand vacuum and ultra-high pressures, with a versatility and reliability that makes it ideal choice for bearings, bushings, and components used in aviation, space, chemical processing, and industrial machinery.

## Design Criteria: Rulon® 907

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -436/+600 (-260/+315) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rc35 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Hardened Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.20 - 0.40 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.43 (0.35) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.7 (13.9) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>5.0 (9.1) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D1708 | 250% |
| Tensile Strength ASTM D1708 (MPa) | 2,800 psi (20.7) |
| Deformation under load ASTM D621 | 0.8% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.11 |

*A more complete data sheet is available upon request.*



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# RULON® 945 Material

Mechanical Strength  Electrical Characterization

Rulon® 945 material is a black PTFE-based material that has very low wear and deformation under load, making it ideally suited for demanding thermal applications. In fact, its deformation is the lowest of all Rulon® grades. It also possesses excellent chemical resistance and good dimensional stability.

Rulon® 945 is best suited for use against hard mating surfaces, like hardened steel substrates since it does have moderate abrasive qualities. It is not suitable in applications where electrically insulating properties are required.

## Design Criteria: Rulon® 945

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,200 (8.3) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rc35 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.15 - 0.30 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.50 (0.36) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>7.6 (13.8) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>6.8 (12.2) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 20% |
| Tensile Strength ASTM D4894 (MPa) | 3,000 psi (20.7) |
| Deformation under load ASTM D621 | 0.7% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 1.95 |

## Typical Product and Application Description

| **Products** |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| **Applications** |
|---|
| Pumps |
| Mixers |
| Compressors |
| Appliances |
| Automotive |
| Insulators |
| Linear slides |
| Pipe support |
| Wear bands |

*A more complete data sheet is available upon request.*

# RULON® 1045 Material

● Mechanical Strength

Rulon® 1045 material is a light brown material that has an excellent ability to elongate in a flip seal application. Coupled with excellent frictional characteristics, it offers the added benefit of energy savings, as well as increased sealing efficiency.

This material is also resistant to many harsh chemicals found in the application environments where it is typically used. It is also compatible with most commercially available lubricants for additional reduction in friction.

Its low deformation properties allow it to be effective as a bearing or sliding surface.

## Typical Product and Application Description

| Products |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Flip seals |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| Applications |
|---|
| AC compressors |
| Transmissions |
| Air compressors |
| Appliances |
| Automotive |
| Linear slides |
| Fluid transfer systems |
| Vacuum pumps |
| Valves |

## Design Criteria: Rulon® 1045

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Stainless to Hardened Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.20 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 1.73 (0.25) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>9.0 (16.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>7.9 (14.1) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 400% |
| Tensile Strength ASTM D4894 (MPa) | 4,000 psi (27.6) |
| Deformation under load ASTM D621 | 1.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.11 |

*A more complete data sheet is available upon request.*



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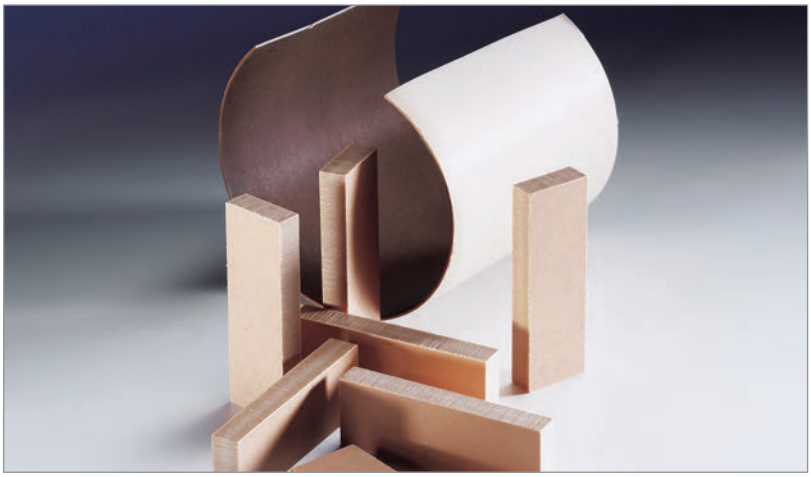
# RULON® 1337 Material

Temperature Performance



Rulon® 1337 material is a tan material made entirely from FDA compliant components. It has excellent physical properties and is chemically compatible with most chemicals, except concentrated sulfuric acid. This offers much flexibility in wash-down environments of food and pharmaceutical processing environments.

Rulon® 1337 is also compliant to the European food regulation EU1935/2004. It has an equivalent coefficient of friction than Rulon® J, offering extended life and less abrasion with softer mating surfaces.

It is compatible with most commercially available natural lubricants for additional reduction in friction.

## Design Criteria: Rulon® 1337

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Stainless to Hardened Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.10 - 0.20 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 2.22 (0.32) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>9.2 (16.6)x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>4.0 (7.2) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 190% |
| Tensile Strength ASTM D4894 (MPa) | 2,500 psi (17.2) |
| Deformation under load ASTM D621 | 2.5% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 1.95 |

## Typical Product and Application Description

| Products |
|---|
| Automatically molded bearings & components |
| Sleeve, flanged and thrust bearings |
| Extruded shapes |
| Machined parts |
| Molded shapes |

| Applications |
|---|
| Pumps |
| Mixers |
| Compressors |
| Appliances |
| Chute liners |
| Insulators |
| Linear slides |
| Shaft bearings |
| Wear bands |
| Seals |

*A more complete data sheet is available upon request.*

# RULON® 1439 Material

Temperature Performance

Rulon® 1439 material is a white FDA compliant material that is suitable for immersed service with better wear characteristics than most other PTFE compounds. Its color makes it aesthetically pleasing for food and pharmaceutical applications.

Rulon 1439 is also compliant to the European food regulation EU1935/2004 and is USP Class VI compliant. This material is also resistant to many harsh chemicals found in the application environments where it is typically used. It is compatible with most commercially available lubricants for additional reduction in friction.

Its properties allow it to be effectively utilized as a bearing or sliding surface.

## Typical Product and Application Description

**Products**

- Automatically molded bearings & components
- Sleeve, flanged and thrust bearings
- Extruded shapes
- Machined parts
- Molded shapes

**Applications**

- Transmissions
- Air compressors
- Appliances
- Pillow blocks
- Linear slides
- Fluid transfer systems
- Vacuum pumps
- Valves
- Food Processing Equipment

## Design Criteria: Rulon® 1439

| | |
|---|---|
| Temperature - Typical Range °F (°C) | -400/+550 (-240/+288) |
| Maximum PV psi.fpm (continuous) (MPa·m/s) | 10,000 (0.35) |
| Maximum P - psi (static) (MPa) | 1,000 (6.9) |
| Maximum V - SFM (no load) (m/s) | 400 (2) |
| Shaft Hardness - Minimum | Rb25 |
| Shaft finish recommended Ra µin (µm) | 8 - 16 (0.2-0.4) |
| Shaft Material | Stainless to Hardened Steel |
| **Engineering Information** | |
| Friction - static & dynamic | 0.15 - 0.25 |
| Flammability ASTM D635 | Non-Flammable |
| Chemical Resistance | Inert |
| Thermal Conductivity BTU/hr/sq. ft./°F/in. (W/m·K) | 3.74 (0.54) |
| Linear Coefficient of Thermal Expansion 86° to 302°F (30° to 150°C)<br>Mold direction<br>Cross direction | <br>9.1 (16.3) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C)<br>4.5 (8.1) x $10^{-5}$ in/in °F (x $10^{-5}$ m/m °C) |
| **Physical Data** | |
| Elongation ASTM D4894 | 120% |
| Tensile Strength ASTM D4894 (MPa) | 1,500 psi (10.3) |
| Deformation under load ASTM D621 | 2% (1,500 psi - 24 hr. RT) |
| Specific Gravity ASTM D792 | 2.55 |

*A more complete data sheet is available upon request.*



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# Material Certifications

All FDA-compliant, high-performance polymer materials listed are approved for repeated contact with food or pharmaceutical products intended for oral consumption, in accordance with Title 21 CFR of the United States Food and Drug Administration (FDA). Global awareness of safe direct food contact has increased significantly, leading to the establishment of multiple regulatory frameworks. As a global developer of advanced polymer solutions, it is essential to provide materials that comply not only with FDA requirements but also with European Direct Food Contact Regulations EU1935/2004 and 10/2011.

In addition, Omniseal Solutions offers high-performance polymer grades certified to USP Class VI, meeting the stringent requirements for both disposable and reusable medical devices. The United States Pharmacopeia (USP) is an independent, non-profit organization that defines recognized standards for quality and safety in healthcare. Plastics are classified into six categories based on biocompatibility testing, with Class VI representing the most rigorous level of evaluation, including systemic toxicity, intracutaneous reactivity, and implantation tests. Achieving Class VI certification demonstrates compliance with the highest standards for medical-grade materials.

## RULON MATERIALS

| Material | Color | FDA Compliant | EU1935/2004 10/2011 | USP Class VI (<87>) | USP Class VI (<88>) | ISO 10993-5 | ISO 10993-12 |
|---|---|---|---|---|---|---|---|
| Rulon® J | Dull Gold | | | | Yes | | |
| Rulon® 123 | Black | Yes | | | | | |
| Rulon® 641 | White | Yes | Simulant A + D2 | Yes | | Yes | Yes |
| Rulon® 907 | Black | | | | Yes | | |
| Rulon® 1337 | Tan | Yes | Simulant A + B + D2 | | | | |
| Rulon® 1439 | White | Yes | Simulant D2 | Yes | Yes | Yes | Yes |

# Solutions & Applications

| Rulon® Solutions | Applications |
|---|---|
| Bearings | Food & Pharmaceutical mixers |
| | Pumps |
| | Compressors |
| | Ovens |
| Piston cup & flip seals | Fuel metering pumps |
| | AC compressors |
| | Oxygen compressors |
| | Pneumatic tools |
| | Automotive transmissions |
| Formed seals | Medical pumps |
| | Refrigeration valves |
| | Dust seals |
| | Emission controls |


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# Industrial Market: Case Study

## Railway Bogie System

**Application Challenges**

- Changing nature of working environment such as weather (dust, snow and high winds) and long-term use (high forces and continuous motion)
- Extreme conditions affect materials and components used in the bogie due to mechanical limits.
- Coefficient of friction can become too high, making it very difficult to brake and perform reliably on the tracks

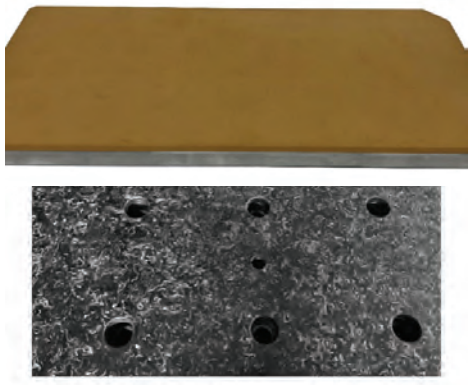
## Our Solution

### Rulon® J components

| | |
|---|---|
| **Product:** | Low friction wear resistant pad |
| **Specifications:** | NFPA 130, EN454542-2 compliant |
| **Typical Temperature:** | -50°C up to +120°C (-58°F up to +250°F) |
| **Typical Load:** | Compressive strength up to 3.5 MPa |
| **Media:** | Dust, air, grease |

## Our Technology Advantages

- We offer other polymer materials such as Hycomp composites that are valued for handling heavy loads, resisting wear and tear; and minimizing maintenance needs.
- Precision solutions that are custom engineered for each customer's design and requirements
- FEA modelling analysis to minimize and shorten design phase and costs
- Longer life and less maintenance (downtime cost)



# Food Processing Market: Case Study

## Heavy-Duty Food Processing & Mixing Equipment

**Application Challenges**

- Extreme environments such as vacuum, pressure, temperature and aggressive media.
- Need to prevent leakage and maintain purity:
  - System pressure resistant
  - Vacuum tight mainly for filling & cleaning
  - Temperature resistant
  - Compatible with media in the mixing vessel & ingredients added for the process
    - gas tightness requirement
    - abrasive particle tightness
    - temperature shock capability
    - chemical compatibility
  - Food certified & compliant with industry standards

## Our Solution

### Rulon® Fluoropolymers, Omniseal® Polymers

| | |
|---|---|
| **Product:** | Rulon® bearings, Omniseal® Rotary Lip Seals, Spring Energized Seals |
| **Specifications:** | FDA, EU1935/2004 compliant |
| **Typical Temperature:** | -160°C up to +250°C (-255°F up to + 480°F) |
| **Typical Pressure:** | From vacuum to 10 bar pressure |
| **Media:** | All kinds of food, cleaning media |

## Our Technology Advantages

- Extended run life with no unexpected production stops
- Longer process time, less maintenance, proven to be only durable solution
- Thorough material testing, certificates available upon request



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# Space Market: Case Study

## Satellite Solar Panel Array Deployment System

**Application Challenges**

- Need low coefficient of friction, which is vital for smooth deployment and movement of large solar panels
- Self-lubrication is necessary due to absence of external lubricants, which would vaporize in space
- Must have minimal outgassing to avoid contamination of sensitive instruments
- Tight tolerances within components needed for the deployment mechanisms
- Temperature Resistance for extreme cold and heat in orbit

## Our Solution

### Rulon® Fluoropolymers

| | |
|---|---|
| **Product:** | Rulon® J bushings |
| **Specifications:** | Low outgassing and high dimensional precision |
| **Typical Temperature:** | -180°C up to +150°C (-290°F up to + 300°F) |
| **Typical Pressure:** | 15 to 20 bar pressure |
| **Media:** | Outer space environment |

## Our Technology Advantages

- Provides wear and friction control and low outgassing
- Handles vibration and/or stiffness issues
- Expertise with precision machining

# Life Science Market: Case Study

## Radio Frequency (RF) Connectors

**Application Challenges**

- High RF power can cause heating and breakdown of the dielectric material.
- At high frequencies, even small losses degrade system performance
- High-power RF signals generate heat in the center conductor and dielectric. Poor thermal management can lead to connector failure.
- Frequent connect/disconnect can cause wear on contacts and threads.
- Connectors must withstand wide temperature ranges without deformation.
- Outdoor or aerospace applications require sealing and corrosion-resistant materials.

## Our Solution

### Rulon® Fluoropolymers

| | |
|---|---|
| **Product:** | Rulon® H component |
| **Specifications:** | Low dissipation and high dimensional precision |
| **Typical Temperature:** | -150°C up to +200°C (-240°F up to + 390°F) |
| **Typical Pressure:** | From vacuum up to 70 bar pressure |
| **Media:** | All kind of media, including outer space environment |

## Our Technology Advantages

- In connectors for UHF or microwave frequencies, where heat buildup at the center conductor can degrade performance, Rulon® H material acts as the dielectric spacer or insulator between the conductors.
- Better heat dissipation from the center conductor to the outer conductor
- Improved power handling capability
- Precise machining with tight tolerances.



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# Application Data Form

Name _____ Address _____
Title _____ City, State _____ Zip _____
Company _____ Phone number _____
Project Name _____ Fax _____
Date _____ Email address _____

## Application Information and Conditions

Component description (Please attach drawing if available) _____

Number of units/year _____ Number of components/unit _____

Type of motion: [ ] Rotary [ ] Oscillating [ ] Reciprocating [ ] Static [ ] Dither

Media/fluid _____

Amount in component area: [ ] Full head [ ] Half shaft [ ] Splash

Operating pressure (units) _____ Proof pressure (units) _____ Burst pressure (units) _____

Temperature (units): [ ] High [ ] Low [ ] Operating RPM _____

Direction or shaft rotation (as viewed from air side or low pressure of side seal): [ ] CW [ ] CCW

Allowable leakage (define units) _____

Friction torque (units) _____ Breakaway _____ Running _____

Life requirement _____ Duty cycle _____

Type of component evaluation: [ ] Bench [ ] Field [ ] Both [ ] Explain _____

## Hardware Data

Can gland hardware be changed? _____

Bore DIA (include TOL) _____ Shaft DIA (include TOL) _____

Bore depth _____ X-section _____

Bore/shaft misalignment (T.I.R.) _____ Shaft runout (T.I.R) _____

Material: Bore _____ Shaft _____

Finish: Bore _____ Shaft _____

Hardness: Bore _____ Shaft _____

Direction which rod/shaft enters element: [ ] Air side or low pressure side [ ] Media side

Will sealing element be required to make contact with keyway, spline, etc.? [ ] Yes [ ] No
If yes, explain _____

Is installation tooling required? [ ] Yes [ ] No [ ] Omniseal Solutions to design [ ] Supply

## Please email a copy of the completed Application Data Form to:

Omniseal Solutions
Email: help@omniseal-solutions.com

# Legal Disclaimers

**Important:** The information in this document is for general reference purposes only and therefore should not be relied upon for any specific application. Technical data presented herein does not constitute a performance guarantee. Application limits for pressure, temperature, speed and media mentioned herein are determined under laboratory test conditions. Actual results are dependent on operating parameters and other variable conditions.

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To obtain the best recommendation for a specific application, please contact us: help@omniseal-solutions.com.

**Uncontrolled Document:** For the controlled version of this Rulon® handbook document, please visit: www.omniseal-solutions.com.

# Notes

# Notes



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# Notes

## A Global Network of Expertise and Service


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