

PORON® Urethanes



Material Selection
Guide For Portable
Electronics



The world runs better with Rogers.®



PORON® Urethane foams

ensure reliability where cushioning, sealing, impact protection or energy management are critical to product performance.



Resistance to Stress

Relaxation and Compression Set

Durable, long-term performance for gasketing, sealing and cushioning

Energy Absorption

High resiliency, good vibration isolation and impact absorption

Low Outgassing

No plasticizers to migrate, non-corrosive to metal, environmentally safe and clean

Broad Temperature Range

Reliable performance from -40°C to 90°C

Chemical Resistance

Information is available on material exposure to acids, bases, organic fluids, automotive fluids and household fluids

Flame Retardant

Many of the materials meet flammability requirements of UL HBF and MVSS 302

Easy to Fabricate

Die-cuts cleanly and readily accepts adhesive without surface preparation

Product Consistency

Quality manufacturing resulting in reliable, consistent material properties

Broad Product Offering

Wide range of firmness, density, thickness and color options available

Quality Service

All products are supported by knowledgeable Rogers Sales and Applications Engineers, Technical Service and Customer Service Representatives

| Application Breakdown | | | |
|----------------------------------|---|--|--|
| Application | Material Family | Benefits | Notes |
| LCD Camera Keypad | Soft Seal Grades (15) ShockSeal™ Grades (79) 92 Formulation Materials | Dust Sealing Shock Absorption Light Blocking Gap Filling | Material selection depends upon gap size and specific needs of each design. |
| Battery Impact Pad | 92-25 79-12 | Shock Absorption Control Battery Movement Holds Component in Place | The key product characteristic for this application is durability. |
| Microphone or Speaker Cushion | 92-09 92-12 92-25 | Gap Filling Improves Tonal Quality Dust Sealing | In most applications, 92-25 is Rogers recommendation for an acoustic gasket. |
| Connector | 30-25 | Hold Component in Place Maintains Constant Contact | This application requires a slightly stiffer and resilient material. |
| PWB Connection | 50-30 | Dynamic Spring Holds Component in Place Maintains Contact | This application requires a very stiff material. |



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Supported PORON® Urethanes



4701-15-06
Soft Seal



4790-92-09
Extra Soft-
Slow Rebound



4790-92-12
Extra Soft-
Slow Rebound



4701-30-25
Very Soft



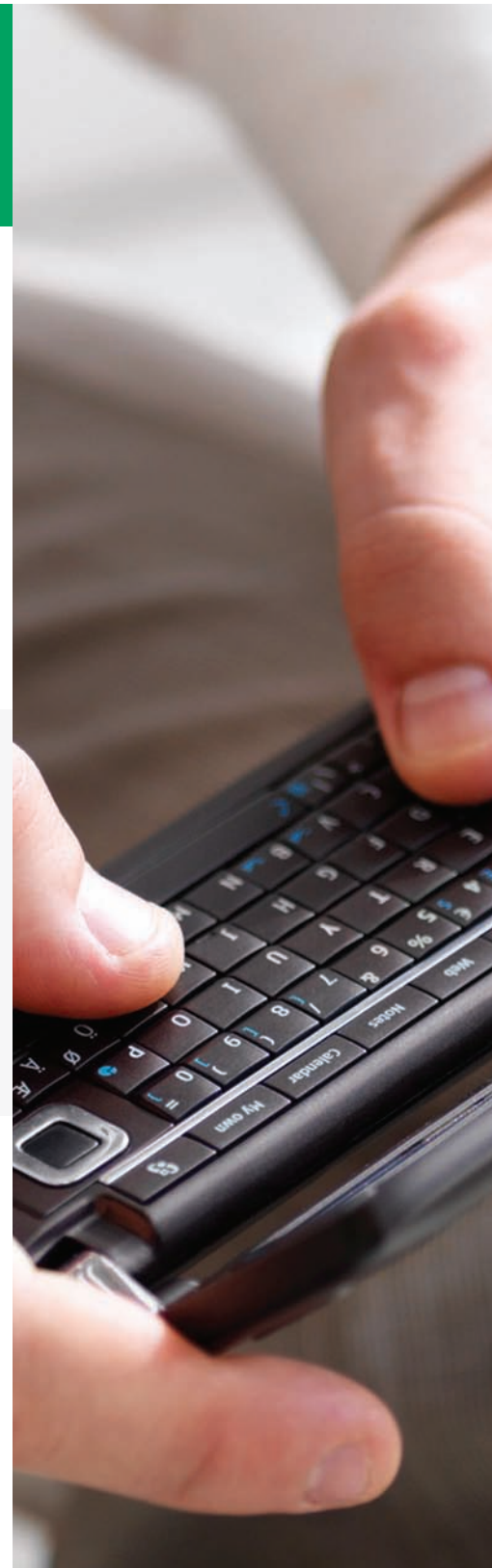
4701-50-30
Firm



4790-79-09
ShockSeal™



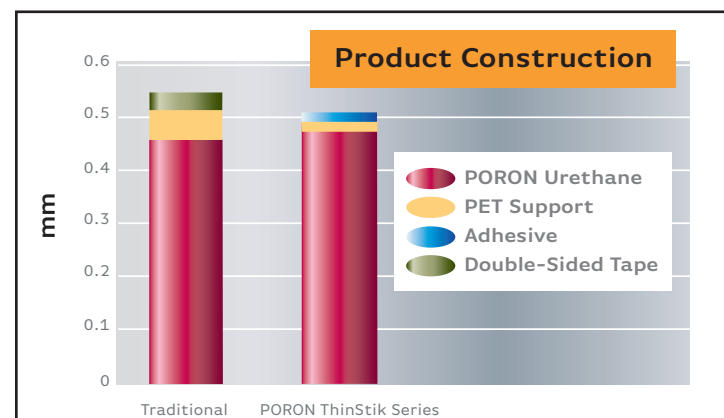
4790-79-12
ShockSeal™



Supported Self-Adhesive Materials

PORON ThinStik™ materials are an all-in-one solution, combining Rogers' highly compressible PORON urethane foam with a pressure-sensitive adhesive layer built into its construction. This innovation enables higher compressibility than traditional laminated adhesive constructions to help designers ensure proper sealing and gap filling in ultra-thin device applications.

- Ultra-thin and Highly Compressible
- Long term Protection and Sealing
- Ease of Design - One Product, One Solution

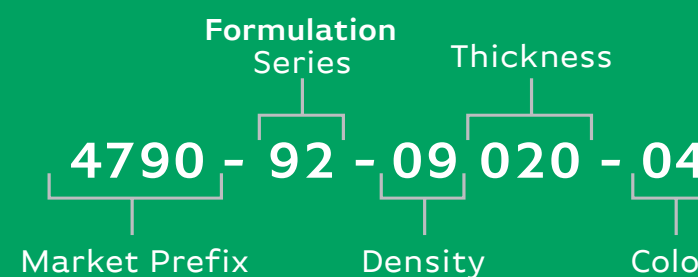


Standard Product Availability

| | | Product | | | | | | | | | | | | | | | | | | | | |
|-----------|------|---------|--------------|---------|--------------|--------|---------------|--------|--------|---------|--------|-------|--------------|---------|--------|--------|---------|--------|--------|--------|--------|---|
| Thickness | | 4701-15 | | 4790-92 | | | | | | 4790-79 | | | | 4701-30 | | | 4701-50 | | | | | |
| IN | MM | 6 pcf | 6 pcf, 15TSl | 9 pcf | 9 pcf, 92TSl | 12 pcf | 12 pcf, 92TSl | 15 pcf | 20 pcf | 25 pcf | 30 pcf | 9 pcf | 9 pcf, 79TSl | 12 pcf | 15 pcf | 20 pcf | 25 pcf | 15 pcf | 20 pcf | 25 pcf | 30 pcf | |
| 0.012 | 0.30 | | | | | | | | | | ● | | | | | | | | | | | ● |
| 0.017 | 0.43 | | | | | | | | | | ▲ | ▲ | | | | | | | | | | ● |
| 0.020 | 0.51 | | | ● | ● | ● | ● | | | | ▲ | ▲ | ● | ▲ | | | | | | | ▲ | ● |
| 0.021 | 0.53 | ● | ● | ▲ | | ▲ | | | | | ● | ● | | ● | | | | | | | ● | ▲ |
| 0.024 | 0.61 | | | ▲ | | ▲ | | | | | ● | | | ▲ | | | | | | | ▲ | ▲ |
| 0.030 | 0.75 | ● | ● | ● | | ● | | | | | ▲ | | | ● | | | | | | | ▲ | ▲ |
| 0.031 | 0.79 | | | ▲ | | ▲ | | | | | ● | | | ▲ | | | | | | | ● | ▲ |
| 0.035 | 0.89 | | | ▲ | | ▲ | | | | | ▲ | | | ▲ | | | | | | | ● | ▲ |
| 0.037 | 0.94 | | | ▲ | | ▲ | | | | | ▲ | | | ▲ | | | | | | | ● | ▲ |
| 0.039 | 1.00 | ● | | ● | | ● | | ● | | | ▲ | | | ● | | | | | | | ▲ | ▲ |
| 0.041 | 1.04 | | | ▲ | | ▲ | | ▲ | ▲ | | ● | | | ▲ | | | | | | | ▲ | ▲ |
| 0.045 | 1.14 | | | | | ▲ | | ▲ | ▲ | ▲ | | | | ▲ | | | | | | | ● | ● |
| 0.047 | 1.19 | | | | | ▲ | | ▲ | ▲ | ▲ | | | | ▲ | | | | | | | ● | ▲ |
| 0.049 | 1.25 | | | | | ● | | ▲ | ▲ | ▲ | | | | ▲ | | | | | | | ▲ | ▲ |
| 0.059 | 1.5 | | | | | ● | | ▲ | ▲ | | | | | | | | | | | | ▲ | ▲ |
| 0.062 | 1.57 | | | | | ▲ | | ▲ | ▲ | | | | | | | ● | ▲ | ● | ▲ | | ● | ▲ |
| 0.064 | 1.63 | | | | | ▲ | | ▲ | ▲ | | | | | | ▲ | ▲ | ● | ▲ | | | ▲ | ▲ |
| 0.081 | 2.06 | | | | | ▲ | | ▲ | ● | | | | | | ▲ | ▲ | ▲ | ▲ | | | ▲ | |
| 0.093 | 2.36 | | | | | | | ▲ | ▲ | | | | | | ● | ▲ | ● | ▲ | | | ● | |
| 0.095 | 2.41 | | | | | | | ▲ | ▲ | | | | | | ▲ | ▲ | ● | ▲ | | | ▲ | |
| 0.120 | 3.05 | | | | | | | ● | ▲ | | | | | | ▲ | ▲ | ▲ | ▲ | | | ▲ | |

Table Legend:
 ● Standard Product
 ▲ Non-Standard Product
 ■ Self-Adhesive Product (ThinStik Series)
 - Supported Product With PET
 □ Product Not Available

Product Description Chart



| Property | Test Method | Value |
|---|-----------------|------------------|
| Coefficient of Friction A/B, (Kinetic) | ASTM D 1894 | 0.40 |
| Density, g/cm ³ | ASTM D 1505 | 1.395 |
| Modules, MD, psi (kg/cm ²) | ASTM D 882 | 500,000 (35,200) |
| Shrinkage, MD, %, (TD) | 39 min. at 150C | 1.2 (0.0) |
| Tensile Strength, MD, psi (kg/cm ²) | ASTM D 882 | 30,000 (2,110) |
| Ultimate Elongation | ASTM D 882 | 150 |
| Yield Strength (F5), psi (kg/cm ²) | ASTM D 882 | 15,000 (1,050) |

| Product | Typical Physical Properties | | | | | | Electrical & Thermal | | | | | Outgassing | | | | Environmental | | | | |
|----------------------|---|---|-----------------------------|--|---|--|--|--|---|--|--|---|---|---|---|---|---|--|--|---|
| | Density: lb./ft ³ (kg / m ³), Tolerance % ASTM D 3574 Test A | Thickness: inches (mm), Tolerance % | Standard Color (Code) | Compression Force Deflection: Range psi (kPa), Typical[†] psi (kPa), 0.2"/min. Strain Rate Force @ 25% Deflection | Compression Set: % max, Typical[†] % , ASTM D 3574 Test D @ 73°F (23°C) | Compression Set: % max, Typical[†] % , ASTM D 3574 Test D @ 158°F (70°C) | Volume Resistivity: ohm-cm, ASTM D 257 | Surface Resistivity: ohm/sq., ASTM D 257 | Thermal Conductivity: W/m-C (BTU-in/hr- ft ² -F) ASTM C 518 | | Coefficient of Thermal Expansion from -30°C to 100°C (in./in./°C) ASTM E831 | Outgassing: Total Mass Loss (TML) % ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Outgassing: Collected Volatile Condensable Materials (CVCM) %, ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Outgassing: Collected Volatile Condensable Materials (CVCM) mg, GMW3235 Code B Condensible Constituent | Outgassing: Water Vapor Regain (WVR) %, ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Gasketing and Sealing: UL JMST2 (Consisting of UL50 and UL508), CAN/CSA- C22.2 No. 94-M91 | Water Absorption: Typical [†] High Humidity Exposure % weight gain, AMS 3568 | Water Absorption: Typical [†] Immersion Testing % weight gain, ASTM D 570 | Corrosion Resistance: Median visual evaluation number, SAE J1389 | |
| 4701-15 Soft Seal | 06.5 (104), ± 15.0 | 0.021- 0.039 (0.53 - 1.00), ± 19.0 - 10.3 | Soft Seal Gray (90) | 0.29 - 0.67 (2.00 - 4.62), NA | NA, NA | 10, 1.7 | 8.29 x 10 ¹⁴ | 1.50 x 10 ¹⁴ | NA (NA) | | 7.01-9.59 x 10 ⁻⁴ | NA | NA | NA | NA | NA | NA | NA | NA | |
| 4790-92 | 09 (144), ± 10.0 | 0.020 - 0.039 (0.50-1.00), ± 19.5 - 10.0 | Black (04) | 0.25 - 1.35 (1.7-9.3), NA | NA, 1.3 | 10, 2.0 | NA | NA | NA (NA) | | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | 12 (192), ± 16.7 | 0.020 - 0.059 (0.50-1.50), ± 15.0 - 5.1 | | 0.25 - 2.5 (2-17), NA | 2, 1.0 | 10, 2.0 | 1.84 x 10 ¹⁴ -2.37 x 10 ¹⁴ | 7.52 x 10 ¹² -2.07 x 10 ¹³ | NA (NA) | | 1.56-3.29 x 10 ⁻⁴ | NA | NA | NA | NA | NA | NA | NA | NA | 5 |
| | 15 (240), ± 13.3 | 0.039 - 0.120 (1.00-3.05), ± 10.0 | | 0.3-3.5 (2-24), 1.7 (12) | 2, 1.4 | 10, 1.6 | 8 x 10 ¹¹ | 10 x 10 ¹¹ | 0.083 (0.58) | | 2.3-3.1 x 10 ⁻⁴ | 1.73 | 0.14 | 0.1 | 0.71 | NA | 2 | 25 | 6 | |
| | 20 (320), ± 10.0 | 0.081 (2.06), ± 10.0 | | 1-5 (7-35), 3.2 (22) | 2, 0.4 | 10, 1.6 | 8 x 10 ¹¹ | 10 x 10 ¹¹ | NA (NA) | | 2.3-3.1 x 10 ⁻⁴ | 1.63 | 0.29 | 0.1 | 0.49 | NA | 2 | 23 | 6 | |
| | 25 (400), ± 10.0 | 0.021 - 0.041 (0.53 - 1.04), ± 15 or ± 0.003 inches (0.08mm): (whichever is larger) | | 1.25-8.5 (8-58), 5.3 (37) | 2, NA | 10, 1.6 | 8 x 10 ¹¹ | 10 x 10 ¹¹ | NA (NA) | | 2.3-3.1 x 10 ⁻⁴ | 1.44 | 0.27 | NA | 0.44 | NA | 2 | 14 | NA | |
| | 30 (480), ± 10.0 | 0.012 (0.30), ± 25.0 | | 2.4 - 13.6 (16-94), NA | 4, 1.5 | 10, 2.2 | NA | NA | NA (NA) | | NA | NA | NA | NA | NA | NA | NA | NA | NA | |

† Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.

| Product | Typical Physical Properties | | | | | | Electrical & Thermal | | | | | Outgassing | | | | Environmental | | | |
|--------------------------|---|--|-----------------------------|---|---|--|--|---|---|--|--|---|---|---|---|---|---|---|---|
| | Density: lb./ft ³ , (kg / m ³), Tolerance % ASTM D 3574 Test A | Thickness: inches (mm), Tolerance % | Standard Color (Code) | Compression Force Deflection: Range psi (kPa), Typical[†] psi (kPa) , 0.2"/min. Strain Rate Force @ 25% Deflection | Compression Set: % max, Typical[†] % , ASTM D 3574 Test D @ 73°F (23°C) | Compression Set: % max, Typical[†] % , ASTM D 3574 Test D @ 158°F (70°C) | Volume Resistivity: ohm-cm, ASTM D 257 | Surface Resistivity: ohm/sq., ASTM D 257 | Thermal Conductivity: W/m-C (BTU-in/hr- ft ² -F) ASTM C 518 | | Coefficient of Thermal Expansion from -30°C to 100°C (in./in./°C) ASTM E831 | Outgassing: Total Mass Loss (TML) % ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Outgassing: Collected Volatile Condensable Materials (CVCM) %, ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Outgassing: Collected Volatile Condensable Materials (CVCM) mg, GMW3235 Code B Condensible Constituent | Outgassing: Water Vapor Regain (WVR) %, ASTM E 595 24 hrs. @ 257°F (125°C) @ <7x10 ⁻³ Pa | Gasketing and Sealing: UL JMST2 (Consisting of UL50 and UL508), CAN/CSA- C22.2 No. 94-M91 | Water Absorption: Typical [†] High Humidity Exposure % weight gain, AMS 3568 | Water A bsorption: Typical [†] Immersion Testing % weight gain, ASTM D 570 | Corrosion Resistance: Median visual evaluation number, SAE J1389 |
| 4701-30 | 20 (320), ± 10.0 | 0.064 - 0.095 (1.63 - 2.36), ± 10.0 | Black (04) | 3-8 (21-55), 5.0 (34) | 4, 3.1 | 10, 2.5 | 3.1 x 10 ¹¹ | 5.9 x 10 ¹¹ | 0.076 (0.53) | | 2.3-3.1 x 10 ⁻⁴ | 1.0 | 0.1 | 0.04 | 0.3 | Pass* | 2 | 9 | 6 |
| | 25 (400), ± 10.0 | 0.021 - 0.047 (0.53 - 1.19), ± 15.0 | Black (04) | 5-12 (35-83), 8.4 (58) | 4, NA | 10, 2.1 | 3.1 x 10 ¹¹ | 5.9 x 10 ¹¹ | NA (NA) | | 1.64-3.41 x 10 ⁻⁴ | 1.3 | 0.2 | NA | 0.6 | Pass* | 2 | 14 | NA |
| 4701-50 | 30 (480), ± 10.0 | 0.012 - 0.020 (0.30 - 0.50), ± 25.0 - 15.0 | Black (04) | 15-45 (103-310), 32 (221) | 5, NA | 10, 2.0 | 3.86 x 10 ¹⁴ | 1.88 x 10 ¹⁴ | 0.090 (0.63) | | 1.42-2.00 x 10 ⁻⁴ | 0.9 | 0.06 | NA | 0.43 | Pass* | 2 | 5 | NA |
| 4790-79 ShockSeal™ | 09 (144), ± 10.0 | 0.021 - 0.039 (.53 - 1.00), ± 19.0 - 10.3 | Black (04) | 2 (13.7), NA | 5, 0.9 | 10, 1.9 | 1.96 x 10 ¹⁴ | 1.50 x 10 ¹⁴ | NA (NA) | | 3.39-3.66 x 10 ⁻⁴ | NA | NA | NA | NA | NA | NA | NA | NA |
| | 12 (192), ± 10.0 | 0.021 - 0.039 (.53 - 1.00), ± 19.0 - 10.3 | Black (04) | 3 (20.7), NA | 2, 0.7 | 10, 2.2 | NA | NA | NA (NA) | | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4701-15TTS1 ThinStik™ | 06.5 (104), ± 15.4 | 0.019 - 0.0285 (0.48 - 0.72), ± 21.1 - 14.0 | Gray (90) | 0.31 - 0.46 (2.15 - 3.2), NA | 5, NA | 10, 1.7 | 9.19 x 10 ¹³ | 3.10 x 10 ¹⁴ | NA (NA) | | 2.83-7.35 x 10 ⁻⁴ | NA | NA | NA | NA | NA | NA | NA | NA |
| 4790-92TTS1 ThinStik™ | 09 (144), ± 11.1 | 0.018 (0.46), ± 22.2 | Black (04) | 0.80 (5.52), NA | 5, 1.3 | 10, 2.0 | NA | NA | NA (NA) | | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 12 (192), ± 16.7 | 0.018 (0.46), ± 16.7 | Black (04) | 1.63 (11.2), NA | 5, 1.0 | 10, 2.0 | 6.21 x 10 ¹³ | 1.26 x 10 ¹⁵ | NA (NA) | | 3.02-3.81 x 10 ⁻⁴ | NA | NA | NA | NA | NA | NA | NA | NA |
| 4790-79TTS1 ThinStik™ | 09 (144), ± 11.1 | 0.019 (0.48), ± 21.1 | Black (04) | 1.06 (7.31), NA | 5, 0.9 | 10, 1.9 | NA | NA | NA (NA) | | NA | NA | NA | NA | NA | NA | NA | NA | NA |

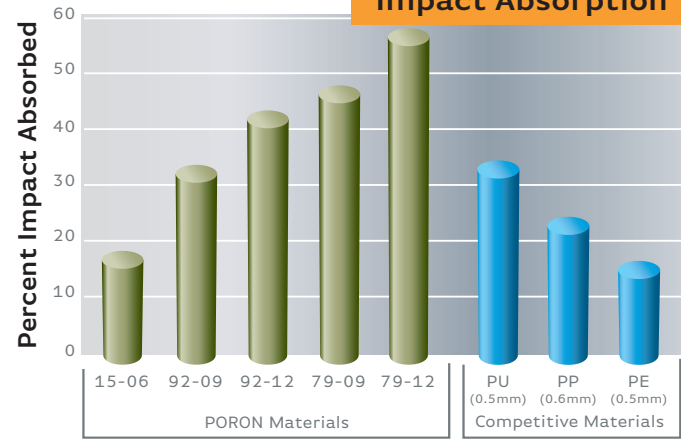
PET Supported

† Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.
* See UL File MH15464



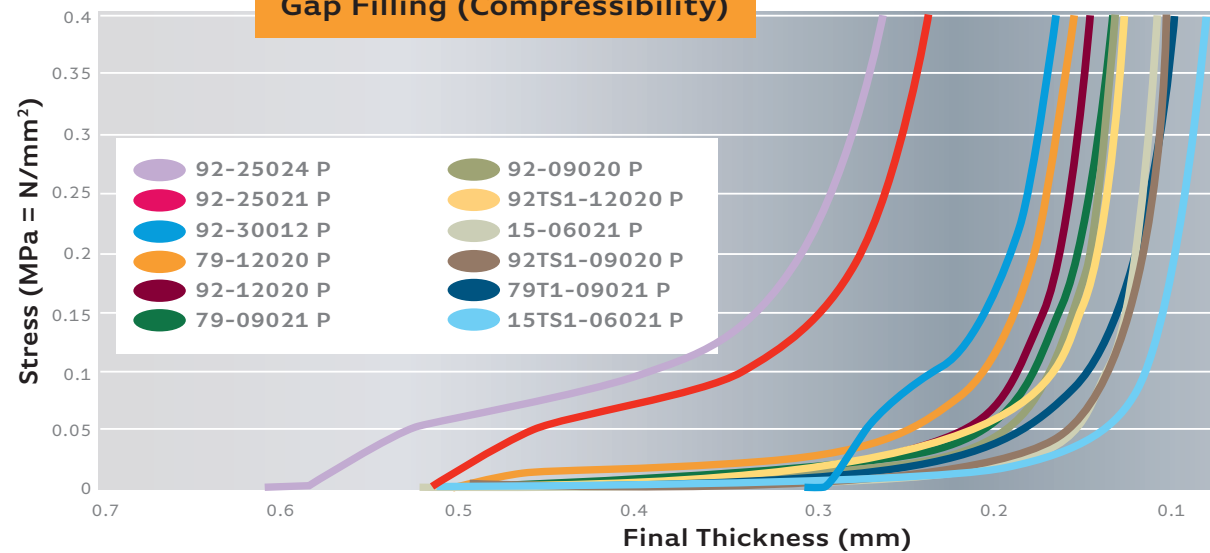
Performance Data

Impact Absorption



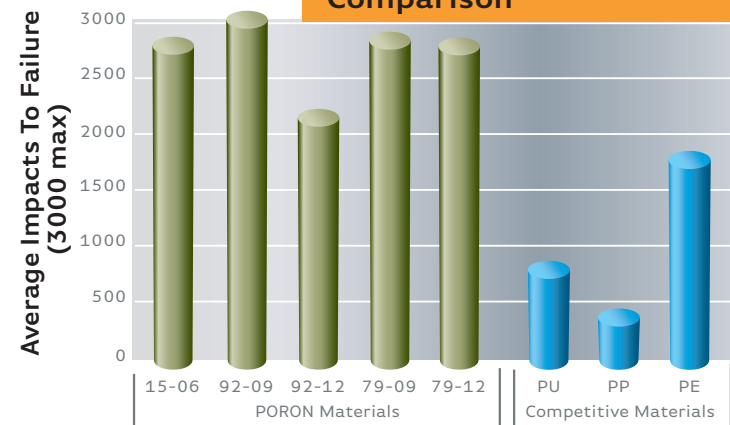
The Rogers High Performance Foams Impact Prediction Tool
www.rogerscorp.com/hpf/tools/impactprediction
 This tool was developed to help you choose the best PORON® Urethane or BISCO® Silicone materials for energy absorbing applications.

Gap Filling (Compressibility)

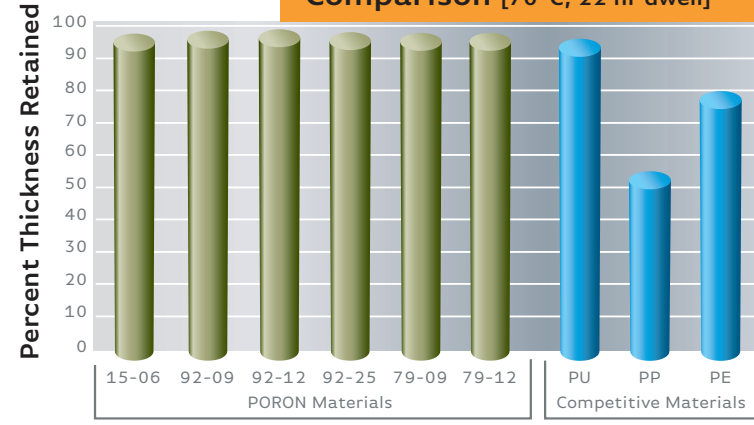


The PORON Urethanes Gap Filling Tool
www.rogerscorp.com/hpf/tools/gapfilling
 This tool will assist you in identifying the proper PORON® foams for all of your gap filling applications.

Dust Sealing Competitive Comparison



Compression Set Resistance Comparison [70°C, 22 hr dwell]



The Rogers High Performance Foams Online Material Selection Tool

www.rogerscorp.com/hpf/tools/msg



This tool will assist you in identifying the proper PORON® Urethane and BISCO® Silicone materials that best meet your numerous design requirements. The purpose of the tool is to provide several material options based upon your application requirements.

For additional information not found in the Rogers Online Tools, please contact your local Sales Engineer!

Typical Portable Electronics Application: Tablet



World Class Performance

Rogers Corporation (NYSE:ROG) is a global technology leader in specialty materials and components that enable high performance and reliability of consumer electronics, power electronics, mass transit, clean technology, and telecommunications infrastructure. With more than 178 years of materials science and process engineering knowledge, Rogers provides product designers with solutions to their most demanding challenges. Rogers' products include advanced circuit materials for wireless infrastructure, power amplifiers, radar systems, high speed digital; power electronics for high-voltage rail traction, hybrid-electric vehicles, wind and solar power conversion; and high performance foams for sealing and energy management in smart phones, aircraft and rail interiors, automobiles and apparel; and other advanced materials for diverse markets including defense and consumer products. Headquartered in Connecticut (USA), Rogers operates manufacturing facilities in the United States, Belgium, China, Germany, and South Korea, with joint ventures and sales offices worldwide.

For more information on PORON® Urethanes visit www.rogerscorp.com/hpf

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