Rogers... leading the way with global flame, smoke and toxicity compliant solutions and technical expertise

Rogers’ BISCO® material family offers a wide range of multi-functional silicone based elastomeric foams and solids for use in many rail interior applications such as seals, gaskets, floor isolation pads, thermal insulation, sound barriers and anti-squeak / rattle pads.

These materials are offered in continuous sheet form, enabling ease of fabrication whether slitting, die-cutting or laminating with adhesives. A highly durable, long lasting and comfortable silicone seat cushion foam is supplied in bun stock form.

**TECHNICAL EXPERTISE TO HELP DESIGN ROBUST SOLUTIONS**

**En45545**

The European standard for railway applications. This standard classifies all materials on board into different groups which must fulfill specific "requirement sets" that often include the use of several test methods.

49CFR238/ NFPA 130

The North American standard for railway applications. This standard is based upon a variety of test methods which cover flame, smoke, and toxicity. The specific area of application may limit the requirement sets.

**BS 6853**

The British standard for fire safety in the design and construction of railway vehicles. Although the standard has been withdrawn and replaced with EN 45545, Rogers still maintains the capabilities necessary to meet BS 6853 certification to allow for support of legacy projects.

**RAIL STANDARDS INCLUDE:**

**EN45545**

The material requirement set (R1, R2, R3...) is dependent on the train car type (HL rating) and product classification (IN1A, EX2,..):

**HAZARD LEVEL CLASSIFICATION**

<table>
<thead>
<tr>
<th>HL1</th>
<th>HL2</th>
<th>HL3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level pass / fail requirement stringency (Material compliant to HL3 fulfills HL1 &amp; HL2 requirements) HL classification dependent on operation and design category</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT CLASSIFICATION**

IN1A, EX2, F1...

Listed Products: EN 45454-2 Table 2 defines the requirement sets to be met for various listed product / applications. The listed products are categorized into numerous material applications sets for interior, exterior, furniture, electro technical and mechanical equipment.

Non-listed Products: Products not listed in En45545-2 Table 2 are subject to the requirements of EN 45454-2 Section 4.3 and Table 3.

**REQUIREMENT SET**

R1, R2, R3...

The material requirement set (R1, R2, R3...) defines the specific tests and pass/fail criteria of the associated products (IN1A, EX2, F1,..) for each Hazard Level classification (HL1, HL2, HL3). The requirement sets are groupings of various product classifications and their applications (i.e. R22 defines requirements for interior rails).

Colors and Patterns: A test that qualifies a product will also qualify any other product which differs only in color and/or pattern.

Material Thickness: All intermediate thicknesses are also compliant when a product is compliant at two different thicknesses. Rogers is compliant at two different thicknesses with identical formulations.

**EN45545 explained**

The material requirement set (R1, R2, R3...) is dependent on the train car type (HL rating) and product classification (IN1A, EX2,..):

**Converter Networks**

- Rogers partners with and sells its materials through a select group of Preferred Converters.
- These converters specialize in various fabrication processes including laminating adhesives, slitting, die-cutting, contour shape cutting, CNC and assembly of components.
- Seat cushion design
- Cushion CAD mockup and prototyping
- Molded to fabricated cushion conversion and design
- Seat construction guidance

**Rail Specification Material Selection Guide**

Rogerscorp.com
**GLOBAL RAIL SPECIFICATION**

Global Rail Specification 49CFR238 / NFPA 130 is the North American standard for flame, smoke and toxicity (FST). The standard specifies fire protection and life safety requirements for underground, surface, and elevated fixed guideway transit and passenger rail systems.

Rogers Corporation regularly tests our interior rail materials against global rail flame, smoke and toxicity standards. Doing so allows us to offer a high-quality solution no matter where your project is located.

**ASTM E162 - Surface Flammability**
This test method measures and compares the surface flammability of materials when exposed to a prescribed level of radiant heat energy. It is intended for use in measurements of the surface flammability of materials exposed to fire.

**ASTM E662 - Smoke Density**
This test method provides a means for determining the specific optical density of the smoke generated by specimens of materials and assemblies under the specified exposure conditions.

**SMP 800-C - Toxic Gas Generation**
The Bombardier SMP 800-C measures the toxic gas generation from the combustion of materials used in the vehicles construction.

**ASTM C1166 - Flame Spread**
This test method is designed to differentiate the flame propagation characteristics of dense or cellular elastomeric compounds used in gaskets, setting blocks, shims, or spacers.

**ASTM E1354 - Heat Release**
This test method is used primarily to determine the heat evolved in, or contributed to, a fire involving products of the test material. Also included is a determination of the effective heat of combustion, mass loss rate, the time to sustained flaming, and smoke production.

**ASTM D3675 - Surface Flammability**
This test method is intended for use when measuring surface flammability of flexible cellular materials exposed to fire.

---

**APPLICATION AND MATERIAL GUIDE**

The BISCO Silicones Advantage – Peace of Mind

**Multi-Functional Solutions**
- Numerous benefits in one material choice.
- Unique chemistries deliver exceptional performance to long-term physical, thermal and environmental abuse.

**Long-Term Durability**
- Excellent dimensional stability
- Resistant to mechanical fatigue
- High & low temperature resistance
- Low compression set, creep and stress relaxation

**Design Reliability**
BISCO Silicones ensure components and systems perform as expected for the life of the railcar through:
- Long-term material durability and performance
- Resistance to environmental factors (UV, ozone, chemical, temperature resistance)

**Passenger Safety**
- Compliance to global FST standards without the use of restricted toxic substances.
- Fire-resistant properties are inherent to the homogenous formulation and cell structure, eliminating the need for fire-block layers and providing lasting fire resistance.

**Reducing Maintenance Costs**
By utilizing the MF1® silicone seat foam, transit authorities benefit from:
- Longer lasting cushion life and comfort compared to commonly used urethane cushions
- Significant savings in maintenance costs and revenue lost to downtime

---

**FLOATING FLOOR SYSTEM**

BISCO Silicone vibration isolation pads enable optimum passenger comfort, floor protection and design flexibility. These pads are designed to benefit all floor construction types including plywood, honeycomb or composite floors.

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**PRODUCT DATA**

Typical values shown unless otherwise noted. Refer to datasheet for specification values.

<table>
<thead>
<tr>
<th>Product</th>
<th>Standard Color</th>
<th>Physical Properties Standard</th>
<th>Density</th>
<th>Firmness</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF-2000</td>
<td>Black</td>
<td>3.18-12.70 (0.125-0.500)</td>
<td>175 (1)</td>
<td>0.17 (0.25)</td>
</tr>
<tr>
<td>BF-1000</td>
<td>White, Gray, Black</td>
<td>1.59-25.40 (0.063-1.000)</td>
<td>192 (12)</td>
<td>1.6 (2.4)</td>
</tr>
<tr>
<td>HT-670</td>
<td>Red, Black</td>
<td>1.59-12.70 (0.063-0.500)</td>
<td>240 (15)</td>
<td>2.4 (3.6)</td>
</tr>
<tr>
<td>HT-800</td>
<td>Black, Gray, Red</td>
<td>0.79-12.70 (0.031-0.500)</td>
<td>352 (22)</td>
<td>4.1-97 (6-14)</td>
</tr>
<tr>
<td>HT-820</td>
<td>Gray</td>
<td>0.79-6.35 (0.031-0.250)</td>
<td>384 (24)</td>
<td>82-138 (12-20)</td>
</tr>
<tr>
<td>HT-840</td>
<td>White</td>
<td>1.59-6.35 (0.063-0.250)</td>
<td>448 (28)</td>
<td>110-179 (16-26)</td>
</tr>
<tr>
<td>MF1-55</td>
<td>Black</td>
<td>6.35-203.2 (0.250-8.00)</td>
<td>512 (32)</td>
<td>5.5 (8.8)</td>
</tr>
<tr>
<td>HT-6360</td>
<td>Black</td>
<td>0.50-3.18 (0.020-0.125)</td>
<td>112 (7)</td>
<td>5.5 (8.8)</td>
</tr>
<tr>
<td>HT-200</td>
<td>Black</td>
<td>HT-200 defined by aerial density</td>
<td>1.59-6.35 (0.063-0.250)</td>
<td>5.5 (8.8)</td>
</tr>
<tr>
<td>FPC</td>
<td>Black</td>
<td>1.22-7.32 (0.25-1.5)</td>
<td>320 (20)</td>
<td>2.05 +/- .03</td>
</tr>
</tbody>
</table>

### Physical Properties

- **Cellular**
  - **Continuous Roll**
  - **Bun**
  - **HT-6000 Series**
  - **w/substrate**

- **Solid**
  - **Silicone Foam**
  - Flame Resistant
  - Acoustic Barrier
  - Flame Barrier

- **Specialty**
  - **HT-6360**
  - **HT-200**
  - **FPC**

### Density

- **Density, kg/m³ (lb./ft³)**
  - BF-2000: 175 (11)
  - BF-1000: 192 (12)
  - HT-670: 240 (15)
  - HT-800: 352 (22)
  - HT-820: 384 (24)
  - HT-840: 448 (28)
  - MF1-55: 512 (32)
  - HT-6360: 632 (39)
  - HT-200: 112 (7)
  - FPC: 512 (32)

### Firmness

- **Compressive Force Deflection, kPa (psi)**
  - BF-2000: 10 (1.5)
  - BF-1000: 16.5 (2.4)
  - HT-670: 26 (3.8)
  - HT-800: 67 (10)
  - HT-820: 106 (15.3)
  - HT-840: 142 (20.6)
  - MF1-55: 384 (28)
  - HT-6360: 110-179 (16-26)
  - HT-200: 112 (7)
  - FPC: 512 (32)

- **Durometer Shore A, except HT 6210**
  - Shore OO: 65 +/- 5

- **Compression Set (%)**
  - BF-2000: 6.9
  - BF-1000: 7.1
  - HT-670: 1.6
  - HT-800: 2.4
  - HT-820: 2.6
  - HT-840: 1.8
  - MF1-55: 1.5
  - HT-6360: 35
  - HT-200: 1720 (250)

- **Tensile Strength, kPa (psi)**
  - BF-2000: 140 (20)
  - BF-1000: 140 (20)
  - HT-670: 240 (35)
  - HT-800: 240 (35)
  - HT-820: 240 (35)
  - HT-840: 240 (35)
  - MF1-55: 69 (10)
  - HT-6360: 1720 (250)
  - HT-200: 1720 (250)
  - FPC: 1720 (250)

- **Water Absorption (%)**
  - BF-2000: 1.4
  - BF-1000: 0.5
  - HT-670: 0.5
  - HT-800: 0.5
  - HT-820: 0.5
  - HT-840: 0.5
  - MF1-55: 5
  - HT-6360: 5
  - HT-200: 5
  - FPC: 5

- **Tear Resistance (ppi)**
  - BF-2000: 60
  - BF-1000: 60
  - HT-670: 45
  - HT-800: 45
  - HT-820: 45
  - HT-840: 45
  - MF1-55: 35
  - HT-6360: 35
  - HT-200: 35
  - FPC: 35

- **Water Absorption (%)**
  - BF-2000: 1.4
  - BF-1000: 0.5
  - HT-670: 0.5
  - HT-800: 0.5
  - HT-820: 0.5
  - HT-840: 0.5
  - MF1-55: 5
  - HT-6360: 5
  - HT-200: 5
  - FPC: 5

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  - BF-2000: 60
  - BF-1000: 60
  - HT-670: 45
  - HT-800: 45
  - HT-820: 45
  - HT-840: 45
  - MF1-55: 35
  - HT-6360: 35
  - HT-200: 35
  - FPC: 35
World Class Performance

Rogers Corporation (NYSE: ROG) is a global leader in engineered materials to power, protect, and connect our world. With more than 180 years of materials science experience, Rogers delivers high-performance solutions that enable clean energy, internet connectivity, and safety and protection applications, as well as other technologies where reliability is critical. Rogers delivers Power Electronics Solutions for energy-efficient motor drives, vehicle electrification and alternative energy; Elastomeric Material Solutions for sealing, vibration management and impact protection in mobile devices, transportation interiors, industrial equipment and performance apparel; and Advanced Connectivity Solutions for wireless infrastructure, automotive safety and radar systems.

Headquartered in Arizona (USA), Rogers operates manufacturing facilities in the United States, China, Germany, Belgium, Hungary, and South Korea, with joint ventures and sales offices worldwide.

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Beijing, China
Tel: 86.10.8559.7599
Fax: 86.10.8559.7585

Rogers is committed to producing quality products in a safe environment manufactured with robust management systems certified to industry standards.

For more information visit rogerscorp.com/elastomeric-material-solutions/bisco-silicones