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MATERIAL SELECTION GUIDE
INDUSTRIAL APPLICATIONS

ROGERS CORPORATION

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www.marianinc.com
1-800-773-0062

For product designers and engineers, Rogers Corporation is the elastomeric materials solutions partner of choice when quality, innovation, and collaborative support are critical to design optimization and product functionality.

Rogers' materials are designed into products and applications in segments where high reliability and mission-critical performance are essential: automobiles, aerospace, mass transit, electronics, protective gear, footwear, medical products, and much more.

With unrivaled technical support, we foster successful customer relationships through a dedication to technical know-how, application expertise, and global support.

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ARLON® ENGINEERED FOR YOU

DeWAL® SHEER QUALITY

Silicone Engineering Ltd

For further information on Rogers' portfolio of elastomeric material solutions, please contact the Rogers' facility closest to you or visit rogerscorp.com.

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BISCO® Silicone Materials are the unrivaled long-lasting solution for product designers and engineers addressing mission-critical sealing, shock and vibration challenges across many applications and industries.

PRODUCT OVERVIEW

The BISCO portfolio offers a wide range of silicone buns, cellular foams, sponges, solids, and specialty materials in roll stock as well as a variety of firmness, thickness, and color options.

These specially engineered materials maintain high performance in extreme conditions and meet stringent safety requirements.

All materials come with the support of our experienced Technical Service Team.

1 **BUN**
Block form of silicone foam with key properties of low density, softness, and excellent acoustic absorption and vibration isolation properties.

2 **CELLULAR FOAMS**
Open-cell silicone foams with key properties of superior compression set, durability, conformability, and excellent sealing for long-term protection.

3 **SPONGES**
Closed-cell silicone sponges with key properties of good tensile strength and elongation, durability, and good sealing with relatively low compression.

4 **SOLIDS**
Solid form of silicones available in industrial and performance grades with various key properties including tight thickness tolerances, high tear strength, superior FST performance, and select flame-resistant offerings.

5 **SPECIALTY**
Variety of specialty materials addressing unique challenges including heat management, sound blocking, electrical conductivity, and more.

KEY BENEFITS

- **Superior Resistance to Compression Set**
  At ambient and elevated temperatures.
- **Superior Flame Ratings**
  Cellular foams meet the highest UL, railway and aerospace standards.
- **Low Flame, Smoke, and Toxicity**
  During combustion.
- **Extreme Temperature Resistance**
  Excellent performance at extreme high and low temperatures.
- **Environmental Protection**
  Natural resistance to UV and Ozone.
- **Excellent Sealing**
  Excellent sealing under compression for long periods of time.
- **Product Consistency**
  Quality manufacturing resulting in reliable and 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.

MATERIAL SAMPLES
BISCO® SILICONES

Cellular Foam

BF-2000 **BF-1000** **HT-870** **HT-800** **HT-820** **HT-840**

Specialty with Substrate | Bun | Sponge

FPC **IF-200** **RF-120** **MF1®-55** **RS-800**

Solid

1200 series | 1600 series

HT-1240 **HT-1250** **HT-1260** **HT-1270** **MS-1600**

6000 series

HT-6220 **HT-6210** **HT-6135** **HT-6240** **HT-6360**

Specialty

HT-200 **EC-2130** **EC-2265**

PRODUCT DATA

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

For more BISCO® product information visit the BISCO® Product Properties Guide or www.rogerscorp.com.

		BUN			CELLULAR FOAM					SPONGE				SOLID									SPECIALTY						
		BLOCK FORM			SOFTEST OF FOAMS		HIGHLY VERSATILE				FIRE RESISTANT				AEROSPACE AND MILITARY SPECIFICATION GRADE				PERFORMANCE GRADE					MEDICAL GRADE				VARIES BY PRODUCT						
		MF1 Series			BF Series		HT-800 Series				RS-800 Series				HT-1200 Series				HT-6000 Series					MS-1600 Series				Specialty Series						
Product		MF1-35	MF1-55	MF1-75	BF-2000	BF-1000	HT-870	HT-800	HT-820	HT-840	RS-870	RS-800	RS-820	RS-840	HT-1240	HT-1250	HT-1260	HT-1270	HT-6210	HT-6220	HT-6135	HT-6240	HT-6360	MS-1640	MS-1650	MS-1660	MS-1670	HT-1500	EC-2130	EC-2265	HT-200	FPC	RF-120	IF-200
Physical Properties	**Standard**																																
Firmness		Soft	Medium	Firm	Ultra Soft	Extra Soft	Soft	Medium	Firm	Extra Firm	Soft	Medium	Firm	Extra Firm	Compliant with A-A-59588				Extra Soft	Soft	Tight Tolerance	Medium	Fire-Safe	Compliant with USP Class VI				Press Pad	EMI Shielding	Electrically Conductive	Sound Block	Flame Barrier	Heat Shield	Abrasion Resistant
Standard Color		White			Black	White, Gray, Black	Red, Black	Black, Gray, Red	Gray	Gray	Gray				Red, Black, Gray, White				Gray	Black	Cream	Transparent	Black	Translucent				Red	Dark Gray	Black	Black	White	White	White
Thickness mm (in)		6.35 - 203.20 (0.250 - 8.00)	6.35 - 203.20 (0.250 - 8.00)	6.35 - 152.4 (0.250 - 6.00)	3.18-12.70 (0.125-0.500)	1.59-25.40 (0.063-1.000)	1.59-12.70 (0.063-0.500)	0.79-12.70 (0.031-0.500)	0.79-12.70 (0.031-0.500)	1.59-6.35 (0.063-0.250)	2.4-12.7 (0.094-0.500)	1.6-12.7 (0.063-0.500)			0.79-3.18 (0.031-0.125)				0.250-3.18 (0.010-0.125)	0.250-3.18 (0.013-0.125)	0.250-1.59 (0.010-0.063)	0.250-3.18 (0.010-0.125)	0.50-3.18 (0.020-0.125)	0.254-12.7 (0.010-0.500)				0.0787-3.175 (0.031-0.125)	1.60-3.20 (0.063-0.125)	0.5-6.35 (0.020-0.250)	HT-200 defined by areal density	1.59-6.35 (0.063-0.250)	2.50, 5.00 (0.098, 0.197)	5.00 (0.197)
Density																																	
Density, kg/m³ (lb./ft³)		80 (5.0)	96 (6.0)	112 (7.0)	175 (11)	192 (12)	240 (15)	352 (22)	384 (22)	448 (28)	256 (16)	400 (25)	481 (30)																		513 (32)		
Areal Density, kg/m² (lb./ft²)																														1.22-7.32 (0.25-1.5)		0.83 (0.17) 1.17 (0.24)	1.42 (0.29) <1.71 (<0.35)
Specific Gravity Internal Method (g/cc)															1.1	1.16	1.23	1.29	1.07	1.08	1.22	1.07	1.71	1.14	1.15	1.17	1.21		1.97	1.17	2.05 ± .03			
Firmness																																	
Compression Force Deflection, kPa (psi) typical values specification values	ASTM D1056 @ 25% Deflection	4.85 (0.7) 1.4-8.3 (0.2-1.2)	5.5 (0.80) 2.8-10.3 (0.4-1.5)	8.25 (1.2) 4.1-12.4 (0.6-1.8)	10 (1.5) 0-17 (0-2.5)	16.5 (2.4) 7-35 (1-5)	26 (3.8) 7-48 (1-7)	67 (9.7) 41-97 (6-14)	106 (15.3) 82-138 (12-20)	142 (20.6) 110-179 (16-26)	34 (5) 13.8 - 48 (2-7)	79 (11.5) 41 - 97 (6-14)	155 (22.5) 110 - 193 (16-28)																			
Durometer, Shore A, except HT-6210 Shore OO	ASTM D2240														40 ± 5	50 ± 5	60 ± 5	70 ± 5	62 ±4	22 ±5	35±5	40±5	65±5	40 +/- 5	50+/-5	60+/-5	70+/-5	70 ± 10	30 ± 5	65 +/- 5				
Compression Set (%) typical values specification values	ASTM D1056 @ 100°C (212°F)	1.5 < 5			6.9 <12	1.7 <5	1.6 <5	2.4 <5	2.6 <5	1.8 <5	3.5 <5	4 <5												6	9.5	12.2	12.3							
	ASTM D395 @ 150°C (302°F)														≤25				<25			<35						<10%	26				
	ASTM D395 @ 175°C (347°F)																											25						
Tensile Strength, kPa (psi) HT-1500 Tensile Fill/Tensile Warp, kN/m (ppi)	ASTM D412				140 (20)	262 (38)	240 (35)								7650 (1110)	7110 (1030)	6095 (1010)	7200 (1050)	3300 (480)	4400 (640)	5520 (800)	7170 (1040)	1720 (250)	6890 (1000)	8270 (1200)				414 (60)	5200 (754)				
	ASTM D751	86 (12.5)		93 (13.5)	172 (20)	140 (20)	207 (30)																										
Tensile Elongation (%)	ASTM D412	45		35	60	86	20	45							≥240	≥ 200	≥150	≥125	565	580	580	325	>125	700	600				50	260				
Water Absorption (%)					1.4 <15%	1.4 <10%	0.5 <10%	0.5 <5%			1.0 <5																						
Tear Resistance (ppi)	ASTM D624	>2.0																						140	150					46				
Flammability																																	
Flame Resistance	UL 94 (File E83967) V-0				Meets		Meets				Meets												Meets					3.2mm V-1		Meets	For flame specifications please refer to the Technical Data Sheets			
Flame Spread Index (1s)	ASTM E162, Flaming Mode <35																																
Smoke Density (Ds)	ASTM E662 Flaming Mode @ 1.5 min, <100 Flaming Mode @ 4.0 min, <200	Meets																															
Burn Length	FMVSS 302, <100mm/min																																
Outgassing																																	
Toxic Gas Emissions Rating	SMP-800-C @ 1.5/4.0 min	Meets			Meets		Meets																							Meets				
Total Mass Loss (%)	ASTM E595 @ (4x10⁻⁶ Torr)				3.81	3.46	1.19	0.98	2.11	2.08																								
Collected Volatile Condensible Materials (CVCM) (%)	ASTM E595 @ (4x10⁻⁶ Torr)				1.14	1.12	0.34	0.25	0.63	0.57																								
Water Vapor Regain (%)	ASTM E595 @ (4x10⁻⁶ Torr)				0.07	0.04	0.02	0.03	0.02	0.01																								
Temperature Resistance																																	
Recommended Constant Use		-55 to +200°C (-67 to +392°F)			-55 to +200°C (-67 to +392°F)		-55 to +200°C (-67 to +392°F)				-55 to +200°C (-67 to +392°F)				-62 to +218°C (-80 to +425°F)				-55 to +200°C (-67 to +392 °F)					-62 to +232°C (-80 to +450°F)				-55 to +200°C (-67 to +392°F)	-62 to +200°C (-80 to +392°F)	-62 to +225°C (-80 to +437°F)	-55 to +200°C (-67 to +392°F)			
Thermal Conductivity (W/m °K)	ASTM C518	0.043	0.037	0.036	0.048		0.076	0.09		0.037									0.19	0.22	0.31	0.21	0.1						3.33		0.08		0.067	0.06
Low Temperature Flex	ASTM D1056 @ -55°C (-67°F)	Meets			Meets		Meets				Meets																						
Low Temperature Brittleness	ASTM D746 @ -55°C (-67°F)																																
	ASTM D2137 @ -62°C (-80°F)														Meets				Meets									Meets						
Electric																																	
Dielectric Strength (Volts/mil)	ASTM D149		45		48	72	65	75	66	57									372	374	381	386								284	9	55	64
Dielectric Constant (1 kHz)	ASTM D150				1.4	1.5	1.5	1.7		1.8									2.8	3	3	2.8								4.56	1.46	1.6	1.42
Dissipation Factor (1kHz)	ASTM D150				0.003	0.004	0.005		0.006										0.003											0.04	0.05	0.0251	0.025
Dry Arc Resistance (Seconds)	ASTM D495				86	123	125		174	149									122	123	145	124								190	141	99	185
Volume Resistivity (Ohm-cm)	ASTM D257	7.0 x 10^13			10^14		10^14												10^14									<1.00		10^14			
EMI Shielding (dB) & Electrical Conductivity (Ohm-cm)	MIL G83528, ASTM D991																										Refer to Technical Data Sheets						

Product		
Physical Properties	**Standard**	
Firmness		
Standard Color		
Thickness mm (in)		
Density		
Density, kg/m³ (lb./ft³)		
Areal Density, kg/m² (lb./ft²)		
Specific Gravity Internal Method (g/cc)		
Firmness		
Compression Force Deflection, kPa (psi) typical values specification values	ASTM D1056 @ 25% Deflection	
Durometer, Shore A, except HT-6210 Shore OO	ASTM D2240	
Compression Set (%) typical values specification values	ASTM D1056 @ 100°C (212°F)	
	ASTM D395 @ 150°C (302°F)	
	ASTM D395 @ 175°C (347°F)	
Tensile Strength, kPa (psi) HT-1500 Tensile Fill/Tensile Warp, kN/m (ppi)	ASTM D412	
	ASTM D751	
Tensile Elongation (%)	ASTM D412	
Water Absorption (%)		
Tear Resistance (ppi)	ASTM D624	
Flammability		
Flame Resistance	UL 94 (File E83967) V-0	
Flame Spread Index (1s)	ASTM E162, Flaming Mode <35	
Smoke Density (Ds)	ASTM E662 Flaming Mode @ 1.5 min, <100 Flaming Mode @ 4.0 min, <200	
Burn Length	FMVSS 302, <100mm/min	
Outgassing		
Toxic Gas Emissions Rating	SMP-800-C @ 1.5/4.0 min	
Total Mass Loss (%)	ASTM E595 @ (4x10⁻⁶ Torr)	
Collected Volatile Condensible Materials (CVCM) (%)	ASTM E595 @ (4x10⁻⁶ Torr)	
Water Vapor Regain (%)	ASTM E595 @ (4x10⁻⁶ Torr)	
Temperature Resistance		
Recommended Constant Use		
Thermal Conductivity (W/m °K)	ASTM C518	
Low Temperature Flex	ASTM D1056 @ -55°C (-67°F)	
Low Temperature Brittleness	ASTM D746 @ -55°C (-67°F)	
	ASTM D2137 @ -62°C (-80°F)	
Electric		
Dielectric Strength (Volts/mil)	ASTM D149	
Dielectric Constant (1 kHz)	ASTM D150	
Dissipation Factor (1kHz)	ASTM D150	
Dry Arc Resistance (Seconds)	ASTM D495	
Volume Resistivity (Ohm-cm)	ASTM D257	
EMI Shielding (dB) & Electrical Conductivity (Ohm-cm)	MIL G83528, ASTM D991	

DESIGN TOOLS

Product Properties Guide

The Product Properties Guide filters BISCO® product information by various criteria, providing several material options based on your application requirements.

Example - Filters
// Groups: Flammability and Outgassing
// Product Category: Silicone Materials

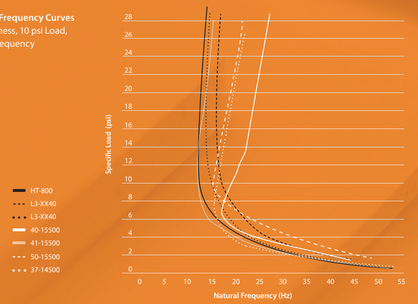
	Results					
Product	**BF-2000**	**BF-1000**	**HT-870**	**HT-800**	**HT-820**	**HT-840**
Flamability and Outgassing						
UL94 V-0 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Burn Rate FMVSS302 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Flame Resistance @ 12 Sec FAR 25.853 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Flame Resistance @ 60 Sec FAR 25.853 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Smoke Density (D_s) @ 1.5 min ASTM E 662	<100	<100	<100	<100	<100	<100
Smoke Density (D_s) @ 4.0 min ASTM E 662	<200	<200	<200	<200	<200	<200
Toxic Gas Emissions Rating SMP-800C (Pass/Fail @1.5/4.0 min)	Pass	Pass	Pass	Pass	Pass	Pass
Total Mass Loss ASTM E 595 (%)	3.81	3.46	1.19	0.98	2.11	2.08
Collected Volatile Condensable Materials ASTM E 595 (%)	1.14	1.12	0.34	0.25	0.63	0.57
Water Vapor Regain ASTM E595 (%)	0.07	0.04	0.02	0.03	0.02	0.01

http://tools.rogerscorp.com/ems/products/bisco-properties/index.aspx

Vibration Isolation Tool

The Vibration Isolation Tool recommends the proper PORON® Polyurethane and BISCO® Silicone materials for your vibration mitigation applications. This tool uses your specifications to calculate the isolation efficiency of our materials, and provides the most effective material option.

Example - Natural Frequency Curves
// 0.50 in Pad Thickness, 10 psi Load,
// 100 Hz Forcing Frequency



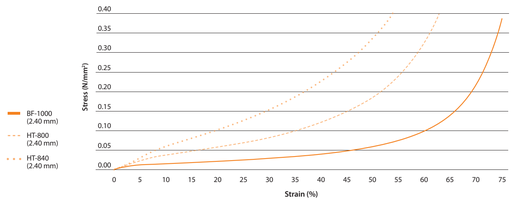
	BISCO® Silicones		PORON® Polyurethanes			
Product	**HT-800**	**L3-XX40**	**40-15500**	**41-15500**	**50-15500**	**37-14500**
Thickness mm (in)	12.70 (0.500)	12 (0.472)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)
Isolation Efficiency (%)	> 97.00	> 94.00	> 97.00	> 96.00	> 95.00	> 94.00
Natural Frequency (Hz)	12	17	19	12	16	16

http://tools.rogerscorp.com/ems/vibration/index.aspx

Compression Force Deflection (CFD) Tool

Using stress-strain data, the CFD Curve Tool helps in the identification of the BISCO® or PORON® material(s) that meet your engineering requirements.

Example - CFD Data Curve
// 1.5 to 4.75 mm Thickness
// 0.60 N/mm² Maximum Stress



Elastomeric Material Solutions Application Design Tool

The Elastomeric Material Solutions Application Design Tool assists in the identification of PORON® Polyurethane and BISCO® Silicone materials that best meet your design requirements and provides material options based upon your application requirements.

PORON® Polyurethanes
// PORON® 4701-40
// PORON® Dura-Shape® Foams

BISCO® Silicones
// BISCO® HT-800

Example - Configuration
// Application: EV/HEV Battery Pads & Cushions
// 5.1 - 15.0 mm Thickness
// Medium Compressibility

http://tools.rogerscorp.com/ems/products/msg/index.aspx

STANDARDS

Industry	Standard
Aerospace	ABS 5006 ABS 5026 ABS 5708 ABS 5789 AIMS04-14-002A AMS 3195 AMS 3196 BMS 1-23 BMS 1-60 BMS 1-68 CMS-RB-202 CMS-RB-209 DMS 1980 GR2 CL2 DMS 1980 GR1 CL1 DMS 1980 GR1 CL2 DMS 1980 GR3 CL1 DMS 1980 GR 3 CL2
Automotive	Chrysler MS-AY556 GMW16392
Rogers Internal	BISCO Standard
Food	21 CFR 177.2600
Rail	49 CFR 238 EN 45545-2 NFPA 130
UL	UL 50 UL 50E UL 157 UL 508

TIPS FOR MATERIAL SELECTIONS

// Acrylic one or two sides of material
// Silicone one side only

Material Slitting
// Ability to slit minimum width of 6.35 mm (0.250")
// Width of slit must be greater or equal to thickness
// Material can be slit with or without adhesive applied
// Maximum roll diameter is 355.6 mm (14")

Applications	Aerospace	Communications	Rail	Automotive	Energy	Lighting
Flame, Smoke & Toxicity	●×	●×	●×	●×	●×	●×
UL Rated Material		●×			●×	●×
Vibration Reduction	●×	●×	●×	●○×	●○×	
Acoustic Performance	●×		●×	●○×		
Softness	●○×	●○×	●○×	●○×	●○×	●○×
Firmness	●○×	●○×	●○×	●○×	●○×	●○×
EMI Shielding		×				
Moisture Resistant	●○×	●○×	●○×	●○×	●○×	●○×
Heat Shielding	×	×	×	×	×	×
Insulating		●	●	●	●	●

LEGEND
● BISCO Cellular Silicones ○ BISCO Solid Silicones × BISCO Specialty Silicones

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World Class Performance

Rogers Corporation (NYSE:ROG) is a global leader in engineered materials to power, protect and connect our world. Rogers delivers innovative solutions to help our customers solve their toughest material challenges. Rogers' advanced electronic and elastomeric materials are used in applications for EV/HEV, automotive safety and radar systems, mobile devices, renewable energy, wireless infrastructure, energy-efficient motor drives, industrial equipment and more. Headquartered in Chandler, Arizona, Rogers operates manufacturing facilities in the United States (U.S.), Asia and Europe, with sales offices worldwide.

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

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