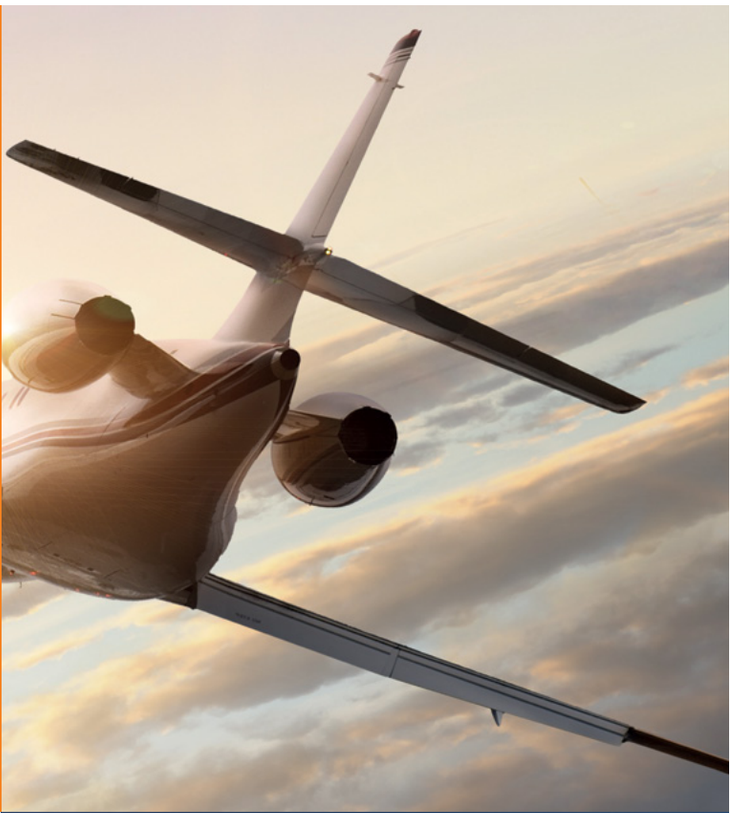
bisco®
TRUSTED TO THE EXTREME

MATERIAL SELECTION GUIDE
INDUSTRIAL APPLICATIONS



ROGERS CORPORATION

INSUL-FAB®
a division of concote corporation
insulfab.net (800.442.1338)

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.

poron® ALWAYS THERE

bisco® TRUSTED TO THE EXTREME

ARLON® ENGINEERED FOR YOU

DSP® QUICK SILICONE SOLUTIONS

DeWAL® SHEER QUALITY

poron® COMFORT

KUSHON®

HeatSORB

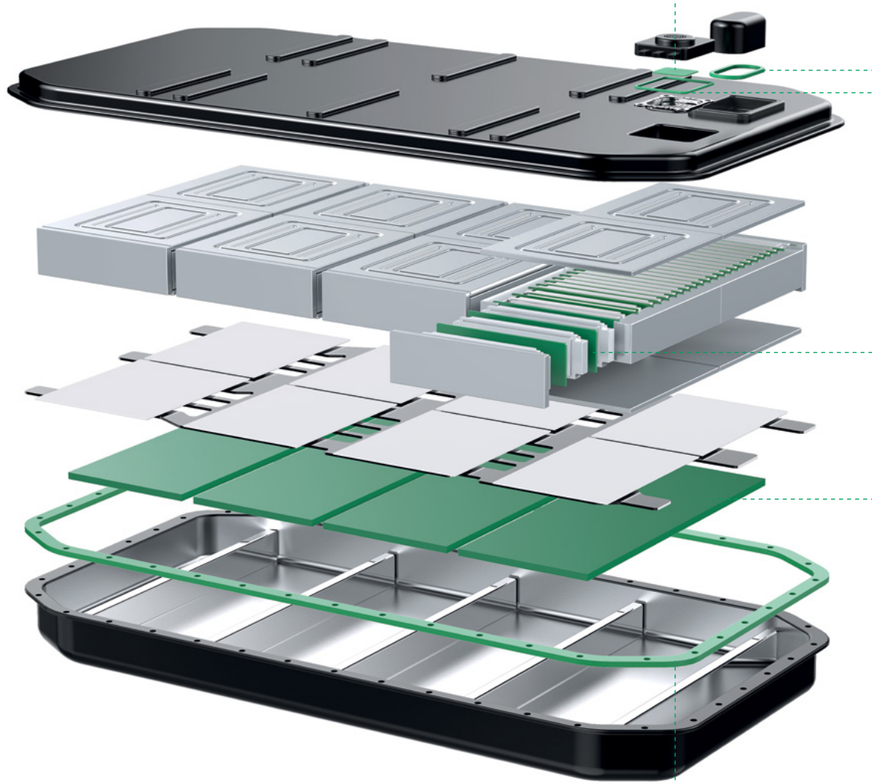
GRISWOLD® ADVANCING PERFORMANCE

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

bisco® TRUSTED TO THE EXTREME

BISCO® Silicone Materials are the unrivaled long-lasting solution for product designers and engineers addressing mission-critical sealing, shock and vibration challenges under extreme conditions or safety requirements.

Pouch Cell Battery Pack



Venting Films
DeWAL® V-Series venting material for battery air pressure management.

Manual Service Disconnect Seal
BISCO® materials are used as a reliable environmental seal that withstands repeated opening and closing. The materials' flame resistance (UL-V0) contributes to the safety requirements for high voltage batteries.

Pouch Cell Pads
PORON® polyurethanes pouch cell pads hold components in place, while withstanding dimensional changes to the pouch cells over the life of the battery. In parallel, they protect the cells against internal impact and vibration.

Cooling Plate Spring Pads
BISCO® silicones and PORON® polyurethanes are used as reliable elastomeric springs to maintain close contact between the cooling plate and the battery, ensuring performance.

Battery Housing Seal
BISCO® silicones provide ingress protection over the lifetime of the battery pack.

KEY BENEFITS

- **Superior Flame Ratings**
  Meets the highest UL, railway and aerospace standards.
- **Low Flame, Smoke, and Toxicity**
  During combustion.
- **Excellent Performance**
  At extreme high and low temperatures.
- **Superior Resistance to Compression Set**
  At ambient and elevated temperatures.
- **Natural Resistance to UV and Ozone**
- **Good Sealability with Low Compression**
- **Product Consistency**
  Quality manufacturing resulting in reliable and consistent material properties.
- **Broad Product Offering**
  Wide range of firmness, density, and thickness 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

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

Specialty with Substrate

FPC **IF-200** **RF-120**

Bun

MF1®

Solid

1200 series

HT-1240 **HT-1250** **HT-1260** **HT-1270**

6000 series

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

Specialty

HT-200 **EC-2130**

PRODUCT DATA

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

		Cellular							Solid								Specialty						
		Continuous Roll						Bun	HT-1200 Series				HT-6000 Series					w/substrate					
		Silicone Foam							General Purpose Silicone				Performance Grade				Flame Resistant	Press Pad	EMI Shielding	Acoustic Barrier	Flame Barrier	Heat Shield	Abrasion Resistance
Product		**BF-2000**	**BF-1000**	**HT-870**	**HT-800**	**HT-820**	**HT-840**	**MF1-55**	**HT-1240**	**HT-1250**	**HT-1260**	**HT-1270**	**HT-6210**	**HT-6220**	**HT-6135**	**HT-6240**	**HT-6360**	**HT-1500**	**EC-2130**	**HT-200**	**FPC**	**RF-120**	**IF-200**
Standard Color		Black	White, Gray, Black	Red, Black	Black, Gray, Red	Gray	Gray	Gray	Red				Gray	Black	Cream	Transparent	Black	Red	Dark Gray	Black	White	White	White
Physical Properties	**Standard**																						
Thickness mm (in)		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)	0.79-6.35 (0.031-0.250)	1.59-6.35 (0.063-0.250)	6.35-203.2 (0.250-8.00)	0.79-3.18 (0.031-0.125)				0.250-3.18 (0.010-0.125)	0.250-3.18 (0.010-0.125)	0.250-1.59 (0.01-0.063)	0.250-3.18 (0.010-0.125)	0.50-3.18 (0.020-0.125)	0.079-3.18 (0.031-0.125)	1.59-3.18 (0.063-0.125)	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) typical values / specification values		175 (11) Max 200 (12.5)	192 (12) 156-287 (9.8-17.9)	240 (15) 215-327 (13.4-20.4)	352 (22) 300-473 (18.7-29.5)	384 (24) 336-528 (21-33)	448 (28) 369-553 (23.7-34.5)	112 (7.0) 45-55 (6.5-8)													320 (20) min.		
Areal Density, kg/m² (lb./ft²)																				1.22-7.32 (0.25-1.5)		1.22 (0.25), 1.71 (0.35)	1.71 (0.35) max.
Specific Gravity Internal Method (g/cc)									1.1	1.16	1.23	1.29	1.07	1.08	1.22	1.07	1.71		1.97	2.05 +/- .03			
Firmness																							
Compression Force Deflection, kPa (psi) typical values / specification values	ASTM D1056 @ 25% Deflection	10 (1.5) 0-17 (0-2.5)	16.5 (2.4) 0-35 (0-5)	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)	5.5 (0.8) 2.8-10.3 (0.4-1.5)													Refer to BF-1000 for properties (foam only)		
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	70 +/-10	80 +/-10				
Compression Set (%)	ASTM D1056 @ 100°C (212°F)	6.9	1.7	1.6	2.4	2.6	1.8	1.5															
	ASTM D395 @ 150°C (302°F)								25	25	25	25	25	25	25	35	35		30				
	ASTM D395 @ 175°C (347°F)																	25					
Tensile Strength, kPa (psi) HT-1500- Tensile Fill/Tensile Warp (ppi)	ASTM D412 ASTM D751	140 (20)	140 (20)	240 (35)	240 (35)	240 (35)	240 (35)	69 (10)	7650 (1110)	7100 (1030)	6950 (1010)	7200 (1050)	3300 (480)	4400 (640)	5500 (800)	7170 (1040)	1720 (250)	300/300	2068 (300)				
Tensile Elongation (%)	ASTM D412	60	60	20	45	45	45	35	530	370	260	210	565	580	450	325	125		40				
Water Absorption (%)		1.4	0.5	0.5	0.5	0.5	0.5	5															
Tear Resistance (ppi)	ASTM D624												20	116	50	112							
Flammability																							
Flame Resistance	UL 94 (File E83967) V-0 ; HF-1	Meets	Meets	Meets	Meets	Meets	Meets	Meets									Meets		Meets	Meets	For flame specifications please refer to product data sheet		
Flame Spread Index (Is)	ASTM E162, Flaming Mode <35	Meets	Meets	Meets	Meets	Meets	Meets	Meets									Meets			Meets			
Smoke Density (Ds)	ASTM E662 Flaming Mode @ 1.5 min, <100 Flaming Mode @ 4.0 min, <200	Meets	Meets	Meets	Meets	Meets	Meets	Meets									Meets			Meets			
Burn Length	FMVSS 302, <100mm/min	Meets	Meets	Meets	Meets	Meets	Meets	Meets														Meets	
Outgassing																							
Toxic Gas Emissions Rating	SMP-800-C @ 1.5/4.0 min	Meets	Meets	Meets	Meets	Meets	Meets	Meets									Meets			Meets			
Total Mass Loss (%)	ASTM E595 @ (4x10⁻⁶Torr)	3.81	3.46	1.19	0.98	2.11	2.08																
Collected Volatile Condensible Materials (CVCM) (%)	ASTM E595 @ (4x10⁻⁶Torr)	1.14	1.12	0.34	0.25	0.63	0.57																
Water Vapor Regain (%)	ASTM E595 @ (4x10⁻⁶Torr)	0.07	0.04	0.02	0.03	0.02	0.01																
Temperature Resistance																							
Recommended Constant Use		-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-62°C- +219°C	-62°C- +219°C	-62°C- +219°C	-62°C- +219°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C	-55- +200°C
Thermal Conductivity (W/m °K)	ASTM C518	0.048	0.054	0.06	0.076	0.09	0.09	0.04					0.19	0.22	0.31	0.2	0.1		0.8	0.8	0.08	0.07	0.06
Low Temperature Flex	ASTM D1056 @ -55°C (-67°F)	Pass	Pass	Pass	Pass	Pass	Pass																
Low Temperature Brittleness	ASTM D746 @ -55°C (-67°F)																						
	ASTM D2137 @ -62°C (-80°F)	Pass	Pass	Pass	Pass	Pass	Pass																
Electric											Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass					
Dielectric Strength (Volts/mil)	ASTM D149	48	72	65	75	66	57	17					372	374	381	386	344			284	58	55	64
Dielectric Constant (1 kHz)	ASTM D150	1.096	1.214	1.056	1.34	1.335	1.467						2.76	2.97	2.95	2.76	5.64			4.56	1.46	1.6	1.42
Dissipation Factor (1kHz)	ASTM D150	0.003	0.003	0.001	0.006	0.003	0.005						0.003	0.003	0.001	0.003	0.04			0.04	0.05	0.025	0.025
Dry Arc Resistance (Seconds)	ASTM D495	85.8	123.2	124.7	124.8	173.5	148.9	2					121.7	122.7	145	124.2	187.8			189.6	207.7	99	185.3
Volume Resistivity (Ohm-cm)	ASTM D257	10^13	10^16	10^13	10^14	10^14	10^14	10^13					10^14	10^14	10^14	10^14	10^13		0.2	10^14	10^14	10^16	10^13
EMI Shielding (dB)	MIL G83528																		Refer to data sheet				
Acoustic																							
Sound Transmission (dB)	ASTM E90																			Refer to Datasheet			

TIPS FOR MATERIAL SELECTIONS
SPECIALTY SERVICES

Options
// 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

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.

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

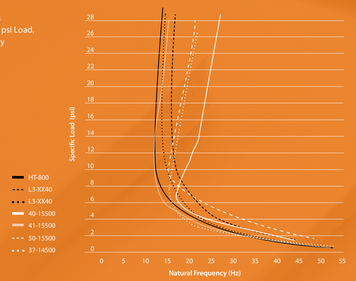
	Results					
Product	**BF-2000**	**BF-1000**	**HT-870**	**HT-800**	**HT-820**	**HT-840**
Flamability and Outgasing						
UL94 V-0 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
UL94 HF-1 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Burn Rate FMVSS302 (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass
Flame Resistance @ 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 Volitile Condensible 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.

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



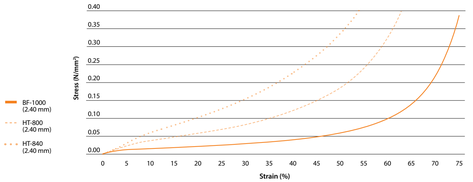
	BISCO® Silicones			PORON® Polyurethanes			
Product	**HT-800**	**L3-XX40**	**L3-XX40**	**40-15500**	**41-15500**	**50-15500**	**37-14500**
Thickness mm (in)	12.70 (0.500)	12 (0.472)	16 (0.630)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)	12.70 (0.500)
Isolation Efficiency (%)	> 97.00	> 94.00	> 94.00	> 97.00	> 96.00	> 95.00	> 94.00
Natural Frequency (Hz)	12	17	15	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.

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



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

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

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/Medical	FDA 21 CFR 177.2600
Rail	49 CFR 238 BS6853 DIN5510 EN 45545 NFF16-1014 NFPA 130
UL	UL 50 UL 50E UL 157 UL 508 UL 1598

APPLICATIONS

Gaskets

Heat Shields

Seals

Cushioning

Insulation

Floating Floors

and more …

Airplane
Cushioning

Industrial Machinery
Insulation

Automotive
Heat Shields

For more information please visit us at:
www.rogerscorp.com/ems/bisco/index.aspx

For more information visit rogerscorp.com/ems

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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