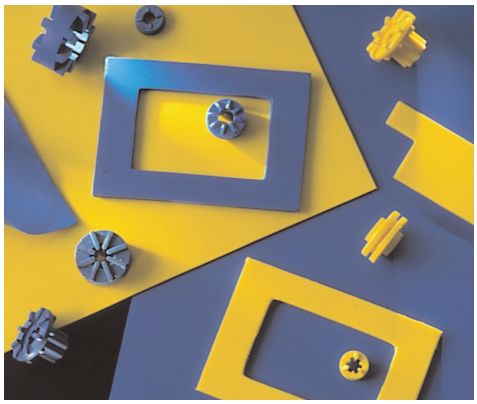
ISODAMP® C-1000 Series Isolation Materials



E-A-R's ISODAMP C-1000 Series thermoplastics are high performance vibration isolation and damping materials, typified by extraordinarily high material loss factors. Their high internal damping enables the materials to reduce mechanically or acoustically induced vibrations and to dissipate shock and impact energy virtually immediately.

Excellent energy absorption capabilities, plus physical strength, flexibility, environmental resistance, anti-skid properties and good flame resistance, make C-1000 Series materials ideal for constrained-layer damping, damped isolation and impact control. Common applications include computers, precision equipment, robotics, appliances, mechanical devices, equipment enclosures and aircraft soundproofing.

Each of the three C-1000 Series formulations is *tuned* to provide optimum energy control performance in a distinct temperature range.

E-A-R offers numerous standard sizes and configurations of grommets and other isolators in all three C-1000 formulations. Custom-molded configurations also are available. The materials are produced as sheets and rolls as well, in several standard thicknesses.

High performance energy control
As part of a constrained-layer damping system, sandwiched between a substrate and a constraining layer, an ISODAMP C-1000 Series material flexes during vibration, undergoing *shear* with the other materials and dissipating the resulting strain energy as low-grade frictional heat. Common substrates include plywood, aluminum, steel and lightweight composites.

When molded into grommets, bushings and other isolators, C-1000 Series thermoplastics control motion, vibration, shock and noise by forming *soft* connections between components, thereby producing a more dynamically compliant system. Their high internal damping properties enable them to address both vibration and shock within very limited sway space, without bottoming out. C-1000 isolators quickly restore system equilibrium, improve precision, increase reliability and can extend product life.

ISODAMP C-1000-Series Formulations

ISODAMP Formulation	Peak Damping Performance Temperature Range C (F)	Shore A Durometer
C-1002	13-41 (55-105)	60
C-1105	27-54 (80-130)	63
C-1100	35-63 (95-145)	70

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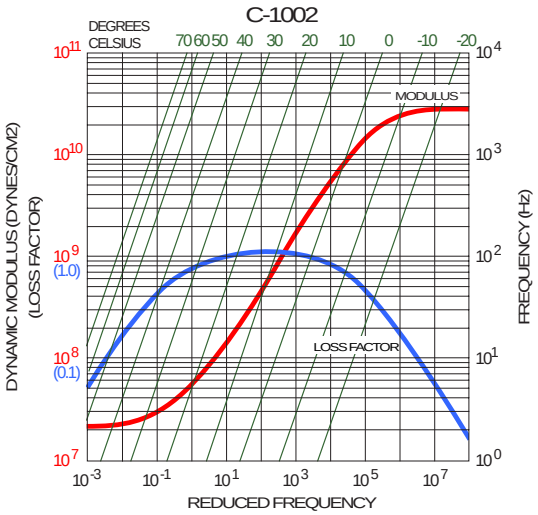
ISODAMP C-1000-Series—Typical Properties

Physical Properties	*C-1002*	*C-1105*	*C-1100*
Specific Gravity			
ASTM D792	1.289	1.287	1.282
Glass Transition C (F)			
ASTM D5279			
10 Hz, 0.3% amplitude	-17C (1F)	-13C (9F)	2C (36F)
Dynamic Properties			
ASTM E756, 200Hz			
Maximum Loss Factor	1.02	1.01	1.04
Temperature at Peak Loss C (F)	15C (59F)	23C (73F)	31C (88F)
ASTM D5279, 10Hz			
Maximum Loss Factor	0.93	0.93	0.76
Temperature at Peak Loss C (F)	8C (46F)	17C (63F)	25C (77F)
Hardness			
ASTM D2240 Shore A Durometer			
15 sec post impact at 23C (73F)	60	63	70
Rebound (%)			
ASTM D2632 (Modified) Bashore Resilience			
First Rebound (%)	4.8	5.4	5.7
Minimum Rebound Temperature C (F)	21C (70F)	34C (93F)	40C (104F)
Outgassing			
ASTM E595 (Modified (%)	0.067 at 40C (104F)		0.135 at 50C (122F)
Total Mass Loss Water Reabsorbed (%)	0.043	–	0.045
Dielectric Strength (volts/mil)			
ASTM D149 Breakdown Voltage	166	–	–
Thermal Conductivity W/m•K (BTU in/hr ft² F)			
ASTM C177	1.0	–	0.88
Coefficient of Friction			
ASTM D1894 on Etched Aluminum			
Static	.92	1.21	1.24
Kinetic	.75	.77	.71
Flammability			
UL 94	Listed V-0	Listed V-0	Listed V-0
FAR 25.853 (a) Appendix F Part I(a) (1) (12 sec)	Meets at 0.08 cm (0.03 in)		
FAR 25.853 (b-3)	Meets 0.04 cm (0.015 in)		
MVSS-302	Meets at 0.04 cm (0.015 in)	Meets at 0.152 cm (0.06 in)	Meets at 0.152 cm (0.06 in)
Compression Load Deflection kPa (psi)			
ASTM D575 at 0.51 cm/min (0.2 in/min)			
10% deflection	490 (71)	634 (92)	1069 (155)
20% deflection	1682 (244)	2206 (320)	3413 (495)
30% deflection	3682 (534)	4785 (694)	7122 (1033)
Compression Modulus kPa (psi)	5805 (842)	–	–
Strength Properties			
Compression Set (%)			
ASTM D395 Method B			
22 hr @ 22C (72F)	14	23	24
22 hr @ 50C (122F)	45	46	48
22 hr @ 70C (158F)	58	51	55
22 hr at 80C (176F)	62	62	55
Compressive Deformation (%)			
ASTM D621 Method B at 24C (75F)			
Deformation After 3 hr	10.4	9.8	8.4
Recovery AFter 1.5 hr	90.4	95.5	95.7
Tensile Strength kPa (psi)			
ASTM D638	10852 (1574)	12459 (1807)	14190 (2058)
Elongation (%)			
ASTM D903	459	417	317
Tensile Modulus kPa (psi)			
ASTM D903	3102 (450)	5550 (805)	7963 (1155)
Tear Strength kN/m (lbf/in)			
ASTM D624	35 (202)	42 (241)	53 (305)
Abrasion Resistance (mg/1000 cycles)			
ASTM D3389 H22 Stone, 1000 Gram Load,			
Wear Factor	242	350	271

ISODAMP C-1000-Series—Typical Properties

Environmental Resistance Properties	C-1002	C-1105	C-1100
Ozone Resistance			
ASTM D1149	Resistant	Resistant	Resistant
Ultraviolet Resistance			
ASTM G84, 300 hr aging cycle	Resistant	Resistant	Resistant
Accelerated Aging			
ASTM G23 Method 1,1 Weather-Ometer, 1000 hr Exposure to cycles 102 min, Light (Carbon Arc) at 50% Relative Humidity and 63C (145F), 18 min Light and Water Spray	Decrease in Gloss No Other Significant Effects Noted.	–	–
Bacteria Resistance			
ASTM G22	Resistant	–	–
Fungal Resistance			
ASTM G21	Resistant	–	–
Chemical Resistance			
ASTM D543			
Diesel Fuel	2.91	2.62	0.92
2M Sulfuric Acid	0	0.38	0.39
Distilled Water	0.36	0.36	0.39
Sea Water	0.36	0.37	0.39
Mineral Oil	-0.36	-0.38	0
Ethylene Glycol	-0.36	1.16	0
Temperature Range C (F)			
Peak Damping Performance Range	13C to 41C (55F to 105F)	27C to 54C (80F to 130F)	35C to 63C (95F to 145F)
Recommended Maximum Intermittent	82C (180F)	82C (180F)	82C (180F)

C-1002

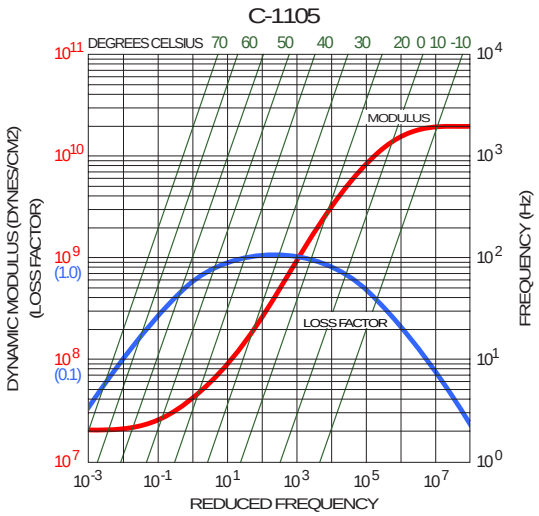


Instructions—Reduced Frequency Nomograms

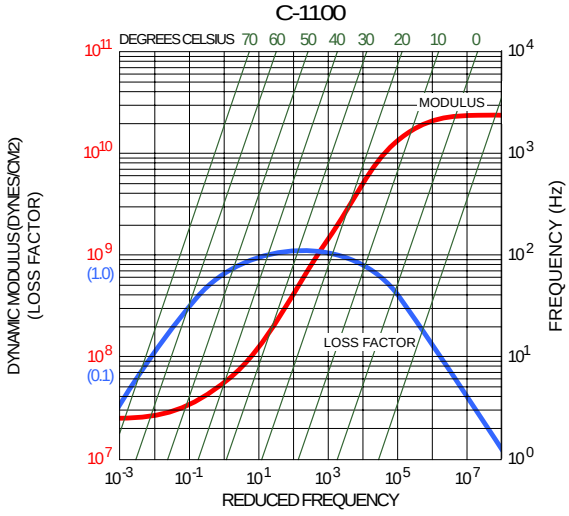
The reduced frequency format is the standard method for displaying damping material performance data. To determine dynamic Young's modulus and material loss factor at a given temperature and frequency, use the following steps.

1) Select the frequency of interest on the right-hand vertical axis.
2) Follow the selected frequency line horizontally to the left until the selected *diagonal* temperature isotherm is intersected.
3) Draw a vertical line up and down through the frequency/isotherm intersection, intersecting the dynamic Young's modulus and material loss factor curves.
4) Draw horizontal lines from these points to intersect the left-hand vertical axis.
5) The dynamic Young's modulus value is read using the Dynamic Modulus scale and the loss factor from the Loss Factor scale.

C-1105

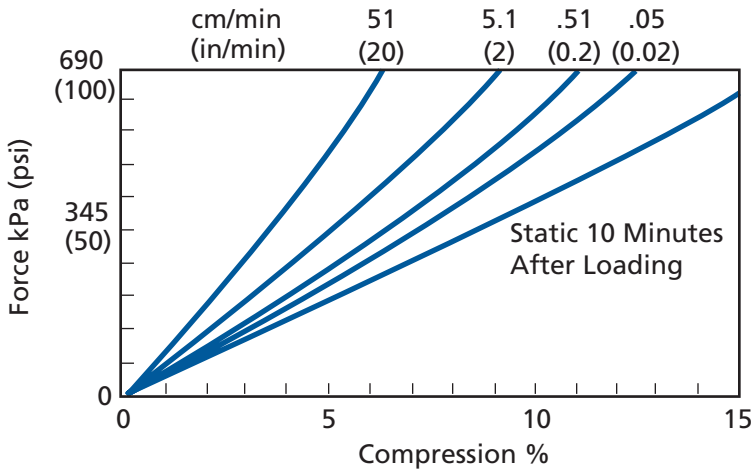


C-1100



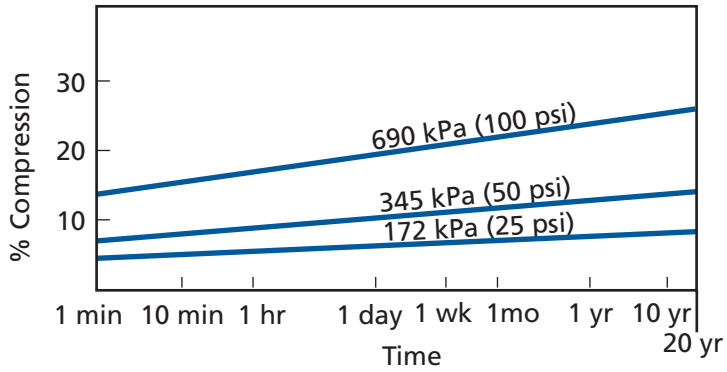
Velocity-Sensitive Compression Resistance

E-A-R ISODAMP C-1000 Series materials are *velocity sensitive*. When they are compressed quickly, they seem stiff. When compressed slowly, they seem soft. This rate sensitivity is one of the keys to the materials' excellent shock absorption and low rebound properties. The data shown here are for C-1105 formulation.



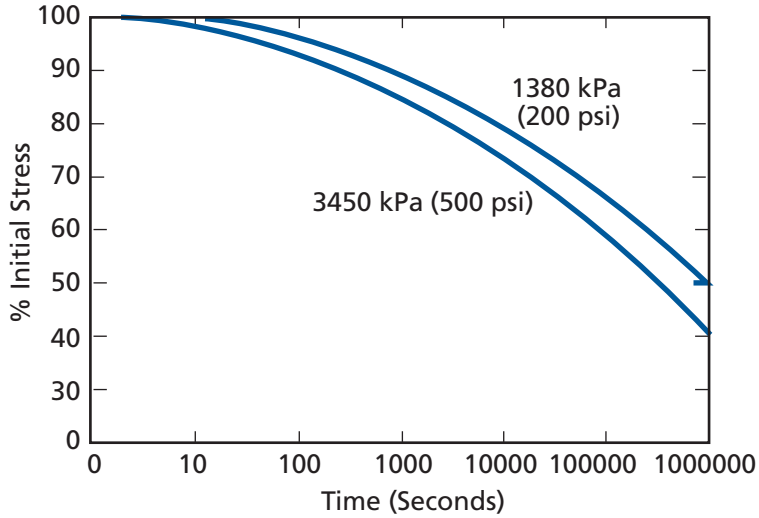
Compressive Creep

In isolation systems, C-1000 Series materials are recommended for an optimum load of 345 kPa (50 psi) each. The compressive creep curves for 172, 345 and 690 kPa (25, 50 and 100 psi) are shown here. The data represent C-1002 formulation at 21C (70F) with a shape factor of 0.5.



Stress Relaxation

ISODAMP C-1000 Series materials are often used in gasket or washer applications. Stress relaxation data are presented here for 30 mil C-1002 material, ASTM F38, 22C (72F).



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