

# Sorbothane



SHAPING SOLUTIONS TO DESIGN PROBLEMS.



## ORBOTHANE.<sup>®</sup> THE SOLUTION TO A WORLD OF PROBLEMS.

Sorbothane is an innovative visco-elastic material with a combination of diverse properties never before realized in a single material.

Although it is a solid, Sorbothane mimics liquid properties, providing unparalleled characteristics for virtually limitless design applications.

### CHARACTERISTICS OF SORBOTHANE.

- Quasi-liquid properties enable high mechanical damping and energy absorption.
- Faultless memory guarantees return to original shape, even after repeated compressions.
- Detrimental effects from torsional loading are favorably reduced and controlled.
- Properties remain stable over a uniquely broad temperature range.

### CUSTOM MOLDED TO YOUR SPECIFICATIONS.

Sorbothane's unique protective and versatile properties make it the ideal solution to problems in areas such as shock/impact absorption, vibration isolation and acoustical damping, as well as human health and safety.

This one-of-a-kind material can be custom molded from low-cost tooling to most any shape, color and size specifications, in large or small production runs.

### THE SORBOTHANE SOLUTION.

Sorbothane is truly a solution looking for a problem ... That problem may be yours.

# S HOCK & IMPACT ABSORPTION

One of Sorbothane's many qualities is the ability to dissipate impact energy. In fact, shock absorption levels as high as 90 percent have been achieved in many applications and laboratory tests.

Placed in line with a system experiencing excessive shock wave transients, Sorbothane can be engineered to reduce these transients to desired levels.

By dispersing energy outward from the impact source, Sorbothane reduces rebound as well as transmitted shock energy for unprecedented absorption levels.

Molecule chains stretch in the path of least resistance (out of phase with the impact) in a delayed deformation and return in a delayed recovery to the

original shape, thus expending energy.

## Applications:

- computer/electronic industry
- stereo industry
- shipping/transportation safety
- industrial machining
- shoe insoles
- sport gloves
- horse shoe pads and saddle pads
- rifle recoil pads
- ?

# V IBRATION ISOLATION

Sorbothane also offers solutions to systems plagued with undesirable vibrations.

Energy moving away from the vibration source (out of phase) is

dissipated within the Sorbothane and is prohibited from

permeating adjoining components within a system.

When vibration is inherent in a system, Sorbothane dampens by working to isolate, then dissipate it.

Sorbothane also dampens vibration over a broad frequency range. According to variations in design and durometer, the degree of isolation can exceed 98 percent over a uniquely broad temperature range.

This offers protection under not only controlled application temperatures, but also uncontrolled environmental temperature swings. (see graphs for design information)

## Applications:

- Sensitive measuring devices
- Laser measuring/projection devices
- Industrial tools, grips, anti-fatigue mats
- Motor and machine isolation
- Computer disk drives
- Audio equipment
- Motion picture cameras
- ?

# A COUSTICAL DAMPING

Applied to the field of acoustics, Sorbothane proves to be an excellent sound dampening tool for both single

and multiple frequencies.

The high frequency acoustic properties of Sorbothane make it an unusual material.

Internal acoustic losses rise rapidly above 10 kHz and at 500 kHz reach a value of greater than 130 db/cm.

The specific acoustic impedance of Sorbothane is very similar to that of water; the acoustic velocity is about 1 km/sec at frequencies in excess of 500 kHz.

## Applications:

- ultrasound screening
- reducing industrial noise pollution

- audio/acoustic applications
- ?

# HEALTH & SAFETY

Injury from shock impact is reduced when Sorbothane is applied in areas such as footwear, sport gloves and industrial gloves.

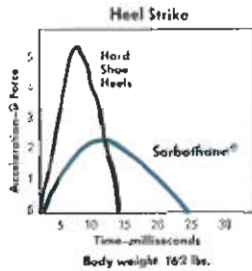
It effectively reduces shock waves which can cause back problems and fatigue as well as joint and tissue damage throughout the body.

In industrial gloves, for example, Sorbothane reduces the "white finger" syndrome commonly associated with the operation of pneumatic tools.

With industrial gloves, tool grips, protective linings, and anti-fatigue mats, Sorbothane makes work environments safer

and more productive. And, as a sound deadening device, it makes work environments quieter and more enjoyable.

Sorbothane has also proven effective in the medical field. Medical uses include trusses, prostheses, lumbar supports, corrective shoes and hand exercise devices.



# DISCOVER THE SORBOTHANE SOLUTION.

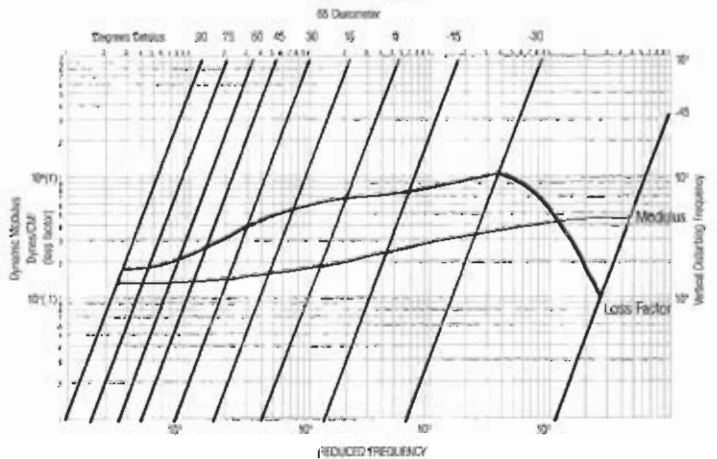
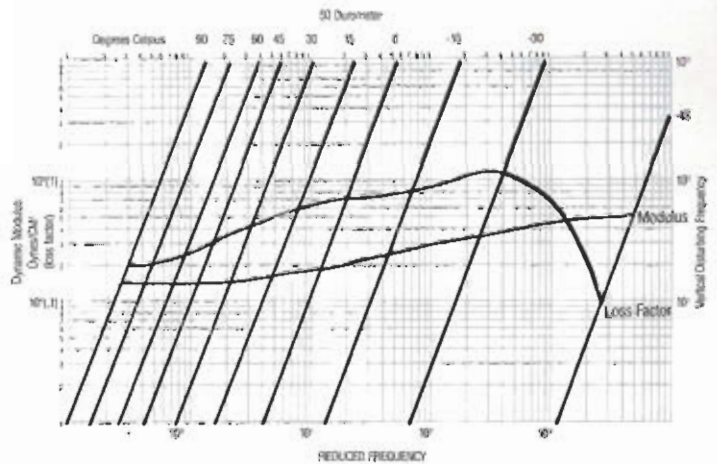
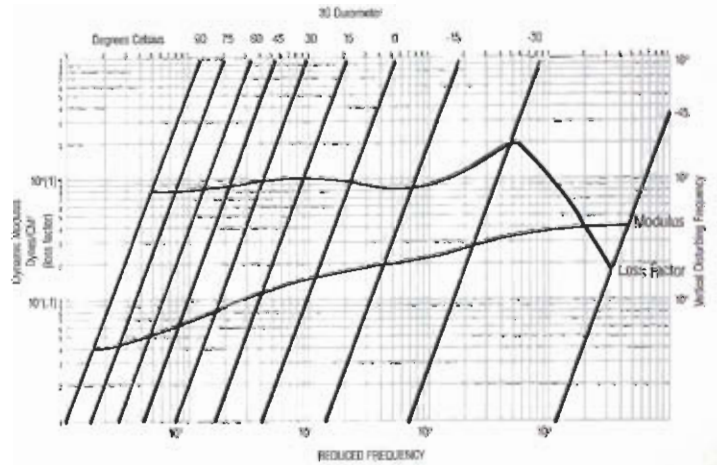
Whatever the application, whatever your design problem—from shock absorption to vibration

isolation to acoustic damping—Sorbothane is your custom-made solution.

Call today for more information or for technical reports containing Sorbothane test and application data.

216/678-9444

FAX 216/678-1303



## IMPACT PROPERTIES

Sorbothane Hardness	Drop Height of 12 lb. Sphere	Peak Strain	Absorption Efficiency	Specific Damping	Specific Absorption at Peak Strain
Shore 00 Units	Feet	%	%	%	$\frac{\text{ft.-lb.}}{\text{lb.}}$
38	6.5	52.4	60.3	75.3	6340
47	6.5	51.1	60.8	74.0	6642
57	6.5	47.5	59.8	73.7	6742
67	6.5	46.1	57.7	71.2	6675

Pad Dimensions: 150mm x 150mm x 50mm thick

ABSORPTION EFFICIENCY =

$\frac{\text{Energy Absorbed}}{\text{Max. Possible Energy Absorbed}} \times 100\%$

SPECIFIC DAMPING =

$\frac{\text{Energy Lost}}{\text{Max. Possible Energy Absorbed}} \times \frac{1}{\pi} \times 100\%$

SPECIFIC ABSORPTION =

$\frac{\text{Energy Absorbed}}{\text{Mass of Active Sorbothane}} \frac{\text{ft.-lb.}}{\text{lb.}}$

The high values for specific damping (70-75%) indicate that, as expected, little energy is returned elastically by the material, whilst the values for specific absorption show that the material exhibits a high absorption of energy per unit mass.

## PHYSICAL PROPERTIES

Test Method	Durometer		
	Soft	Medium	Firm
Density		80 lbs /ft <sup>3</sup>	
Hardness	Shore "00" scale	20 to 70	
Optimum Performance Temperature Range		-40°F to 200°F	
Glass Transition		-40°F	-45°F -60°F
Rebound Resilience	Lupke Rebound test	10%	13.2% 15%
Dielectric Strength	BS 903	11.1KV/mm	— 13.1KV/mm
Thermal Conductivity		$2.6 \text{ Btu-in/hr-ft}^2 \text{ } ^\circ\text{F}$	$2.7 \text{ Btu-in/hr-ft}^2 \text{ } ^\circ\text{F}$
Flammability	Flash Ignition self ignition		570°F 750°F
Expansion/Contraction	-58°F to 212°F		$7.35 \times 10^{-5} \text{ in/in } ^\circ\text{F}$



## STRENGTH PROPERTIES

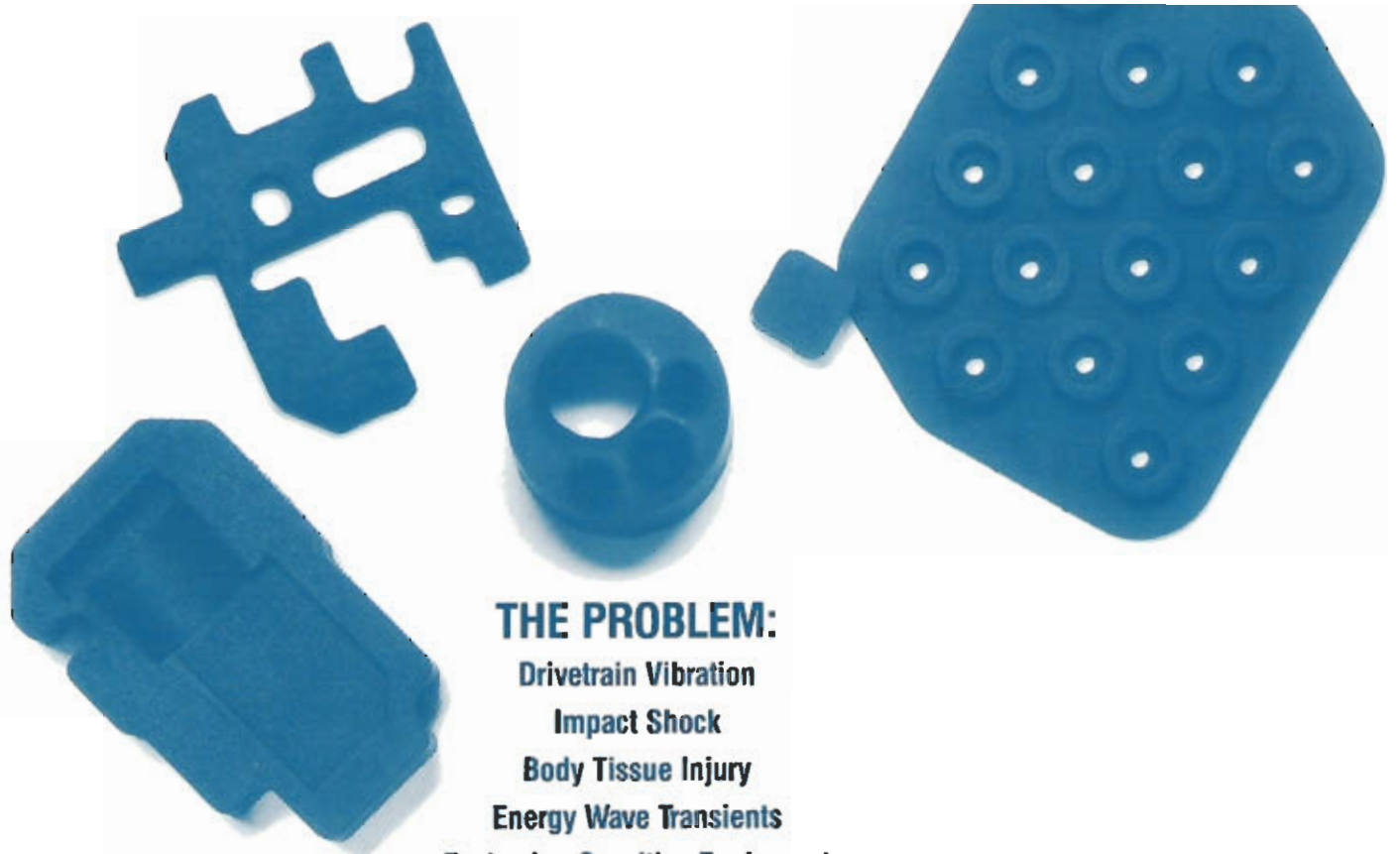
Test Method	Durometer			
	Soft	Medium	Firm	
Compression Set	ASTM-395 Method B 72hr/73° F-25% compression	9.7%	6.2%	4.5%
Compressive Modulus	ASTM D575 Method A	5.4 psi 44.0	12.5 89.0	23.7 190.0
Elongation at Break	ASTM D-412-80 500mm/min @20C	500%	500%	500%
Tensile Elastic Modulus	ASTM D-412-80 100% 500mm/min @20C	16 psi	27	71
	200%	32	60	125
	300%	53	90	148
Tensile Strength	ASTM D 412	75 psi	124.7	155
Tear Strength	ASTM 624 With 1mm nick	17.2 psi	23.5	29.0
Stress-Strain	Load/cw-in @ 50% compression ASTM D 575-81	45 psi	90	115
Abrasion Resistance		fair	fair	fair

## ENVIRONMENTAL RESISTANCE

Test Method	Durometer		
	Soft	Medium	Firm
Ultraviolet		Good	
Ozone		Compoundable	
Bacterial Resistance		No Growth	
Fungal Resistance		No Growth	
Chemical Resistance		Good	
		Good	
Heat Aging	72hrs @ 150°F	Good	
Acoustical Properties	In Water	High acoustic loss of greater than 130db/cm. Specific impedance similar to water	
	In Air	5Khz loss greater than 40db/cm	

- SORBOTHANE IS:**
- nontoxic, nonirritant, noncaustic, non strong sensitizer, non eye irritant
  - uniquely stable over a broad temperature range
  - easily cast with low cost tooling
  - coloring available

Data listed in this brochure is typical of results obtained by independent labs or the manufacturer and is not guaranteed as maximum or minimum values. Materials should be tested under actual service conditions to determine its suitability.



## **THE PROBLEM:**

**Drivetrain Vibration**  
**Impact Shock**  
**Body Tissue Injury**  
**Energy Wave Transients**  
**Packaging Sensitive Equipment**  
**Pneumatic Tool Vibrations**  
**Rebound Shock**  
**Systems Components Vibration**  
**Multiple Frequency Interference**  
**Sensitive Device Isolation**

## **THE SOLUTION:**

***Sorbothane***<sup>®</sup>  
***II***

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### **SORBOTHANE® TRADEMARKS AND PATENTS**

Trademarks: Sorbothane® Sorbolite®

Patents: Sorbothane Polymer—Patent #4,346,205

Sorbothane Insole—Patent # Des. 287,902

Sorbothane Insole—Patent #4,777,739

Sorbothane Horse Shoe Pads—Patent #4,565,250

Sorbothane Saddle Pad—Patent #4,683,709

Sorbothane Energy Absorbing Composites—Patent #4,808,469

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### **IEM Medical Technologies, Inc.**

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