

SOLUTION ENGINEERING FOR NOISE,

BROADEST LINES OF MATERIALS AND PARTS

E-A-R Specialty Composites provides a wide range of materials and component options for controlling complex noise, vibration, motion and mechanical shock. Standard components include grommets, fan mounts, bushings and equipment feet. This extensive offering of standard parts will often provide an “off-the-shelf” solution that meets design requirements.

In addition, E-A-R offers the industry’s broadest range of engineered elastomer platforms specifically developed to address mechanical energy control challenges that are common in today’s complex OEM product designs.

Designers can choose from four standard materials platforms—**ISODAMP C-1000 Series** elastomers, **ISODAMP C-8002 Series** elastomers, **VersaDamp 2000 Series TPEs** and **ISOLOSS HD** thermoset polyurethanes—to obtain precisely the right combination of performance and physical properties.

The ISODAMP, ISOLOSS and VersaDamp material platforms are highly damped elastomers, exhibiting extremely low rebound characteristics. This ensures extremely low amplification at resonance and rapid settling to equilibrium after impulsive shock or vibration input.

In addition, the VersaDamp platform offers adjustable damping and stiffness, enabling the design engineer to custom-tune a part’s dynamic response. VersaDamp TPEs also offer an extended service temperature range, making them ideal for portable electronics and automotive applications.

E-A-R’s ISODAMP C-8002 Series thermoplastic molding material combines excellent damping performance and mechanical strength with compliance to environmental and other high cleanliness specifications, for high performance solutions in a wide variety of molded parts applications.

Additional features and typical applications for each of the materials platforms are listed at left. More detailed information on E-A-R’s full line of elastomers is contained in materials summary sheets and technical data sheets available directly from the company, on the Website at www.earsc.com or on the electronics Website at www.earshockandvibe.com.

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ISODAMP® C-1000 SERIES ELASTOMERS

- Optimized shock and vibration control via high internal damping
- Control shock pulses in minimal sway space
- Three temperature-tuned formulations

TYPICAL APPLICATIONS:

- Hard disk drive mounting in computers, DVRs and MP3 players
- Fan and blower mounting (tool-less) for noise control
- Low rebound bumpers, crash stops and shock pads
- Stepper motor mounting

ISODAMP® C-8002 SERIES ELASTOMERS

- Environmentally-friendly, halogen-free formulation
- Optimized shock and vibration control via high internal damping
- Control shock pulses in minimal sway space

TYPICAL APPLICATIONS:

- Hard disk drive mounting in computers, DVRs and MP3 players
- Fan and blower mounting (tool-less) for noise control
- Low rebound bumpers, crash stops and shock pads
- Stepper motor mounting

VERSADAMP™ 2000 SERIES ELASTOMERS

- Provide uniform performance over a broad temperature range (-40C to 125C)
- Adjustable damping level from moderate to high
- Adjustable durometer (40 to 74 Shore A)
- Adjustable properties enable custom-tuned dynamic response
- 10 standard formulations

TYPICAL APPLICATIONS:

- Circuit board snubbers for portable electronics
- Hard disk drive protection in portable electronics
- LCD shock protection frames and bezels
- External bumpers for ruggedized portable electronics
- Microphone, speaker and other transducer isolation boots
- Isolation of vibration sources in automotive applications

ISOLOSS® HD THERMOSET ELASTOMER

- High internal damping
- Excellent resistance to creep and compression set
- Can be metal-bonded during molding

TYPICAL APPLICATIONS:

- Rotational vibration control for hard disk drives in servers and mass storage units (hot swap and fixed carrier designs)
- Isolation mounts for hard disk drive manufacturing test racks
- Standard and custom sandwich mounts

VIBRATION, SHOCK, CUSHIONING

THE DIFFERENCE IS THE DAMPING

E-A-R damped elastomers offer important advantages over poorly damped materials, such as natural and synthetic rubber, silicone and commodity TPEs. These advantages are especially important when attempting to control noise, shock and vibration in today's complex and component-dense OEM products.

Optimized Shock and Vibration Control

Vibration is typically characterized by continuous oscillatory motion of relatively small amplitude, while *shock* commonly features a relatively large, sudden change in acceleration due to an applied dynamic force. Consequently, vibration and shock considerations often place conflicting requirements on an isolation system.

A poorly damped isolator (typically made from natural rubber or silicone), that is soft enough for good vibration isolation, may require more sway space for deflection during a shock input than the product's design can provide. So a stiffer isolator may be needed to prevent crashing or bottoming out, but this could have a negative effect on vibration performance. E-A-R's highly damped elastomers help mitigate this common conflict.

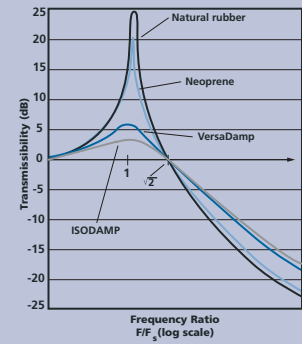
Traditional practice has dictated that the natural frequency of an isolation mount be well below the operating frequency of the vibration source. This tactic seeks to avoid a situation where the source's operational frequency is near the mount's natural frequency, causing excessive amplification of the transmitted vibration. In practice, though, it is often difficult to avoid excitation of the isolation system's resonance, especially in complex systems that cycle on and off, change speed or produce broadband, multi-frequency vibration.

With E-A-R's highly damped elastomers, vibration amplification is minimized. Figure 1 illustrates how an elastomer's loss factor (η_m , a measure of hysteretic damping) influences vibration amplification. E-A-R's elastomers, with material loss factors near 1.0, exhibit a maximum amplification of only 3 to 5 dB (1.4X to 1.8X). Natural rubber or silicone isolators, with loss factors as low as 0.05, can exhibit excessive amplification as high as 25dB (18X). This reduced amplification minimizes the traditional need for an isolation system with a low natural frequency. As a result, a stiffer mount can be used to better accommodate shock requirements while still providing the vibration isolation performance necessary for most noise control applications.

Shock Protection: Reducing Space, Time and Magnitude

For most OEM shock protection applications, E-A-R's highly damped elastomers offer two important advantages:

Figure 1



Poorly damped isolators can amplify incoming vibration, causing damage and excess noise. E-A-R isolators minimize this concern and better accommodate variable-frequency, impulsive or broadband vibration sources.

- Lower peak acceleration (Gs) and displacement (sway) response to shock input, compared to poorly damped elastomers.
- Dramatically reduced settling time after shock input.

Figures 2 and 3 illustrate how the loss factor of an isolator material can influence shock response (transmitted acceleration and peak deflection). E-A-R's highly damped elastomers, with loss factors near 1.0, provide lower peak acceleration and deflection resulting in a higher degree of shock protection within a smaller package design. Poorly damped elastomers often require twice as much sway space to provide the same level of shock protection. This benefit is critical given the tight space constraints that are common in today's smaller portable electronic devices and component-dense OEM products.

In addition, as shown in Figures 2 and 3, E-A-R elastomers provide a quick return to equilibrium while the poorly damped system continues to oscillate and flex. Post-shock, resonant oscillation is a primary contributor to electromechanical system performance loss and component fatigue failure in portable electronic devices. E-A-R's highly damped elastomers help to reduce these post-shock oscillations, increase product performance and extend product life.

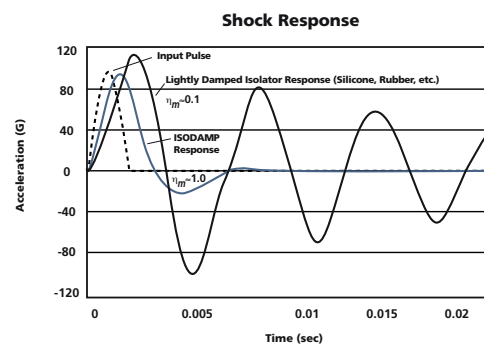


Figure 2

E-A-R elastomers result in lower peak Gs and faster settling, which can help to increase product performance.

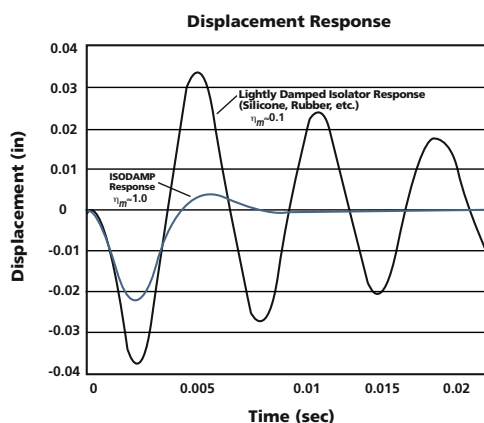


Figure 3

E-A-R elastomers reduce sway space requirements by nearly half, allowing for compact shock protection systems.