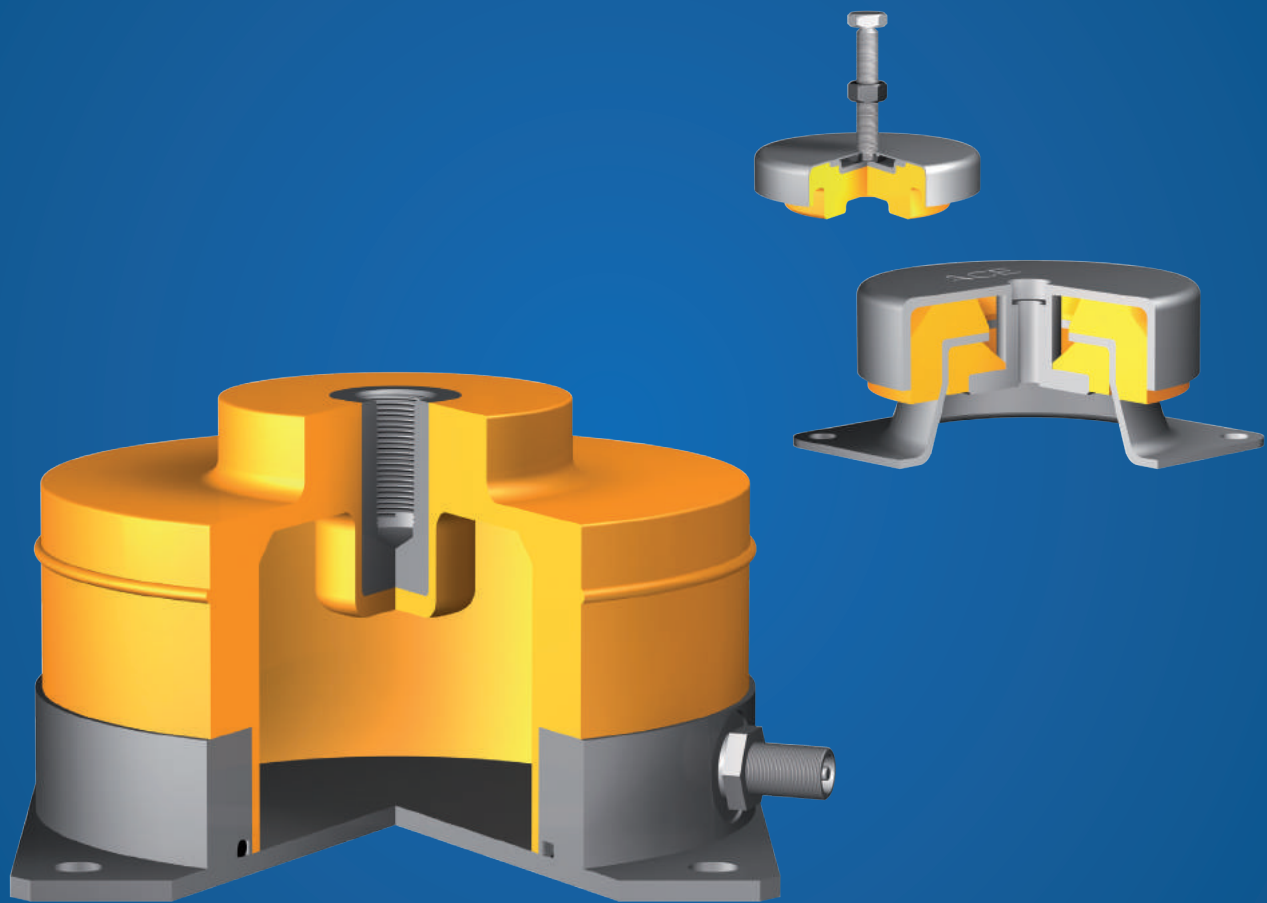


ACEolator

Isolates Vibration



Vibration Technology

*Product images in this catalog are marked in color for visual purposes only. Images do not necessarily represent the actual product.

The ACE Story

In the 1950's industrial shock absorbers were custom designed for specific weights, velocity and propelling force of the moving load. If these variables were precisely known and constant over time, a fixed orifice shock absorber, called a "hydroshock" did the job. But most often the weight, speed and forces were usually estimates and designing and building a shock that would work was a trial and error process.

The founder of ACE Controls, William J. Chorkey Sr. was an engineer at MAC Valves where he was asked by Ford Motor Company to design circuits to decelerate air cylinders. He and Walter Ludwig, the President of MAC Valves, devised a valve circuit that reversed the direction of the cylinder piston cylinder before the end-of-stroke impact. Although this circuit was not an ideal solution, Ford benefited by increased production and less damage to air cylinders. Mr. Chorkey recognized that there was need for deceleration technology in order to increase production speeds.

Mr. Chorkey started Automation Control Equipment Company, later changed to ACE Controls, in 1963 as a pneumatic accessories manufacturer. Their first products were flow controls and check valves. Since Mr. Chorkey knew most of the MAC Valves distributors, he signed many of them up as distributors.

Lynn Nagle, of Kober Sales, Flint, MI, was the very first ACE distributor. Lynn took Mr. Chorkey on a sales call at GM's Fisher Body where they were having problems with a non-adjustable hydroshock on a bumper line. When Fisher Body tried to speed up production, bumpers flew off the line. Mr. Chorkey studied the hydroshock concept and then designed a way to adjust a shock in the field. "Adjust-A-Shock" was born and ACE was on its way. 50 years later, ACE is well recognized as the global leader in industrial shock absorption technology with a strong belief in local support, available worldwide.

ACE Controls apply deceleration and vibration dampening expertise to diverse applications that range from the bottom of the ocean to satellites in space. We support our customers with a worldwide ISO organization, strong investments in new technologies and sophisticated sizing software. Our technologies include: ACEolator vibration and sound absorption solutions, industrial shock absorbers, safety shock absorbers, LOCKED clamping elements, TUBUS profile dampers, rotary dampers, hydraulic dampers and feed controls, and industrial gas springs.

Today we partner with over 120 engineering-focused distributors in over 45 different countries, ACE is available to help you, wherever you are.

Automation Control Equipment



Automation Control

Industrial Shock Absorbers, TUBUS Profile Dampers, TUBUS Press Dampers, SLAB SL-030 to SL-300



Motion Control

Gas Springs Push Type, Gas Springs Pull Type, Hydraulic Dampers, Hydraulic Feed Controls, Rotary Dampers, TUBUS Spring



Vibration Control

Rubber-Metal Isolators, Vibration-Isolating Pads, Low Frequency Pneumatic Leveling Mounts



Safety Products

LOCKED Clamping Elements, Safety Shock Absorbers, TUBUS Single Hit Damper

ACE is your source for industrial damping technology

ACE is the internationally recognized expert in the field of industrial damping technology – with representative offices in 45 countries on all continents. ACE has been headquartered in Farmington Hills, MI since 1963.

September 2016 – Product images in this catalog are marked in color for visual purposes only. Images do not necessarily represent the actual product.

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01 - Rubber-Metal Isolators	14
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01

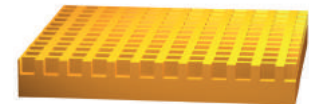
Rubber-Metal Isolators



LEV	Leveling Mounts	16
CM	Cup Mounts	18
COM	Compression Mounts	22
AAM	All Attitude Mounts	30
SFM	Stable Flex Mounts	34
BM	Bubble Mounts	38
UMO	Universal Mounts	40
FL	Flex Loc	42

02

Vibration-Isolating Pads



SLAB	Damping Pads	47
CEL	Elastomer Pads	50
PAD	Sturdy Fiber and Elastomer Pads	52

03

Low Frequency Pneumatic Leveling Mounts



PLM	Pneumatic Leveling Mounts	56
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September 2016 – Product images in this catalog are marked in color for visual purposes only. Images do not necessarily represent the actual product.

Vibration Isolation

Noise reduction and vibration isolation are becoming more important. This applies especially to the workplace and to manufacturing environments.

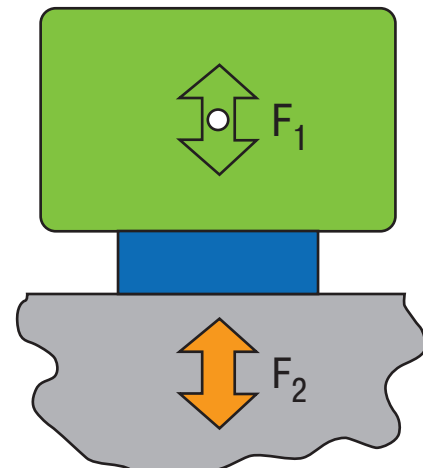
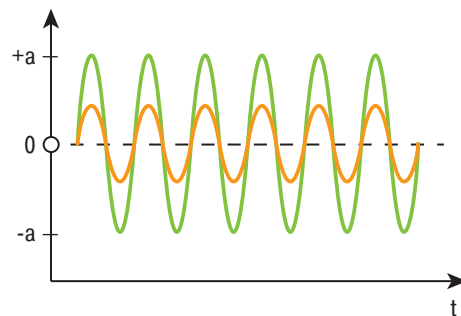
There are many reasons for preventing noise emissions or harmful vibration including; product quality, protecting delicate measuring and testing equipment.

Preventive vibration isolation leads to

- improved working conditions
- more accurate production tolerances and increased product quality
- competitive and cost advantages due to lower reject rates
- increased production speed due to increased maximum machine dynamics
- longer tool and machine life
- faster and more accurate measuring



Degree of Isolation



Types and mode of action of vibration isolation

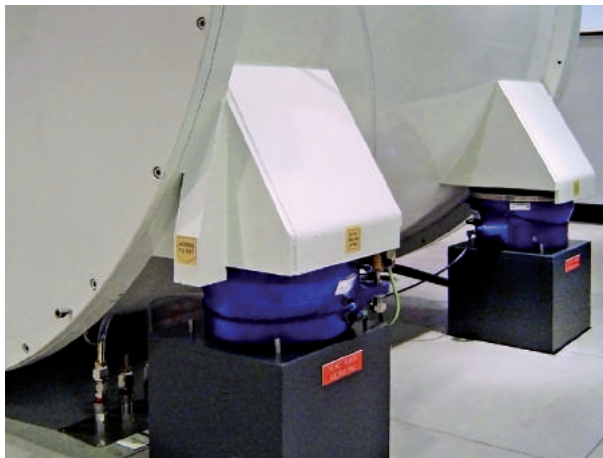
Vibration isolation is generally subdivided into source isolation and receiver isolation. Source isolation, for example, is a press or machine that is isolated from its foundation so that the vibration is isolated.

In the case of receiver isolation, the object to be protected, e.g. a measuring table, is isolated from the foundation. If the machinery or equipment is rigidly connected to the foundation without isolation material, one can assume an almost 100% transmission of vibration or shock.

The task of vibration isolation for machinery and equipment is to reduce the transmission of mechanical vibrations and reciprocal forces by installing elastic, damping components.

It is not always possible to provide an elastic (soft) support for all machines, foundations, measurement facilities and building parts. Users must find a balance between system stability and degree of isolation.

ACE engineers are happy to assist you in selecting products and solutions.



Receiver Isolation Example



Source Isolation Example

Effectiveness and Vibration Calibration

In order to assess the effectiveness of isolation elements for harmonic vibration, one relates the excitation frequency f_e (machine speed in cycles per second) of the isolator to the natural frequency f_0 . The effectiveness of isolation increases with the decreasing natural frequency of the system. If the ratio η of the excitation to the natural frequency of the system is larger than $\sqrt{2}$, one may refer to an isolation effect. Furthermore, the degree of effectiveness (isolation) increases in proportion to the ratio ($\eta = f_e / f_0$).

If the ratio is lower than the limit $\sqrt{2}$, the vibration may become amplified. This is the case in the resonance range if the disturbance frequency is equal to that of the natural frequency of the isolator ($\eta = f_e / f_0 = 1$).

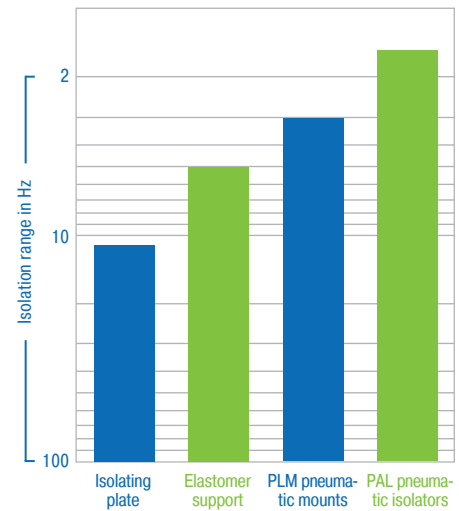
Damping (D) plays an additional, important role in vibration isolation. When ramping up machines to their operating speed or when ramping down, the natural frequencies of the vibration isolation are typically transmitted. In order not to exceed the amplitudes or limit values when passing through the resonances, sufficient damping must be in place.

Quick Selection

Different products can be used to isolate machinery and equipment. These differ in material, form and mode of action. The following quick selection will allow an initial rough estimation by showing you the effectiveness of the different damping products.

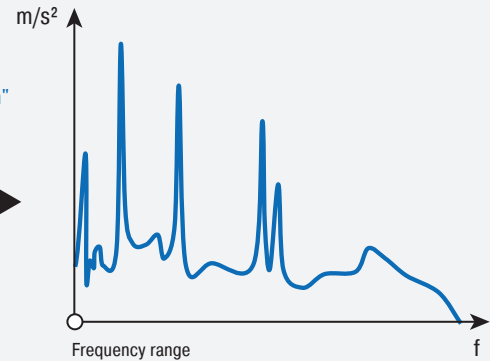
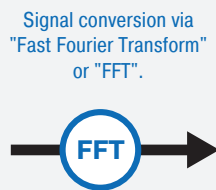
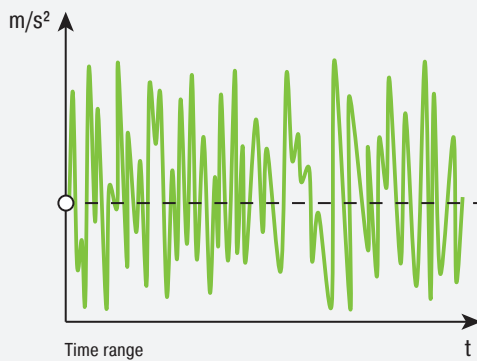
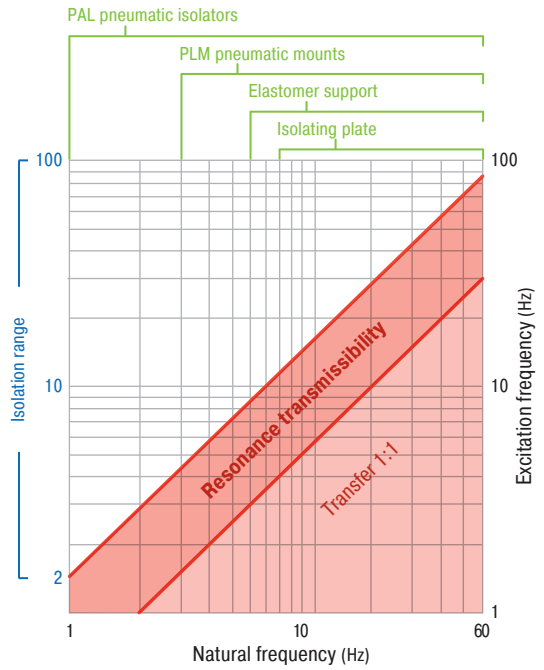
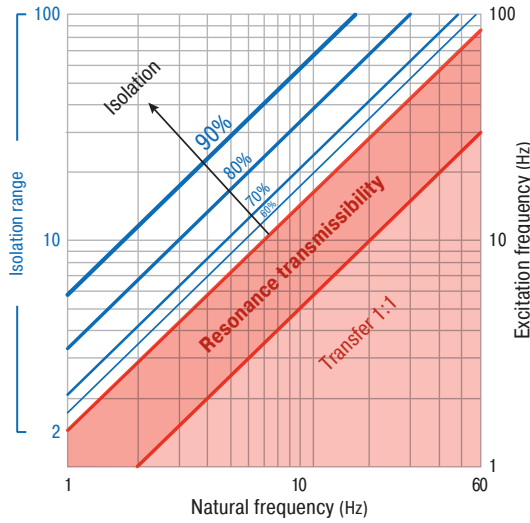
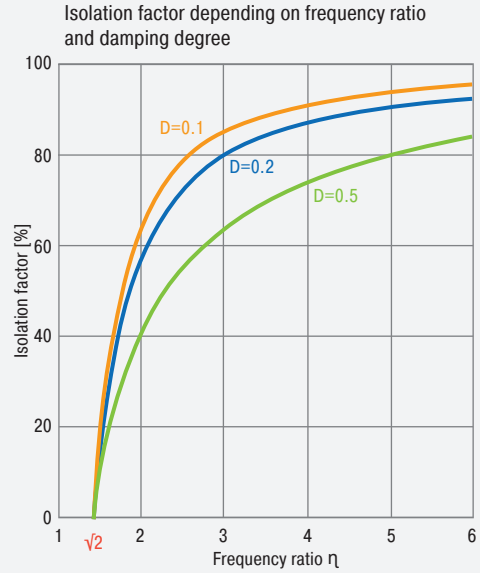
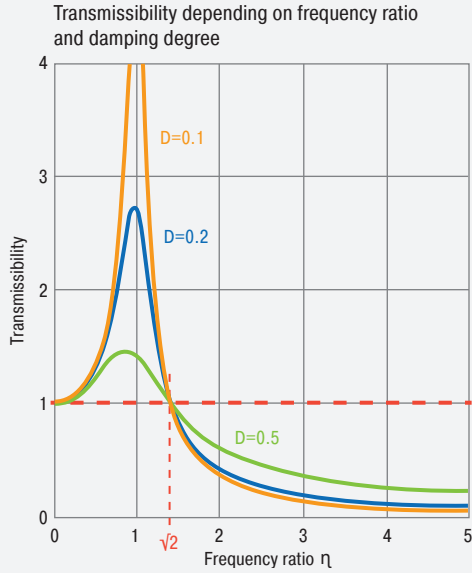
Unlike uniform vibration, shocks induced by machinery, equipment or production processes differ in their time profile and intensity. Application Engineers are available to assist you in selecting the right shock absorber. In addition, selection ranges which suit your needs are available on www.acecontrols.com.

Application Ranges of Isolators











More Complex Vibration

In case of more complex vibration, a vibration analysis is recommended. In this process, the measured time signal is transformed into the frequency range. The analysis of the vibration frequency will allow proper material selection that will result in the lowest excitation frequency being isolated.






Frequency and weight ranges



	Type	Effective Direction	Load Range lbs	Natural Frequency Range Hz
Rubber-Metal Isolators				
	LEV	↓	30 - 13,000	8 - 24
	CM	↕	7 - 400	12 - 35
	COM	↓	14.3 - 1,100	4.5 - 16
	AAM	↕	1.1 - 50	16 - 46
	SFM	↕	44.1 - 2,200	8 - 13
	BM	↓	1.5 - 18	8 - 16
	UMO	↕	9 - 4,550	15 - 24 10 - 19
	FL	↕	0.9 - 61.7	not specified

Application overview

Type	Machines	Conveying Systems	Construction / Transportation	Blower Fan	Foundations	Control Units / Electrical Systems	Off-road vehicles
Rubber-Metal Isolators							
LEV	■	■		■			
CM	■		■	■			■
COM	■	■		■		■	
AAM		■	■			■	■
SFM			■				■
BM				■		■	
UMO	■	■	■			■	■
FL	■		■			■	
Vibration-Isolating Pads							
SLAB	■	■	■	■	■		
CEL	■	■	■	■	■		■
PAD	■		■		■		■
Pneumatic Leveling Mounts							
PLM	■						
PAL					■		

Frequency and Weight Ranges / Application Areas

	Type	Load Range N/mm ²	Natural Frequency Range Hz
Vibration-Isolating Plates			
	SLAB	0.002 - 0.5	12 - 50
	CEL	0.35 - 2.1	11 - 60
	PAD	0 - 13.8	for shock absorption only

	Type	Load Range lbs	Natural Frequency Range Hz
Low-Frequency Pneumatic Levelling Mounts			
	PLM	44 - 19,200	3 - 10
	PAL	80 - 100,000	1.2 - 5

Engines Generators	Compressors	Oil and gas industry	Aerospace	Presses	Medicine	Measuring tables	Test benches	Type
Rubber-Metal Isolators								
				■				LEV
■	■	■	■					CM
■	■			■				COM
■			■		■			AAM
■	■							SFM
					■			BM
■	■	■	■					UMO
■	■							FL
Vibration-Isolating Pads								
		■		■	■	■		SLAB
■	■	■		■	■	■	■	CEL
■	■	■		■				PAD
Pneumatic Levelling Mounts								
				■	■	■	■	PLM
			■			■	■	PAL

Quick selection made easy!

The majority of isolation solutions can be found with the relatively easy use of diagrams. They allow a simple relation to be made between natural frequency, the predominant excitation frequency and the degree of isolation to be expected.

As marked in the diagrams, we recommend the use of products with a theoretical degree of isolation of 50% or higher. Another value for an efficient and cost-effective vibration isolation is a ratio of roughly 3 between the excitation frequency of the isolator and the predominant excitation frequency.

The model on which this simplified quick selection is based upon is the physics of a single-degree of freedom system. It is recommended to contact a technical consultant or application engineer with more complex, non-rigid systems and super structures.

The selection tables were prepared according to our best knowledge; their use excludes entitlement to legal and warranty claims. On request, ACE offers consultation and measurement services separately to this approximate preselection.

- 1 Natural frequencies of products** in relation to the load in pounds (lbs.) per element (rubber-metal isolators) or lb/in² as surface pressure (damping pads).
- 2 Spring characteristic** according to load or surface pressure.
- 3 Relationship diagram** the relationship between the excitation frequency, natural frequency and desired isolation effect.

Using the diagram

Example

A user has a 2,200 lbs machine with 1,800 RPM, which corresponds to an excitation frequency of $1,800 / 60 = 30$ Hz. Furthermore, the user would like to achieve a good isolation to the floor through the use of 4 CM cup mounts (550 lbs per isolator).

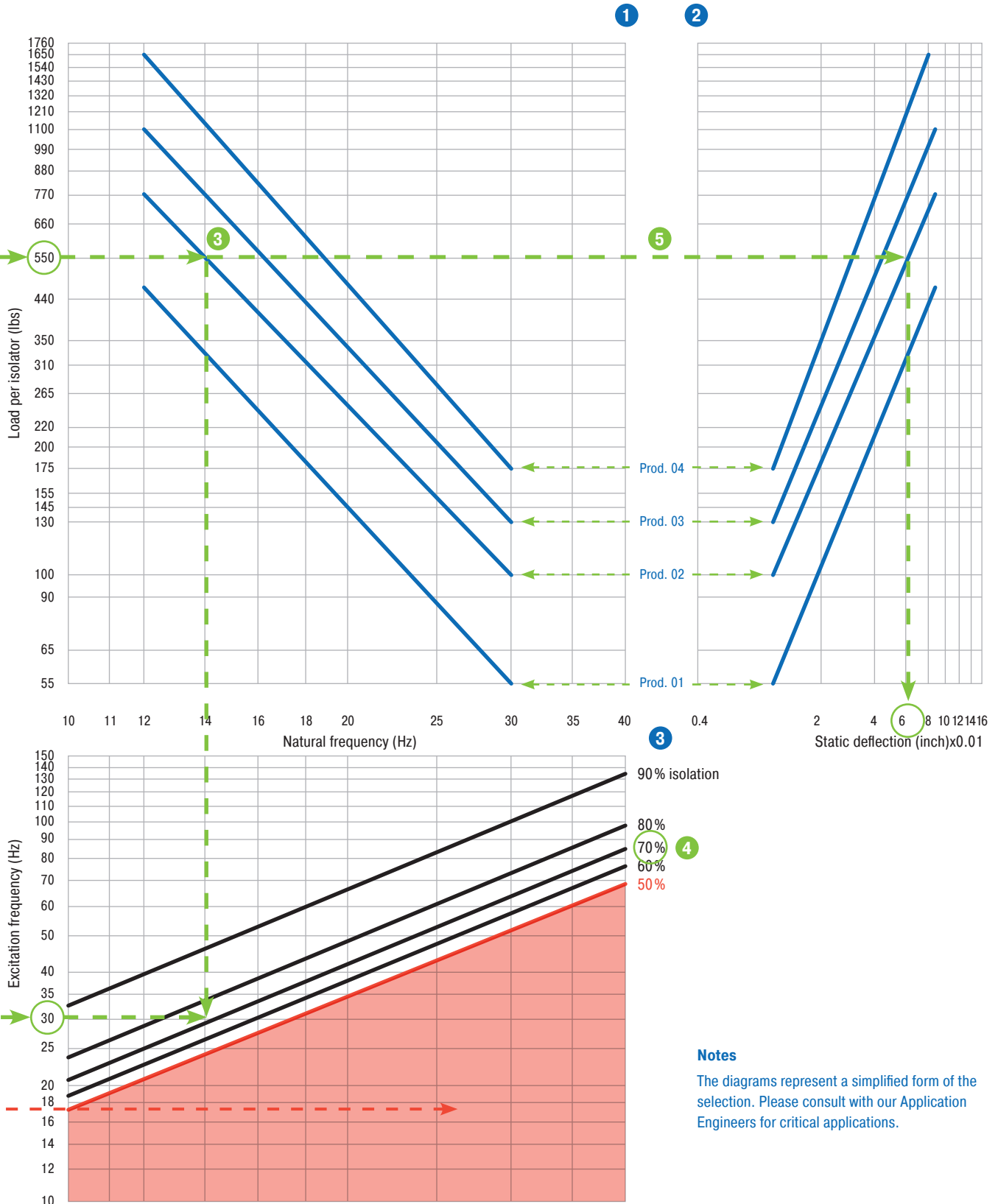
The resultant procedure is as follows:

- 1** Draw horizontal line in diagram 1 at 550 lbs Load per isolator. The line intersects 3 products as solutions, the first and most efficient is product 2 in this case.
- 2** Draw horizontal line in diagram 3 at 30 Hz disturbance frequency.
- 3** Draw a vertical line from the intersection point in diagram 1 downwards until the horizontal line previously drawn in diagram 3 is met.
- 4** Now you can simply read the isolation to be anticipated: in this case it is 70%, which represents a good isolation value.
- 5** Continue to draw the horizontal line from diagram 1 until it intersects the product line product 2 in diagram 2. Here the value for the static deflection can be read on the x-axis below. In this example, the reference value is 0.06 inch.

Critical performance area

In the area shown here in red, there is either no improvement or only a very minor improvement in the starting vibration situation. This critical performance area also corresponds to the area of resonance.

Example Diagram



Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.

Updated September 2016

01

Rubber-Metal Isolators



LEV

Leveling Mount (height-adjustable machine mounts)

Secure, adjustable stabilization for all types of machines, conveying systems, assembly stations, etc.



CM

Cup Mount

For isolating machinery and equipment. Fail-safe isolators for spatial axes in any position. Application examples: compressors, off-road vehicles, electronics, fans, etc.



COM

Compression Mount (high-performance equipment mounts)

Vertically acting isolators for machinery and equipment. Applications include: blowers, compressors, motors, generators, presses, etc.



AAM

All Attitude Mount (vibration isolation mounts)

Maintenance free isolators for decoupling parts and components in electronics, aerospace, the military, medicine transfer systems, etc.



SFM

Stable Flex Mount (stable vibration isolators)

Robust and maintenance-free isolators for marine applications, diesel generators, power generation or off-road vehicles.



BM

Bubble Mount (low frequency vibration isolators)

For protecting small devices and electronic components in medical technology, electronic systems or computers.



UMO

Universal Mount (universal connection isolators)

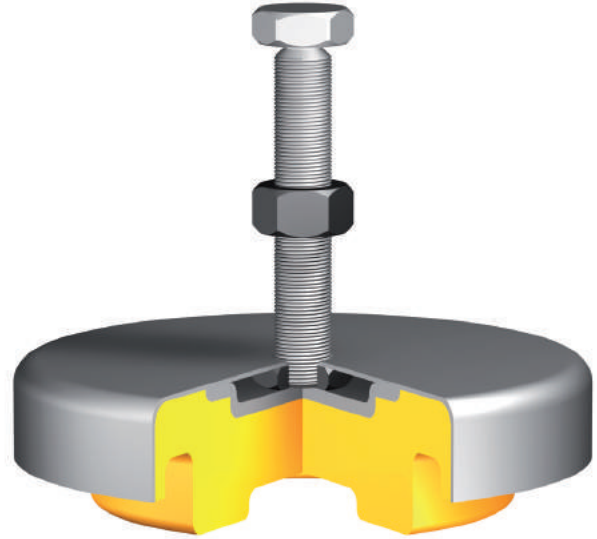
Maintenance-free connection isolators which can be implemented both radially and axially. Application examples: conveying systems, machinery and equipment, off-road, oil and gas industry, control systems, etc.



FL

Flex Loc (quick fastening elements)

Simple, efficient components with versatile applications as isolating fasteners for decoupling structure-borne sound in enclosures, housings, equipment and machinery. For applications in HVAC, buildings, vehicles, or navigation.



LEV

Leveling Mount

Height-adjustable machine mounts

Height-adjustable machine mounts from the LEV product group are maintenance-free and ready to install. The precise, adjustable LEV machine mounts are used whenever machines require an adjustable, stable positioning.

Their function ensures the secure positioning of machinery and equipment, protecting them against damaging shocks and vibrations. LEV machine mounts can be supplied in different sizes, from 3/8" to 1" threads, and can secure and bear loads from 30 lbs to 13,000 lbs.

The selection of suitable machine mounts is made via the given mass of the machine distributed among the desired support points. Weight distribution within the system must be considered in such a way that the mounts are also measured with the associated load component. If additional dynamic loads are exerted by the machine, the next largest type must be chosen in a borderline static load case.

The mounts meet OSHA requirements for anchoring machines.

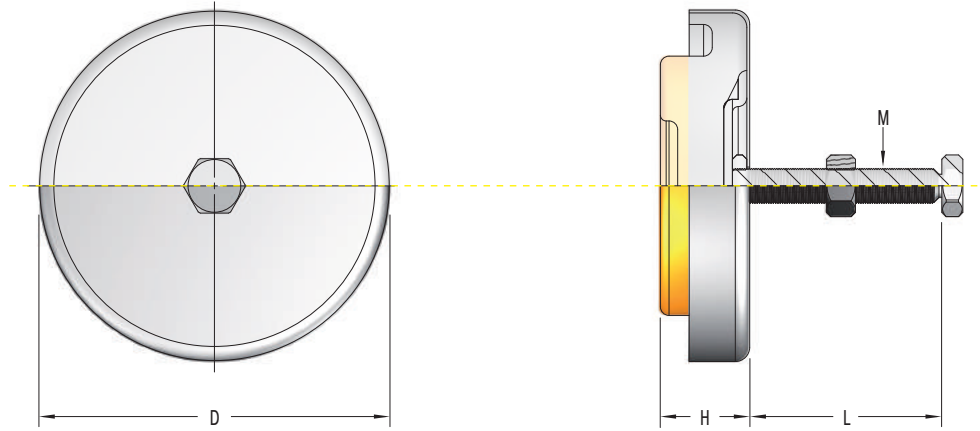
Features and Benefits

- Easy to level
- Vibration-reducing
- Noise-reducing
- Improved product quality
- Maintenance-free
- Compensates for floor unevenness
- Special models available on request
- Special vibration-isolating mounts standard and custom-made
- All metal parts galvanized (ROHS compliant)
- Neoprene rubber parts (chloroprene rubber)
- Natural frequency range: 8 - 24 Hz
- Operating temperature range -22° to +176°F

Areas of Application

- Injection molding machines
- Production and processing centers
- Assembly stations

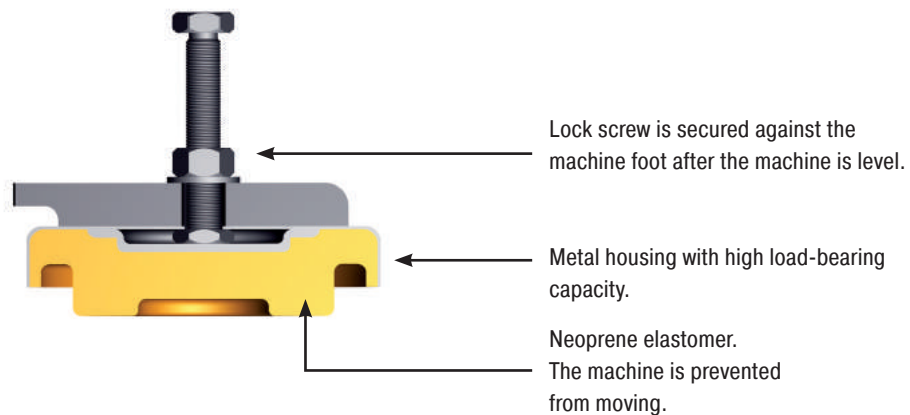
LEV



Type	Min. Load lbs	Max. Load lbs	Thread M	L Inch	D Inch	H Inch
LEV-52220	30	150	3/8-16	3	3.13	1.50
LEV-52221	55	250	3/8-16	3	3.13	1.50
LEV-52221-1	100	500	3/8-24	3	3.13	1.50
LEV-52222	100	500	3/8-16	3	3.13	1.50
LEV-52223*	300	1,000	1/2-13	5	4.75	1.50
LEV-52224	300	1,000	1/2-13	5	4.75	1.50
LEV-52225*	500	4,500	3/4-10	5	6.25	1.63
LEV-52226	500	4,500	3/4-10	5	6.25	1.63
LEV-52227*	4,000	13,000	1-14	8	9.00	2.50
LEV-52229*	4,000	13,000	1-14	8	9.00	2.25
LEV-52231	4,000	13,000	3/4-10	4	9.00	2.25
LEV-52232	4,000	13,000	3/4-10	8	9.00	2.25

Normally supplied with hex head bolt. (*) indicates square head bolts

Installation sketch





CM

Cup Mount

The CM cup mount protect machinery, vehicles and equipment against damaging vibrations and shocks. They are maintenance-free machine mounts.

Cup mounts are designed for harsh environments and incorporate a pre-loaded low profile, fail safe design. The CMs can be installed in the applications freely in space (X, Y and Z) and at any inclination. Standard CMs are manufactured and delivered with neoprene or high damped silicone.

For applications in the areas of heavy shock (off-road) and extreme temperatures, we recommend the use of the CMs with high-damping silicone as damping material. Under normal loading conditions, the CMs have a natural frequency of approximately 25 Hz (please refer to the selection diagram for exact values).

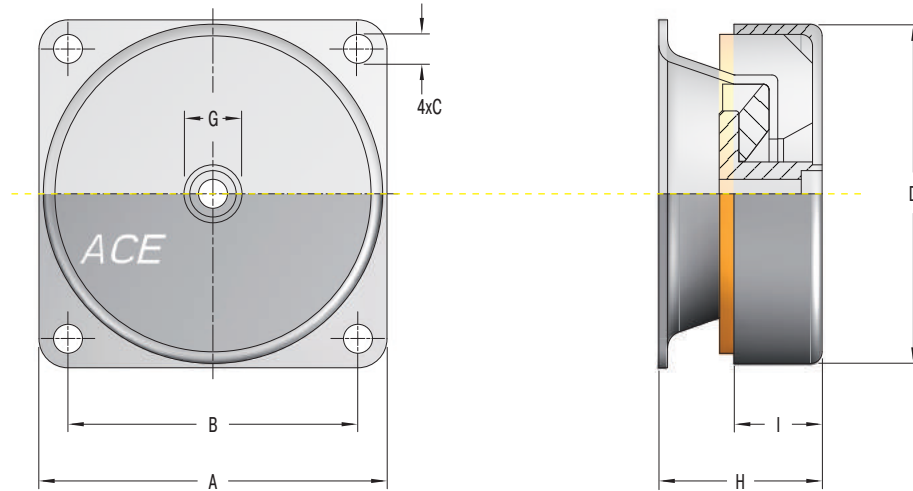
Features and Benefits

- Fail-safe
- Can be installed on all axes
- Can be used for shear, compressive and tensile loads
- Available with standard threads or through-hole core
- Galvanized metal parts, aluminum or stainless steel available
- Temperature range -20 °F to +180 °F for neoprene
- Temperature range -80 °F to +300 °F for high-damping silicone

Areas of Application

- Compressors and other vibrating machines
- Electronic control units and systems
- Crusher plants
- Fans and blowers in construction machinery and in buildings
- Off-road vehicles
- Shipbuilding
- Aircraft construction

CM



Type	Max. Load lbs	Thread G	A Inch	B Inch	D Inch	C Inch	H Inch	I Inch	Material
CM-US1-2-N	20	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	Neoprene Elastomer
CM-US1-4-N	40	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US1-7-N	70	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US1-10-N	100	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US1-2-S	20	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	High Damped Silicone Elastomer
CM-US1-4-S	40	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US1-7-S	70	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US1-10-S	100	1/4 -20*	2 3/8	1 15/16	2.28	0.196	1 1/8	11/16	
CM-US2-5-N	50	3/8-16	3	2 1/2	3	0.266	1 1/2	1	Neoprene Elastomer
CM-US2-10-N	100	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-15-N	150	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-25-N	250	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-40-N	400	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-5-S	50	3/8-16	3	2 1/2	3	0.266	1 1/2	1	High Damped Silicone Elastomer
CM-US2-10-S	100	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-15-S	150	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-25-S	250	3/8-16	3	2 1/2	3	0.266	1 1/2	1	
CM-US2-40-S	400	3/8-16	3	2 1/2	3	0.266	1 1/2	1	

* All Cup Mounts (CM) are available with other thread sizes on request.

Difference between stationary and mobile application in the selection diagrams

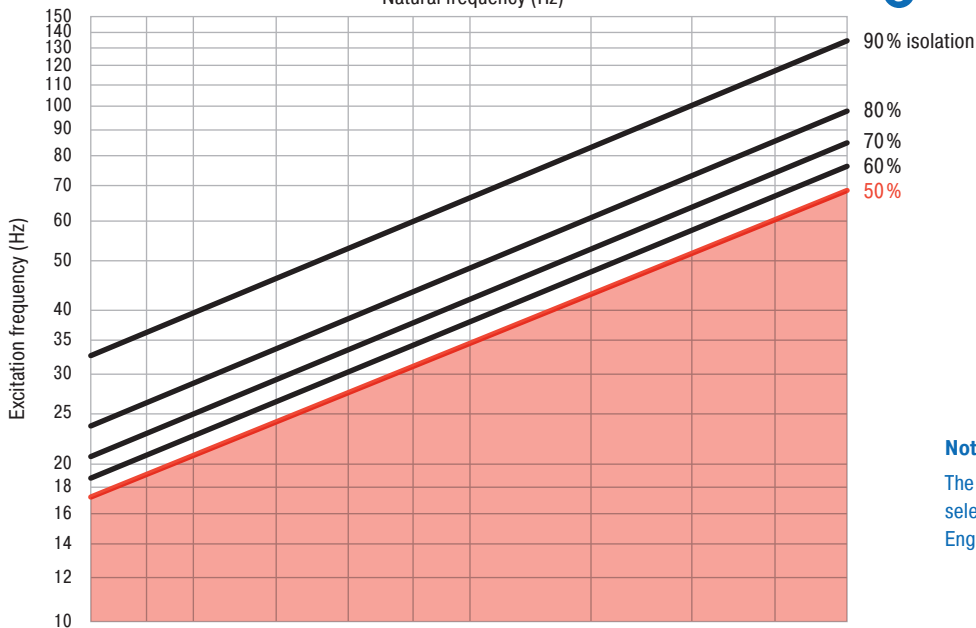
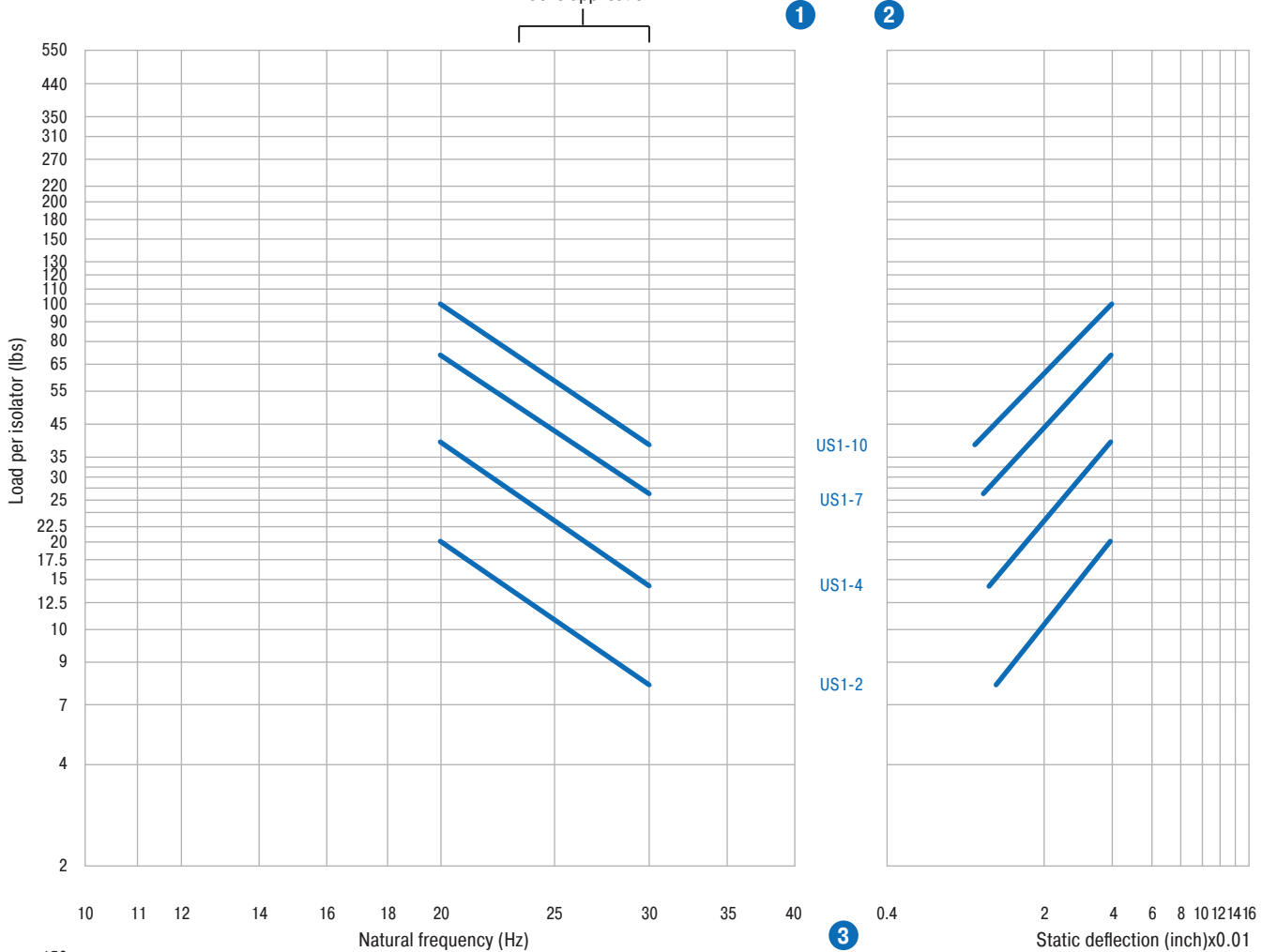
Stationary applications are those in which the cup mounts isolate fixed machines. Mobile applications, refer to applications in which the cup mounts isolate electronics, rotors or other parts on moving vehicles. Their range of application is reduced because, in addition to static load, there are additional dynamic loads exerted by the movement which must be considered.

CM – Cup Mount



CM-US1

Mobile application

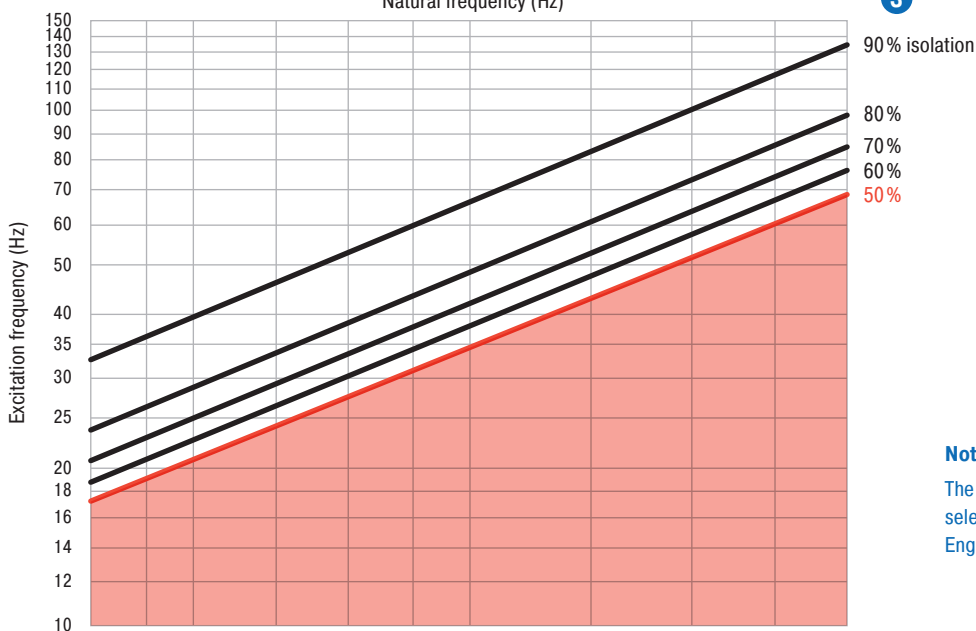
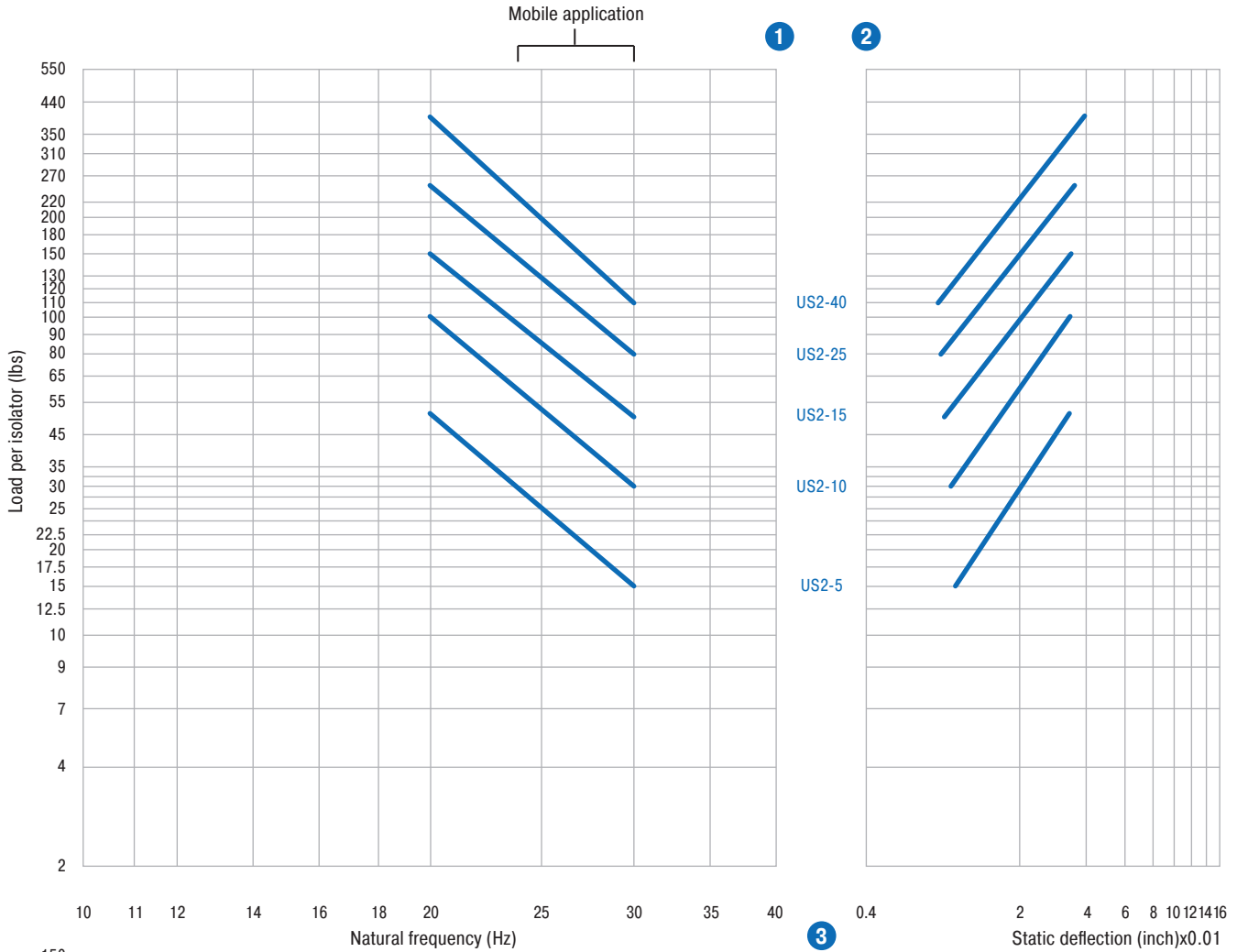


Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.



CM-US2

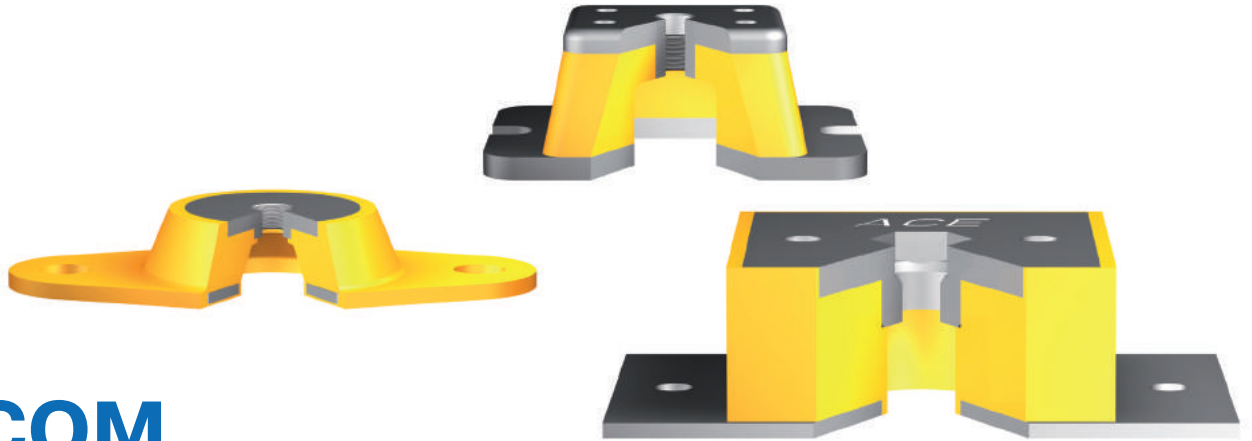


Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.

September 2016 – Product images in this catalog are marked in color for visual purposes only. Images do not necessarily represent the actual product.

COM – Compression Mount



COM

Compression Mount

High-performance equipment mountings

The COM compression mounts are high-performance equipment mounting elements for vertical machine applications. These robust, neoprene elastomer equipment mounts are primarily used in heavy-duty applications, such as pumps and compressors.

In their operating range, COMs exhibit a low natural frequency of approximately 8 to 15 Hz and can be coupled for certain applications, whereby the natural system frequency can be further reduced to approximately 6 to 10 Hz (please refer to the selection diagram for more exact data). They are often used in situations where unbalanced machine parts cause shock and vibration which can have a negative impact on the surrounding area.

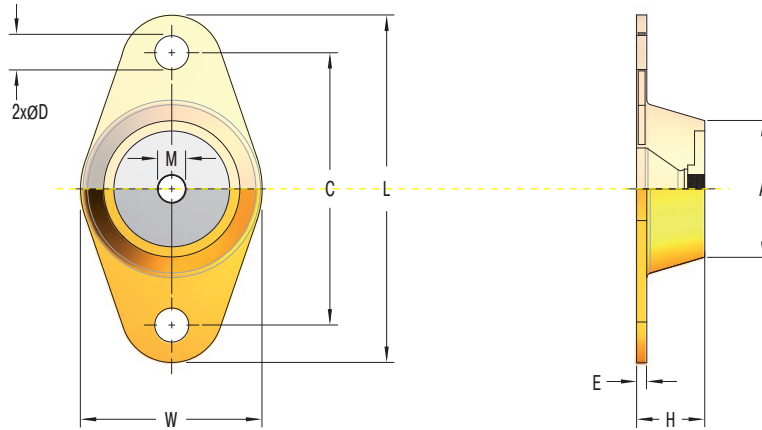
Disturbance frequencies from 900 rpm (15 Hz) are effectively isolated. With excitation frequencies of 25 Hz, the degree of isolation of the COMs is 90%. Through the use of the high-performance equipment mountings, structure-borne noise paths are interrupted, preventing the generation of resonant sound.

Features and Benefits

- Enhance efficiency
- Isolates structure-borne noise
- Low frequency application range from ~15 Hz
- Sturdy
- Maintenance-free
- High-damping silicone available
- Galvanized metal parts (ROHS compliant)
- Neoprene rubber parts (chloroprene rubber)
- Operating temperature range -22° to +176° F

Areas of Application

- Centrifuges
- Blowers
- Vibrators and crushing machines
- Compressors and ventilation systems
- Injection molding systems
- Switch cabinets



COM-5250x / COM-5252x / COM-5254x



Type	Color Code*	Max. Load lbs	Thread M	L Inch	W Inch	H Inch	A Inch	C Inch	D Inch	E Inch
COM-52501	Blue	35	5/16-18	3 1/8	1 3/4	1	1 1/4	2 3/8	11/32	3/16
COM-52502	Black	45	5/16-18	3 1/8	1 3/4	1	1 1/4	2 3/8	11/32	3/16
COM-52503	Red	70	5/16-18	3 1/8	1 3/4	1	1 1/4	2 3/8	11/32	3/16
COM-52504	Green	120	5/16-18	3 1/8	1 3/4	1	1 1/4	2 3/8	11/32	3/16
COM-52521	Blue	135	3/8-16	3 7/8	2 3/8	1 1/4	1 3/4	3	11/32	7/32
COM-52522	Black	170	3/8-16	3 7/8	2 3/8	1 1/4	1 3/4	3	11/32	7/32
COM-52523	Red	240	3/8-16	3 7/8	2 3/8	1 1/4	1 3/4	3	11/32	7/32
COM-52524	Green	380	3/8-16	3 7/8	2 3/8	1 1/4	1 3/4	3	11/32	7/32
COM-52525	Gray	550	3/8-16	3 7/8	2 3/8	1 1/4	1 3/4	3	11/32	7/32
COM-52541	Black	250	1/2-13	5 1/2	3 3/8	1 3/4	2 1/2	4 1/8	9/16	1/4
COM-52542	Red	525	1/2-13	5 1/2	3 3/8	1 3/4	2 1/2	4 1/8	9/16	1/4
COM-52543	Green	750	1/2-13	5 1/2	3 3/8	1 3/4	2 1/2	4 1/8	9/16	1/4
COM-52544	Gray	1100	1/2-13	5 1/2	3 3/8	1 3/4	2 1/2	4 1/8	9/16	1/4

* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**. On request: High Damped Silicone, please add -HDS to the part number. Example: COM-52501-HDS for COM-52501 as High Damped Silicone version.

COM-5251x / COM-5253x / COM-5255x



Type	Color Code*	Max. Load lbs	Thread M	L Inch	W Inch	H Inch	A Inch	C Inch	D Inch	E Inch
COM-52511	Blue	35	5/16-18	3 1/8	1 3/4	1 1/4	1 1/4	2 3/8	11/32	3/16
COM-52512	Black	45	5/16-18	3 1/8	1 3/4	1 1/4	1 1/4	2 3/8	11/32	3/16
COM-52513	Red	70	5/16-18	3 1/8	1 3/4	1 1/4	1 1/4	2 3/8	11/32	3/16
COM-52514	Green	120	5/16-18	3 1/8	1 3/4	1 1/4	1 1/4	2 3/8	11/32	3/16
COM-52531	Blue	135	3/8-16	3 7/8	2 3/8	1 3/4	1 3/4	3	11/32	7/32
COM-52532	Black	170	3/8-16	3 7/8	2 3/8	1 3/4	1 3/4	3	11/32	7/32
COM-52533	Red	240	3/8-16	3 7/8	2 3/8	1 3/4	1 3/4	3	11/32	7/32
COM-52534	Green	380	3/8-16	3 7/8	2 3/8	1 3/4	1 3/4	3	11/32	7/32
COM-52535	Gray	550	3/8-16	3 7/8	2 3/8	1 3/4	1 3/4	3	11/32	7/32
COM-52551	Black	250	1/2-13	5 1/2	3 3/8	2 7/8	2 1/2	4 1/8	9/16	1/4
COM-52552	Red	525	1/2-13	5 1/2	3 3/8	2 7/8	2 1/2	4 1/8	9/16	1/4
COM-52553	Green	750	1/2-13	5 1/2	3 3/8	2 7/8	2 1/2	4 1/8	9/16	1/4
COM-52554	Gray	1100	1/2-13	5 1/2	3 3/8	2 7/8	2 1/2	4 1/8	9/16	1/4

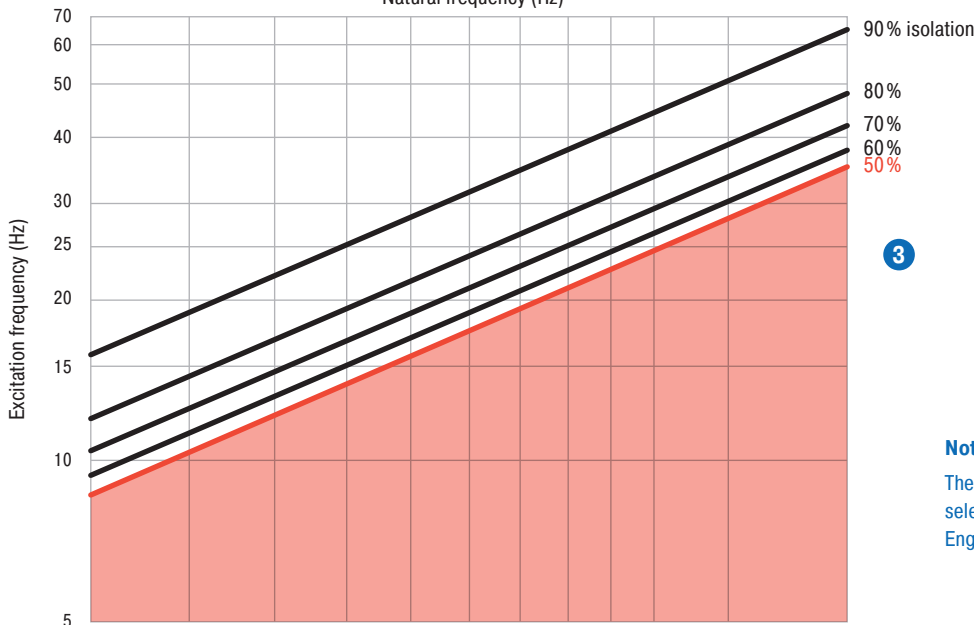
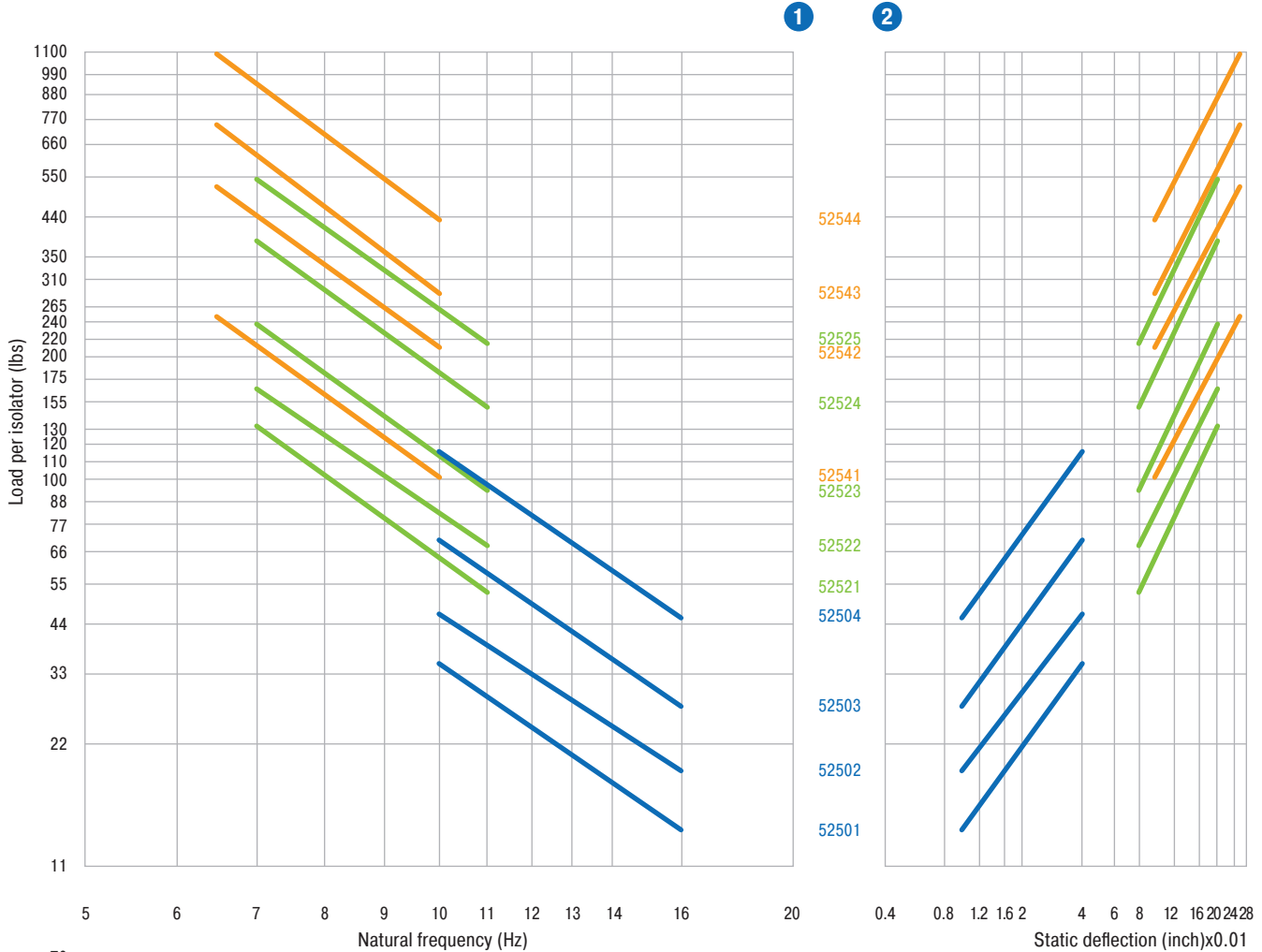
* The color code is for identifying the loading capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**. On request: High Damped Silicone, please add -HDS to the part number. Example: COM-52511-HDS for COM-52511 as High Damped Silicone version.

COM – Compression Mount

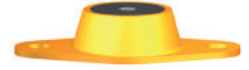


COM-5250x / COM-5252x / COM-5254x

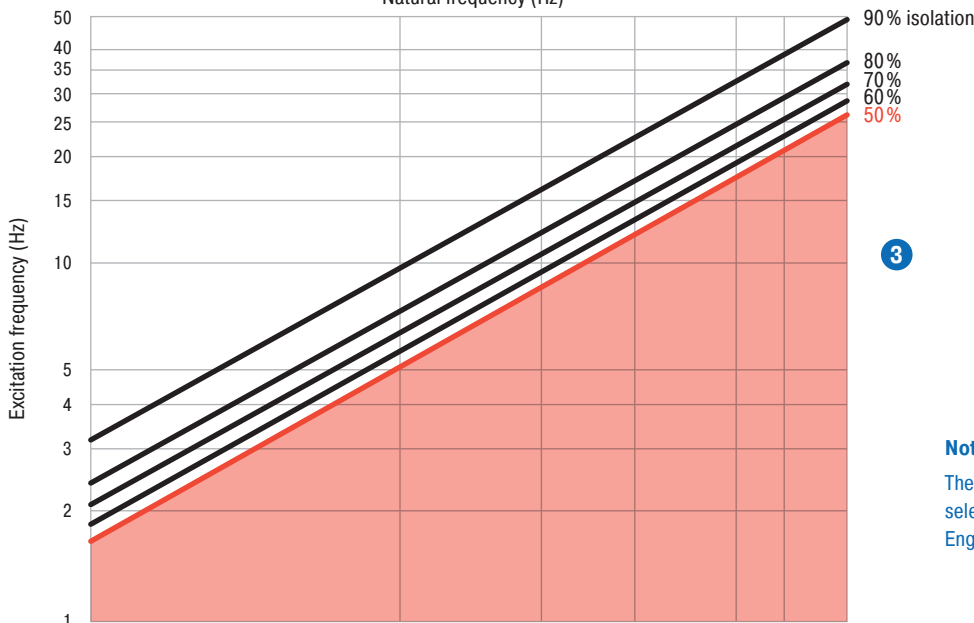
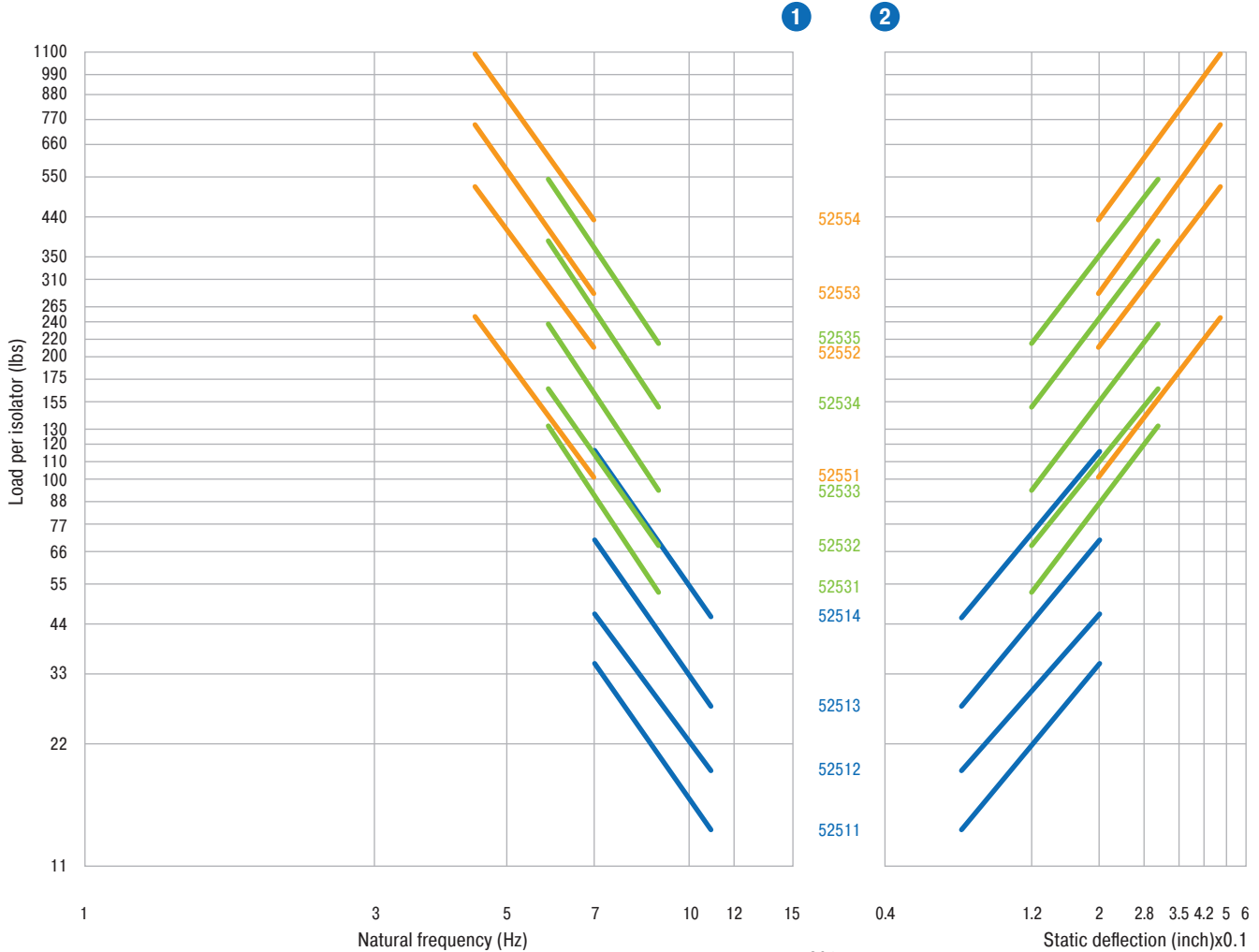


Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.



COM-5251x / COM-5253x / COM-5255x



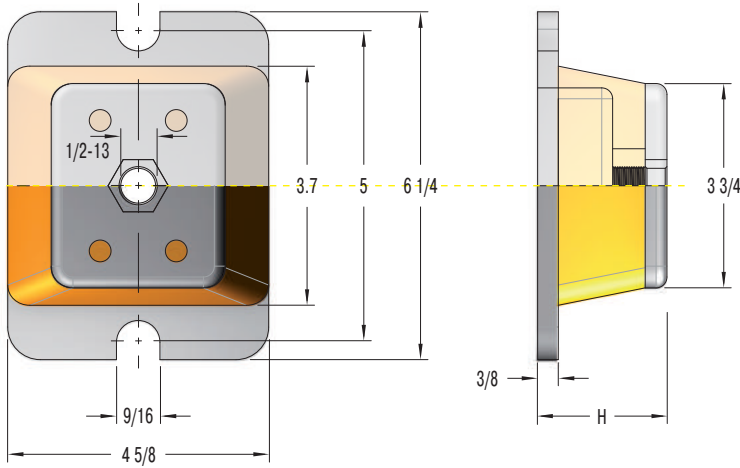
Notes

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COM – Compression Mount

COM-5256x / COM-5257x



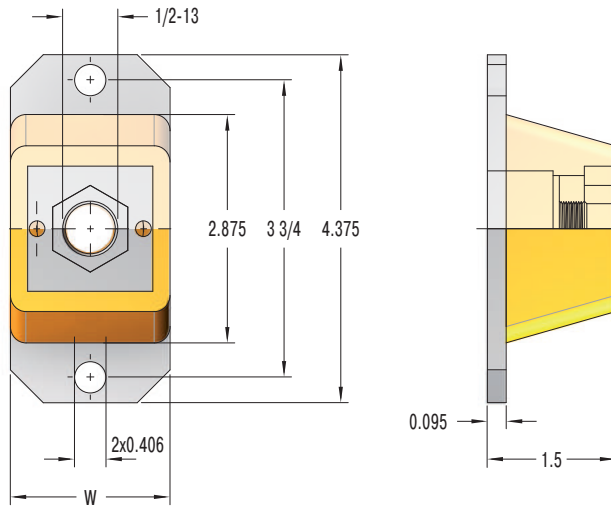
Type	Color Code*	Max. Load lbs	H Inch
COM-52561	Black	1,500	1-5/8
COM-52562	Red	2,250	1-5/8
COM-52563	Green	3,000	1-5/8
COM-52564	Gray	4,000	1-5/8
COM-52571	Black	1,500	2 3/4
COM-52572	Red	2,250	2 3/4
COM-52573	Green	3,000	2 3/4
COM-52574	Gray	4,000	2 3/4

* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**

On request: High Damped Silicone, please add -HDS to the part number. Example: COM-52561-HDS for COM-52561 as High Damped Silicone version.

COM-5216x

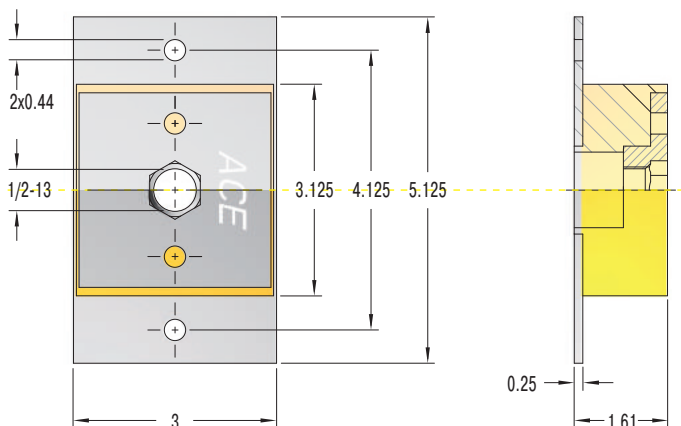


Type	Color Code*	Max. Load lbs	W Inch
COM-52160	Yellow	60	2
COM-52161	Red	100	2
COM-52162	Green	150	2
COM-52163	Blue	200	2
COM-52164	Red	200	4
COM-52165	Green	280	4
COM-52166	Blue	500	4
COM-52167	White	700	4

* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**

COM-5217x

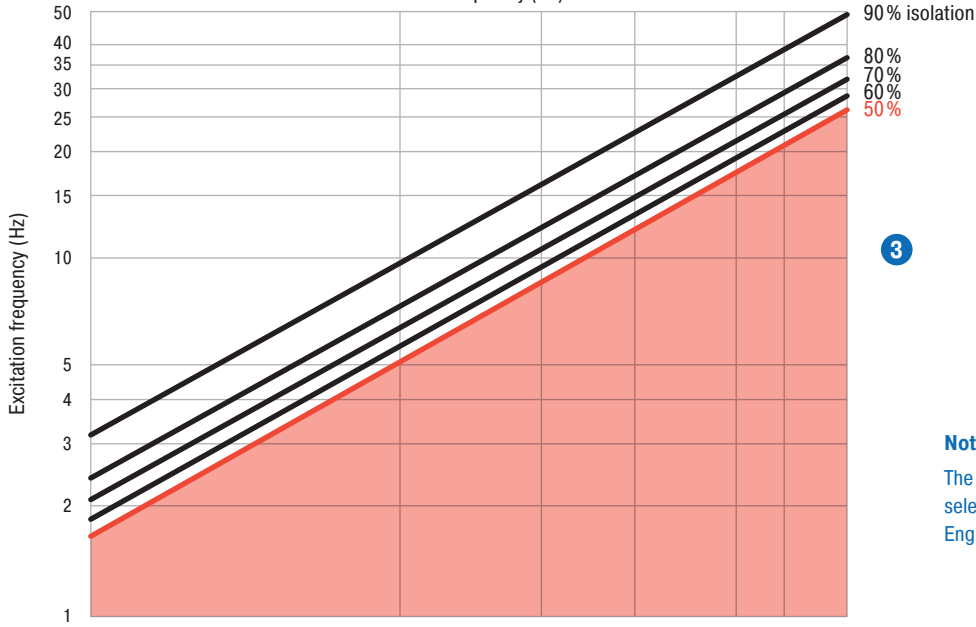
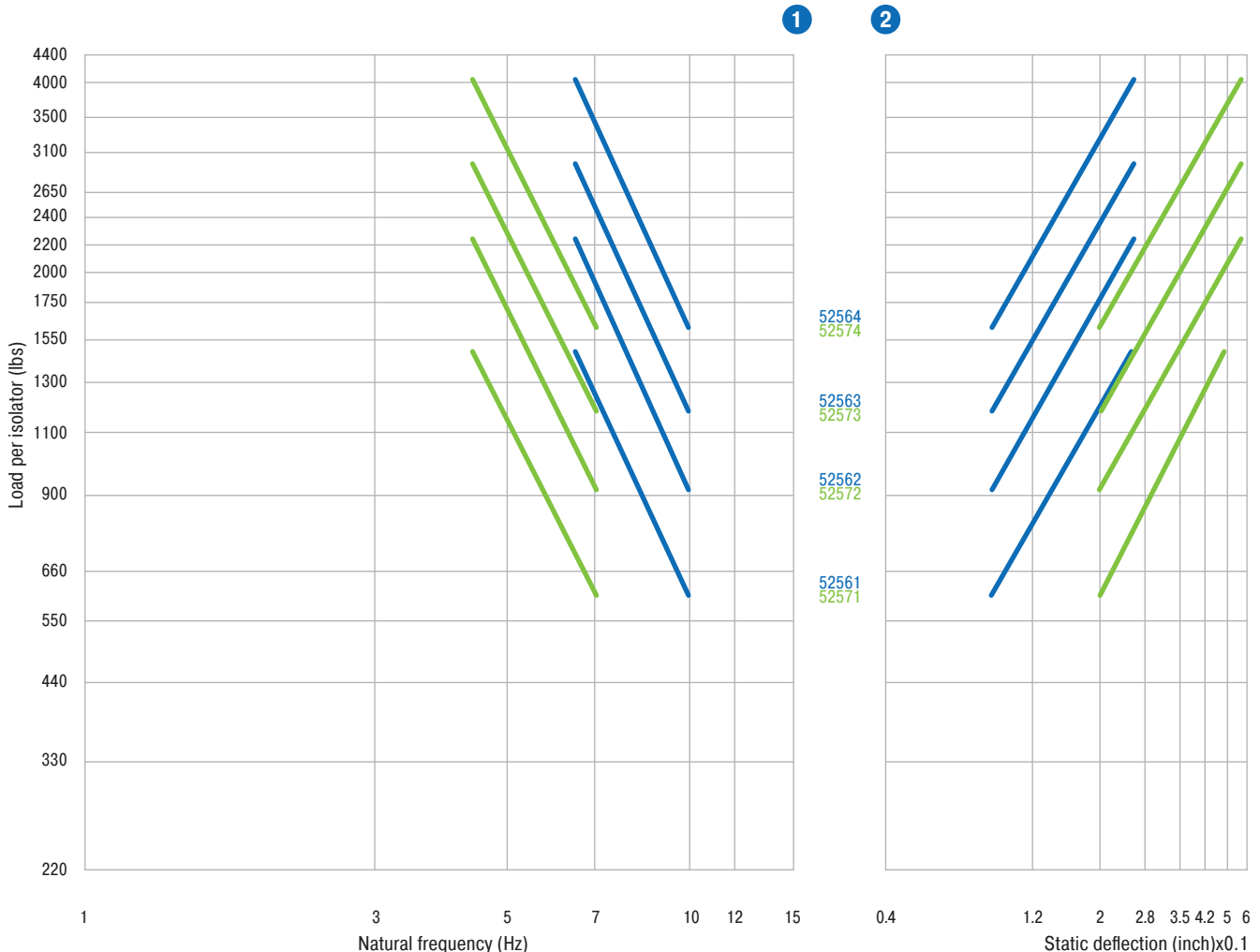


Type	Color Code*	Max. Load lbs
COM-52171	Red	700
COM-52172	Green	1,000
COM-52173	Blue	1,500
COM-52174	White	2,500

* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**

COM-5256x / 5257x



Notes

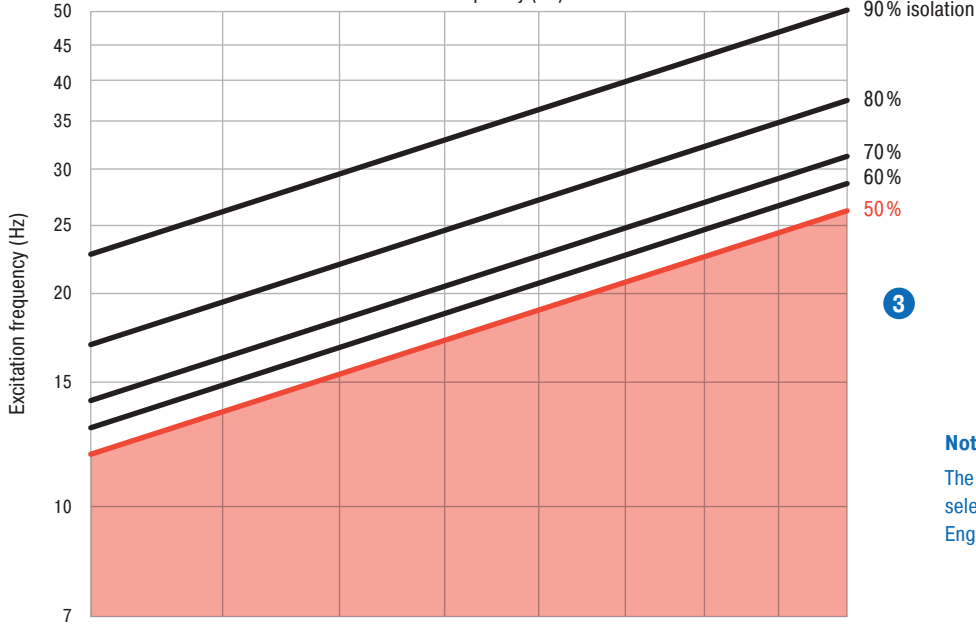
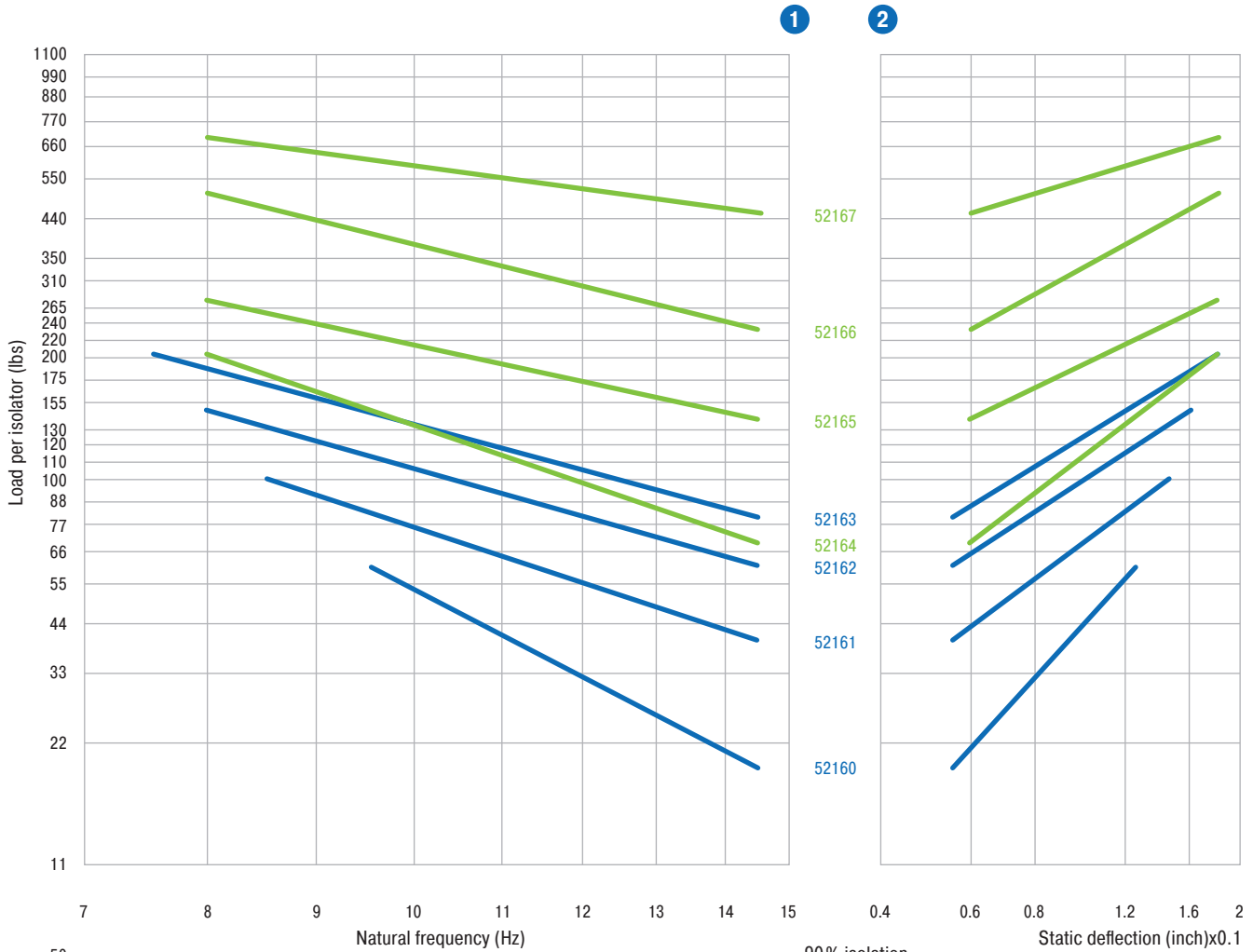
The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.

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COM – Compression Mount



COM-5216x



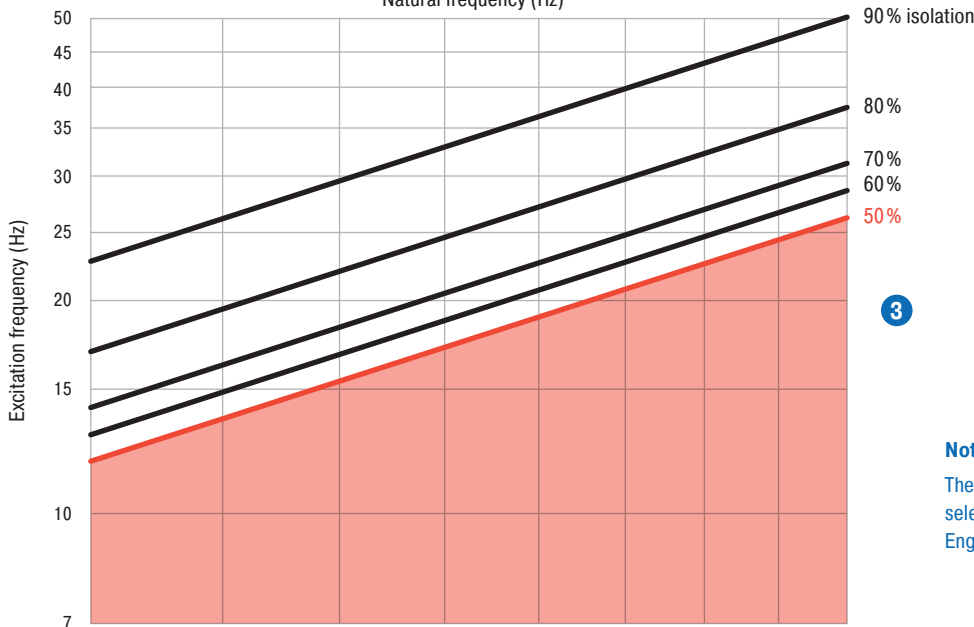
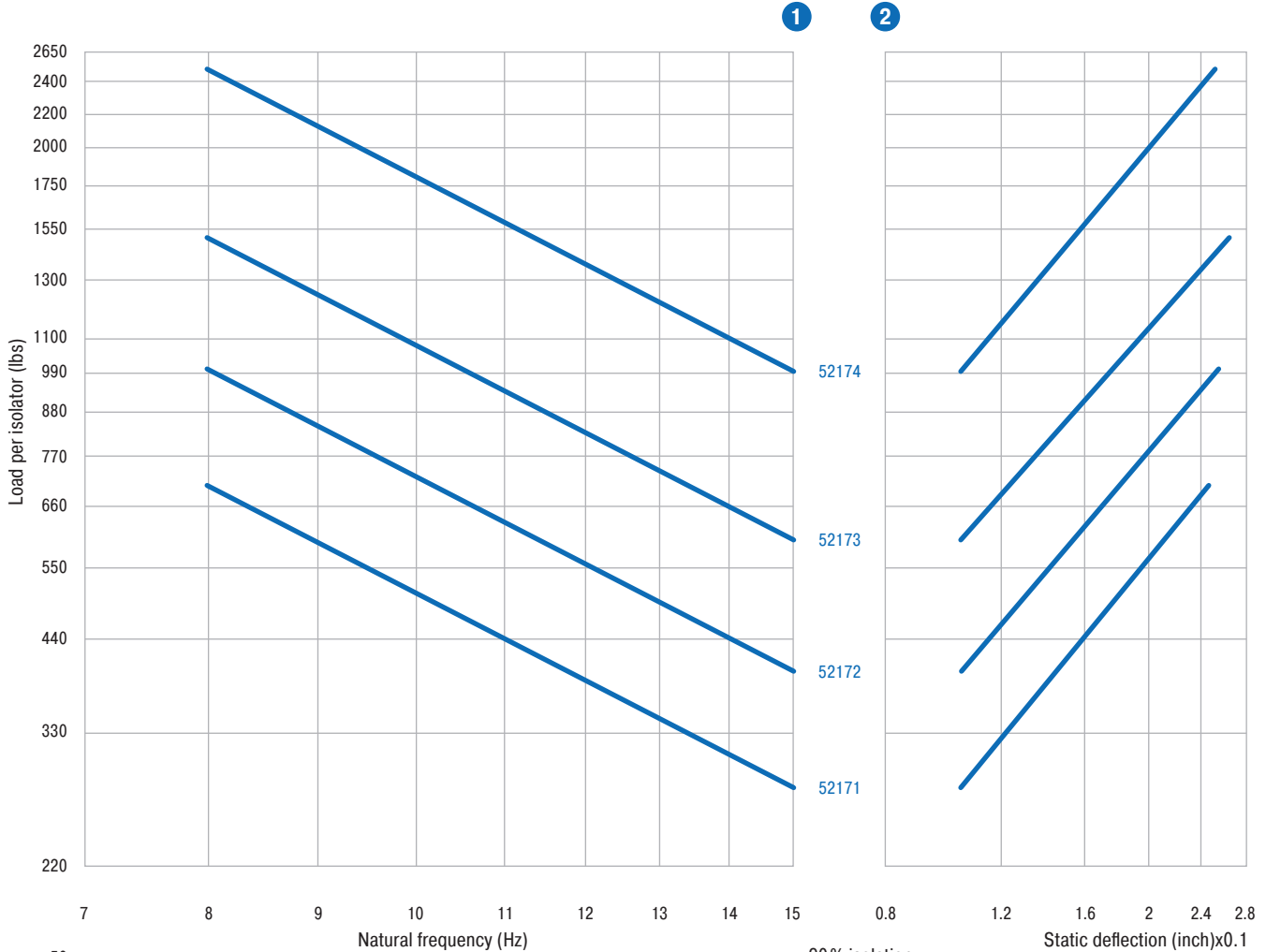
Notes

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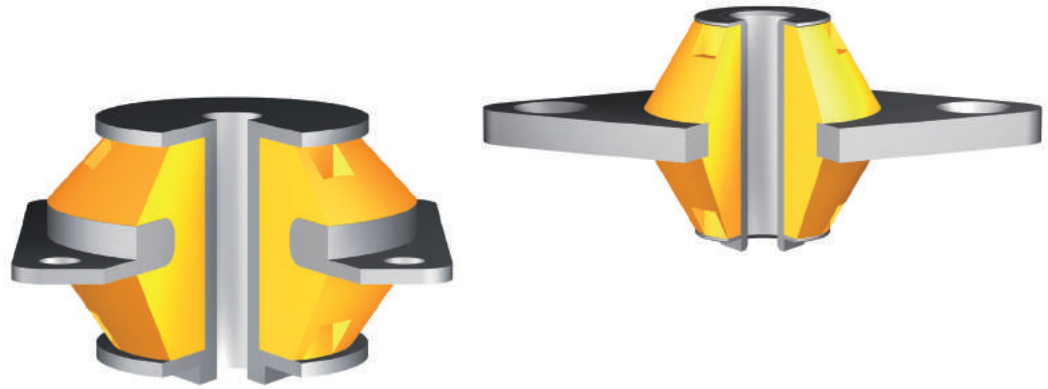


COM-5217x



Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.



AAM

All Attitude Mount

Vibration isolation mounts

The vibration isolation mount (All-Attitude Mount) of the AAM product group are maintenance-free and ready-to-install isolators that can reduce vibration and shock in all directions. The isolation effect is achieved by a special neoprene-elastomer insert.

For applications in which maximum shock absorption is particularly critical, the AAMs can also be manufactured with high-damping silicone. The mounts can be installed in all axes. The AAM range is used mainly for isolating lighter electronic equipment and components.

Features and Benefits

- Can be used in all axes and inclinations
- Standard with neoprene or high-damping silicone
- Shock absorption possible
- Galvanized metal parts (ROHS compliant)
- Operating temperature range -22° to +176° F

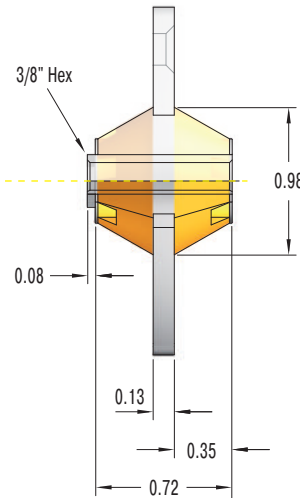
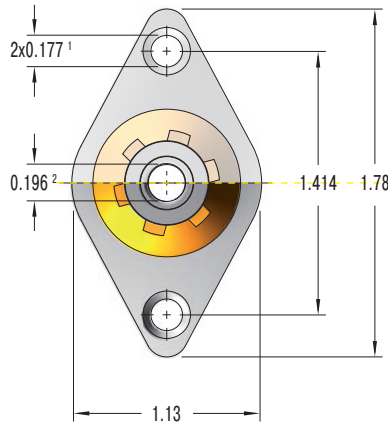
Areas of Application

- Electronic equipment and control panels
- Off-road
- Military

AAM – All Attitude Mount



AAM-5642x



¹ Countersunk 82° to 0.337

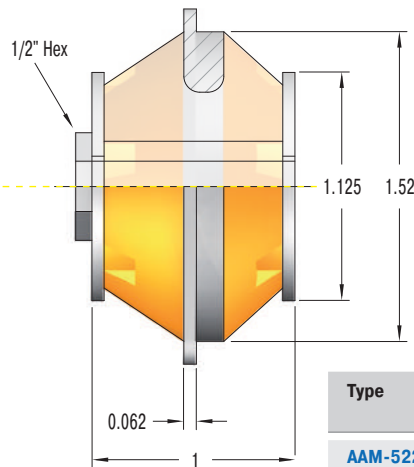
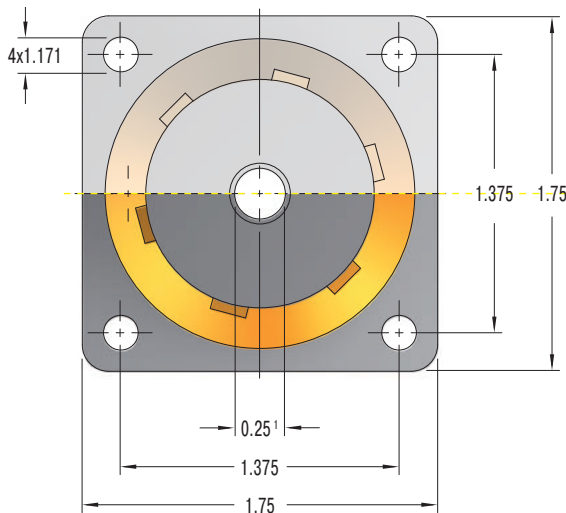
² Thru hole or 8-32 Unc-2b thread add -T to P/N for threaded version

Type	Color Code*	Max. Stationary Load lbs
AAM-56423	Gray	3.0
AAM-56424	Red	4.5
AAM-56425	Yellow	7.0
AAM-56426	Green	10.0
AAM-56423-T	Gray	3.0
AAM-56424-T	Red	4.5
AAM-56425-T	Yellow	7.0
AAM-56426-T	Green	10.0

* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard material: **High damped silicone**

AAM-5220x



¹ Thru hole add -T to P/N for 1/4-20 threaded version

Type	Color Code*	Max. Stationary Load lbs
AAM-52205	Red	15
AAM-52206	Green	25
AAM-52207	Yellow	35
AAM-52208	Blue	50
AAM-52205-T	Red	15
AAM-52206-T	Green	25
AAM-52207-T	Yellow	35
AAM-52208-T	Blue	50

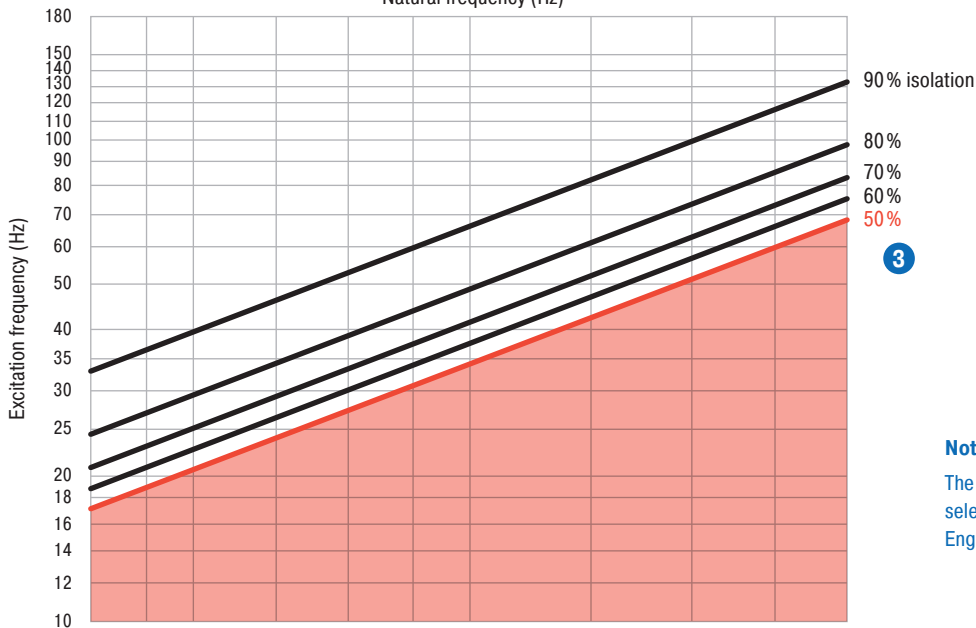
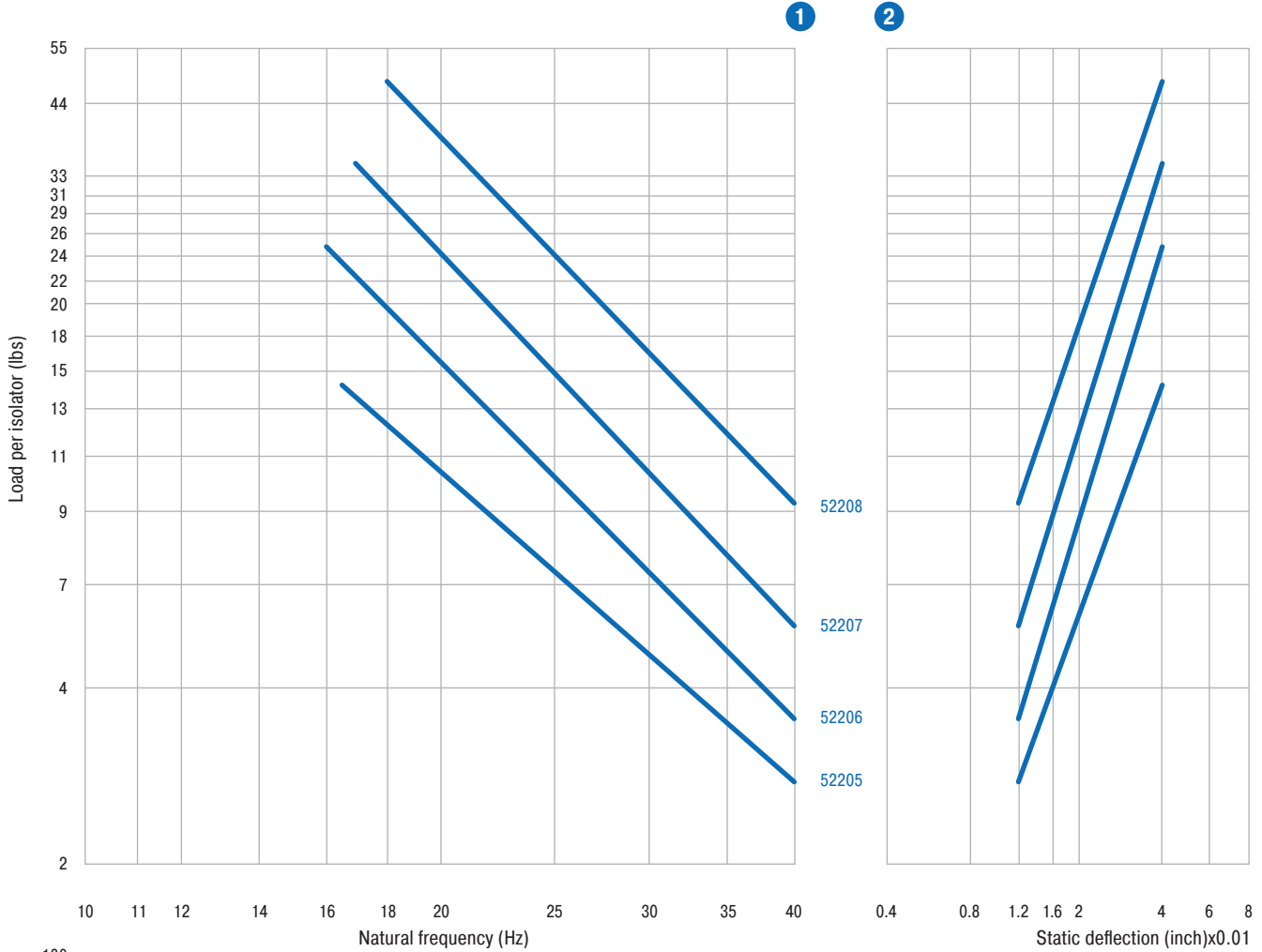
* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene, silicone also available**
On request: High Damped Silicone, please add -HDS to the part number. Example: AAM-52205-HDS for AAM-52205 as High Damped Silicone version.

AAM – All Attitude Mount



AAM-5220x

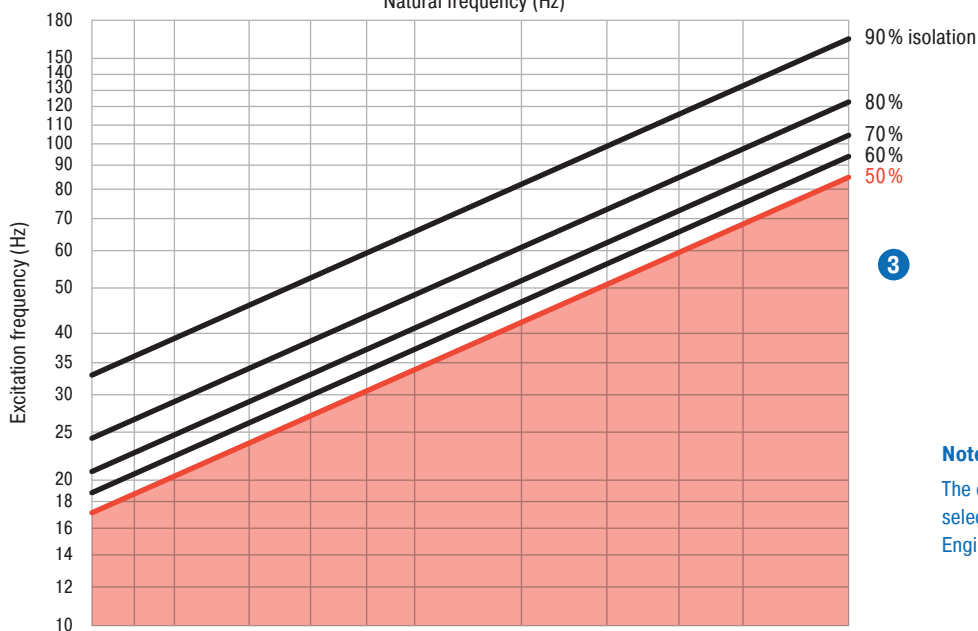
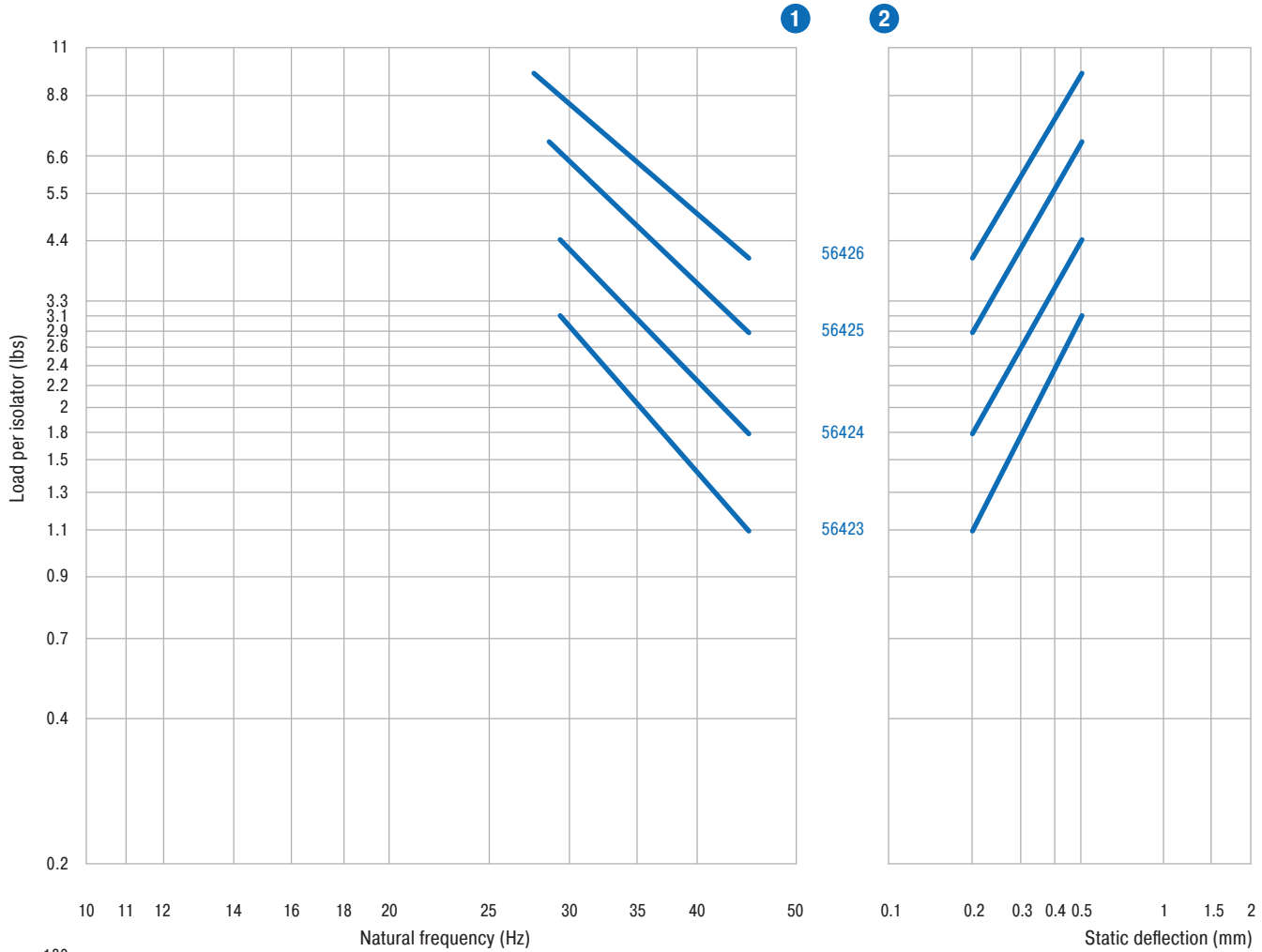


Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.



AAM-5642x



Notes

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SFM

Stable Flex Mount

Stable vibration isolators

These sturdy, fail-safe isolators of the SFM product group are maintenance-free, ready-to-install machine elements. Neoprene is the standard damping material for these extremely effective isolation mounts.

The isolators are used in diesel generator sets and marine engines. The SFMs are available in three sizes for applications from 110 lbs to 2,200 lbs. Horizontal stiffness in the long direction is 2.5 times the axial stiffness and in the short direction it is 0.75 times the axial stiffness. Under a working load, the SFMs have a natural frequency of only 8 Hz.

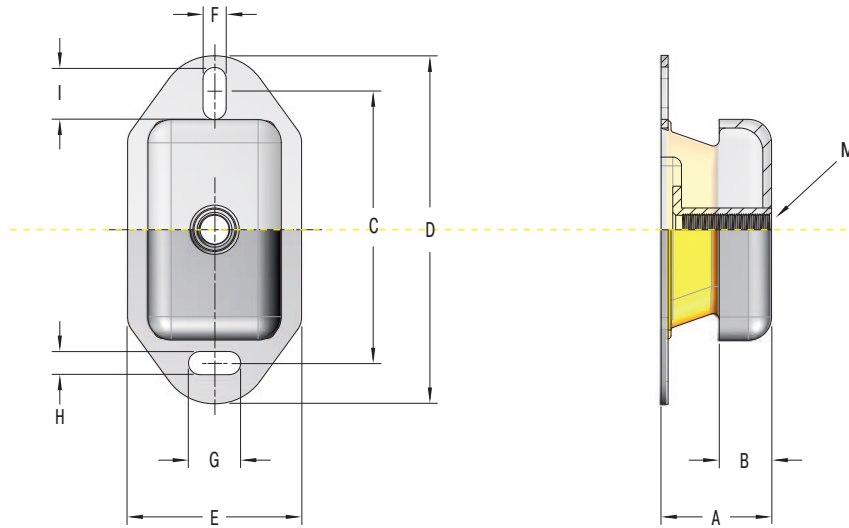
Features and Benefits

- Fail-safe
- Low natural frequency
- Sturdy
- Versatile
- Maintenance-free
- Galvanized metal parts (ROHS compliant)
- Neoprene rubber parts (chloroprene rubber)
- Operating temperature range -22° to +176° F

Areas of Application

- Power generation
- Off-road
- Diesel and marine applications

SFM-52010-xx / SFM-52011-xx / SFM-52012-xx



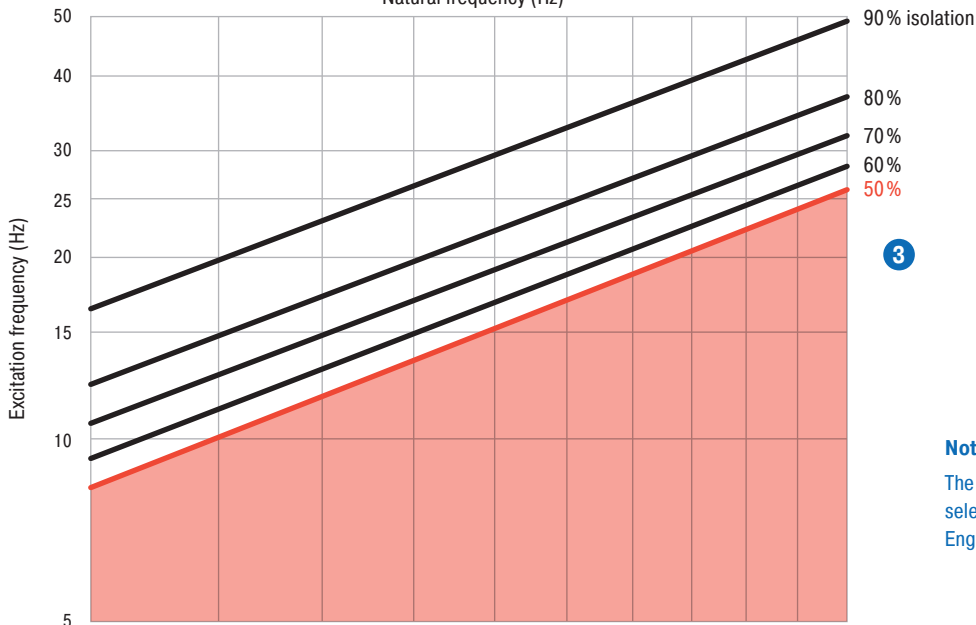
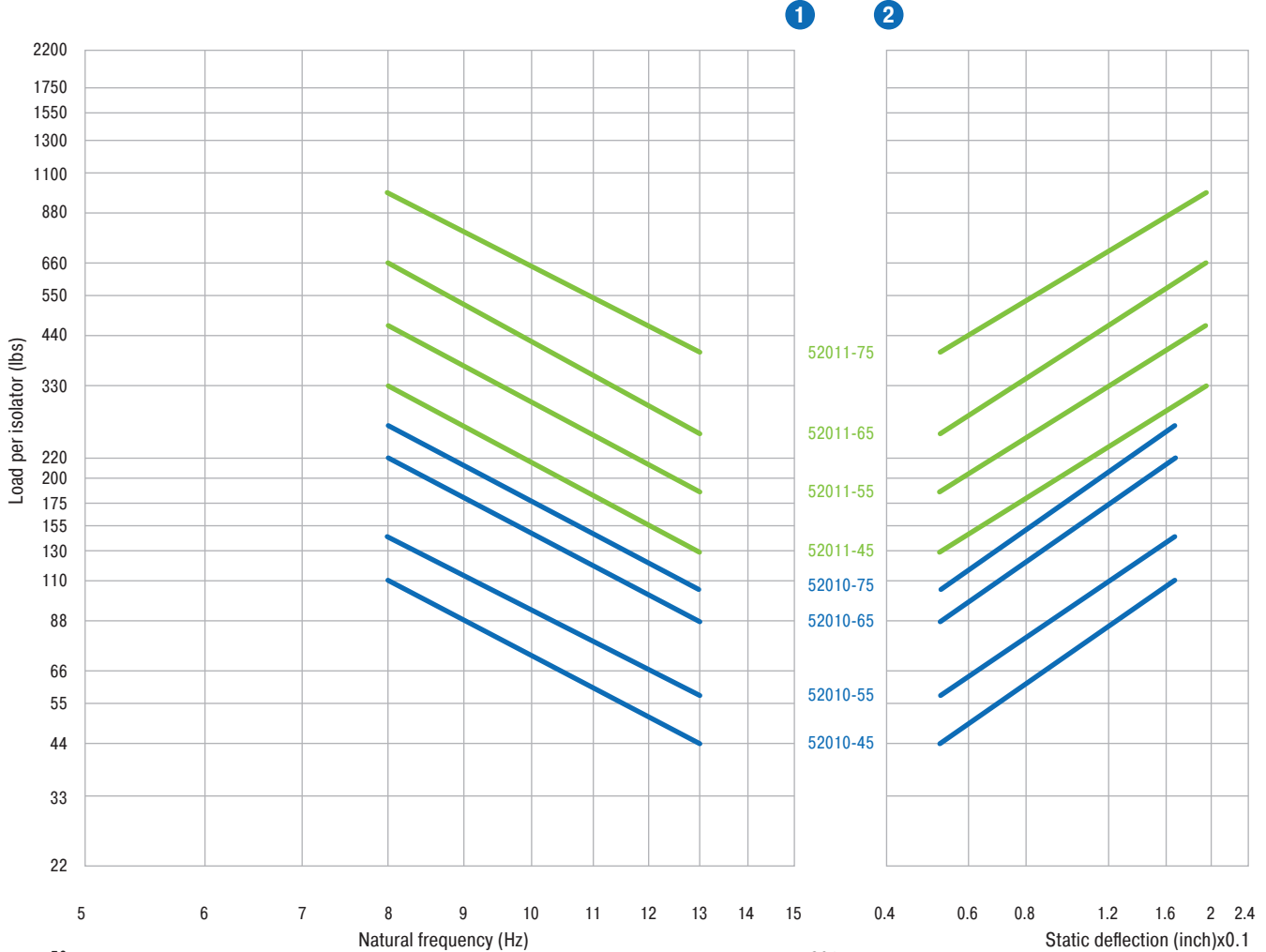
Type	Max. Load lbs	Thread M	A Inch	B Inch	C Inch	D Inch	E Inch	F Inch	G Inch	H Inch	I Inch
SFM-52010-45	110	M12	1.52	0.79	3.94	4.72	2.36	0.56	0.55	0.43	0.55
SFM-52010-55	145	M12	1.52	0.79	3.94	4.72	2.36	0.56	0.55	0.43	0.55
SFM-52010-65	220	M12	1.52	0.79	3.94	4.72	2.36	0.56	0.55	0.43	0.55
SFM-52010-75	265	M12	1.52	0.79	3.94	4.72	2.36	0.56	0.55	0.43	0.55
SFM-52011-45	330	M16	1.97	1.10	5.51	7.20	2.95	0.51	1.18	0.51	0.80
SFM-52011-55	465	M16	1.97	1.10	5.51	7.20	2.95	0.51	1.18	0.51	0.80
SFM-52011-65	660	M16	1.97	1.10	5.51	7.20	2.95	0.51	1.18	0.51	0.80
SFM-52011-75	990	M16	1.97	1.10	5.51	7.20	2.95	0.51	1.18	0.51	0.80
SFM-52012-45	770	M20	2.86	1.65	7.17	8.98	4.41	0.71	1.34	0.71	1.05
SFM-52012-55	1,145	M20	2.86	1.65	7.17	8.98	4.41	0.71	1.34	0.71	1.05
SFM-52012-65	1,550	M20	2.86	1.65	7.17	8.98	4.41	0.71	1.34	0.71	1.05
SFM-52012-75	2,200	M20	2.86	1.65	7.17	8.98	4.41	0.71	1.34	0.71	1.05

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SFM – Stable Flex Mount



SFM-52010 / SFM-52011



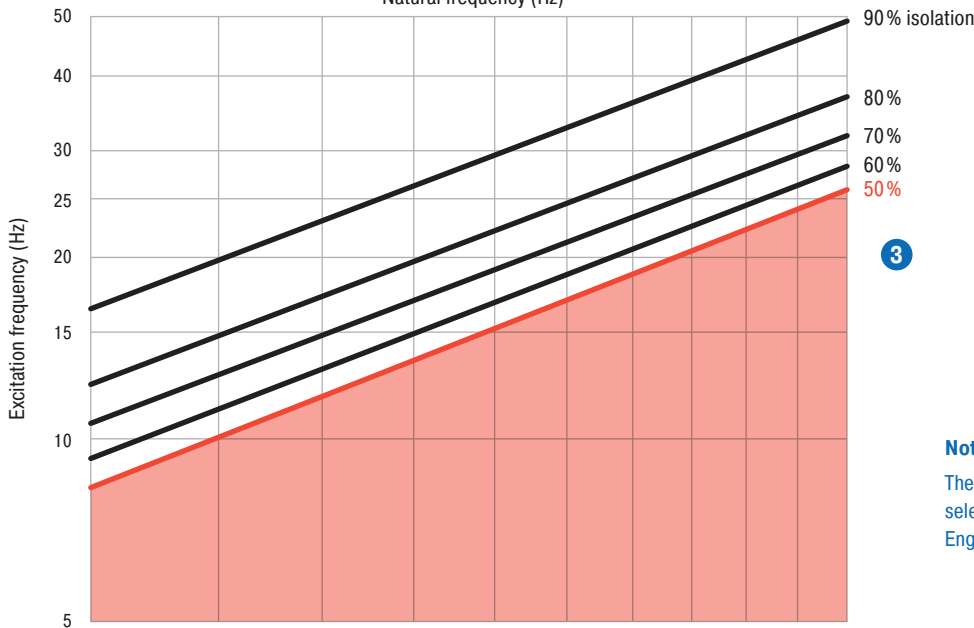
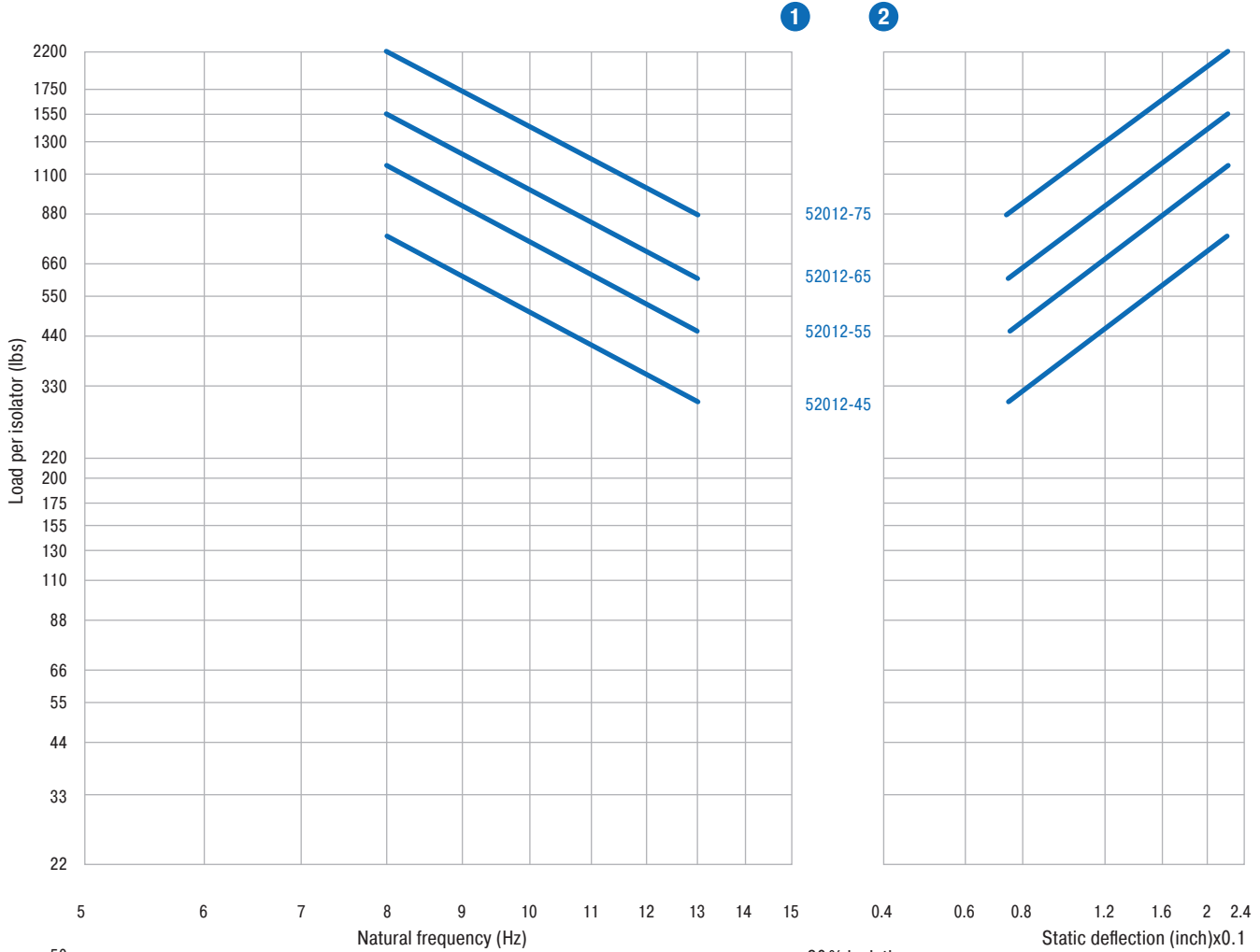
Notes

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SFM-52012



Notes

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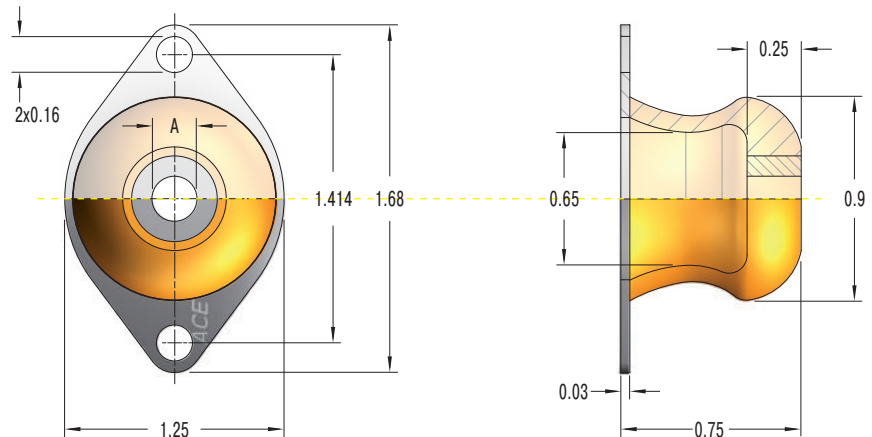
BM

Bubble Mount

Low frequency vibration isolators

The **BM** low frequency vibration dampers are used to isolate small devices, electronic components and control units.

BMs are mainly used in vertical compression loads. They effectively protect electronic or medical equipment against damaging vibrations and shocks.



BM-5064x

BM-5068x

Features and Benefits

- Good shock absorption
- Low natural frequency
- Small, light design
- Galvanized metal parts (ROHS compliant)
- Standard with neoprene, silicone also available
- Operating temperature range -22° to +176° F

Areas of Application

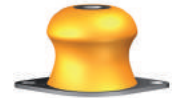
- Medical technology
- Computers
- Electronic equipment
- Small pumps/compressors

Type	Color Code*	Max. Load lbs	A Inch
BM-50640	Yellow	4.0	0.17
BM-50641	Red	6.5	0.17
BM-50642	Green	11.0	0.17
BM-50643	Blue	15.0	0.17
BM-50644	White	18.0	0.17
BM-50680	Yellow	4.0	0.256
BM-50681	Red	6.5	0.256
BM-50682	Green	11.0	0.256
BM-50683	Blue	15.0	0.256
BM-50684	White	18.0	0.256

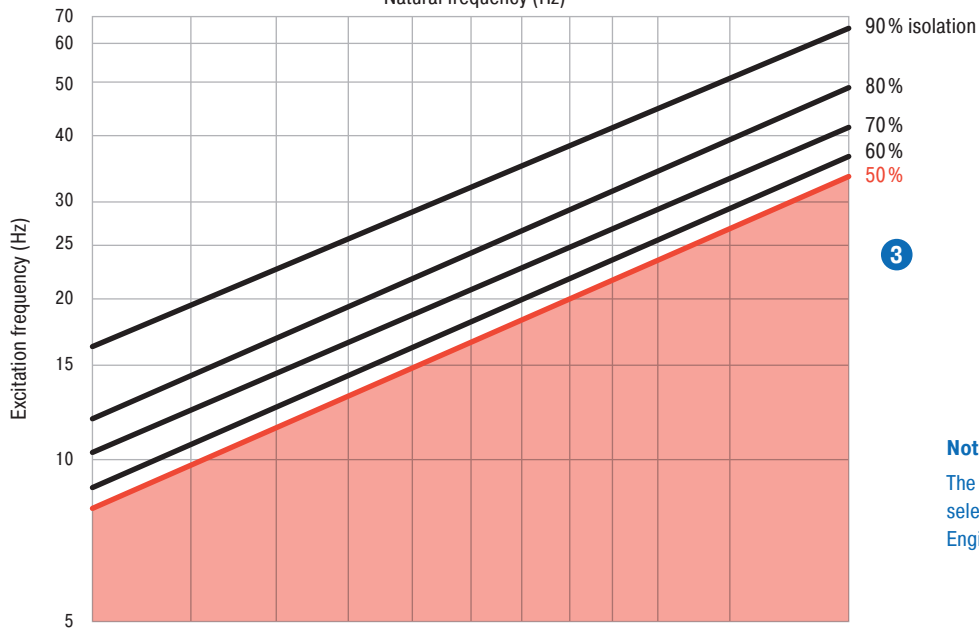
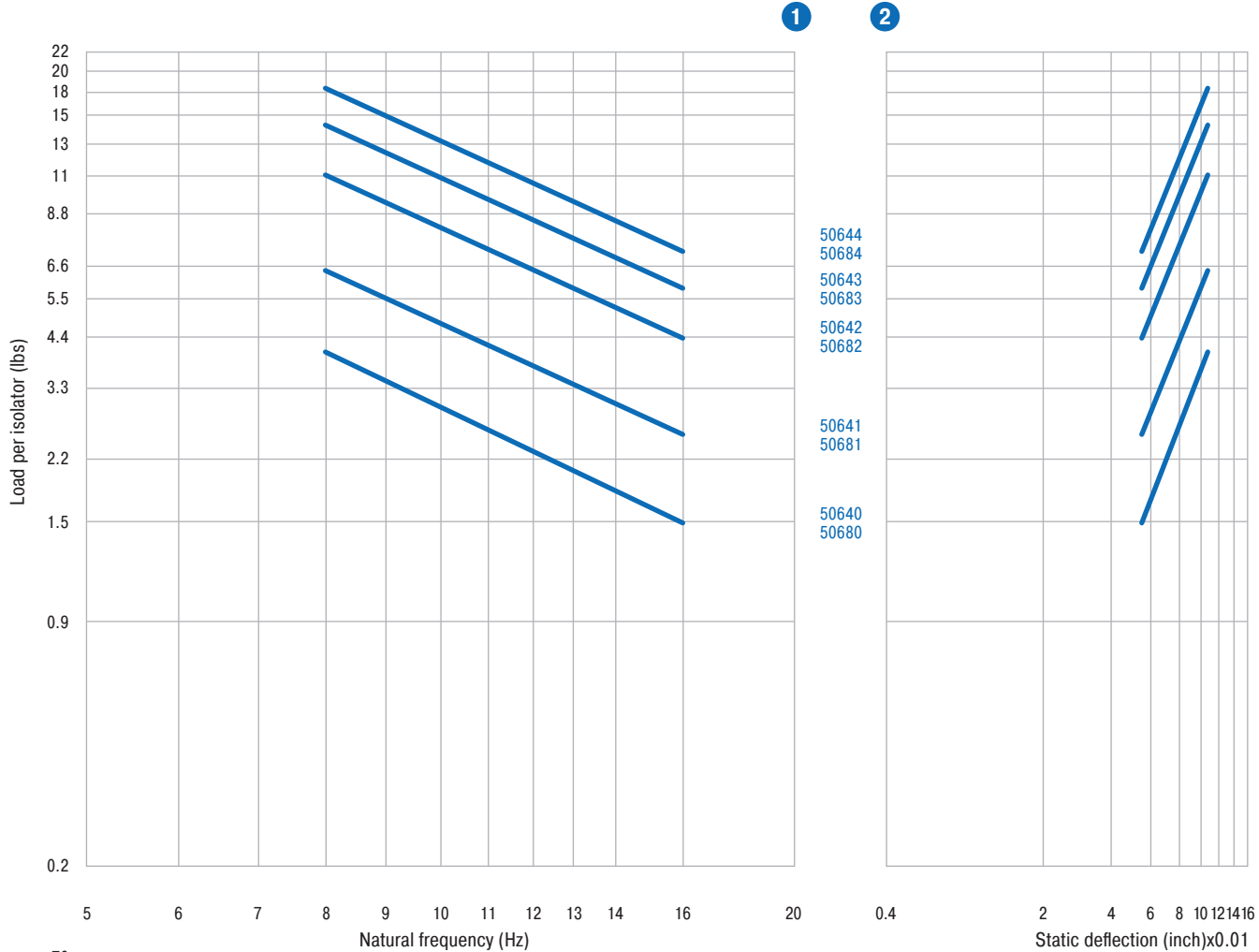
* The color code is for identifying the load capacity. The products are marked in color accordingly.

Standard Material: **Neoprene**

On request: High Damped Silicone, please add -HDS to the part number. Example: BM-50640-HDS for BM-50640.



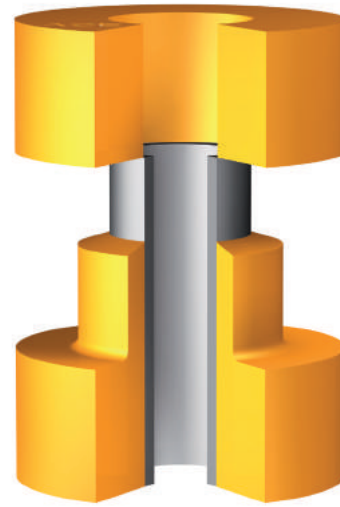
BM-5064x / BM-5068x



Notes

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UMO

Universal Mount

Universal connection isolators

UMOs (Universal Mounts) are two-part isolators for connecting machines with bordering components, such as vehicle cabs, electronics and transmissions.

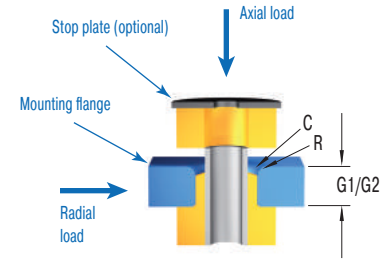
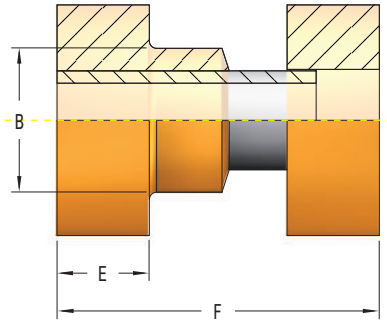
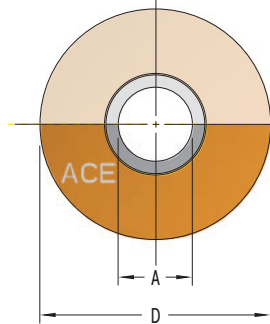
The UMOs can be installed in any spatial position and effectively decouple two components from each other. A galvanized metal spacer is vulcanized into the elastomer cylinders. The UMOs can be used within the wide temperature range of -20 °F to +180 °F.

Features and Benefits

- Any installation position, all axes and angles
- Simple design
- Fail-safe with the use of stop washers
- Oil, fuel and solvent-resistant neoprene
- Galvanized metal parts (ROHS compliant)
- Standard with neoprene, high-damping silicone available
- Operating temperature range -22° to +176° F

Areas of Application

- Machinery and equipment
- Conveyors
- Compressors
- Generators
- Shipbuilding
- Construction machines
- Agricultural machines
- Off-road vehicles
- Transport industry

UMO – Universal Mount
UMO-600xx


C = Mounting hole in flange
 R = Required radius
 F = Length in installed condition
 G1/G2 = Height

Type	A Inch	B Inch	C Inch	D Inch	E Inch	F Inch	G1 Inch	G2 Inch	R Inch
UMO-60011 thru 60015	0.39	0.78	0.75	1.25	0.50	1.25	0.37	N/A	0.03
UMO-60021 thru 60025	0.53	1.31	1.25	1.87	0.78	1.94	0.50	0.56	0.06
UMO-60031 thru 60035	0.64	1.55	1.50	2.53	0.90	2.45	0.75	0.88	0.08
UMO-60041 thru 60045	0.94	2.30	2.25	3.50	1.00	2.88	1.00	1.12	0.12
UMO-60051 thru 60055	1.06	2.55	2.50	4.88	1.25	3.38	1.00	1.25	0.12

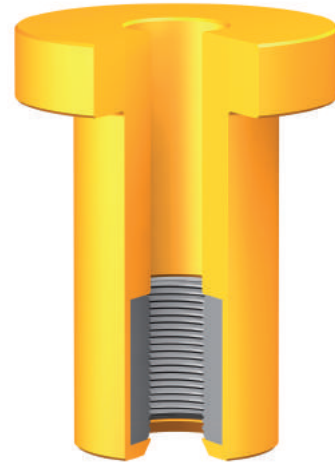
Type	Color Code*	Plate thickness G1			Plate thickness G2		
		Axial Load Rating lbs	Radial Load Rating lbs	Natural Frequency (f0) Hz	Axial Load Rating lbs	Radial Load Rating lbs	Natural Frequency (f0) Hz
UMO-60011	Yellow	35	18	15			
UMO-60012	Red	80	27	15			
UMO-60013	Green	130	36	15			
UMO-60014	Blue	235	45	15			
UMO-60015	White	280	55	15			
UMO-60021	Yellow	65	45	15	135	55	12
UMO-60022	Red	125	80	15	180	85	12
UMO-60023	Green	170	125	15	240	130	12
UMO-60024	Blue	275	190	15	380	190	12
UMO-60025	White	390	290	15	630	290	12
UMO-60031	Yellow	100	80	15	215	90	11
UMO-60032	Red	180	120	15	360	140	11
UMO-60033	Green	250	175	15	490	225	11
UMO-60034	Blue	350	265	15	860	385	11
UMO-60035	White	500	370	15	1,330	690	11
UMO-60041	Yellow	160	100	15	270	130	10
UMO-60042	Red	300	200	15	500	210	10
UMO-60043	Green	410	310	15	760	330	10
UMO-60044	Blue	520	420	15	1,150	550	10
UMO-60045	White	610	570	15	2,070	955	10
UMO-60051	Yellow	300	150	15	1,150	250	10
UMO-60052	Red	500	220	15	1,925	350	10
UMO-60053	Green	700	300	15	2,575	600	10
UMO-60054	Blue	900	470	15	3,550	900	10
UMO-60055	White	1,200	660	15	4,550	1,400	10

* The color code is for identifying the load capacity. The products are marked in color accordingly.

FL

Flex Loc

Quick fastening elements



FLs are removable, quick fastening elements for vibration isolation and shock absorption as well as the isolation of structure-borne noise. They are designed so that only one element can be used to effectively decouple two components from each other by tightening a fastening screw.

Standard metric screws (M3 to M8) can be used to tighten the connecting elements; no additional special tools are required. The FL elastic fasteners can be fixed via the screw connection into blind holes to connect panel elements to existing structures. The inner threaded insert serves as an expansion element for fastening. The EPDM (Ethylene Propylene Diene Monomer) material used is resistant to ozone, oil and most acids. Standard FLs are available in five sizes from M3 to M8.

Features and Benefits

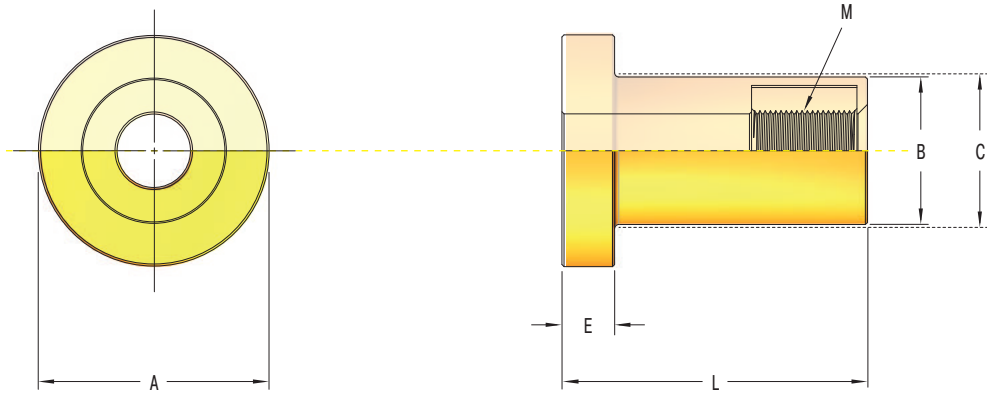
- Easy handling
- Effective decoupling of housings
- No special tools necessary
- Isolates structure-borne noise
- Fail-safe
- Resistant to oil, most acids and ozone
- Neoprene rubber parts (chloroprene rubber)
- Operating temperature range -22° to +176° F

Areas of Application

- Machines and assemblies
- Tiling, sheets and flanges
- Building attachments
- Vehicles and transport industry
- Construction machines



FL-Q-x

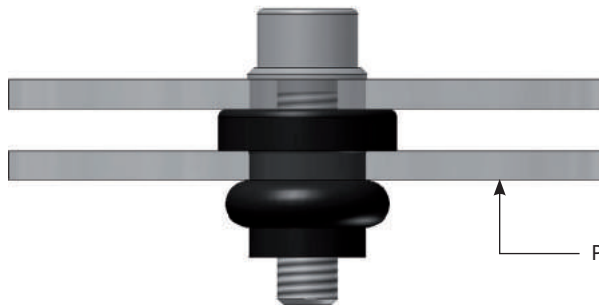


Type	Sheet assembly		Blind hole assembly	Thread M	A Inch	B Inch	C ¹ Inch	E Inch	L Inch	P ² Inch	T I ³ lbf Inch	T II ⁴ lbf Inch
	Compression lbs	Shear lbs										
FL-Q-3	11.0	5.5	2.2	M3	0.354	0.264	0.283 ⁰ _{-0.012}	0.098 ^{+0.016} ₀	0.453 ^{+0.039} _{-0.020}	0.024 - 0.098	3.5 - 4.4	2.7 - 3.5
FL-Q-4	15.4	7.7	2.2	M4	0.472	0.335	0.366 ⁰ _{-0.012}	0.118 ^{+0.016} ₀	0.571 ^{+0.039} _{-0.020}	0.031 - 0.130	3.5 - 5.3	3.5 - 4.4
FL-Q-5	22.0	11.0	3.3	M5	0.591	0.386	0.401 ⁰ _{-0.012}	0.138 ^{+0.016} ₀	0.709 ^{+0.039} _{-0.020}	0.031 - 0.169	5.3 - 8.9	4.4 - 5.3
FL-Q-6	30.9	15.4	6.6	M6	0.709	0.472	0.500 ⁰ _{-0.012}	0.157 ^{+0.016} ₀	0.827 ^{+0.039} _{-0.020}	0.059 - 0.197	20.4 - 31.0	6.2 - 8.0
FL-Q-8	61.7	30.9	11.0	M8	0.945	0.630	0.650 ⁰ _{-0.020}	0.197 ^{+0.016} ₀	1.063 ^{+0.039} _{-0.020}	0.059 - 0.256	26.6 - 35.4	14.2 - 15.9

- ¹ Corresponds to mounting hole
- ² Sheet thickness
- ³ Tightening torque T I (Drawing 01)
- ⁴ Tightening torque T II (Drawing 02)

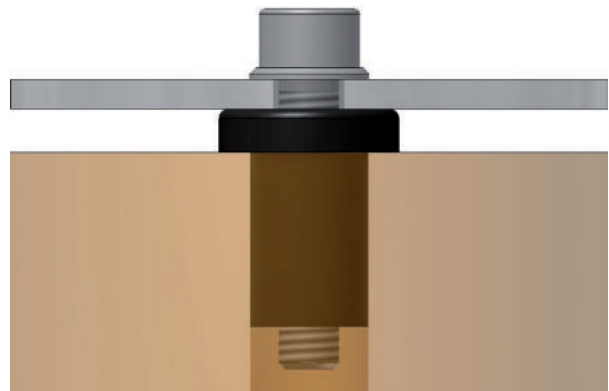
Sheet assembly

Drawing 01



Blind hole assembly

Drawing 02



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02

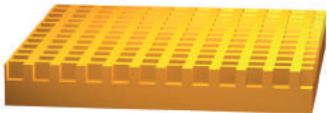
Vibration-Isolating Pads



SLAB

Universal Damping Pads

For application in foundations for plants and machines, compressors, pump stations, generators, insulation, measuring tables, buildings, etc.



CEL

Low Frequency Damping Pads

For use in foundations, buildings, bridges, stairs, test benches, pump stations, generators, compressors, machines, etc.



PAD

Sturdy Fiber and Elastomer Pads

For isolating and protecting foundations such as presses, plants and machines, as well as use in pump stations, crane runways, bridges and heavy-duty applications.

Vibration-Isolation made to measure

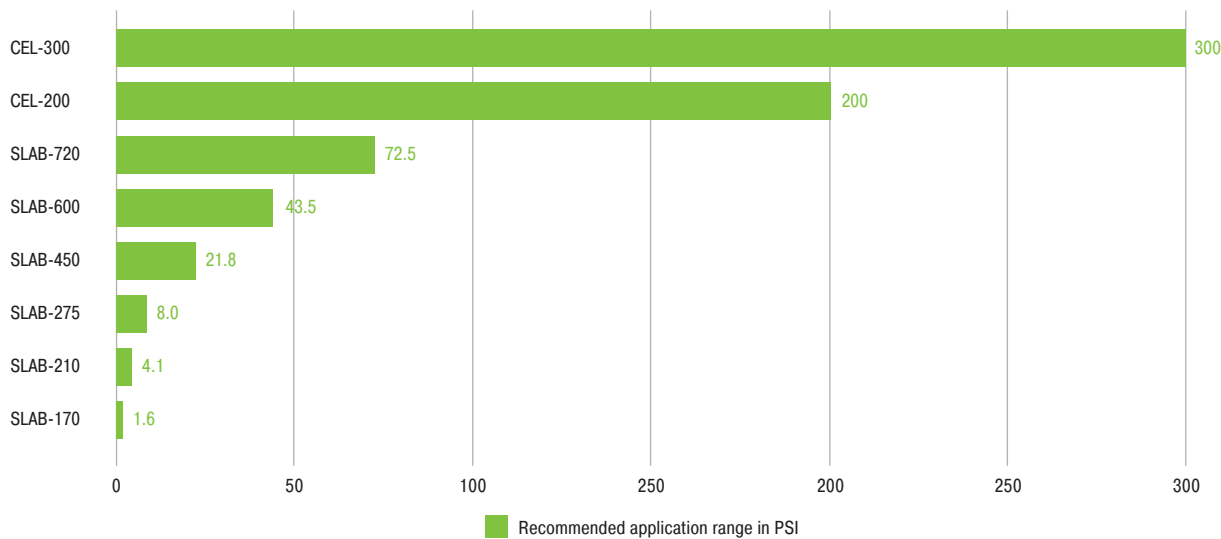
Variable, flexible, custom-cut

Vibration-isolating ACE pads are used whenever an adjusted isolation of vibration and structure-borne noise is required.

The correct damping solution for standard applications can be found by using the selection diagrams (following pages). The correct material type can be identified independently of the load via the desired damping in relation to the excitation frequency. The ideal plate size can be quickly calculated on the basis of the load area.

A rough preselection of suitable plate materials can be made by consulting the surface pressures of different plate materials.

Application range according to surface pressure



The SLAB and CEL pads can either be ordered in their standard size or cut according to customer request. Complete specifications are required for drawings.

The custom-cutting of pads allow almost any shape and solution. Various pads can be layered, bonded and combined with reinforcing pads (steel) or sliding layers (PTFE).

The PAD product group is made from Fiber-reinforced pad material used for very high loads of up to 2,000 PSI.



SLAB

Universal Damping Pads

SLAB damping pads of model series SL-170 to SL-720 are universally applicable elastic Polyurethane (PUR) materials which are manufactured according to a patented formula and can be used for a large number of applications.

The pads with standard sizes of 0.00614 lbs/in³ to 0.026 lbs/in³ serve as starting materials for the vibration isolation of different applications in industry and construction. The static and dynamic product properties are used as the basis for the selection of the most appropriate damping solution.

The material determination (see selection diagram) is used to make the preselection of the correct damping material, after which, in a second, easy step, the suitable dimensions of the support are determined. SLABs are delivered as pre-fabricated

standard pads or can be freely cut from the raw material (roll and plate material).

Standard SLABs are supplied in material thickness of 0.5 inch and 1 inch. On request, the sizes of delivered pads can be cut freely from the standard 31.5 inch x 59 inch stock. Sample pads with dimensions 8.7 inch x 5.9 inch and the respective thicknesses are available for test purposes and small applications, with maximum machinable dimensions up to 197 inch x 59 inch.

Features and Benefits

- Can be cut to many different shapes (water jet cutting)
- Can be combined for many desired isolation packages
- On-site vibration measurement and selection
- ACE offers special application software with no additional costs for designing
- High damping polyurethane
- Operating temperature range -22° to +158° F

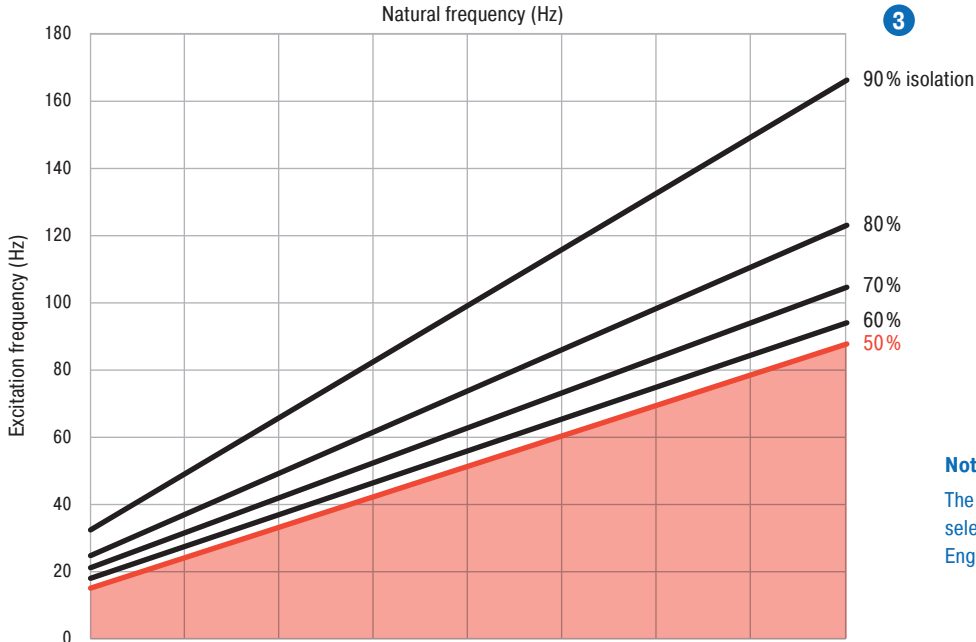
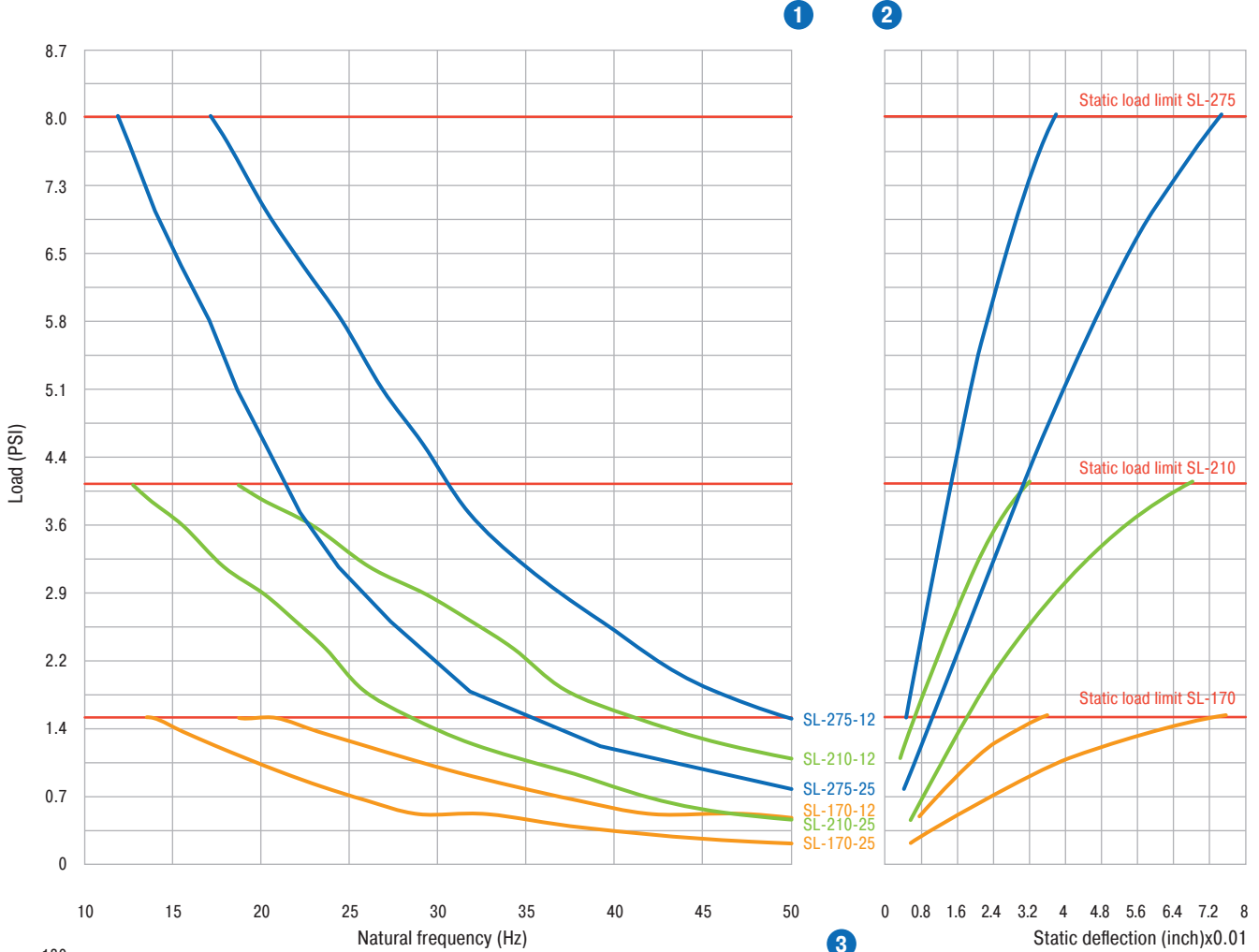
Areas of Application

- Foundations of plants and machines
- Compressors
- Pump stations and generators
- Pipeline isolation
- Test benches, measuring tables and their foundations
- Buildings
- Staircase bearings

SLAB – Universal Damping Pads



SL-170 / SL-210 / SL-275



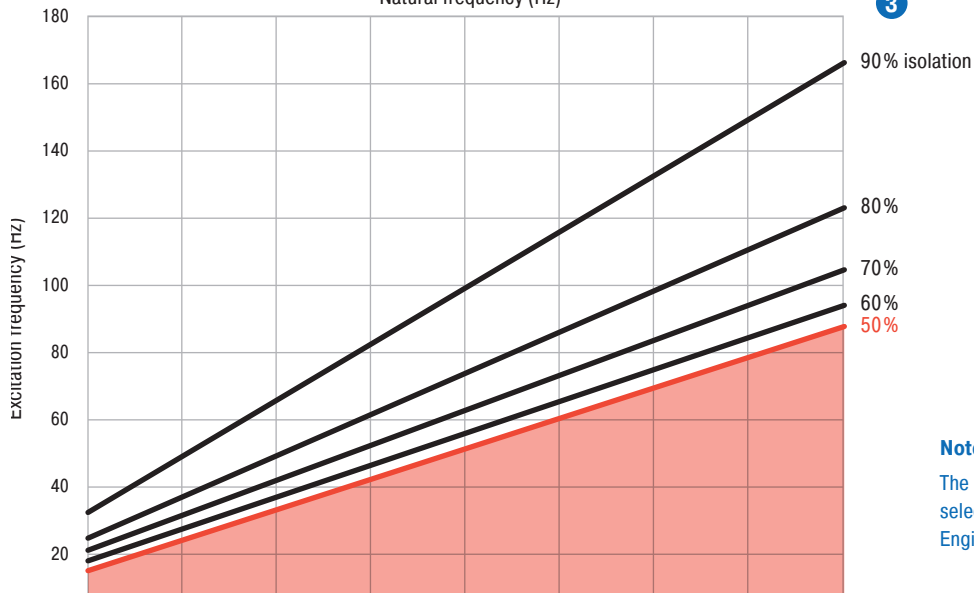
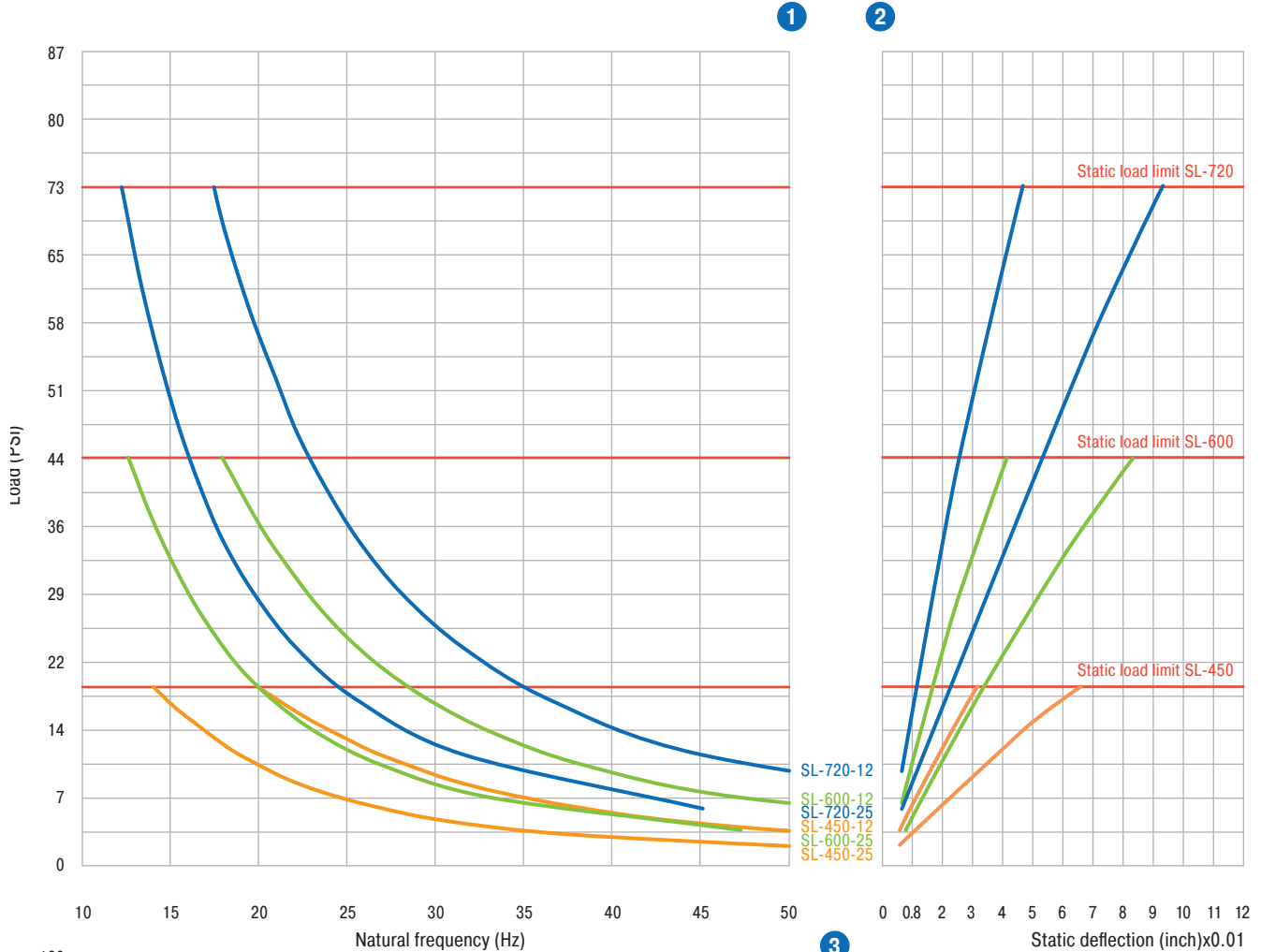
Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.

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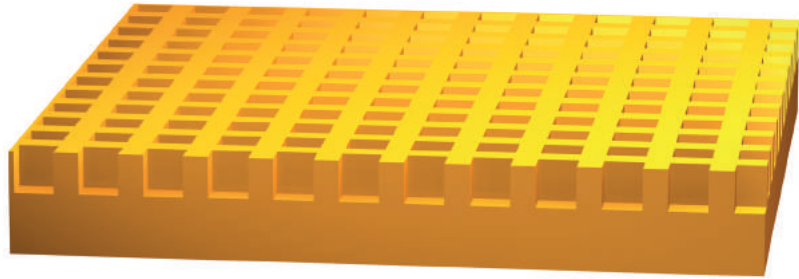
SL-450 / SL-600 / SL-720



Notes

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CEL

Low Frequency Damping Pads

CEL damping pads are produced from a special nitrile rubber which dampens at low frequencies.

The damping pads can be custom-cut and bonded together to achieve the proper thickness based on the application and isolation requirement. The tried-and-tested CEL damping pads are used in the field of machine and plant engineering. Here the pads isolate the floor or foundation to the plant or machine. Damaging vibrations are reduced, increasing production and or measuring quality.

Features and Benefits

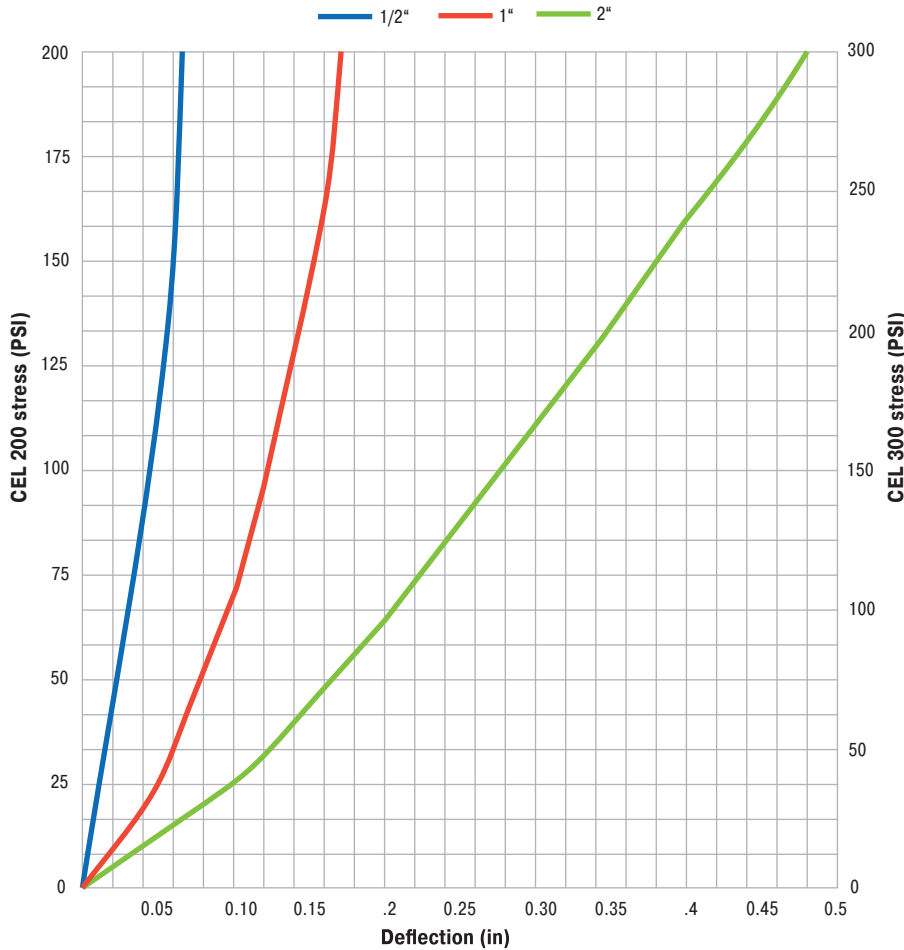
- Can be bonded together (layered) to form desired isolation efficiency
- ACE offers on-site vibration measurement and selection
- ACE offers special application software with no additional costs for designing
- Operating temperature range -40° to +194° F

Areas of Application

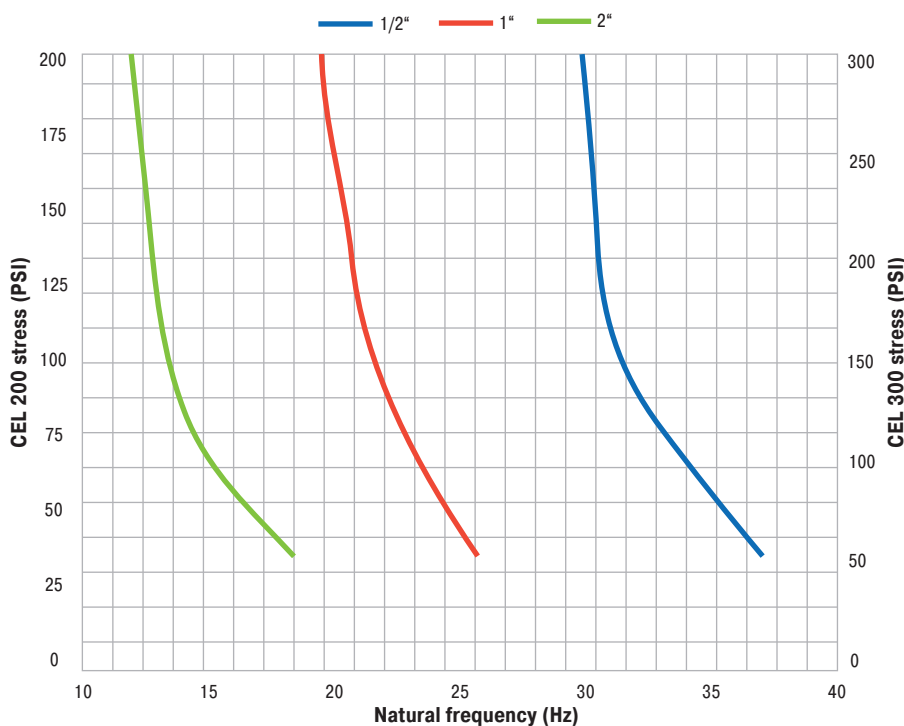
- Foundations of plants and machines
- Compressors
- Pump stations and generators
- Test benches, measuring tables and their foundations
- Fans
- Motors
- Generators
- Presses
- Bumpers



CEL-200 / CEL-300



1 CEL 200 & 300: Load vs. Deflection



2 CEL 200 & 300: Dynamic Natural Frequency

Notes

The diagrams represent a simplified form of the selection. Please consult with our Application Engineers for critical applications.

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PAD

Sturdy Fiber and Elastomer Pads

The PAD Fiber and Elastomer Pads combine the positive properties of isolating elastomer damping with the reinforcing effect of fiber inlays.

The PADs are sturdy damping pads for use in heavy-duty applications, e.g. under crane runways, in steel construction, pipeline construction and the coal, iron and steel industries. Due to their physical properties, the PAD pads provide outstanding damping against shock and impact as well as isolate vibrations and structure-borne noise.

Depending on the shape and selected dimensions, PADs can withstand compressive loads of up to 10,000 PSI. Typically the maximum surface pressure is 2,000 PSI.

Features and Benefits

- Sturdy
- Can be custom cut
- Low creep
- Density: 74 lbs/ft³
- Damping up to 14%
- Ultimate load to 10,000 psi; Working loads up to 2,000 psi
- Operating temperature range -67° to +203° F

Areas of Application

- Foundations of presses, plants and machines
- Impact pads
- Pipelines
- Pump stations and generators
- Crane runways
- Bridges
- Heavy-duty applications
- Forging hammers
- Mining
- Transportation
- Steel industry



Due to the layered structure, the material exhibits excellent compressibility. This allows deflection to be reached without material flow (custom-fit installation to specific dimensions is possible). The material properties are also apparent in the creep behavior under load. For example, under continuous static load, the material only exhibits a creep tendency of approximately 5% of original thickness.

Depending on the application, the PADs can be custom cut to meet customer specifications and/or be used as supports, washers and bushings with an isolating/damping effect.

Selection and calculation

As with a conventional shock absorption application, the selection of a suitable material is based on the consideration of the kinetic energy in the system in relation to the desired damping value. The hysteresis curve for the material is then taken as the basis for selecting the correct material dimensions.

To measure the Kinetic Energy (KE), shock absorber calculation software is available at www.acecontrols.com free of charge. You can enter your values and obtain a suitable KE result.

Our in-house and field teams are available to assist you.

Note

PADs consist of organic material subject to batch-based variations

PADs meet the following military specifications: MIL-C-882 and MIL-E-5272A.

The PADs are resistant to most oils, water vapor, water, mold and brine.

Operating temperature range is between -65 °F and 200 °F.

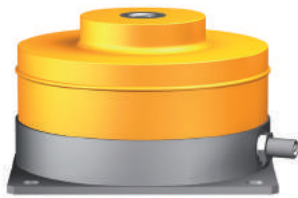
The hardness of PADs is 90 ±5 shore A.

The standard pads are available in different thicknesses, graduated between 1/16" and 1". Other thicknesses are available by combining and bonding the standard thicknesses.

A combination with steel or PTFE pads is also available upon request.

03

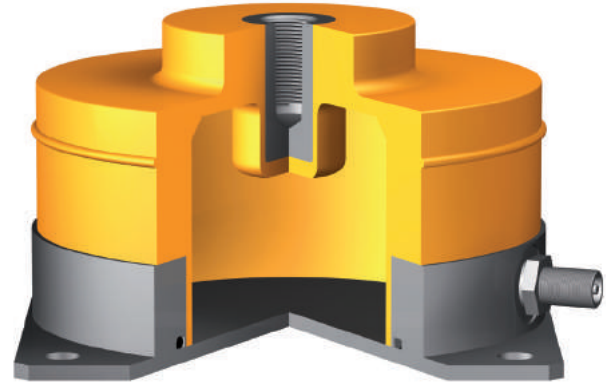
Low Frequency Pneumatic Leveling Mounts

**PLM****Pneumatic Leveling Mounts**

For isolation of measuring equipment and machines.

**PAL****Pneumatic Isolators with Automatic Level Control**

Isolation against vibration and level-adjustment for test and measuring equipment. Isolating at extremely low frequencies, these components are used in the automotive industry and aerospace.



PLM

Pneumatic Leveling Mounts

PLM pneumatic leveling mounts provide low frequency vibration and shock control for surface pads, coordinate fans, air compressors, motor/generator sets, high speed punch presses and more.

The PLM series pneumatic isolation mounts are low frequency vibration and shock isolators that provide both attenuation of vibration and equipment leveling.

For vibration control applications, the pneumatic (pressurized) portion of these Pneumatic Leveling Mounts provide significant reduction of vibration amplitudes occurring at frequencies above 5 Hz, having a natural frequency as low as 3 Hz.

PLM pneumatic leveling mounts will also continue to isolate with no pressure having a vertical natural frequency of approximately 10 Hz, isolating frequencies above 14 Hz. The vertical to horizontal natural frequency ratio is approximately 1:1 with a high degree of horizontal stability.

For shock or impact applications, the outer elastomeric wall construction provides a high deflection shock mount. A low natural frequency (3 Hz) can be maintained by utilizing an external spacer to prevent a “bottom out” condition.

The PLM design features includes a molded threaded insert which allows the mounts to be inflated via either the standard tank valve or a pneumatic fitting. No custom adapters are necessary.

Supplied with a tank valve, the isolators are inflated and leveled manually using a hand pump or air chuck connected to an air supply. When supplied with a fitting, the Pneumatic Leveling Mounts can be plumbed to a dedicated, regulated air supply making pressurizing and leveling easier. A regulator control panel (right) can be supplied to regulate the pressure and height of the interconnected air spring elements when leveling valves are not used.

The PLM pneumatic leveling mounts can also be supplied with automatic leveling valves for height control. Each master isolator incorporates a leveling

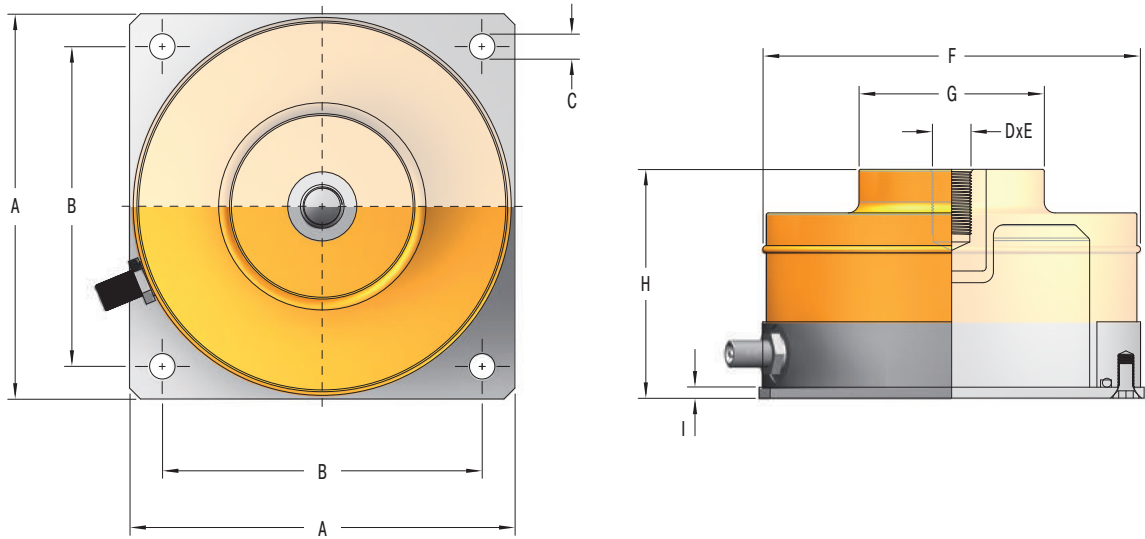
Features and Benefits

- Low natural frequency of 3 Hz
- Easy level control via integrated valve
- Height regulation control on request
- Ratio of horizontal to vertical natural frequency 1:1

Areas of Application

- Measuring tables
- Test benches
- Production plants

PLM



Typ	A Inch	B Inch	C Inch	D Inch	E Inch	F Inch	G Inch	H Inch	I Inch	Max. Load lbs
PLM 1	3.00	2.38	0.28	3/8-16	0.47	2.88	1.00	2.50	0.125	100
PLM 3	4.19	3.50	0.28	1/2-13	0.53	4.14	1.75	2.45	0.125	300
PLM 6	5.12	4.25	0.29	1/2-13	0.53	4.99	2.13	3.50	0.125	600
PLM 12	6.88	6.00	0.29	1/2-13	0.53	6.74	3.00	3.50	0.125	1,200
PLM 24	10.0	8.50	0.56	5/8-11	0.75	9.66	4.75	3.50	0.188	2,400
PLM 48	13.50	12.00	0.56	5/8-11	0.75	13.31	7.50	3.50	0.188	4,800
PLM 96	18.50	16.00	0.81	1-14	0.88	18.44	10.50	3.50	0.250	9,600
PLM 192	24.00	20.00	0.81	1-14	0.88	24.00	15.75	3.50	0.250	19,200

valve, which is the load sensing and height controlling element. Multiple support isolators may be added to support the total weight of the equipment.

Our technicians are available to assist you in the selection process and provide any necessary support.

Selection and calculation

The optimum isolation values can be achieved with PLM mounts when the maximum load of the individual Pneumatic Leveling Mounts are utilized to the fullest extent.

In standard applications, it is sufficient to select PLM mounts on the basis of the weight of the machine or plant to be isolated. If the maximum isolation effect is to be realized, additional weights (e.g. steel or granite pads) may have to be added to achieve the maximum permitted load range and thus the ideal isolation effect.

Note

When installing be sure to apply a load on the PLM Pneumatic Leveling Mounts before they are filled with operating pressure (max. 72 PSI for sizes 1 and 3) max. 87 PSI for the remaining sizes using the valve.

A separate control unit can be used to check the operating condition and adjust to the desired pressure.

PAL

Pneumatic Isolators with Automatic Level Control

The PAL type of Pneumatic Isolators provide superior low frequency isolation for metrology instruments, electron microscopes, MRI units, coordinate measuring machines and precision manufacturing equipment.

PAL pneumatic vibration isolation systems use level controlled air springs. These isolators are ideally suited for conditions where height control and vibration control must co-exist. PAL isolators meet the critical needs of metrology instruments, electron microscopes, inspection stations and precision manufacturing equipment.



The standard PAL isolators have a natural frequency as low as 1.7 Hz, however, lower natural frequencies (0.5 Hz) can be obtained from custom designed isolators.



Features and Benefits

- Height-adjustable
- Low frequency isolation, natural frequencies as low as 0.5 Hz possible

Areas of Application

- Test and measuring equipment
- Aircraft and automotive test benches
- Foundation bearings

PAL – Pneumatic Isolators with Automatic Level Control

Extremely low frequency calibrated precision isolators for use in high-resolution measuring and testing systems.

A complete PAL system consists of a minimum of three master isolators for 3-point determinate leveling. Each isolator incorporates a leveling valve which is the load sensing and height controlling element. Any number of support isolators may be added to support the total weight of the equipment.

Systems are supplied with a control panel, automatic height control valves, tubing and all other pneumatic accessories necessary for complete system installation.

PAL isolators react quickly to changes in the supported load and to center of gravity shifts by automatically releveling to a preset position.

A pneumatic isolation system's performance is a compromise between natural frequency (isolation), valve leveling accuracy and settling time.

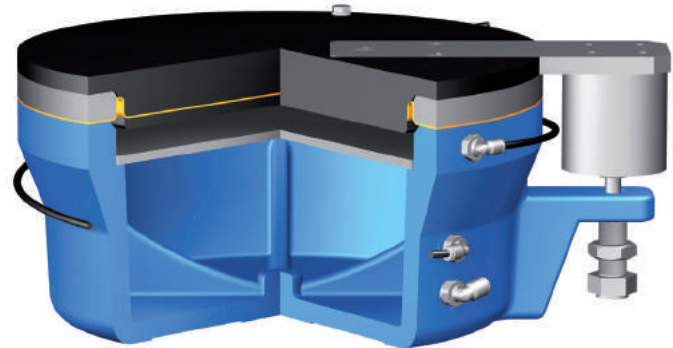
Settling time can be defined as the time it takes for an isolation system's motion to return to a predetermined reference with respect to a defined input disturbance. The disturbance can be an environmental input or machine induced, such as a gantry or stage movement.



PAL-3 to PAL-9
Small size



PAL-5.5-2.5
with level control valve PALV 5-5



Settling time is minimal with optimum damping and corresponding valve flow. Long settling times using pneumatic isolators are unacceptable because precision measuring and positioning machines can suffer repeatability errors and throughput losses.

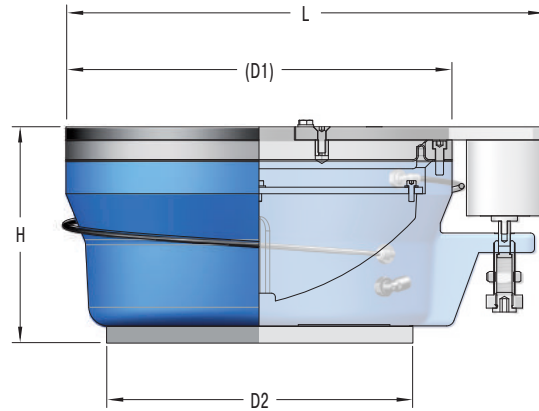
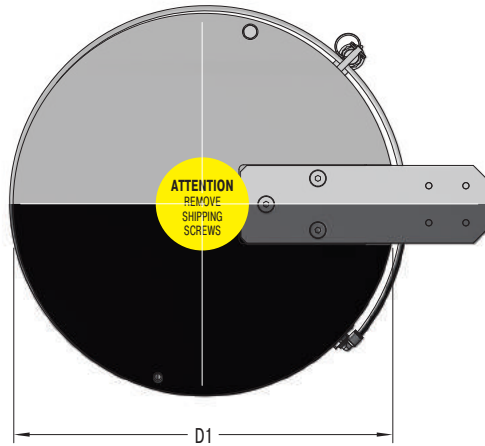
ACE offers many leveling valve options depending on the application. Valve flow rate, stiffness and accuracy characteristics are key variables in the design of an acceptable solution. Leveling accuracies of +/- 0.006" (0.15 mm) or +/- 0.001" (0.025 mm) are available. The flow rate and stiffness of a valve are chosen based on the pneumatic isolator design and damping.



PAL-18 to PAL-1000
Large size

The pictures are not in the same scale.

PAL



Type	D1 Inch	D2 Inch	H (deflated) Inch	H (Max. Lift) Inch	L Inch	Max. Lifting capacity* lbs	Special design only on request
PAL 18-6	6.50	6.00	6.00	6.25	9.21	1,800	■
PAL 21-6	7.87	5.90	6.00	6.40	10.60	2,100	
PAL 21-12	7.87	7.87	12.00	12.40	10.60	2,100	■
PAL 36-6	8.65	7.50	6.00	6.40	11.40	3,600	
PAL 55-6	10.25	9.00	6.00	6.40	13.00	5,500	
PAL 55-12	10.25	10.25	12.00	12.40	13.00	5,500	■
PAL 75-6	11.80	10.45	6.00	6.40	14.55	7,500	
PAL 133-6	15.00	13.78	6.00	6.40	17.70	13,300	
PAL 133-12	15.00	15.00	12.00	12.40	17.70	13,300	■
PAL 255-6	20.87	18.50	6.00	6.50	23.60	25,500	
PAL 255-12	20.87	18.10	12.00	12.50	23.60	25,500	
PAL 416-8	25.20	23.00	8.00	8.45	28.00	41,600	
PAL 1000-6	37.40	35.80	6.00	7.00	40.15	100,000	■
PAL 1000-18	35.98	35.98	17.70	18.70	39.00	100,000	■
PAL 3-2.5	3.20	3.15	2.50	2.75	6.20	260	
PAL 5.5-2.5	3.95	3.95	2.50	2.75	6.95	480	
PAL 9-4	5.10	5.10	3.65	3.95	8.15	735	
PAL 9-6	5.10	5.10	6.00	6.25	8.71	735	

* At a maximum operating pressure of 100 PSI

Note

The maximum permissible horizontal movement of the PAL Pneumatic Leveling Mounts should be limited to 0.079 inch, if necessary.

Isolation properties

Natural frequency	PAL xx-6 Hz	PAL xx-12 Hz	Damping	PAL xx-6 %	PAL xx-12 %
vertical	2.5 - 2.7	1.5 - 1.7	vertical (adjustable)	6 - 20	6 - 20
horizontal	2.0 - 4.5	2.0 - 4.5	horizontal	5 - 6	5 - 6

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Design service and analysis

Low frequency vibrations, strong shocks and force peaks influence the accuracy, production quality and productivity of high-performance and precision machinery.

The specifications for the maximum permissible acceleration and vibration are often prescribed by the manufacturers of testing, measuring and production machines. The ACE team is available to assist you with analyzing the site conditions and selecting the right isolators to comply with the required system parameters.

Upon request ACE personnel are available to obtain precise measurements on site, document actual and target conditions, and develop suitable system solutions. Requirements and solutions may vary widely from application to application.

Application Engineers are available to assist you in the selection process and provide any necessary support.

Application examples



Measuring tables, example: coordinate measuring machine

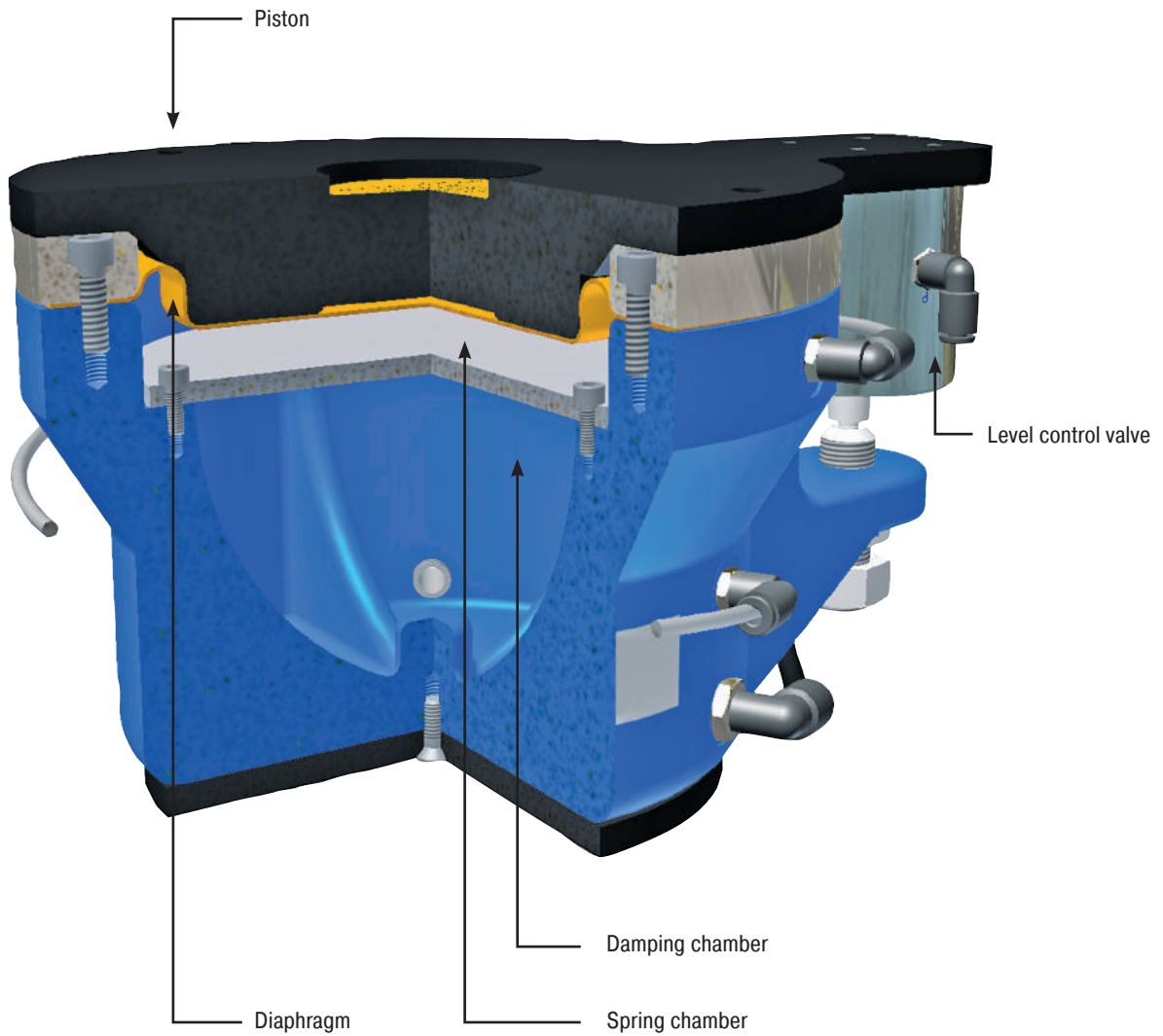


Test benches, example: street simulation test bench

PAL

Pneumatic Isolators with Automatic Level Control

Structure



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Technical Assistance Form

To obtain a better picture of your application before establishing contact, we ask that you send us the following information.

Please provide a sketch or drawing so our application engineers can understand your needs. Please use the designated area or send a dimensioned sketch with a copy of the calculation form to calculation@aceolator.com. You can also use the online calculation form at www.aceolator.com.

Project designation _____

Application description _____

Technical Data

Excitation frequency / speed Hz _____ or 1/s _____

Weight of system in lbs. _____

Weight distribution concentric (please indicate in sketch) eccentric (please indicate in sketch)

Machine dimensions (inch) length _____ width _____ height _____

Number of support points (quantity) _____

Dimensions of the support points (inch) length _____ width _____ diameter _____

Desired degree of isolation 50% (basic isolation) 60% 70% 80% 90% (very good isolation) _____

Environmental influences media _____ temperature _____ misc _____

Need / year (quantity) _____

Contact Details

Company _____

First Name _____

Last Name _____

Department _____

Street Address _____

City/State/Zip _____

Country _____

Telephone _____

Email _____

**Please copy, complete and fax to ACE:
248-476-2470**

or use our calculation form on our website:
www.aceolator.com

Sketch

Box for your sketch

ACEolator

Isolates Vibration



www.aceolator.com



Sales Locations



USA

ACE CONTROLS INC.

23435 Industrial Park Drive
Farmington Hills, Michigan 48335, USA
T 1 (248) 476-0213
F 1 (248) 476-2470
www.acecontrols.com



GERMANY

ACE STOSSDÄMPFER GMBH

Albert-Einstein-Straße 15
40764 Langenfeld, Germany
T 49 (0) 2173-9226-10
F 49 (0) 2173-9226-19
www.ace-ace.de



GREAT BRITAIN

ACE CONTROLS INTERNATIONAL

Unit 404 Easter Park, Haydock Lane
Haydock, WA11 9TH, U.K.
T 44 (0)1942-727 440
F 44 (0)1942-717 273
www.ace-controls.co.uk



JAPAN

ACE CONTROLS JAPAN L.L.C.

City Center Bldg. II 2fl, 3-1-42, Chigasaki-minami, Tsuzuki-ku
Yokohama, 224-0037, Japan
T 81 45-945-0123
F 81 45-945-0122
www.acecontrols.co.jp



CHINA

ACE CONTROLS (PINGHOU) CO. LTD.

No. 888 Changsheng Road
Pinghu Economic Development Zone
Zhejiang, P.R. China
T 86 512-8860 6699
F 86 512-8860 6698
www.acecontrols.cn.com

