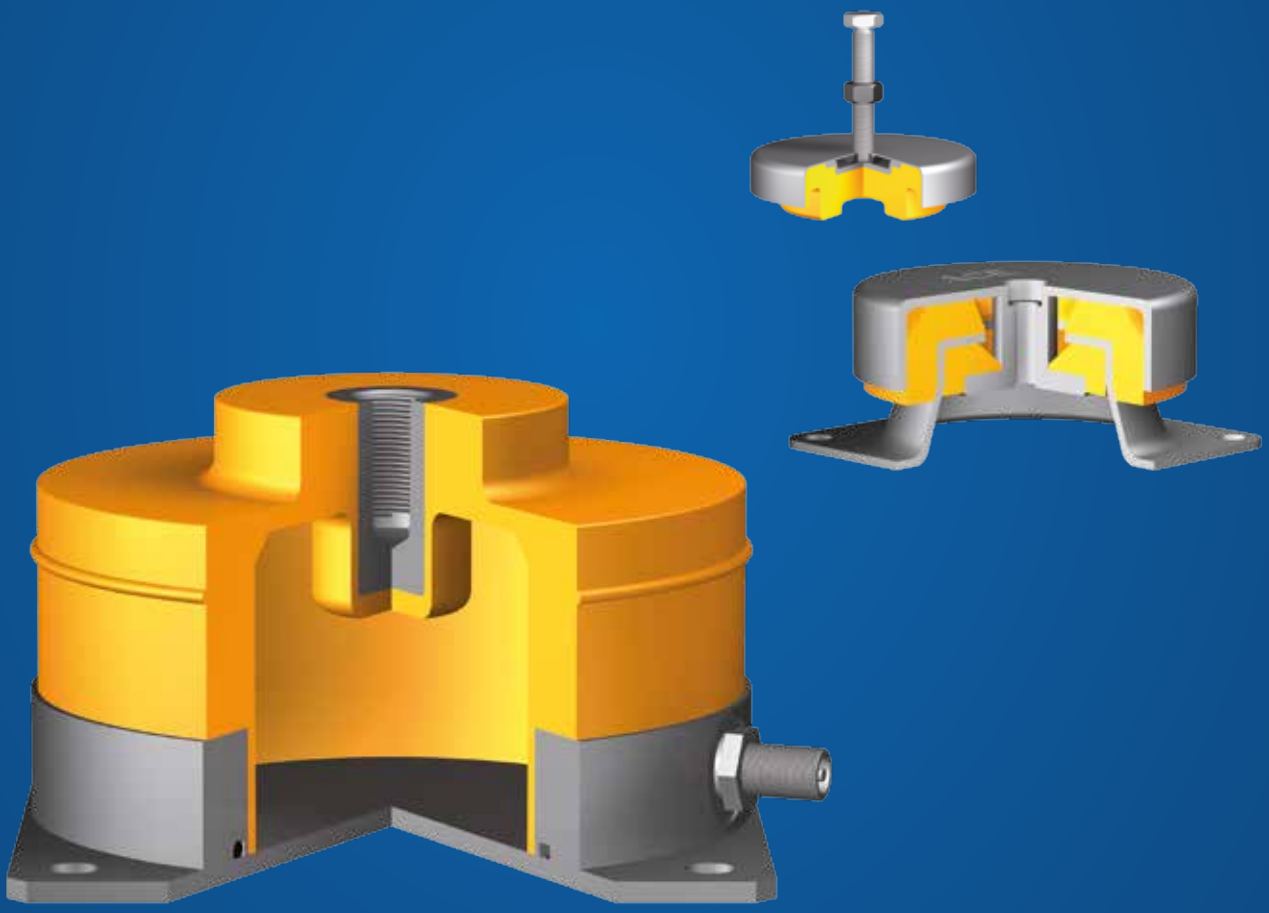
Issue May 2015

ACEolator

Isolates Undesired Vibrations



Vibration Technology

For support please contact the international help desk

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For local support please contact your ACE distributor on page 64 and 65.

Room for your company stamp or company sign

Automation Control Equipment

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

Industrial 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 Plates, Low-Frequency Air Spring Elements

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

We are your specialists for industrial damping technology

ACE is the internationally recognised expert in the field of industrial damping technology – with representative offices in 45 countries on all continents. ACE has also been active in Germany since 1978. A team of 25 engineers work in this country alone on further developing the product range every day.

ACE customers profit from well-conceived solutions, valuable innovations and model service for all damping technology issues. Thanks to its close cooperation with leading mechanical engineering companies, the German ACE branch office has recently established itself as a pioneer of technical progress in damping technology.

This catalogue is a decisive step – a much expressed desire of our customers: the realisation of offering everything from one source for damping technology and vibration isolation.

ACE develops, produces and distributes a broad spectrum of damping products. These include industrial and safety shock absorbers, profile dampers, rotary dampers, industrial gas springs, brake cylinders, vibration isolators, air springs and oil brakes.

The products are particularly successful with forward-looking companies, because there are no better solutions available for braking moving masses rapidly, gently and precisely or for isolating harmful vibrations.

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01 Rubber-Metal Isolators

02 Vibration-Isolating Plates

03 Low-Frequency Air Spring Elements

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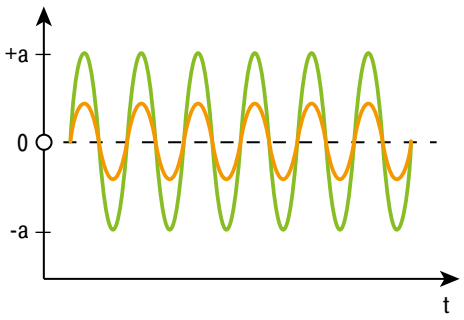
Vibration Isolation

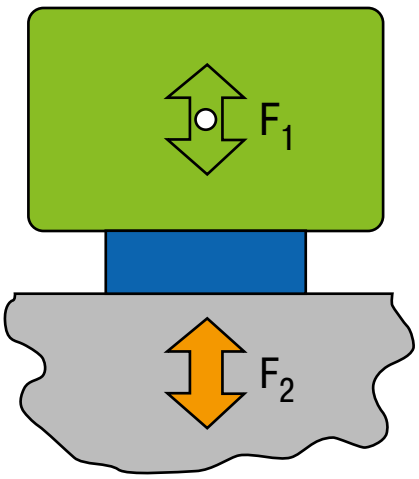
Noise reduction and vibration isolation are becoming more and more important in our daily lives. This applies in particular to the workplace and the environments around production companies.

Preventing noise emissions or harmful vibrations is therefore not only a necessity required by noise protection and occupational health and safety legislation; their sources must also be localised by means of targeted analyses in order to develop suitable improvement measures for achieving, for example, increased production quality. A second by-product of vibrations are their effects on the surrounding production environment and any measuring and testing facilities that may be in use.

Preventive vibration isolation leads to

- improved working conditions for people and the environment
- more accurate production tolerances and thereby increased product quality
- competitive and cost advantages thanks to lower reject rate in production
- increased production speed thanks to increased maximum machine dynamics
- longer tool and machine life thanks to lower stress
- faster and more accurate measuring results





Measurement of degree of isolation

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Types and mode of action of vibration isolation

Vibration isolation is generally subdivided into source isolation and receiver isolation. In source isolation (emission protection), for example, a press or a machine is isolated from its foundation so that the vibrations are damped to a desired extent.

In the case of receiver isolation, however, the object to be protected, e.g. a measuring table, is isolated from the foundation. If the machinery or equipment is rigidly connected with the foundation, one can assume an almost 100% transmission of vibrations or shocks.

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.

However, it is not always possible in practice to provide a desirably elastic (soft) support for all machines, foundations, measurement facilities and building parts. Users are forced therefore to aim for a viable state between system stability and degree of isolation.

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

A machine connection as an example for source isolation

A measuring machine as an example of receiver isolation

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Effectiveness and vibration calibration

In order to assess the effectiveness of isolation elements for harmonic vibrations, one relates the excitation frequency f_e (machine speed in 1/s) of the isolator to the natural frequency f_0. It may generally be assumed that the effectiveness of an isolation increases with the decreasing natural frequency of the system. If the ratio η of the excitation frequency 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 $\sqrt{2}$, the vibrations become amplified. This is particularly the case in the resonance range if the disturbance frequency is equal to the natural frequency of the isolator ($\eta = f_e / f_0 = 1$).

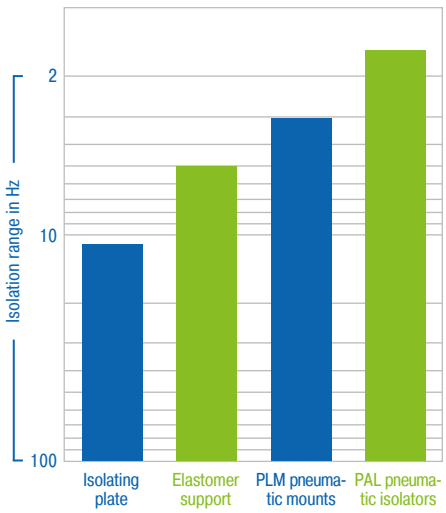
Damping (D) plays an additional, not unimportant role in vibration isolation. When ramping up machines to their operating speed or when ramping down, the natural frequencies of the vibration isolation are generally passed through. In order not to exceed the amplitudes or limit values when passing through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

Quick selection

Different materials 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 vibrations, shocks induced by machinery, equipment or production processes differ in their time profile and intensity. Our application engineers are happy to assist you in selecting the right shock absorber. In addition, selection ranges which suit your needs are available on our homepage.

Application ranges of isolators



More complex vibration states

In case of more complex vibration states, a prior vibration analysis is recommended. In this process, the measured time signal is transformed into the frequency range. This allows for an evaluation of the frequencies for which an isolation is required. The selection of isolation material is then made for the lowest excitation frequency to be isolated.

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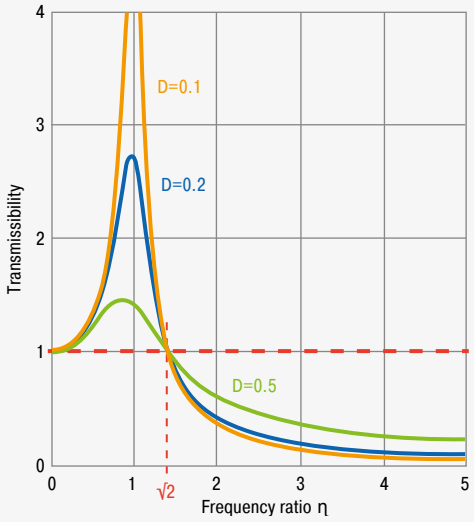
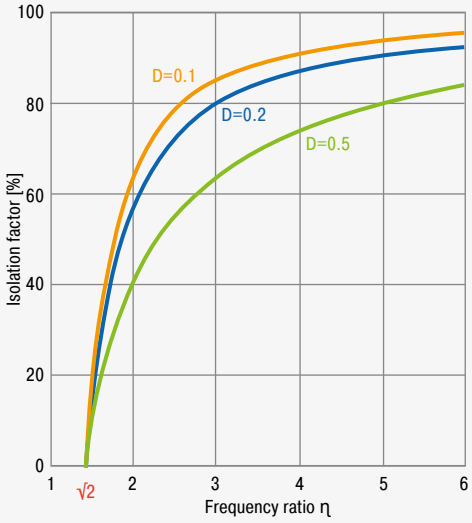
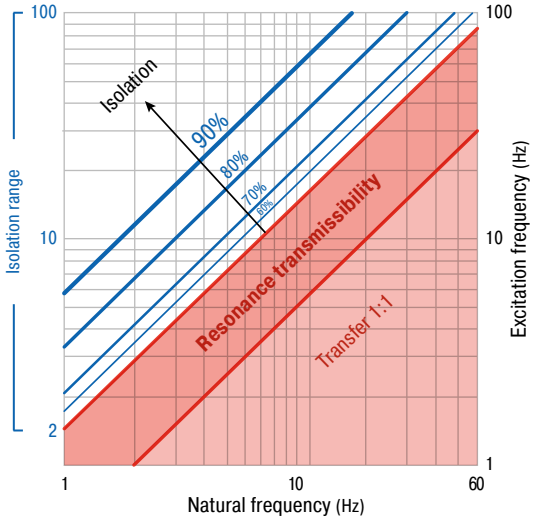
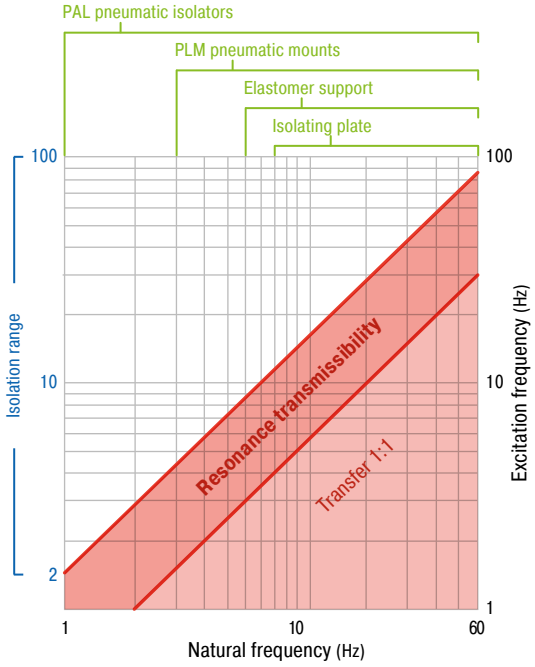
Transmissibility depending on frequency ratio and damping degree

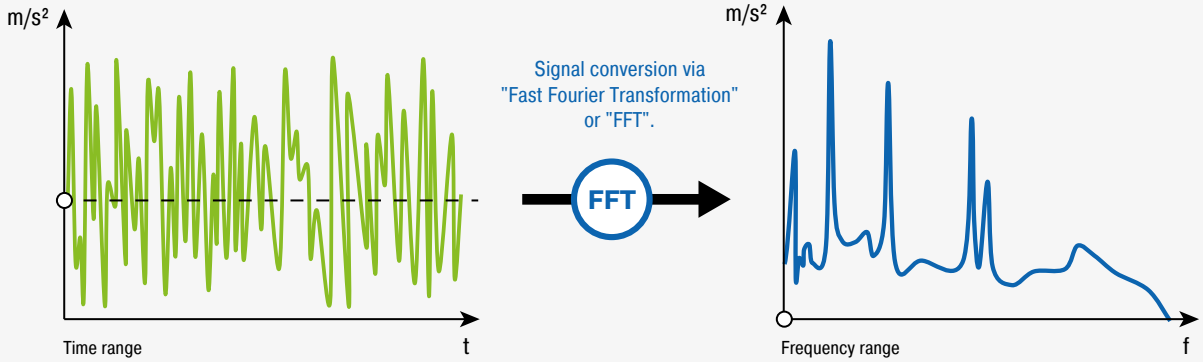


Isolation factor depending on frequency ratio and damping degree









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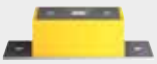
Frequency and weight ranges

	Type	Effective Direction		Load Range kg		Natural Frequency Range Hz
Rubber-Metal Isolators						
	LEV	↓		45 - 5900		8 - 24
	CM	↔ ↕		3 - 750		12 - 35
	COM	↓		6.5 - 1814		4.5 - 16
	AAM	↔ ↕		0.5 - 22.7		16 - 46
	SFM	↔ ↕		20 - 1000		8 - 13
	BM	↓		0.7 - 8.2		8 - 16
	UMO	↔ ↕	For plate thickness G1*: For plate thickness G2*:	axial 8 - 545 24 - 2065	radial 4 - 300 10 - 640	15 - 24 10 - 19
	FL	↔ ↕		2 - 28 0.4 - 5		not specified

* See page 41.

Application overview

Type	Machines	Transfer systems	Construction Transport	Blower Fan	Foundations	Control units Electrical systems	Off-road vehicles
Rubber-Metal Isolators							
LEV	■	■		■			
CM	■		■	■			■
COM	■	■		■		■	
AAM		■	■			■	■
SFM			■				■
BM				■		■	
UMO	■	■	■			■	■
FL	■		■			■	
Vibration-Isolating Plates							
SLAB	■	■	■	■	■		
CEL	■	■	■	■	■		
PAD	■		■		■		■
Air Spring Elements							
PLM	■						
PAL					■		

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	Type	Load Range N/mm²	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

	Typ	Load Range kg	Natural Frequency Range Hz
Low-Frequency Air Spring Elements			
	PLM	20 - 8800	3 - 10
	PAL	36 - 42 000	1.3 - 2.7

Engines Generators	Compressors	Oil and gas industry	Aerospace engineering	Presses	Medicine	Measuring tables	Test benches	Type
								Rubber-Metal Isolators
				■				LEV
■	■	■	■					CM
■	■			■				COM
■			■		■			AAM
■	■							SFM
					■			BM
■	■	■	■					UMO
■	■							FL
								Vibration-Isolating Plates
		■		■	■	■		SLAB
		■		■	■	■	■	CEL
		■		■				PAD
								Air Spring Elements
				■	■	■	■	PLM
			■			■	■	PAL

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Quick selection of suitable isolation products 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 rough guide 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 natural frequency.

The quick selection guide is based on the physics of a single degree of freedom system. With more complex and non-rigid systems and superstructures, it is always recommended to contact a technical consultant or application engineer.

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 kg per element (rubber-metal isolators) or N/mm² as surface pressure (damping plates).

2. **Spring characteristic**
according to load or surface pressure.

3. **Relationship diagram**
with relation between excitation frequency and the required natural frequency of an isolator in relation to the desired isolation result.

Using the diagram

Example

A user has a 1,000 kg machine with 1,800 1/min, which corresponds to an excitation frequency of 1,800 / 60 = 30 Hz. Furthermore, the user would like to achieve a good isolation from the floor by using 4 CM cup mounts (250 kg per isolator).

The selection is as follows:

1. Draw horizontal line in diagram 1 at 250 kg Load per isolator. The line intersects 3 products as solutions, with the most cost-effective being the CM-VSC3-40 in this case.

2. Draw horizontal line in diagram 3 at 30 Hz excitation 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 CM-VSC3-40 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 1.5 mm.

1

2

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.

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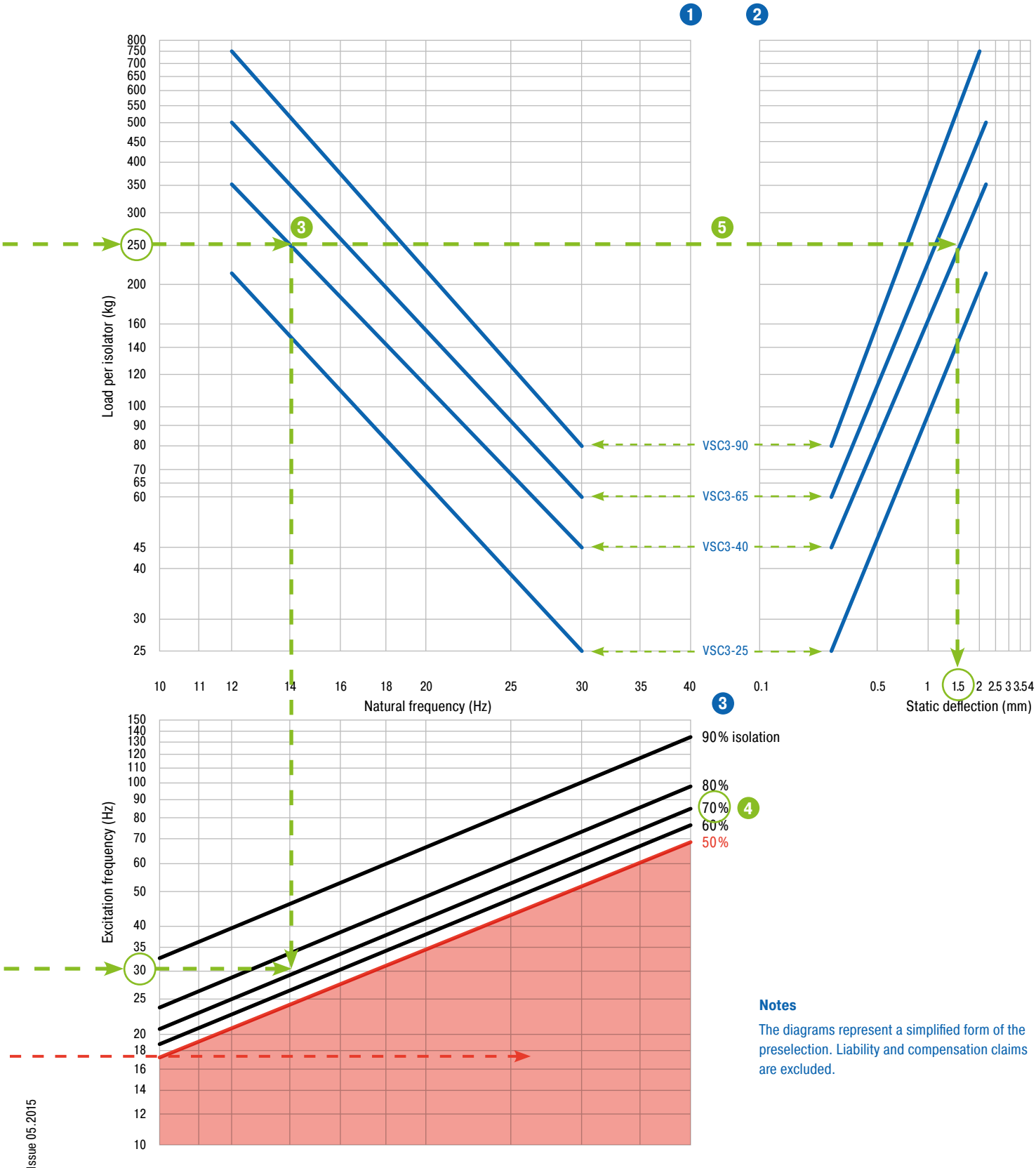
Example Diagram



Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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01

Rubber-Metal Isolators

LEV

Levelling Mounts (height-adjustable machine feet)
Secure, adjustable stabilisation for all types of machines, transfer systems, assembly stations, etc.

CM

Cup Mounts
For isolating machinery and equipment. Fail-safe isolators for all axes in any installation position. Application examples: compressors, off-road vehicles, engines, fans, etc.

COM

Compression Mounts (pre-tensioned high-performance bearing surface)
Vertically acting isolators for machinery and equipment. Applications include: blowers, compressors, motors, generators, presses, etc.

AAM

All Attitude Mounts (vibration-isolating fasteners)
Maintenance free isolators for decoupling parts and components in electronics, aerospace, the military, medicine transfer systems, etc.

SFM

Stable Flex Mounts (stable machine feet)
Extremely rugged and maintenance-free isolators, e.g. for marine applications, for diesel generators, in power generation or in off-road vehicles.

BM

Bubble Mounts (low-frequency vibration isolators)
For protecting small devices and electronic components, e.g. in medical technology, aerospace, electronic systems or computers.

UMO

Universal Mounts (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 Locs (quick fastening elements)
Simple, efficient components with versatile applications as isolating fasteners for decoupling structure-borne sound in enclosures, housings, equipment and machinery. For application in mechanical engineering, in buildings, vehicles, or navigation.

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LEV
Levelling Mounts
Height-adjustable machine feet

Height-adjustable machine feet from the LEV product group are maintenance-free and ready-for-installation. The precise, adjustable LEV machine feet 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 feet can be supplied in different sizes, from M10 to M24 threads, and can secure and bear loads in these sizes from 45 to 5,900 kg.

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

The mounts meet OSHA requirements for anchoring machines.

Properties

- Easy to level
- Vibration-reducing
- Noise-reducing
- Improved product quality
- Maintenance-free
- Compensates for floor unevenness
- Special models available on request
- Special vibration-isolating feet according to design and custom-made product
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber)
- Operating temperature range -30 °C to +80 °C

Areas of application

- Injection moulding machines
- Conveyors
- Production and processing centres
- Assembly stations
- Small presses, etc.

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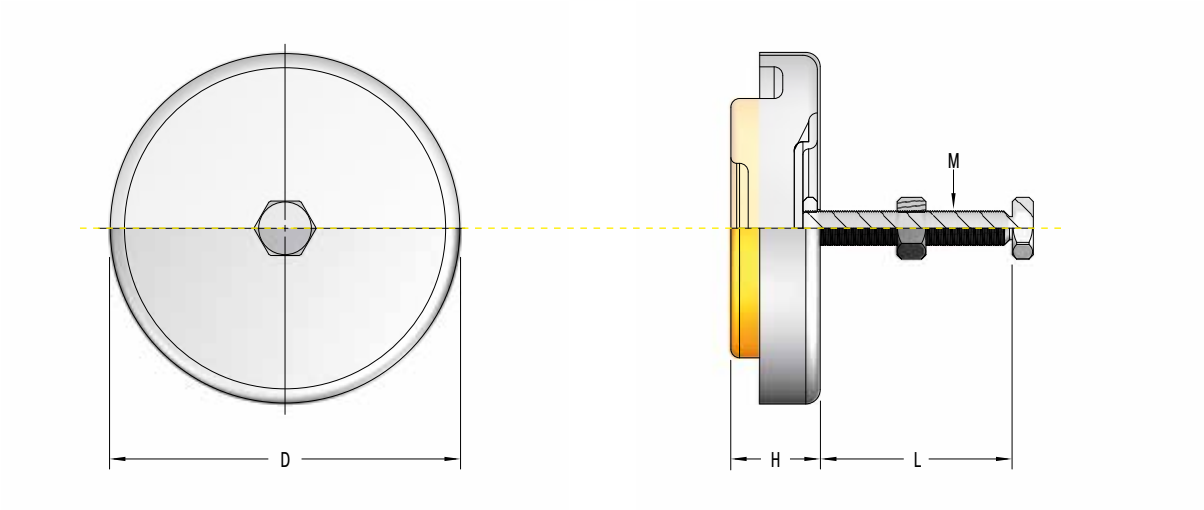
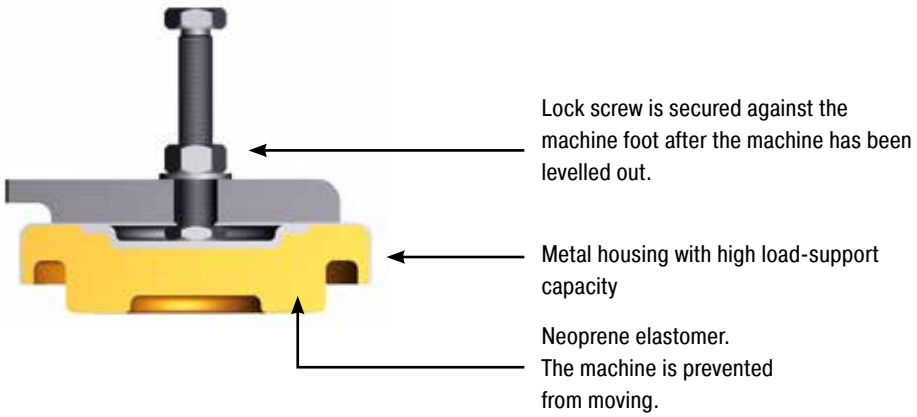
LEV M10 to M24



Type	Min. Load kg	Max. Load kg	Natural Frequency Range Hz	M	L mm	D mm	H mm
LEV-52221-M10	45	230	8 - 24	M10x1.5	80	80	38
LEV-52224-M12	135	450	8 - 24	M12x1.75	130	120	38
LEV-52226-M20	230	2040	8 - 24	M20x2.5	130	160	41
LEV-52229-M24	1815	5900	8 - 24	M24x3.0	180	230	57

Standard delivery with hexagon nut

Installation sketch



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CM
Cup Mounts

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

The correct function of the mounts is guaranteed even in an arduous environment due to the fail-safe design of the machine elements. The low-profile CMs are able to isolate machine parts from each other in an effective way. 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 as damping material.

For applications in the areas of heavy shocks (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 up to 12 Hz (please refer to the selection diagram for more exact values).

Properties

- Fail-safe
- Can be installed in all spatial axes
  Can be used for shear, compressive and tensile loads
- Available with centric thread or through-hole
- All metal parts galvanised, aluminium or stainless steel available on request
- Operating temperature range -30 °C to +80 °C for neoprene
- Operating temperature range -60 °C to +150 °C 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

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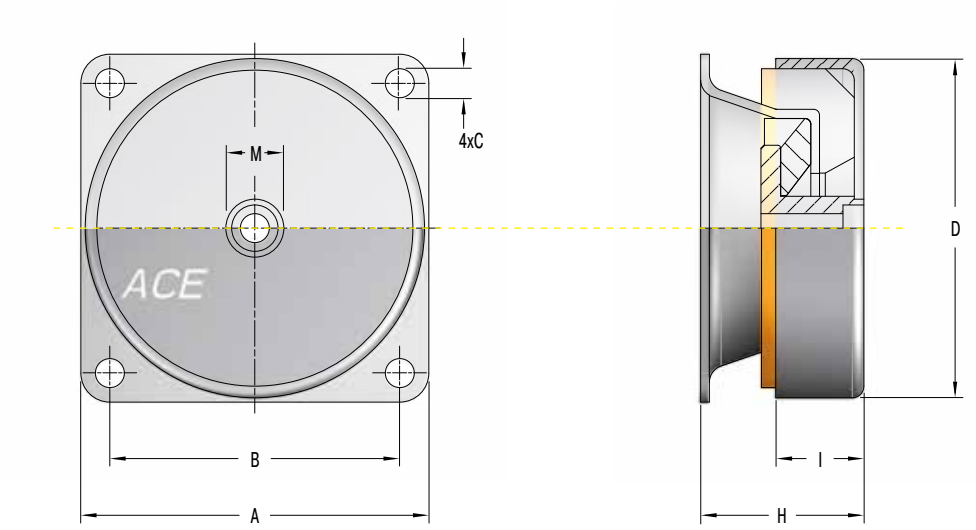
CM-VSC1 / CM-VSC2 / CM-VSC3



Type	Min. Load kg	Max. Load kg	M	Screw-in Depth mm	A mm	B mm	D mm	C mm	H mm	I mm	Weight kg
CM-VSC1-2	3	16	M6 or M8	20	60	49.5	58	5.5	28	18	0.2
CM-VSC1-4	7	35	M6 or M8	20	60	49.5	58	5.5	28	18	0.2
CM-VSC1-7	14	60	M6 or M8	20	60	49.5	58	5.5	28	18	0.2
CM-VSC1-10	25	100	M6 or M8	20	60	49.5	58	5.5	28	18	0.2
CM-VSC2-5	9	35	M10 or M12	30	76	63.5	76	6.4	38	25	0.45
CM-VSC2-10	14	60	M10 or M12	30	76	63.5	76	6.4	38	25	0.45
CM-VSC2-15	25	90	M10 or M12	30	76	63.5	76	6.4	38	25	0.45
CM-VSC2-25	50	200	M10 or M12	30	76	63.5	76	6.4	38	25	0.45
CM-VSC2-40	35	250	M10 or M12	30	76	63.5	76	6.4	38	25	0.45
CM-VSC3-25	25	210	M16	19	133	108	124	11.9	63	38	1.8
CM-VSC3-40	45	350	M16	19	133	108	124	11.9	63	38	1.8
CM-VSC3-65	60	500	M16	19	133	108	124	11.9	63	38	1.8
CM-VSC3-90	80	750	M16	19	133	108	124	11.9	63	38	1.8

Difference between stationary and mobile application in the selection diagrams

Stationary applications are those in which the cup mounts isolate stationary machines, plants, etc.

Mobile applications, however, refer to applications in which the cup mounts isolate engines, 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.

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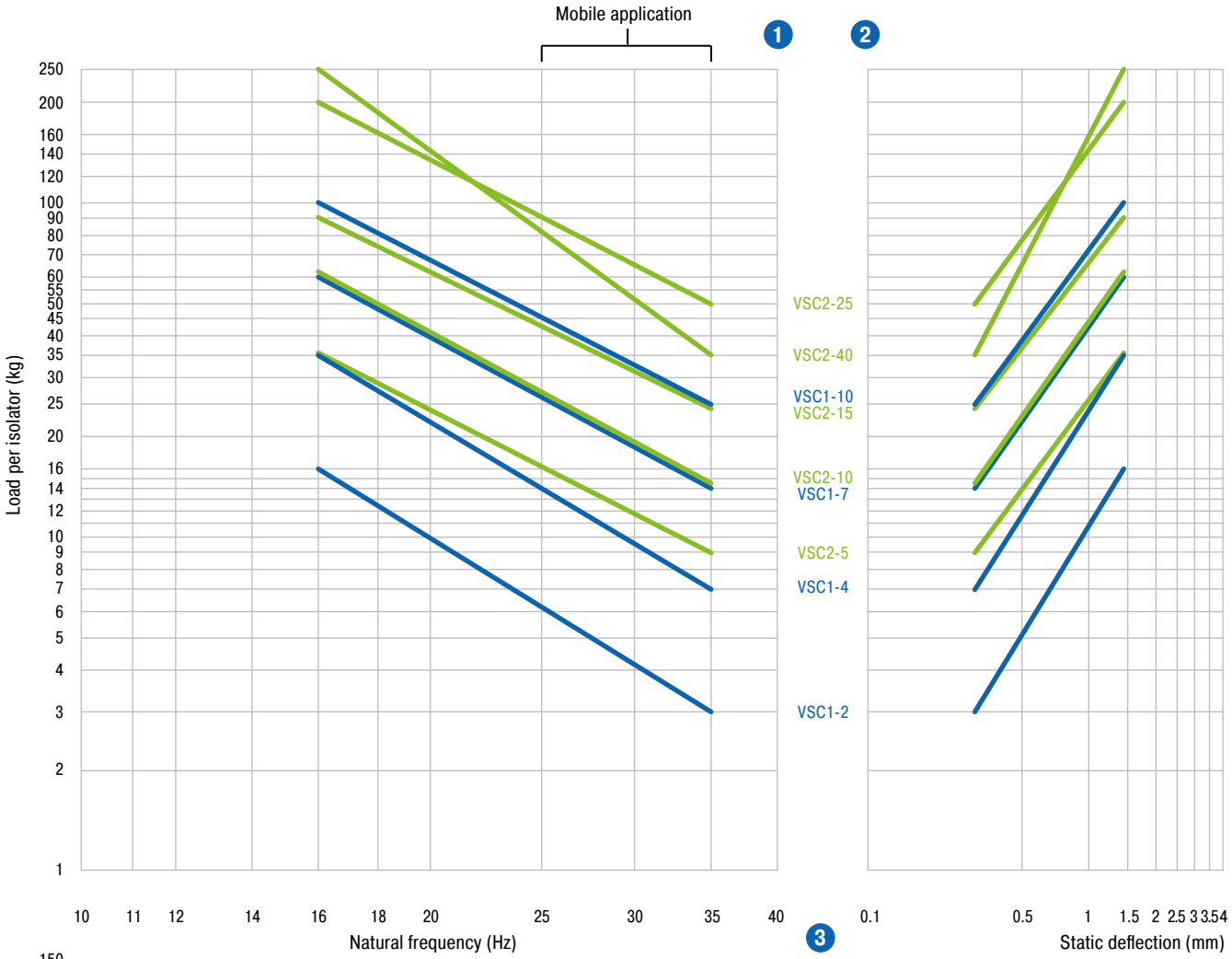
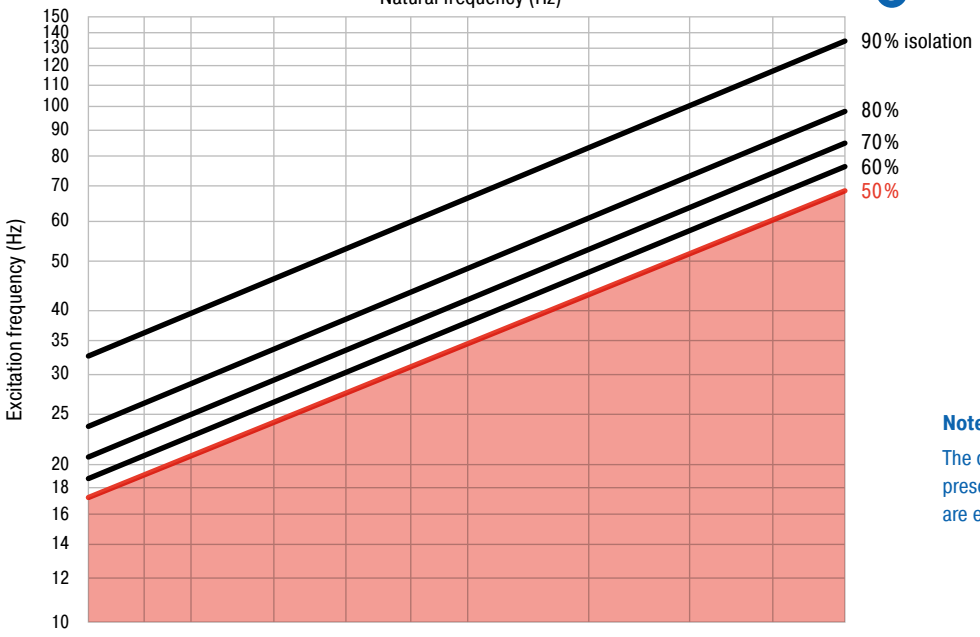
CM-VSC1 / CM-VSC2





Notes

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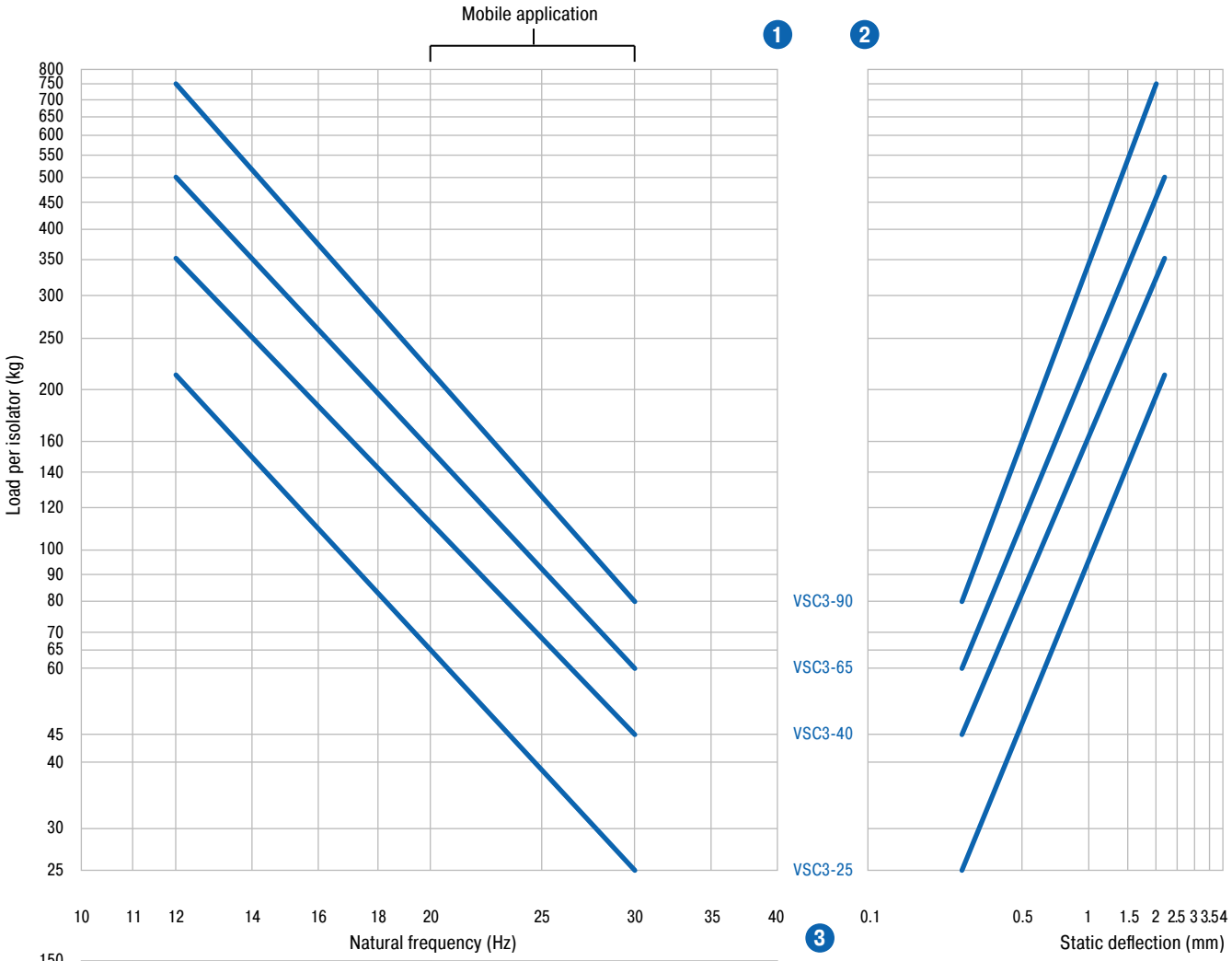
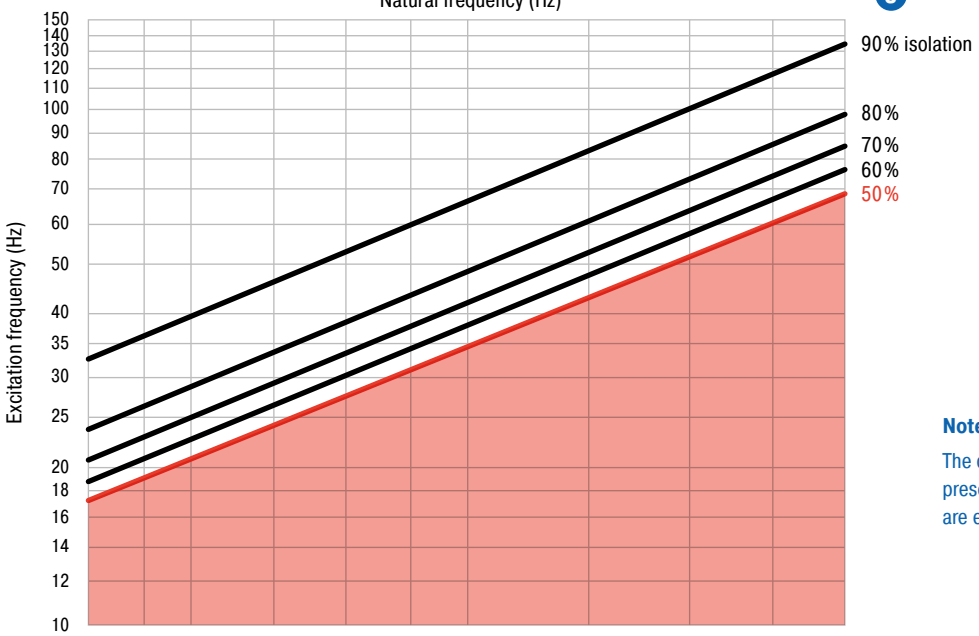
CM-VSC3





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COM

Compression Mounts

Pre-tensioned high-performance bearing surfaces

The COM compression mounts are high-performance bearing surface elements for isolating machines and plants. These extremely rugged elastomer bearing surfaces are primarily used in heavy-duty applications, such as in pumps and compressors.

In their operating range, the COMs exhibit a low natural frequency of approx. 8 to 15 Hz and can when necessary be coupled for certain applications, whereby the natural system frequency can be further reduced to approx. 6 to 10 Hz (please refer to the selection diagram for more exact data). They are often used in situations in which unbalanced machine parts cause shocks and vibrations which can have a negative impact on the surrounding area. Disturbance frequencies from 900 min-1 (15 Hz) are effectively isolated. Through the use of the high-performance bearing surfaces, structure-borne noise paths become interrupted, preventing the generation of resonant sound.

Properties

- Pre-tensioned to enhance efficiency
- Isolates structure-borne noise
- Low-frequency application range from about 15 Hz
- Rugged
- Maintenance-free
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber)
- Operating temperature range -30 °C to +80 °C

Areas of application

- Centrifuges
- Blowers
- Vibrators and crusher plants
- Compressors and ventilation systems
- Injection moulding systems
- Switch cabinets
- Military and off-road vehicles

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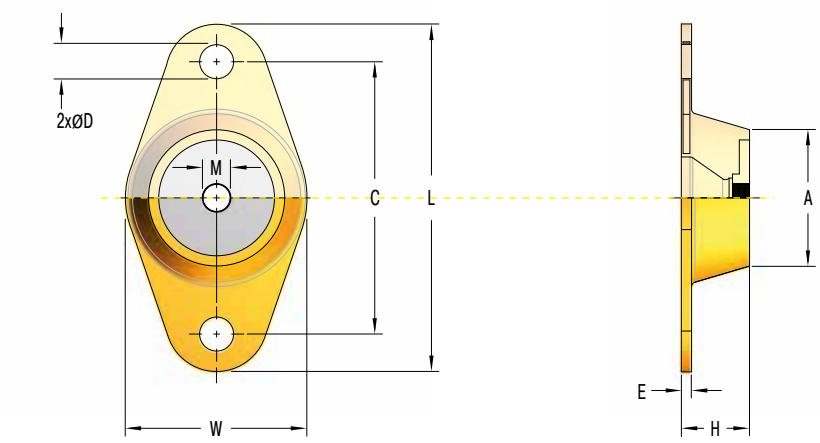

COM-5250x / COM-5252x / COM-5254x

Type	Colour Code*	Min. Load kg	Max. Load kg	M	L mm	W mm	H mm	A mm	C mm	D mm	E mm
COM-52501	blue	6.3	15.9	M8x1.25	79.4	44.5	25.4	31.8	60.3	8.7	4.8
COM-52502	black	8.2	20.4	M8x1.25	79.4	44.5	25.4	31.8	60.3	8.7	4.8
COM-52503	red	12.7	31.8	M8x1.25	79.4	44.5	25.4	31.8	60.3	8.7	4.8
COM-52504	green	21.8	54.4	M8x1.25	79.4	44.5	25.4	31.8	60.3	8.7	4.8
COM-52521	blue	24.5	61.2	M10x1.5	98.4	60.3	31.8	44.5	76.2	8.7	5.6
COM-52522	black	30.8	77.1	M10x1.5	98.4	60.3	31.8	44.5	76.2	8.7	5.6
COM-52523	red	43.6	108.9	M10x1.5	98.4	60.3	31.8	44.5	76.2	8.7	5.6
COM-52524	green	69.0	172.4	M10x1.5	98.4	60.3	31.8	44.5	76.2	8.7	5.6
COM-52525	grey	99.8	249.5	M10x1.5	98.4	60.3	31.8	44.5	76.2	8.7	5.6
COM-52541	black	45.4	113.4	M12x1.75	139.7	85.7	44.5	63.5	104.8	14.3	6.4
COM-52542	red	95.2	238.1	M12x1.75	139.7	85.7	44.5	63.5	104.8	14.3	6.4
COM-52543	green	136.1	340.2	M12x1.75	139.7	85.7	44.5	63.5	104.8	14.3	6.4
COM-52544	grey	199.6	499.0	M12x1.75	139.7	85.7	44.5	63.5	104.8	14.3	6.4

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

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

Type	Colour Code*	Min. Load kg	Max. Load kg	M	L mm	W mm	H mm	A mm	C mm	D mm	E mm
COM-52511	blue	6.3	15.9	M8x1.25	79.4	44.5	31.8	31.8	60.3	8.7	4.8
COM-52512	black	8.2	20.4	M8x1.25	79.4	44.5	31.8	31.8	60.3	8.7	4.8
COM-52513	red	12.7	31.8	M8x1.25	79.4	44.5	31.8	31.8	60.3	8.7	4.8
COM-52514	green	21.8	54.4	M8x1.25	79.4	44.5	31.8	31.8	60.3	8.7	4.8
COM-52531	blue	24.5	61.2	M10x1.5	98.4	60.3	44.5	44.5	76.2	8.7	5.6
COM-52532	black	30.8	77.1	M10x1.5	98.4	60.3	44.5	44.5	76.2	8.7	5.6
COM-52533	red	43.6	108.9	M10x1.5	98.4	60.3	44.5	44.5	76.2	8.7	5.6
COM-52534	green	69.0	172.4	M10x1.5	98.4	60.3	44.5	44.5	76.2	8.7	5.6
COM-52535	grey	99.8	249.5	M10x1.5	98.4	60.3	44.5	44.5	76.2	8.7	5.6
COM-52551	black	45.4	113.4	M12x1.75	139.7	85.7	73	63.5	104.8	14.3	6.4
COM-52552	red	95.2	238.1	M12x1.75	139.7	85.7	73	63.5	104.8	14.3	6.4
COM-52553	green	136.1	340.2	M12x1.75	139.7	85.7	73	63.5	104.8	14.3	6.4
COM-52554	grey	199.6	499.0	M12x1.75	139.7	85.7	73	63.5	104.8	14.3	6.4

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

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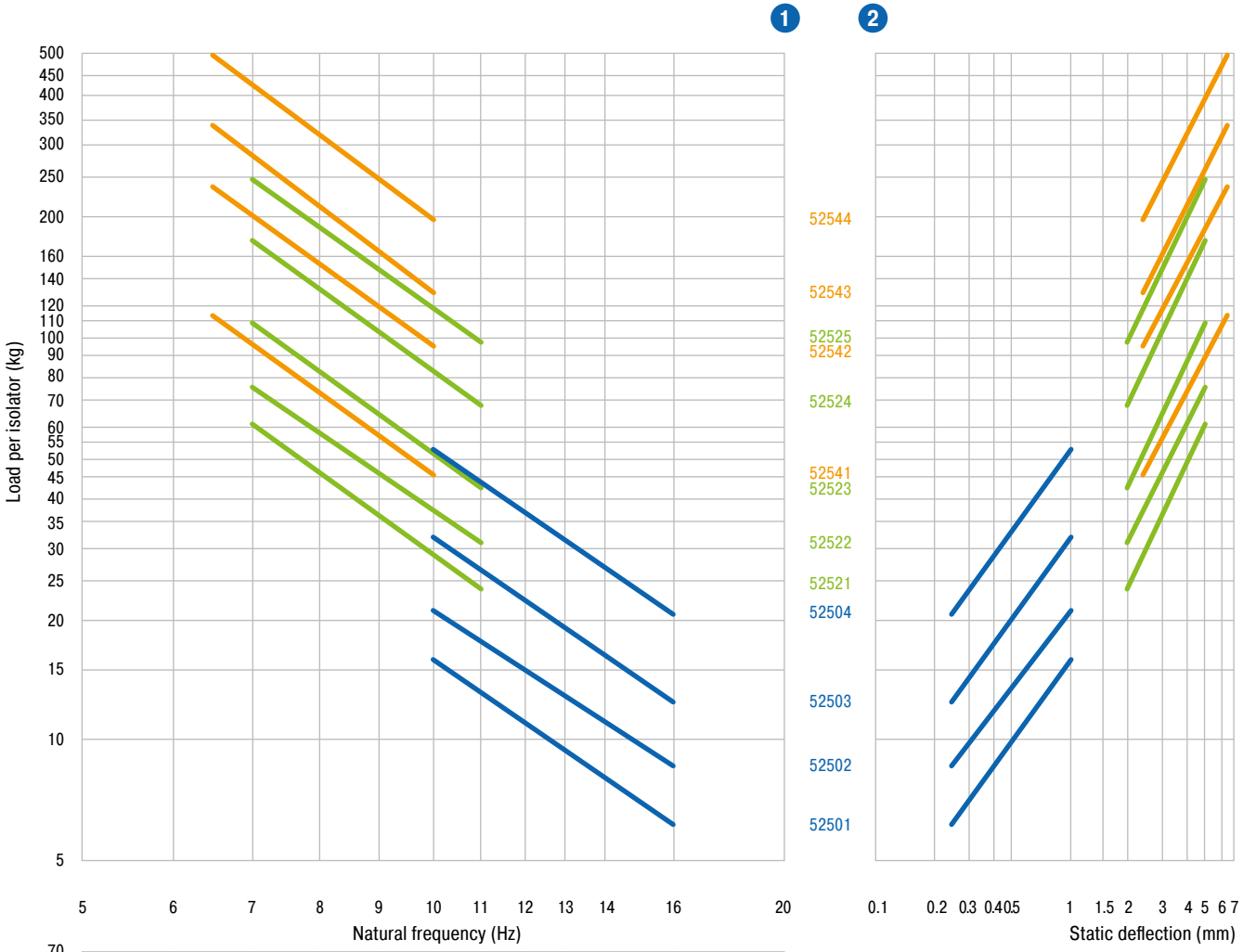
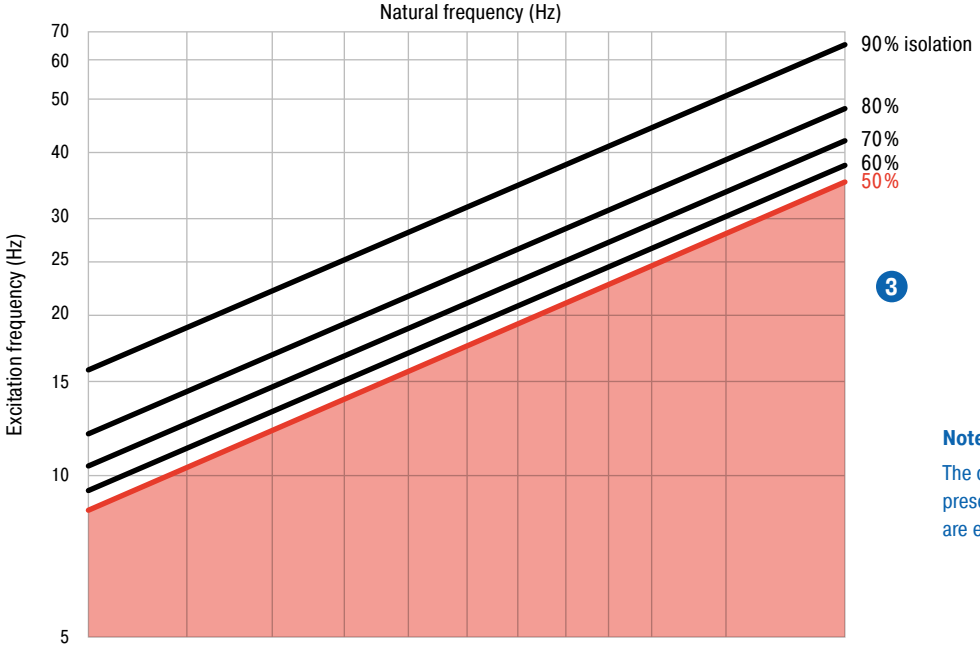
COM-5250x / COM-5252x / COM-5254x





Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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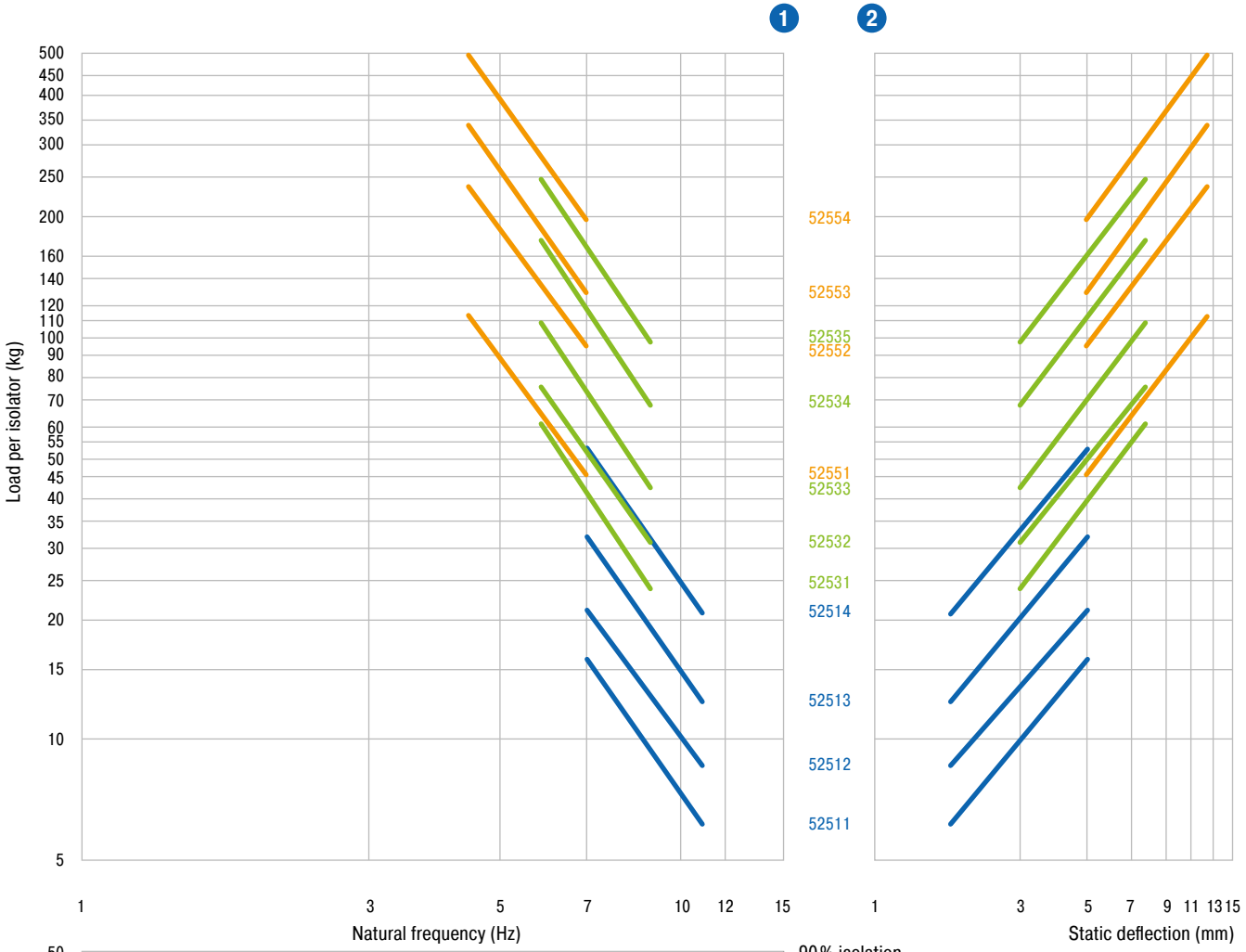
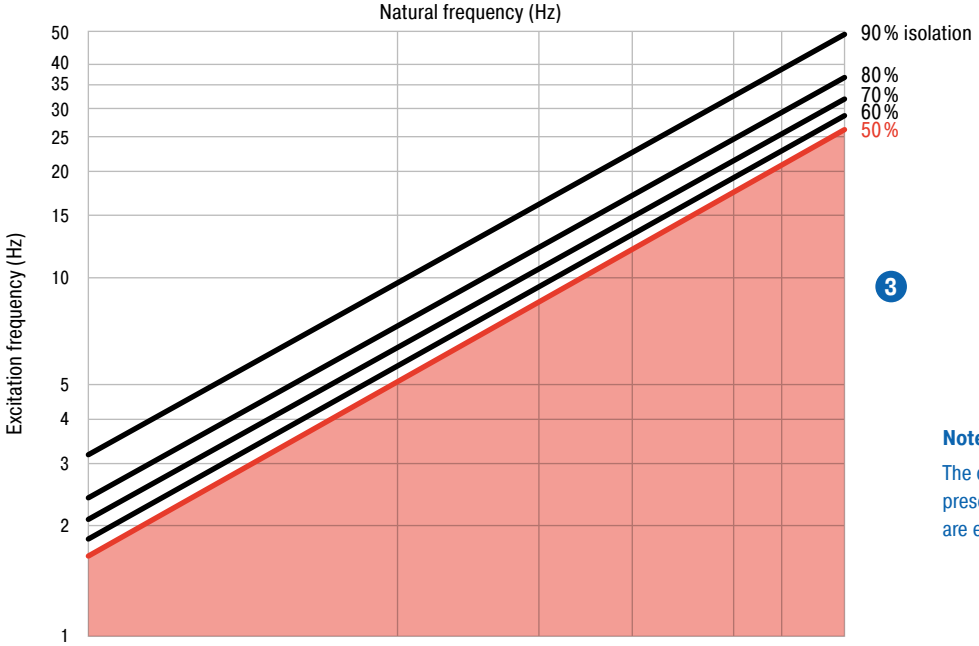
COM-5251x / COM-5253x / COM-5255x





Notes

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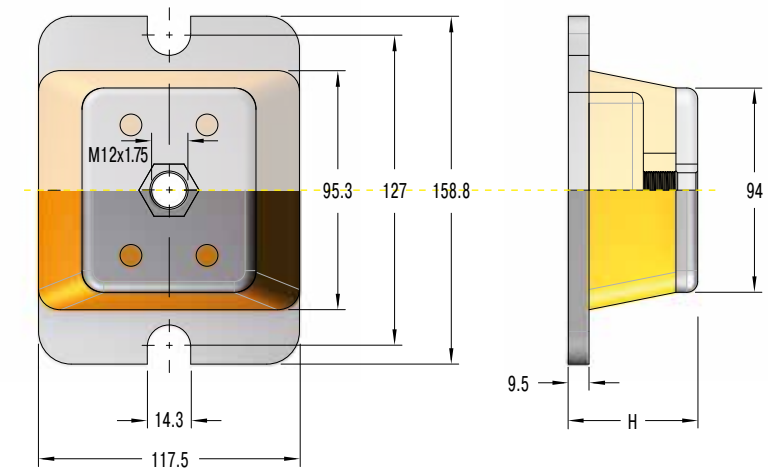
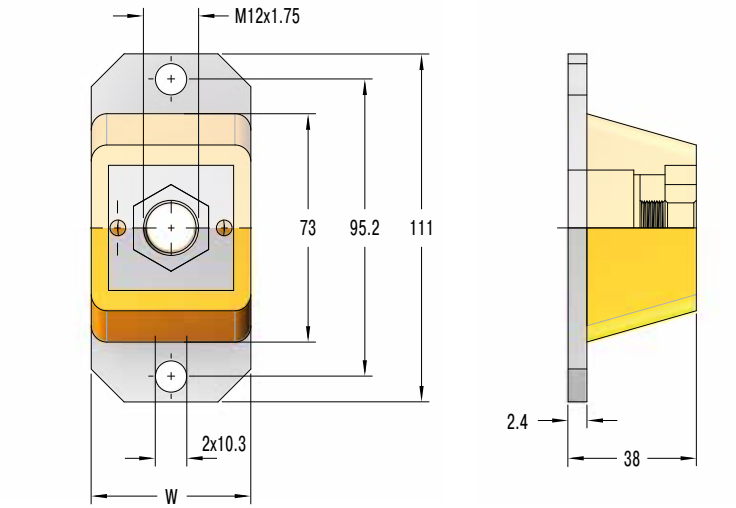
COM-5256x / COM-5257x



Type	Colour Code*	Min. Load kg	Max. Load kg	H mm
COM-52561	black	272.2	680.4	41.3
COM-52562	red	408.2	1020.6	41.3
COM-52563	green	544.3	1360.8	41.3
COM-52564	grey	725.8	1814.4	41.3
COM-52571	black	272.2	680.4	69.9
COM-52572	red	408.2	1020.6	69.9
COM-52573	green	544.3	1360.8	69.9
COM-52574	grey	725.8	1814.4	69.9

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

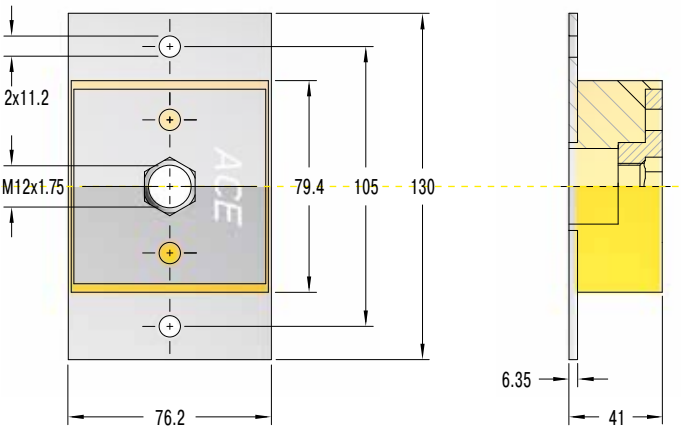
COM-5216x



Type	Colour Code*	Min. Load kg	Max. Load kg	W mm
COM-52160	yellow	10.9	27.2	50.8
COM-52161	red	18.2	45.4	50.8
COM-52162	green	27.2	68.0	50.8
COM-52163	blue	36.3	90.7	50.8
COM-52164	red	36.3	90.7	101.6
COM-52165	green	50.8	127.0	101.6
COM-52166	blue	90.7	226.8	101.6
COM-52167	white	127.0	317.5	101.6

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

COM-5217x



Type	Colour Code*	Min. Load kg	Max. Load kg
COM-52171	red	127.0	317.5
COM-52172	green	181.4	453.6
COM-52173	blue	272.2	680.4
COM-52174	white	453.6	1134.0

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

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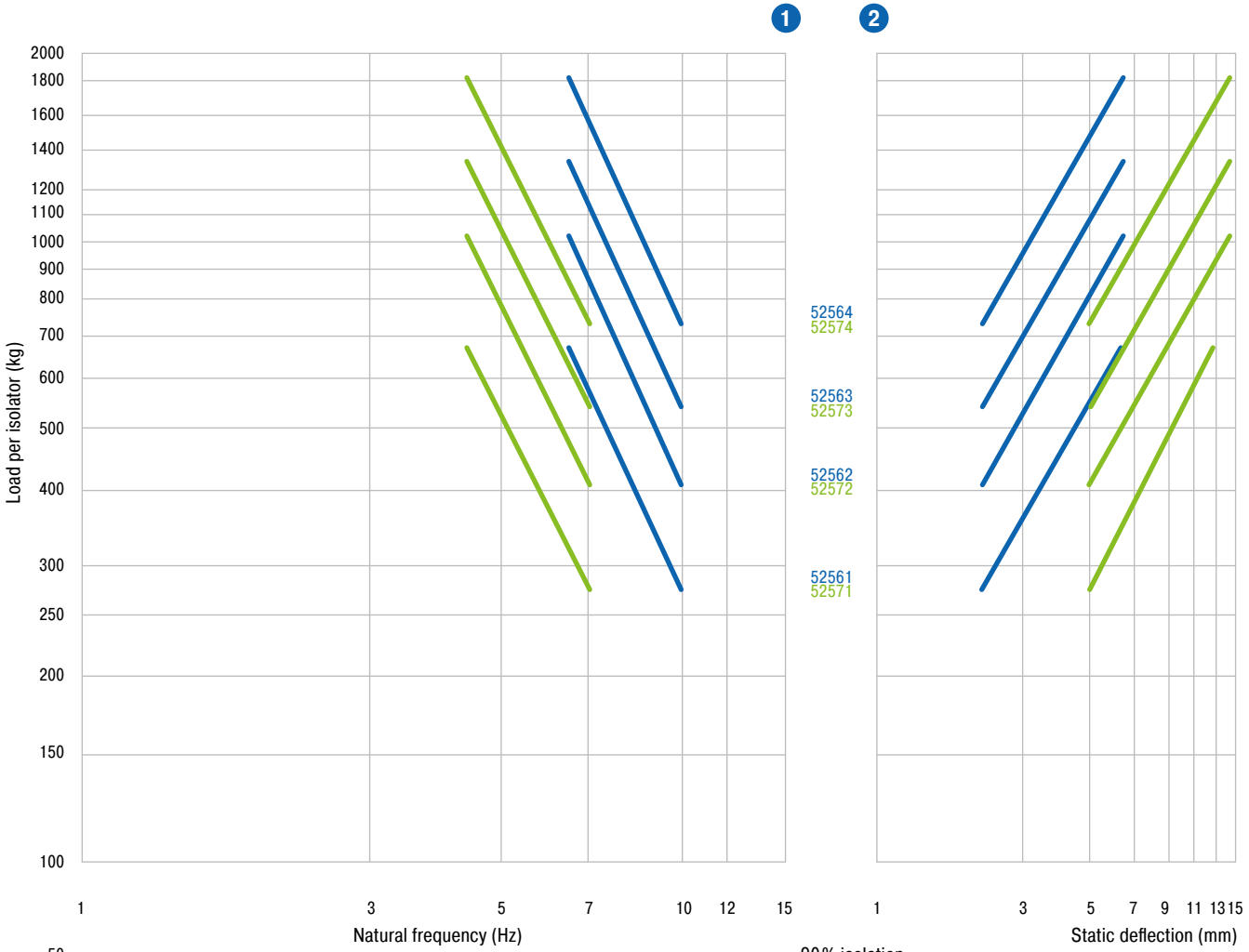
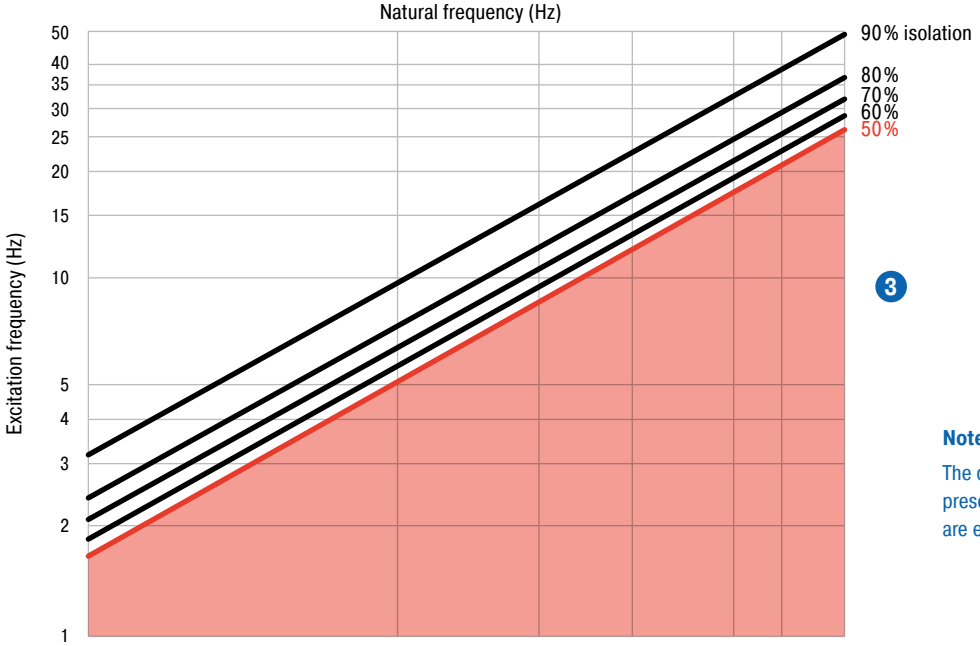
COM-5256x / 5257x





Notes

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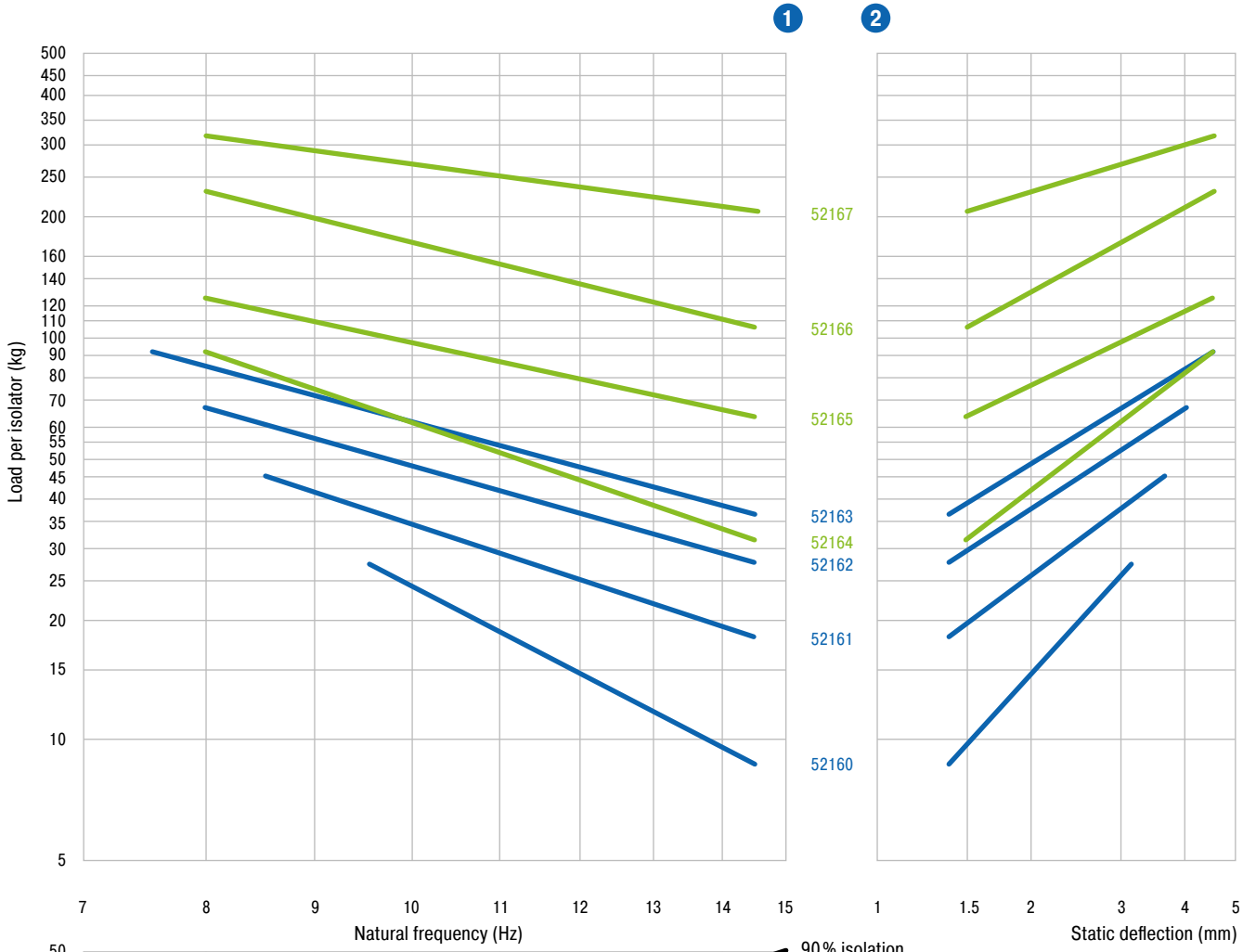
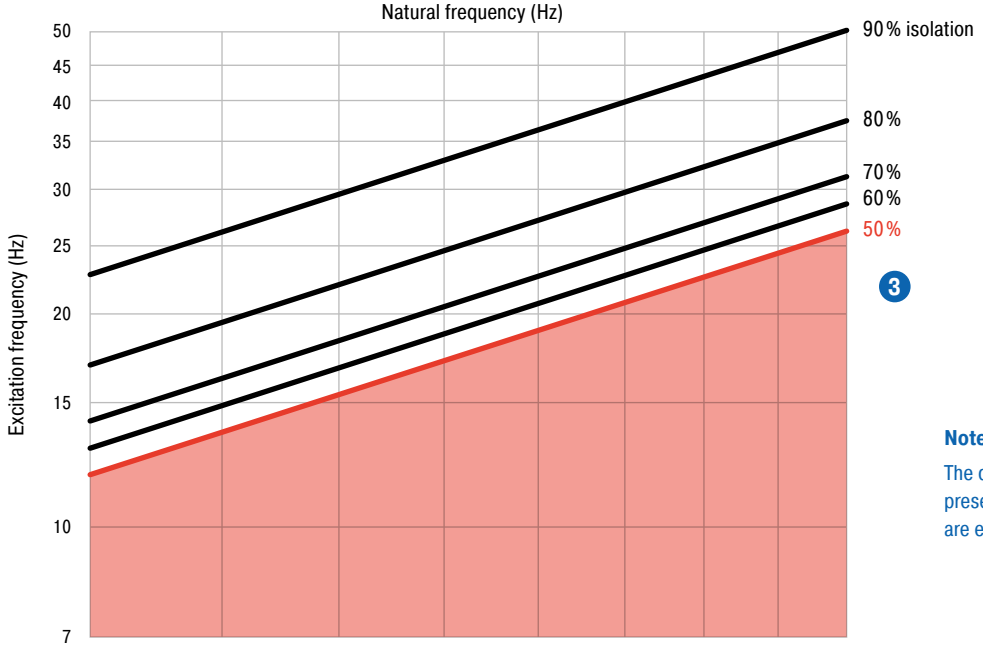
COM-5216x





Notes

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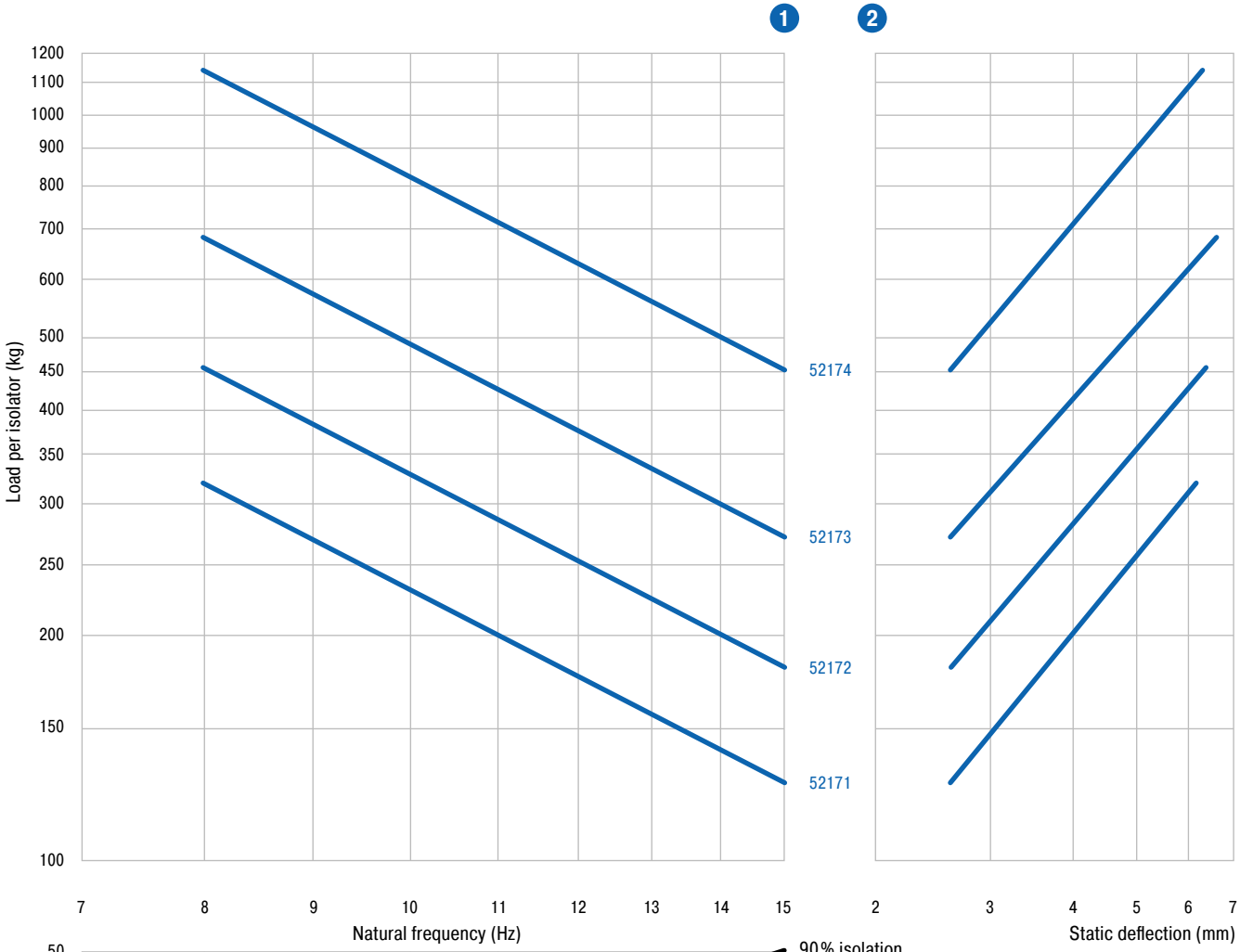
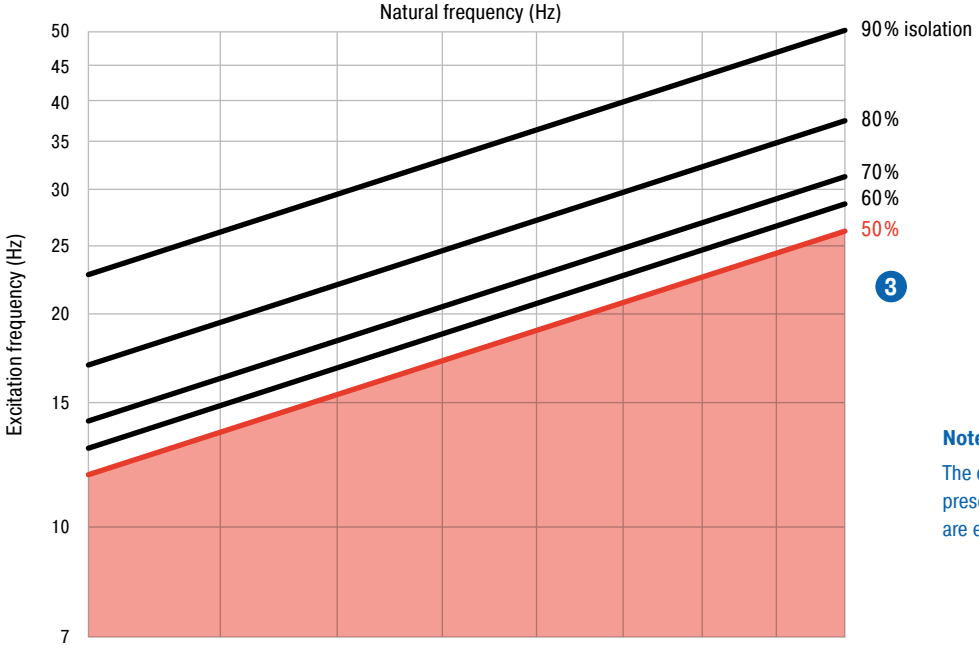
COM-5217x





Notes

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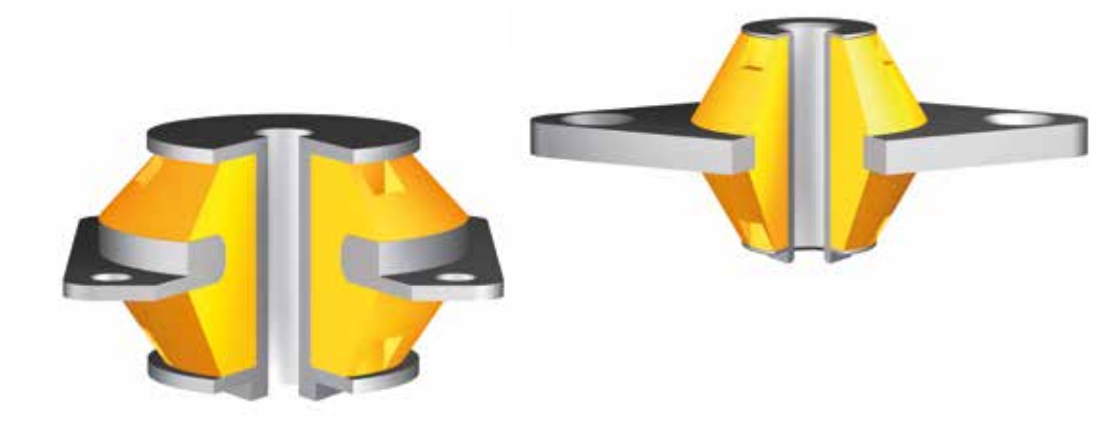

AAM

All Attitude Mounts

Vibration-isolating fasteners

The vibration-isolating fasteners (all-attitude mounts) of the AAM product group are maintenance-free and ready-to-install isolators that can reduce vibrations and shocks in all directions. The isolation effect is achieved by a special neoprene- or silicone-elastomer.

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

Properties

- Can be installed in all spatial axes
  Can be used for shear, compressive and tensile loads
- Special applications with high-damping silicone possible
- Shock absorption possible
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber) or silicone, depending on the type
- Operating temperature range -30 °C to +80 °C

Areas of application

- Electronic equipment and control units
- Off-road vehicles
- Military

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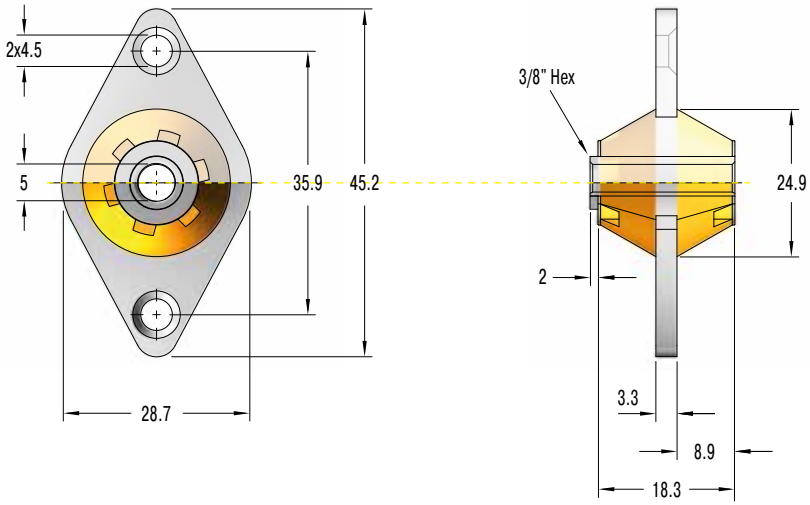
AAM-5642x

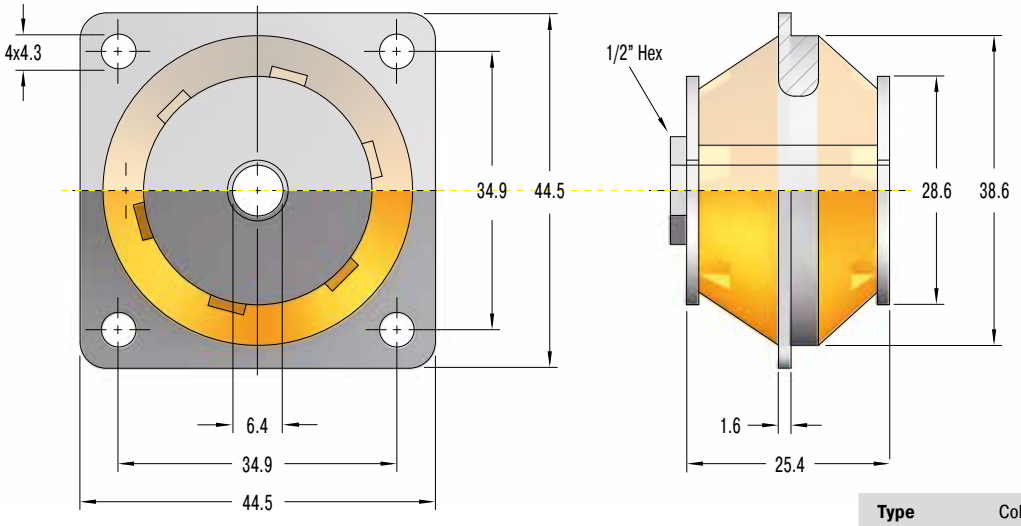


Type	Colour Code*	Min. Load kg	Max. Load kg
AAM-56423	grey	0.5	1.4
AAM-56424	red	0.8	2.0
AAM-56425	yellow	1.3	3.2
AAM-56426	green	1.8	4.5

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

Standard material: Silicone

AAM-5220x



Type	Colour Code*	Min. Load kg	Max. Load kg
AAM-52205	red	1.3	6.8
AAM-52206	green	1.8	11.3
AAM-52207	yellow	2.7	15.9
AAM-52208	blue	4.1	22.7

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

Standard material: Neoprene, silicone alternatively available

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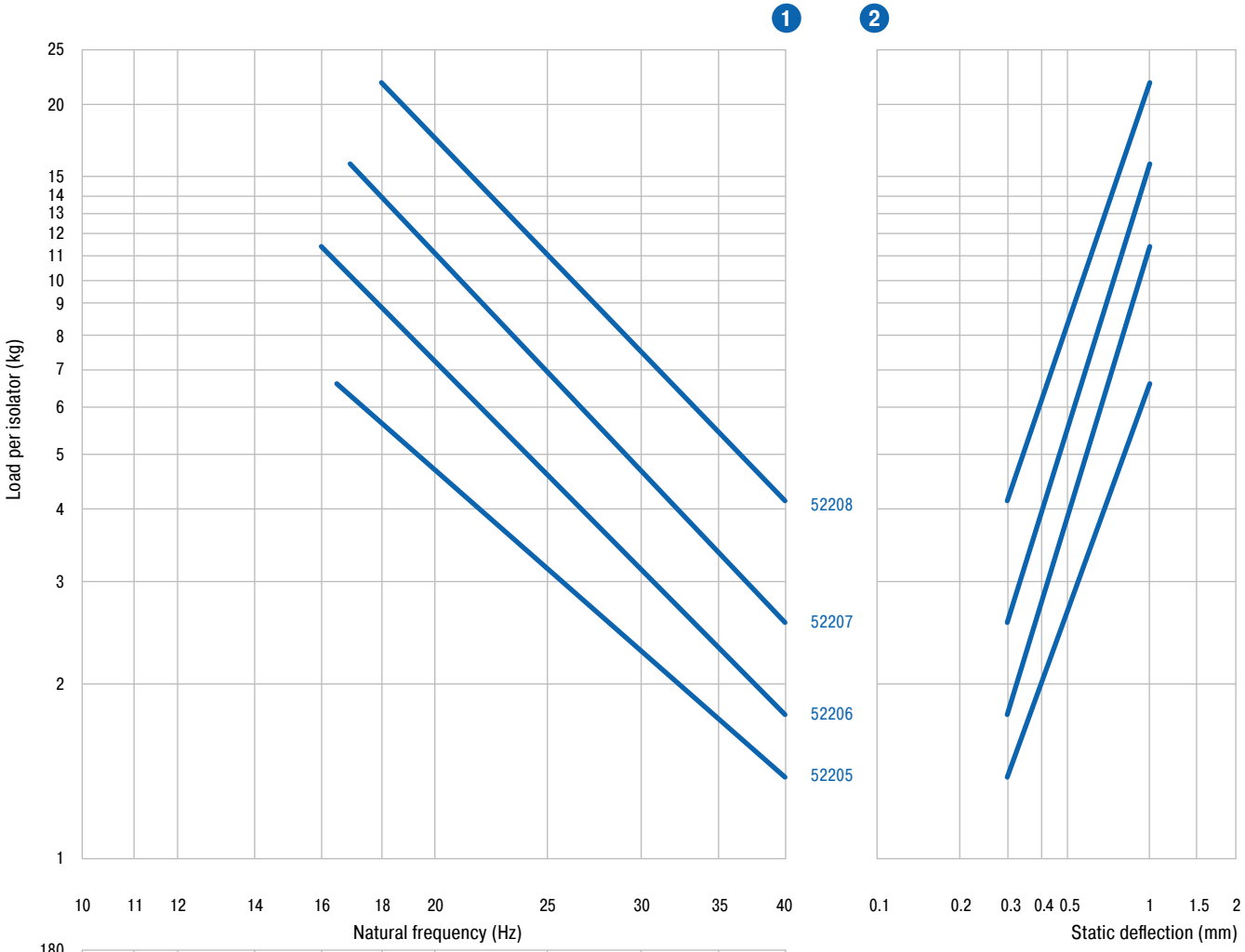
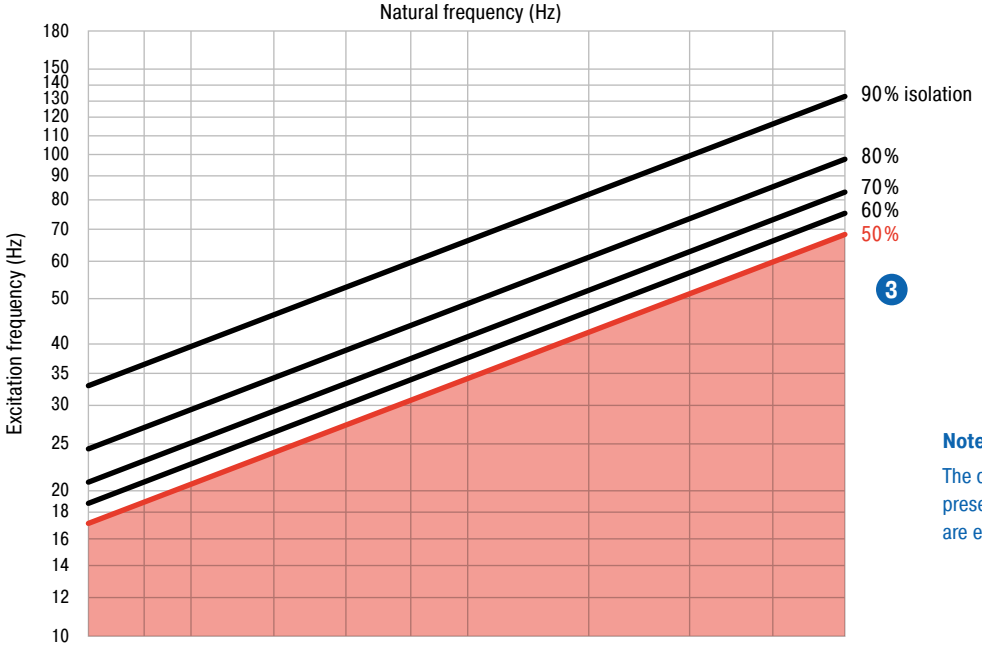
AAM-5220x





Notes

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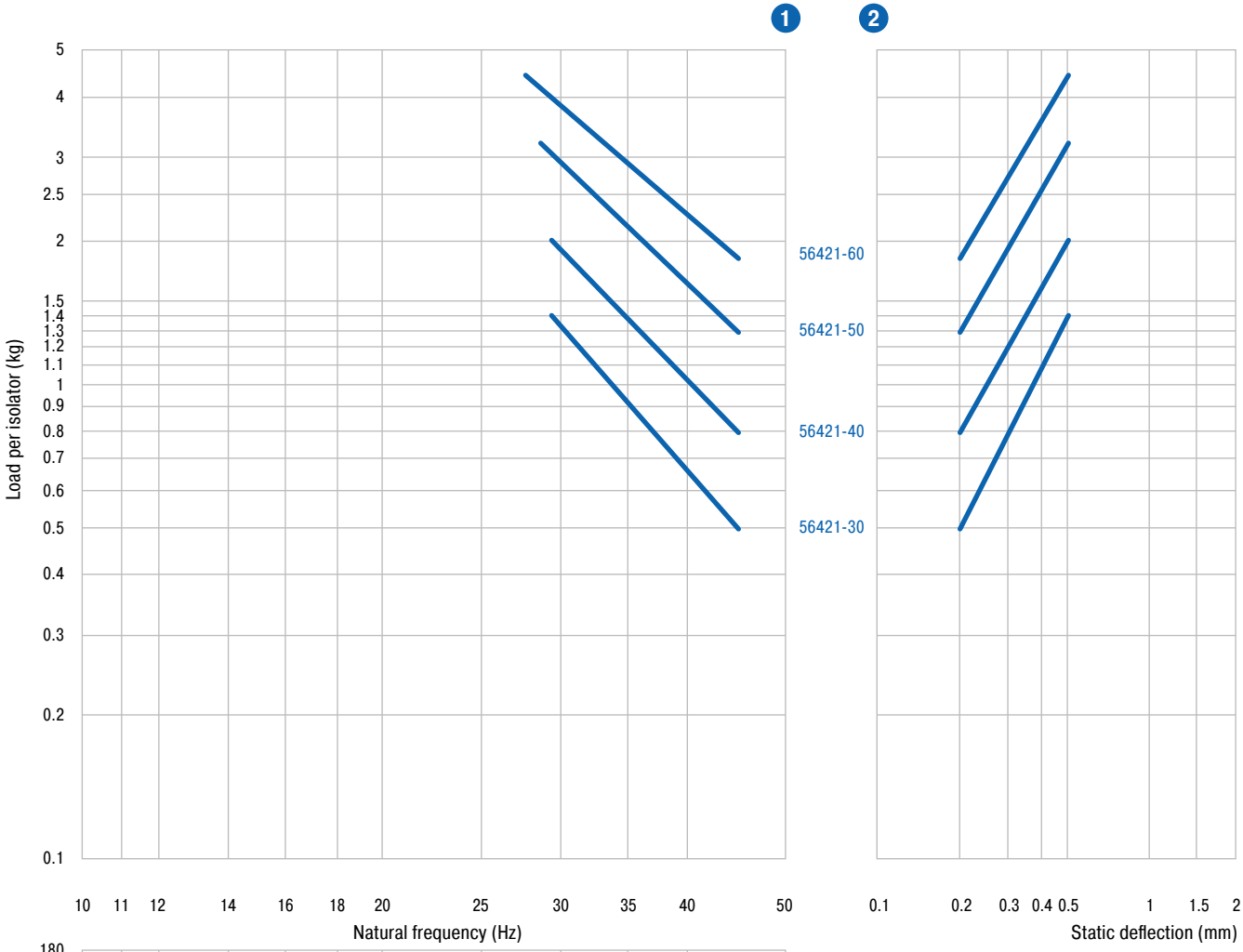
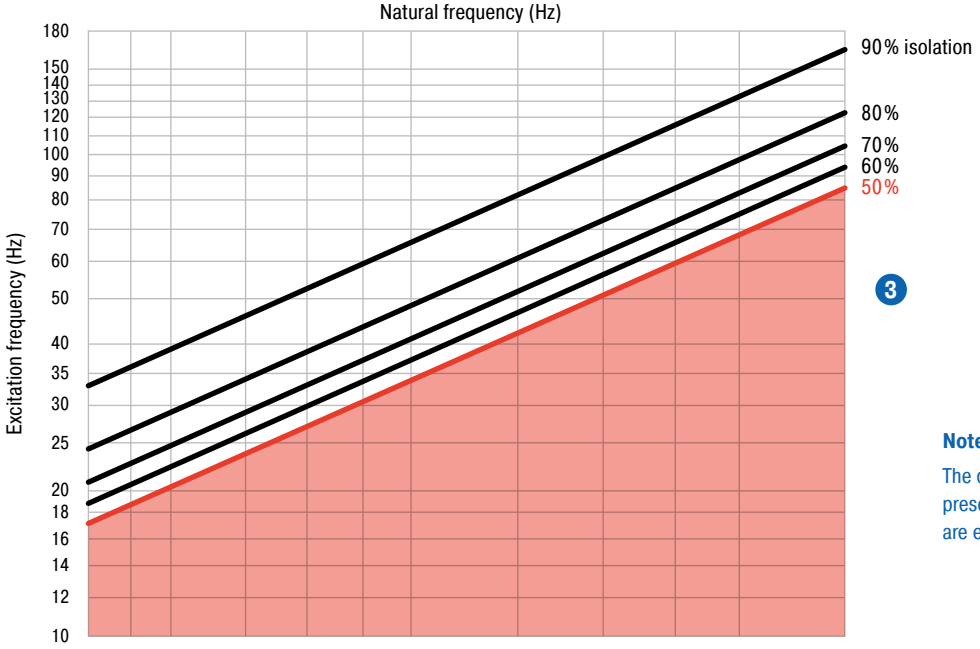
AAM-5642x





Notes

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SFM

Stable Flex Mounts

Stable machine feet

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

The isolators are used in marine applications and for diesel generators. The SFMs are available in three sizes for applications from 20 kg to 1,000 kg. Their longitudinal rigidity is by a factor of 2.5 higher than their vertical rigidity. The transversal rigidity is by a factor of 0.75 lower than the vertical rigidity. Under maximum load, the SFMs have a natural frequency of only 8 Hz.

Properties

- Fail-safe
- Low natural frequency
- Rugged
- Versatile
- Maintenance-free
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber)
- Operating temperature range -30 °C to +80 °C

Areas of application

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

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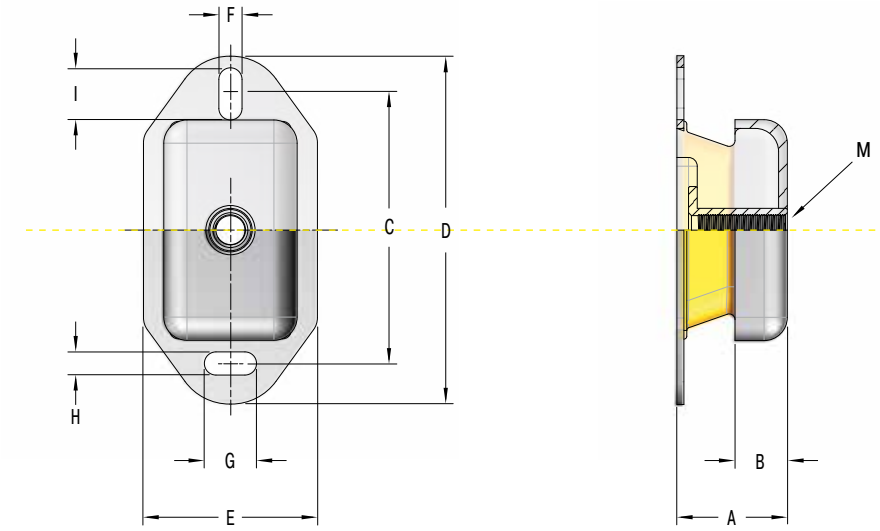
SFM-52010-xx / SFM-52011-xx / SFM-52012-xx



Type	Min. Load kg	Max. Load kg	M	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm
SFM-52010-45	20.0	49.9	M12	38.6	20.1	100.1	119.9	59.9	14.2	14.0	10.9	14.0
SFM-52010-55	26.3	65.8	M12	38.6	20.1	100.1	119.9	59.9	14.2	14.0	10.9	14.0
SFM-52010-65	39.9	99.8	M12	38.6	20.1	100.1	119.9	59.9	14.2	14.0	10.9	14.0
SFM-52010-75	48.1	120.2	M12	38.6	20.1	100.1	119.9	59.9	14.2	14.0	10.9	14.0
SFM-52011-45	59.9	149.7	M16	50.0	27.9	140.0	182.9	74.9	13.0	30.0	13.0	20.3
SFM-52011-55	84.4	210.9	M16	50.0	27.9	140.0	182.9	74.9	13.0	30.0	13.0	20.3
SFM-52011-65	119.8	299.4	M16	50.0	27.9	140.0	182.9	74.9	13.0	30.0	13.0	20.3
SFM-52011-75	179.6	449.1	M16	50.0	27.9	140.0	182.9	74.9	13.0	30.0	13.0	20.3
SFM-52012-45	139.7	349.3	M20	72.6	41.9	182.1	228.1	112.0	18.0	34.0	18.0	26.7
SFM-52012-55	207.8	519.4	M20	72.6	41.9	182.1	228.1	112.0	18.0	34.0	18.0	26.7
SFM-52012-65	281.2	703.1	M20	72.6	41.9	182.1	228.1	112.0	18.0	34.0	18.0	26.7
SFM-52012-75	399.2	997.9	M20	72.6	41.9	182.1	228.1	112.0	18.0	34.0	18.0	26.7

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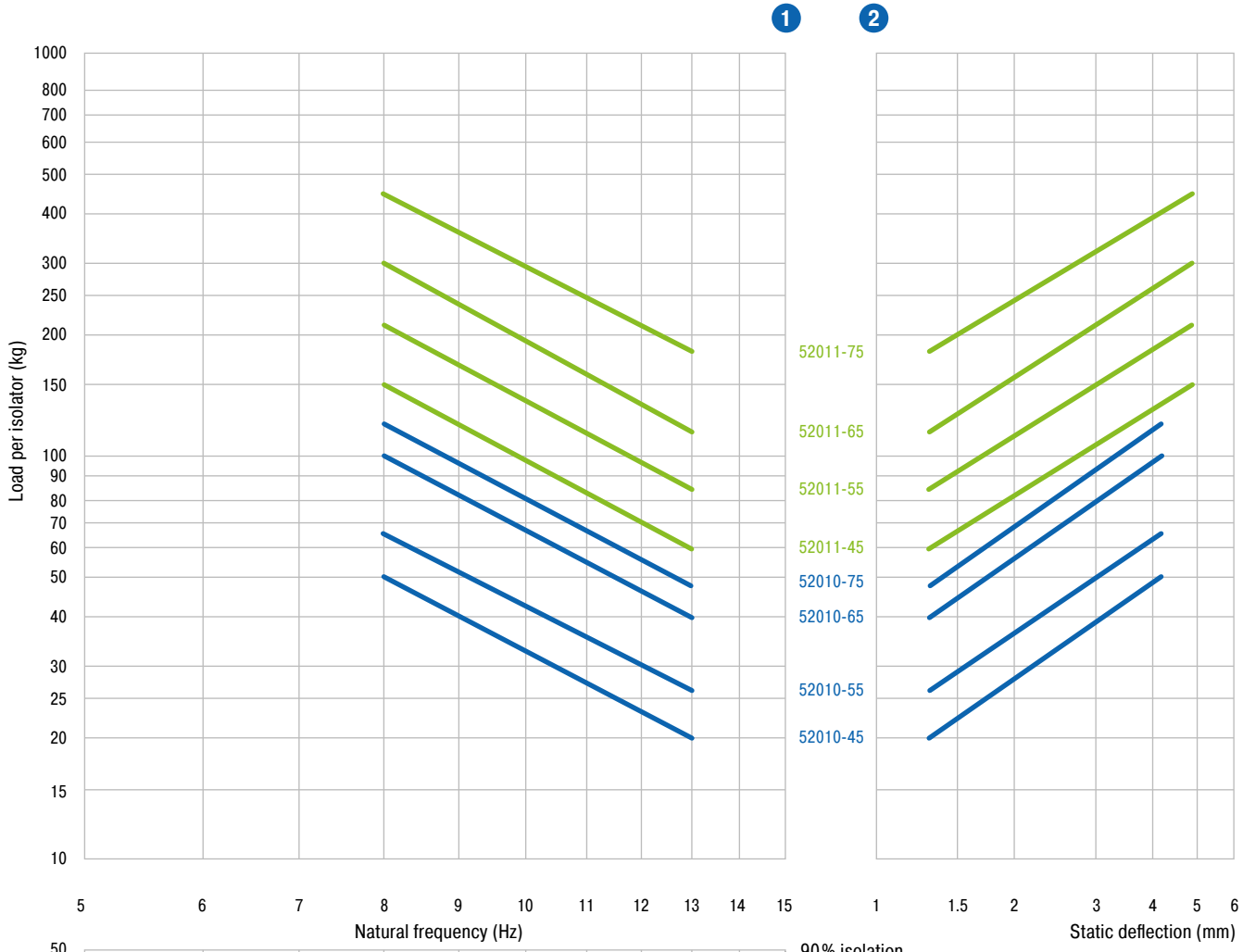
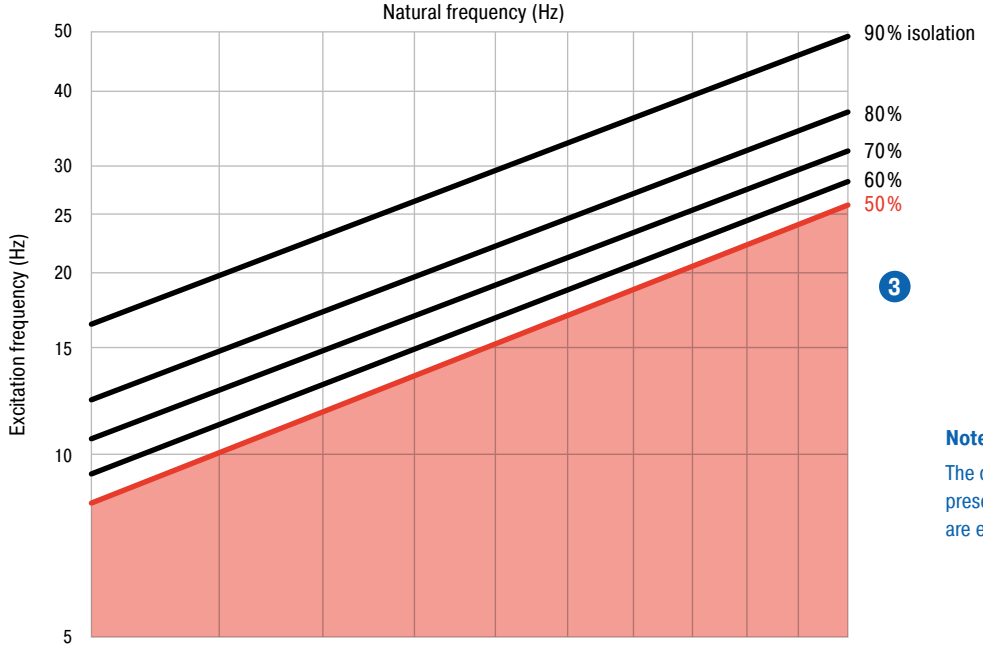
SFM-52010 / SFM-52011





Notes

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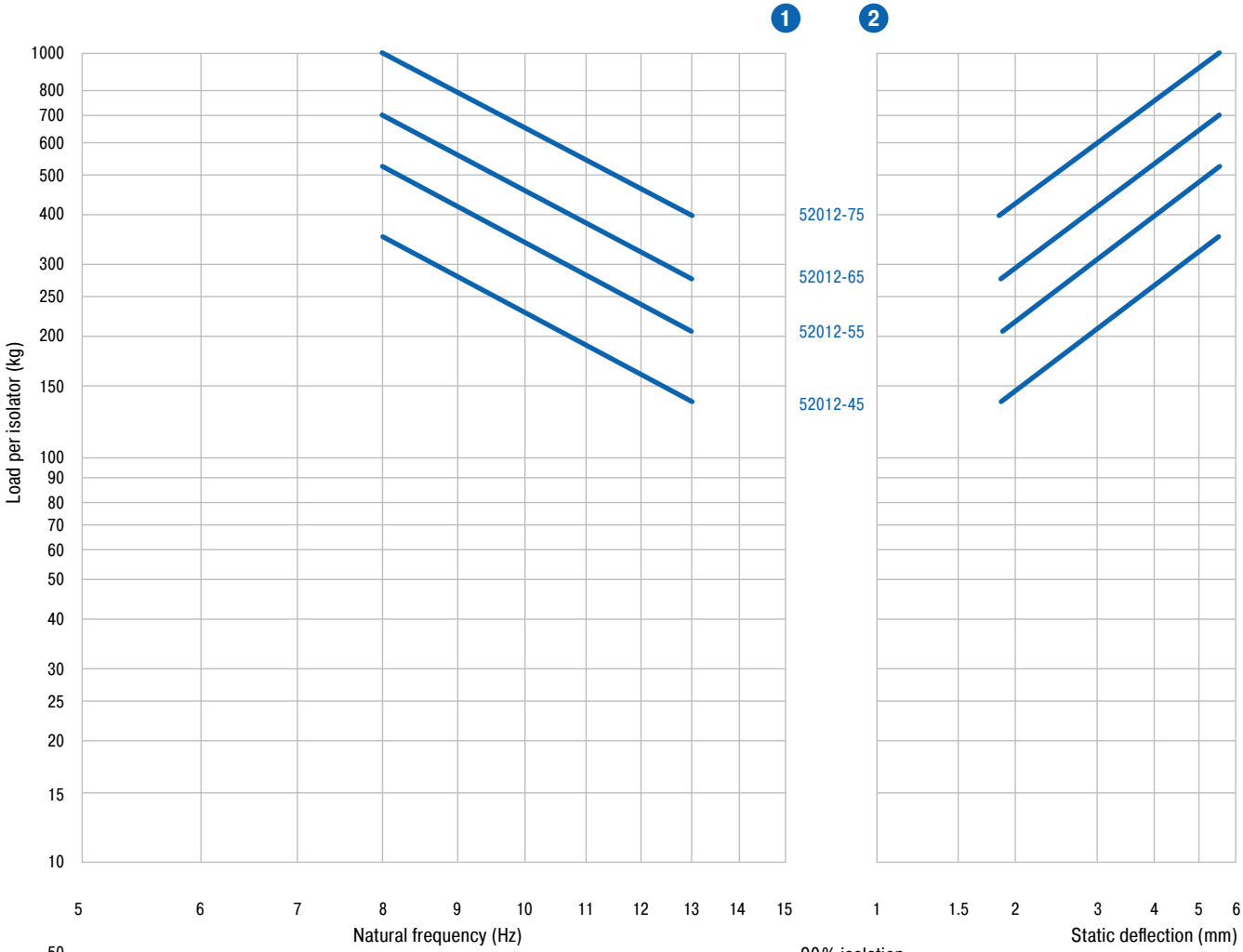
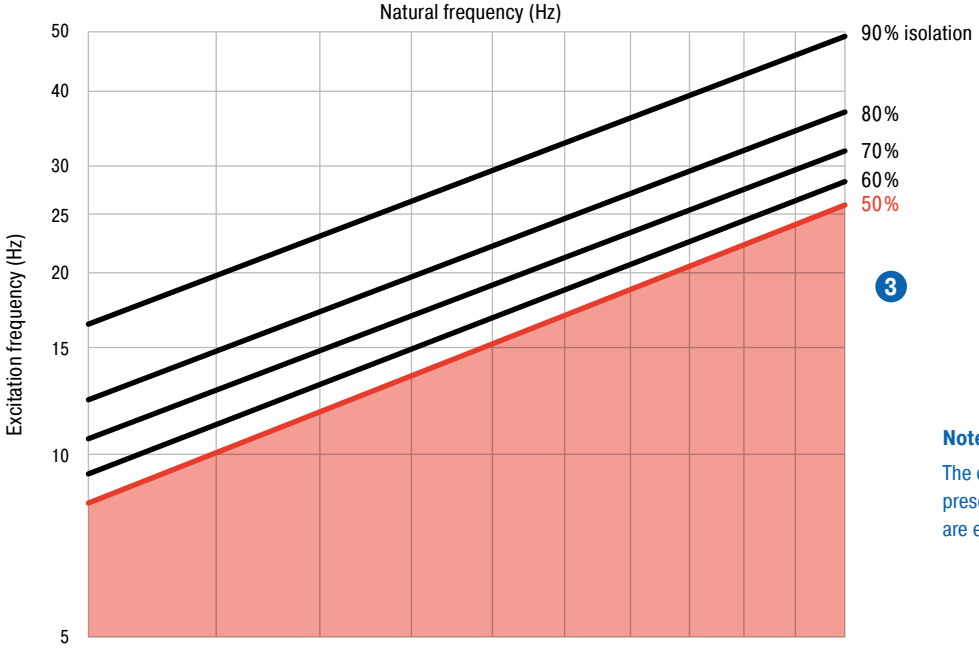
SFM-52012





Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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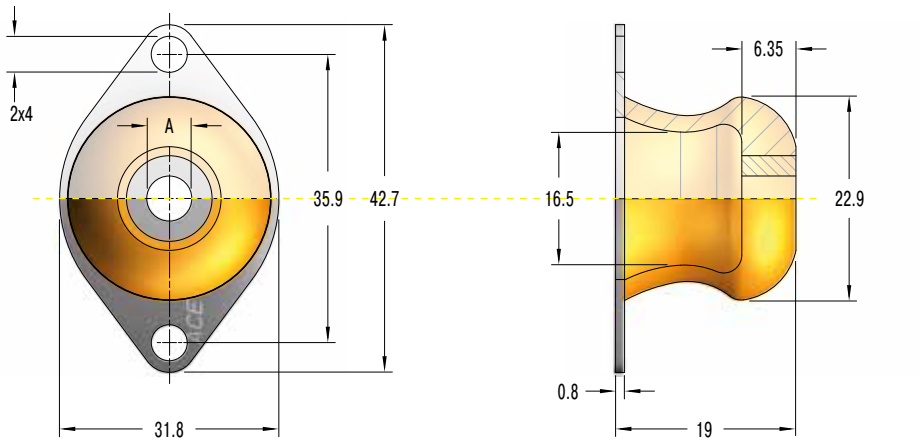
BM

Bubble Mounts

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 compressive stresses under load. They efficiently protect electronic or medical equipment against damaging vibrations and shocks.



BM-5064x
BM-5068x

Properties

- Good shock absorption
- Low natural frequency
- Small, light design
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber), silicone available on request
- Operating temperature range -30 °C to +80 °C

Areas of application

- Medical technology
- Computers
- Electronic equipment
- Aerospace

Type	Colour Code*	Min. Load kg	Max. Load kg	A mm
BM-50640	yellow	0.7	1.8	4.3
BM-50641	red	1.2	2.9	4.3
BM-50642	green	2.2	5.0	4.3
BM-50643	blue	2.7	6.8	4.3
BM-50644	white	3.3	8.2	4.3
BM-50680	yellow	0.7	1.8	6.5
BM-50681	red	1.2	2.9	6.5
BM-50682	green	2.2	5.0	6.5
BM-50683	blue	2.7	6.8	6.5
BM-50684	white	3.3	8.2	6.5

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

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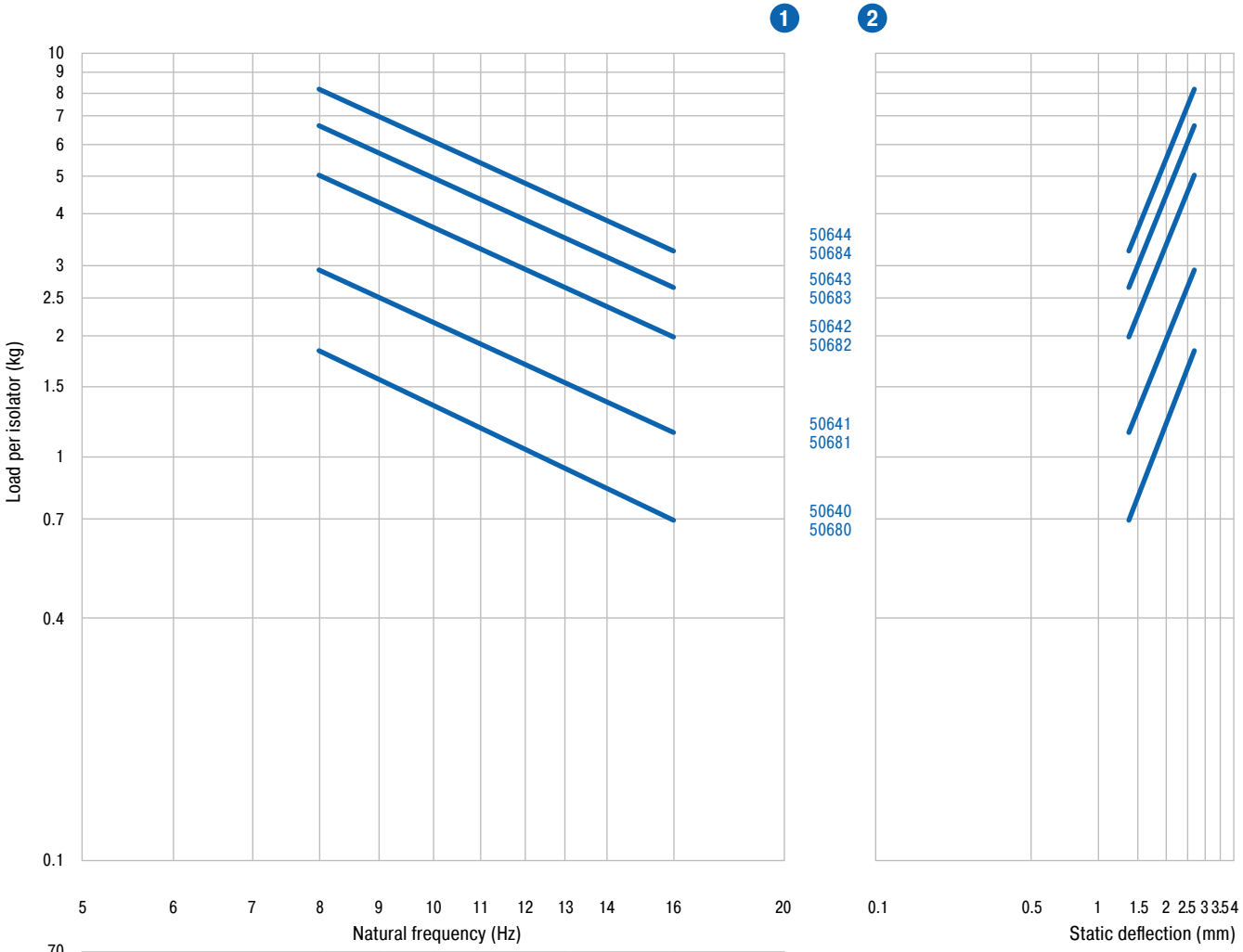
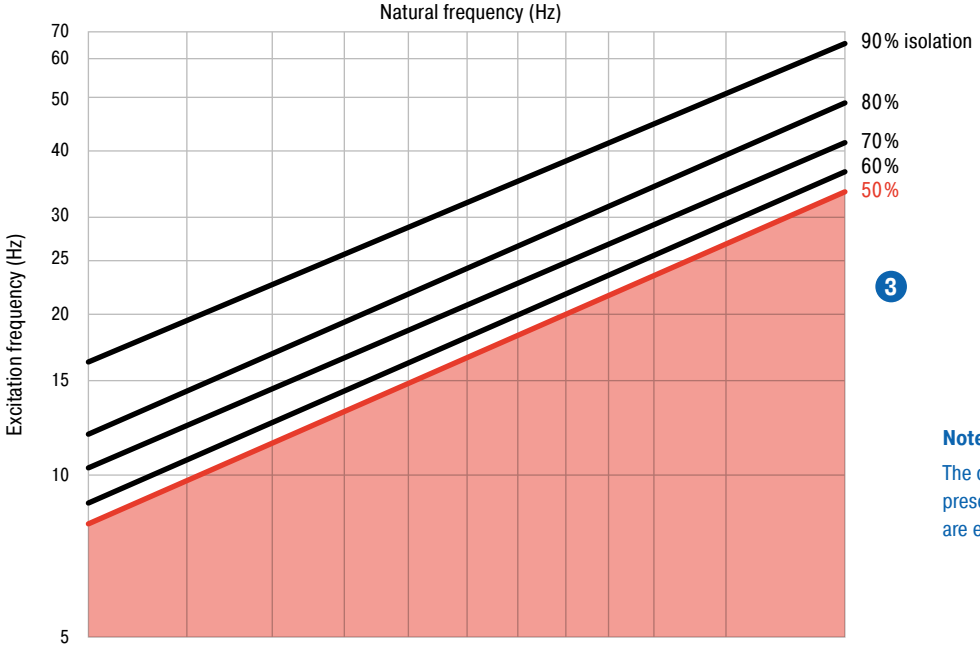
BM-5064x / BM-5068x





Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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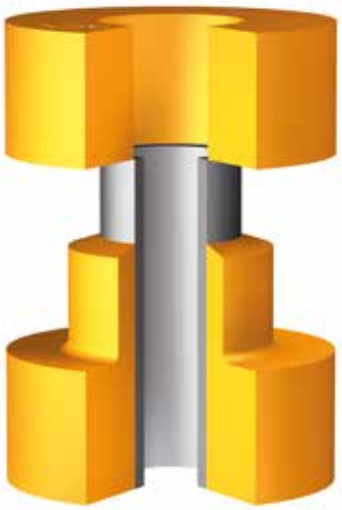

UMO

Universal Mounts

Universal connection isolators

UMOs (universal mounts) are two-part isolators for connecting machines or plants with bordering components, such as cabins or housings.

The UMOs can be installed in any spatial position and effectively decouple two components from each other. A galvanised metal limiting sleeve is vulcanised into the elastomer cylinders. The UMOs can be used within the wide temperature range of -30 °C to +80 °C.

Properties

- Can be installed in all spatial axes
  Can be used for shear, compressive and tensile loads
- Simple design
- Fail-safe with the use of stop washers
- All metal parts galvanised (ROHS compliant)
- Rubber part made of neoprene (chloroprene rubber), silicone available on request
- Operating temperature range -30 °C to +80 °C

Areas of application

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

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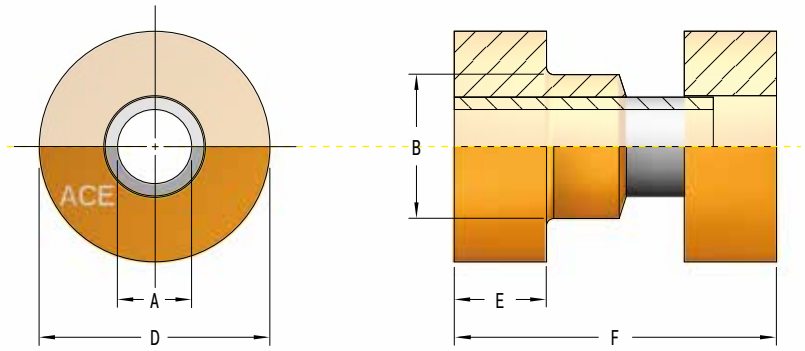
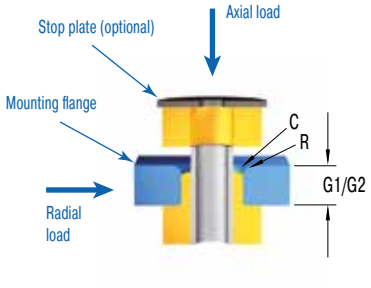
UMO-600xx





C = Mounting hole in flange
R = Required radius

F = Length in installed condition

Type	A mm	B mm	C mm	D mm	E mm	F mm	G1 mm	G2 mm	R mm
UMO-60011 - 60015	9.9	19.8	19.0	31.8	12.7	31.8	9.4		0.75
UMO-60021 - 60025	13.5	33.3	31.8	47.5	19.8	49.3	12.7	14.2	1.5
UMO-60031 - 60035	16.3	39.4	38.1	64.3	22.9	62.2	19.1	22.4	2.0
UMO-60041 - 60045	23.9	58.4	57.2	88.9	25.4	73.2	25.4	28.0	3.0
UMO-60051 - 60055	26.9	64.8	63.5	124.0	31.8	85.9	25.4	28.4	3.0

			Load with plate thickness G1				Load with plate thickness G2			
Type	Colour Code*	Shore (+5)	axial kg	radial kg	fe Hz	T1 Nm	axial kg	radial kg	fe Hz	T2 Nm
UMO-60011	yellow	35	20	10	15	10				
UMO-60012	red	45	40	15	15	10				
UMO-60013	green	55	65	20	15	10				
UMO-60014	blue	65	115	25	15	10				
UMO-60015	white	75	140	30	15	10				
UMO-60021	yellow	35	30	20	15	13	60	25	12	14
UMO-60022	red	45	55	40	15	13	80	30	12	14
UMO-60023	green	55	75	60	15	13	110	40	12	14
UMO-60024	blue	65	120	80	15	13	175	75	12	14
UMO-60025	white	75	175	130	15	13	285	125	12	14
UMO-60031	yellow	35	40	30	15	19	95	40	11	22
UMO-60032	red	45	70	50	15	19	160	65	11	22
UMO-60033	green	55	105	75	15	19	220	100	11	22
UMO-60034	blue	65	150	110	15	19	390	175	11	22
UMO-60035	white	75	230	165	15	19	600	315	11	22
UMO-60041	yellow	35	70	50	15	25	125	60	10	28.6
UMO-60042	red	45	140	100	15	25	230	105	10	28.6
UMO-60043	green	55	180	140	15	25	350	155	10	28.6
UMO-60044	blue	65	230	180	15	25	530	265	10	28.6
UMO-60045	white	75	365	265	15	25	950	440	10	28.6
UMO-60051	yellow	35	140	70	15	25	515	110	10	32
UMO-60052	red	45	230	100	15	25	875	155	10	32
UMO-60053	green	55	320	140	15	25	1170	275	10	32
UMO-60054	blue	65	410	215	15	25	1600	400	10	32
UMO-60055	white	75	545	300	15	25	2065	640	10	32

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

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FL

Flex Locs

Quick fastening elements

FLs are removable quick fastening elements for vibration isolation and shock absorption as well as the isolation of structure-borne noise. Their extremely simple design is so selected 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, for example. The inner threaded insert serves as an expansion element for fastening. The EPDM material used is resistant to ozone, oil and most acids. Standard FLs are available in 5 sizes from M3 to M8.

Properties

- Easy handling
- Efficient decoupling of housings
- No special tools necessary
- Isolates structure-borne noise
- Fail-safe
- Resistant to oil and UV radiation
- Rubber part made of neoprene (chloroprene rubber)
- Operating temperature range -30 °C to +80 °C

Areas of application

- Machines and assemblies
- Tiling, sheets and flanges
- Attachments to buildings
- Vehicles and transport industry
- Construction machines

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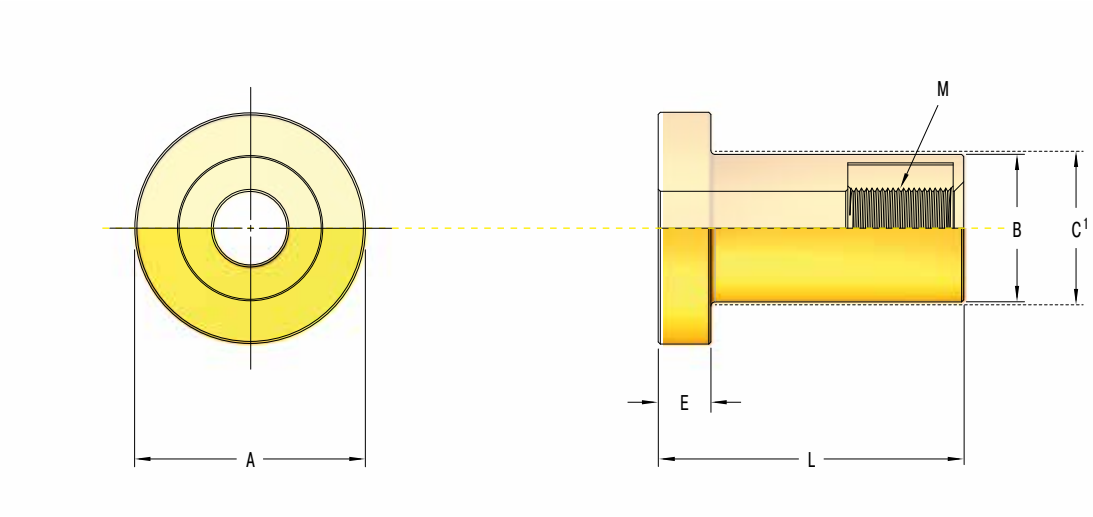
FL-Q-x



	Sheet assembly		Blind hole assembly									
Type	Pressure **kg**	Shear **kg**	Pressure / Shear **kg**	M	A **mm**	B **mm**	C [1] **mm**	E **mm**	L **mm**	P [2] **mm**	T I [3] **Nm**	T II [4] **Nm**
FL-Q-3	5	2.5	1.0	M3	9	6.7	$7.2\ ^{0}_{-0.3}$	$2.5\ ^{+0.4}_{0}$	$11.5\ ^{+1}_{-0.5}$	0.6 - 2.5	0.4 - 0.5	0.3 - 0.4
FL-Q-4	7	3.5	1.0	M4	12	8.5	$9.3\ ^{0}_{-0.3}$	$3.0\ ^{+0.4}_{0}$	$14.5\ ^{+1}_{-0.5}$	0.8 - 3.3	0.4 - 0.6	0.4 - 0.5
FL-Q-5	10	5.0	1.5	M5	15	9.8	$10.2\ ^{0}_{-0.3}$	$3.5\ ^{+0.4}_{0}$	$18.0\ ^{+1}_{-0.5}$	0.8 - 4.3	0.6 - 1.0	0.5 - 0.6
FL-Q-6	14	7.0	3.0	M6	18	12.0	$12.7\ ^{0}_{-0.3}$	$4.0\ ^{+0.4}_{0}$	21.0 +/-1	1.5 - 5.0	2.3 - 3.5	0.7 - 0.9
FL-Q-8	28	14.0	5.0	M8	24	16.0	$16.5\ ^{0}_{-0.5}$	$5.0\ ^{+0.4}_{0}$	27.0 +/-1	1.5 - 6.5	3.0 - 4.0	1.6 - 1.8

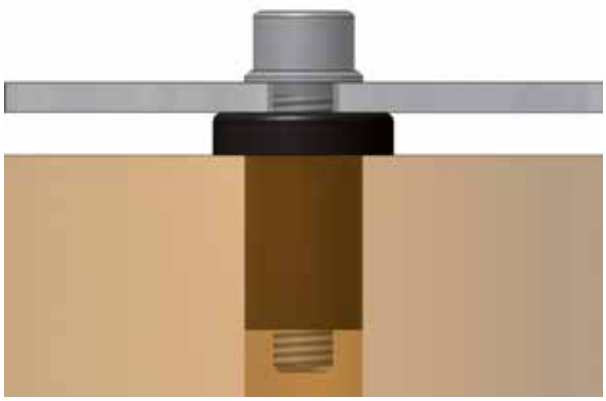
1 Corresponds to mounting hole
2 Sheet thickness
3 Tightening torque T I (Drawing 01)
4 Tightening torque T II (Drawing 02)

Sheet assembly

Drawing 01

Blind hole assembly

Drawing 02



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02

Vibration-Isolating Plates

SLAB

Universal Damping Plates

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

CEL

Low-Frequency Damping Plates

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

PAD

Rugged Fibre and Elastomer Plates

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

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Vibration-isolation made to measure

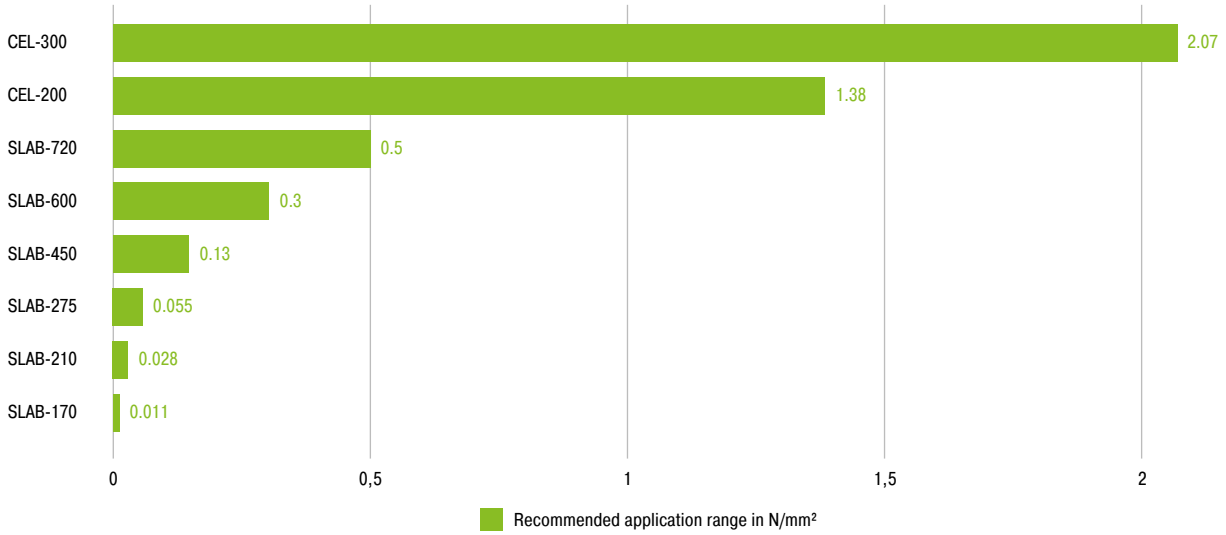
Variable, flexible, custom-made

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

The right damping solution for standard applications can be simply found by using the selection diagrams (following pages). The right 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 permissible surface pressures of different plate materials.

Application range according to surface pressure



The SLAB and CEL plates can either be ordered in their standard size or cut according to customer request. We require the desired specifications and quantities for calculating the required parts.

The custom-cutting of the plates allow the realisation of almost any shape and solution. In addition, various plates can be layered, glued and combined with reinforcing plates (steel) or sliding layers (PTFE).

The PAD product group is made from fibre-reinforced plate material used for very high loads of up to 13.8 N/mm².

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SLAB
Universal Damping Plates

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

The plates with standard sizes of 170 kg/m³ to 720 kg/m³ 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 suitable 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 plates or can be freely cut from the raw material (roll and plate material).

Standard SLABs are supplied in material thickness of 12.5 mm and 25 mm. On request, the sizes of delivered plates can be cut freely from the standard 800 x 1,500 mm stock. Sample plates with dimensions 220 x 150 mm and the respective thicknesses are available for test purposes and small applications, with maximum machinable dimensions up to 5,000 x 1,500.

Properties
- Can be cut to many different shapes (water jet cutting)
- Can be combined to any desired isolation packages
- On-site vibration measurement and selection
- Special dimensioning software, no additional costs for designing
- Highly damping PUR
- Operating temperature range -30 °C to +70 °C

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

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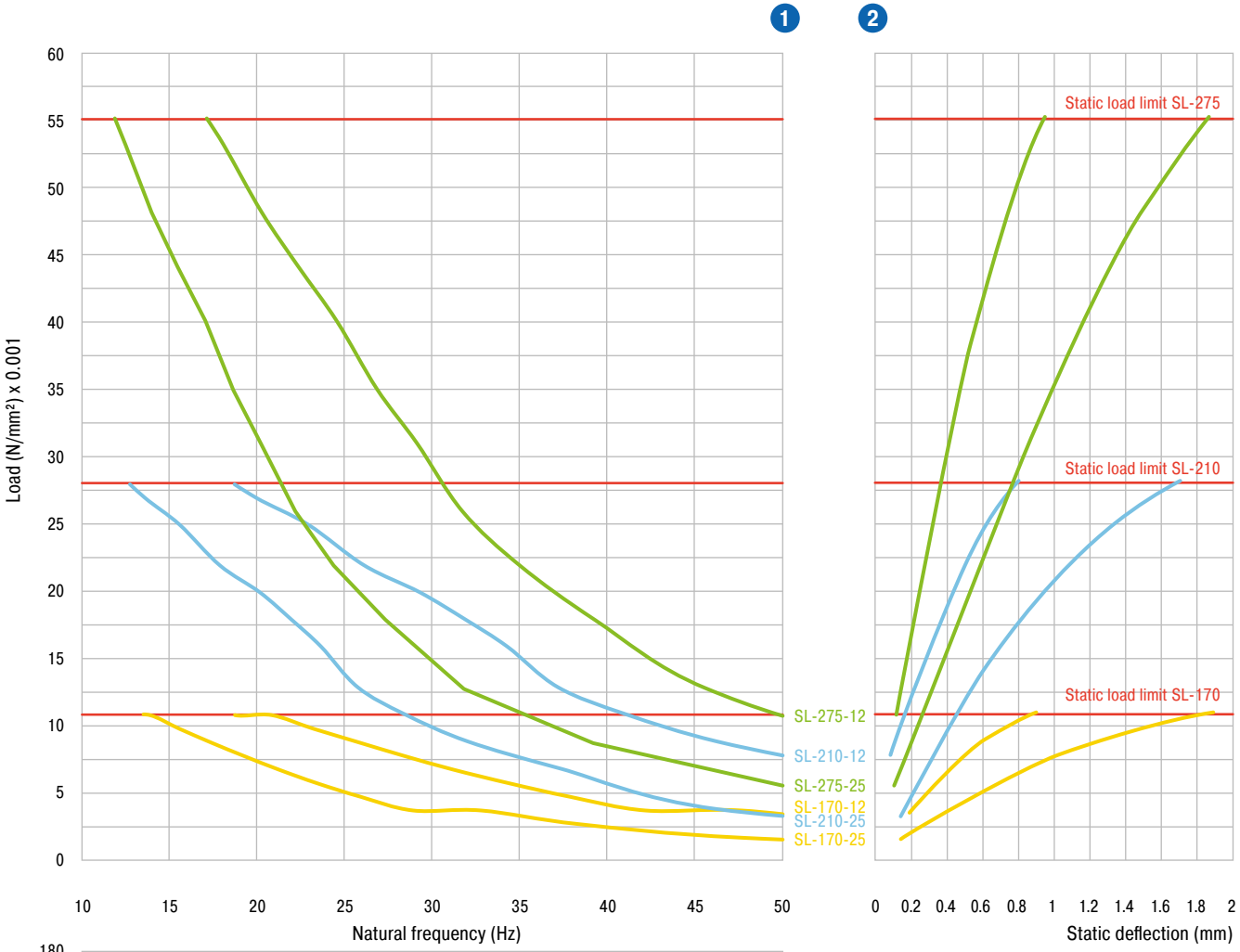
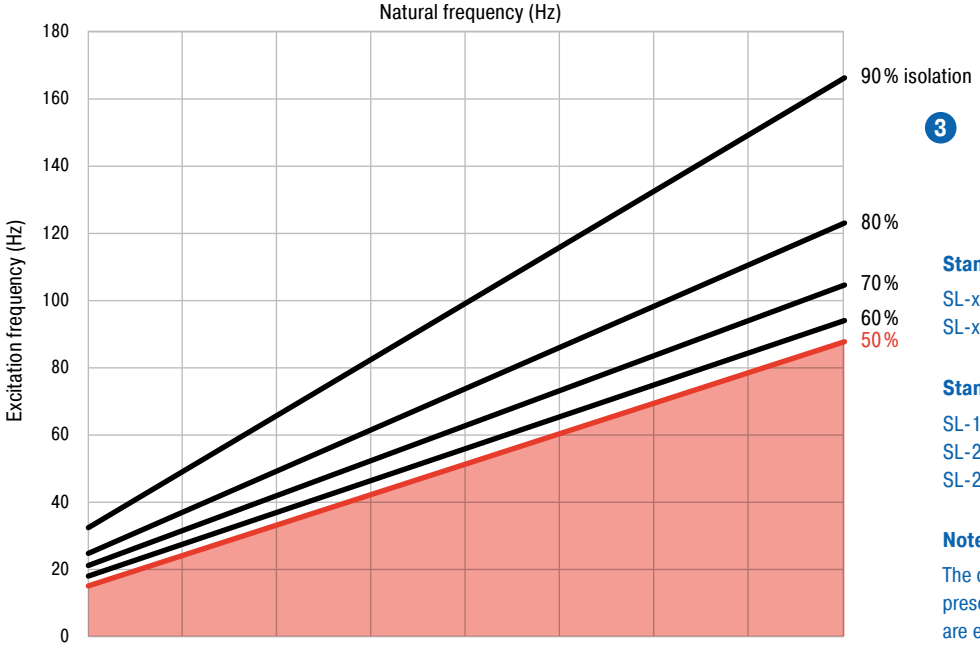
SL-170 / SL-210 / SL-275





Standard thicknesses

SL-xxx-12: 12.5 mm
SL-xxx-25: 25 mm

Standard colours

SL-170: Yellow
SL-210: Blue
SL-275: Green

Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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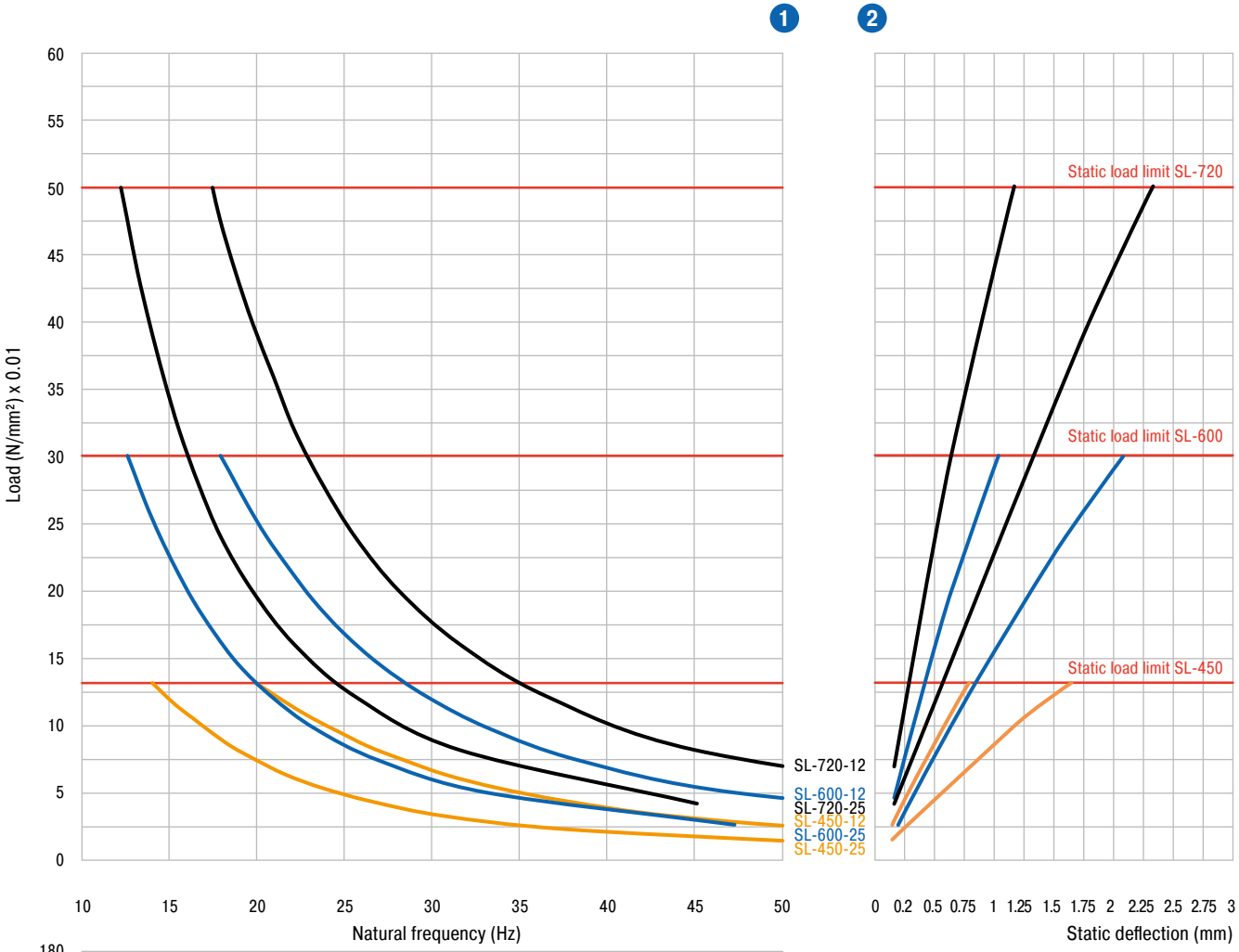
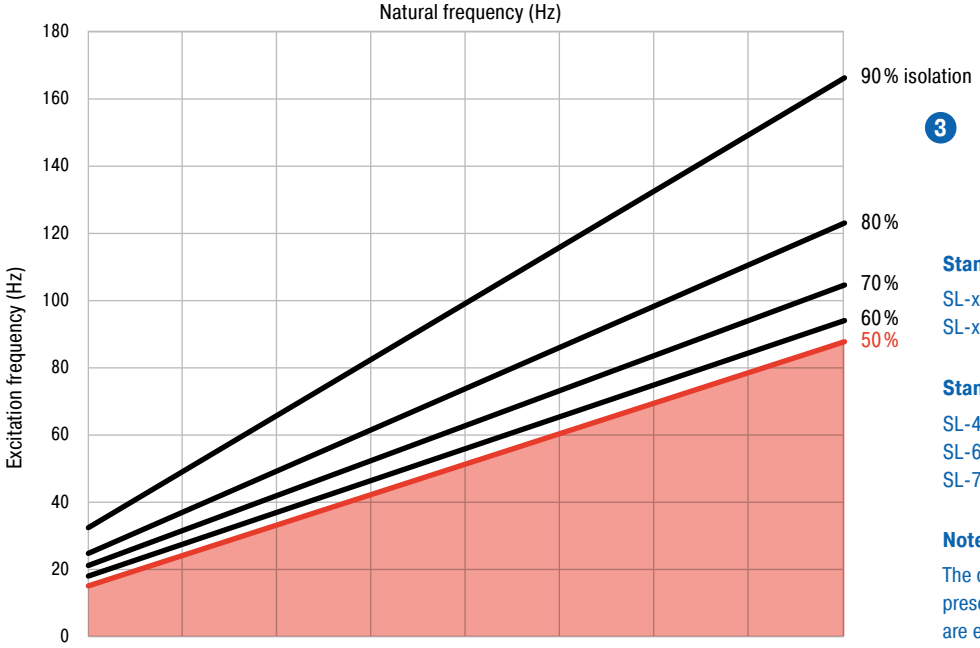
SL-450 / SL-600 / SL-720





3

Standard thicknesses

SL-xxx-12: 12.5 mm
SL-xxx-25: 25 mm

Standard colours

SL-450: Orange
SL-600: Dark blue
SL-720: Black

Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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CEL
Low-Frequency Damping Plates

CEL damping plates are produced from a special nitrile rubber which damps at low-frequencies.

The damping plates can be custom-cut and glued together to form multiple layers depending on the application. The tried-and-tested CEL damping plates are used in the field of machine and plant engineering. Here the plates take charge of isolating the floor or foundation to the plant or machine. Damaging vibrations are prevented, increasing production or measuring quality.

Properties

- Can be combined to form any desired isolation packages or glued together
- On-site vibration measurement and selection
- Special dimensioning software, no additional costs for designing
- Operating temperature range -20 °C to +65 °C

Areas of application

- Foundations of plants and machines
- Compressors
- Pump stations and generators
- Pipeline isolation
- Test benches, measuring tables and their foundations
- Buildings
- Transport routes, bridges
- Staircase bearing surfaces

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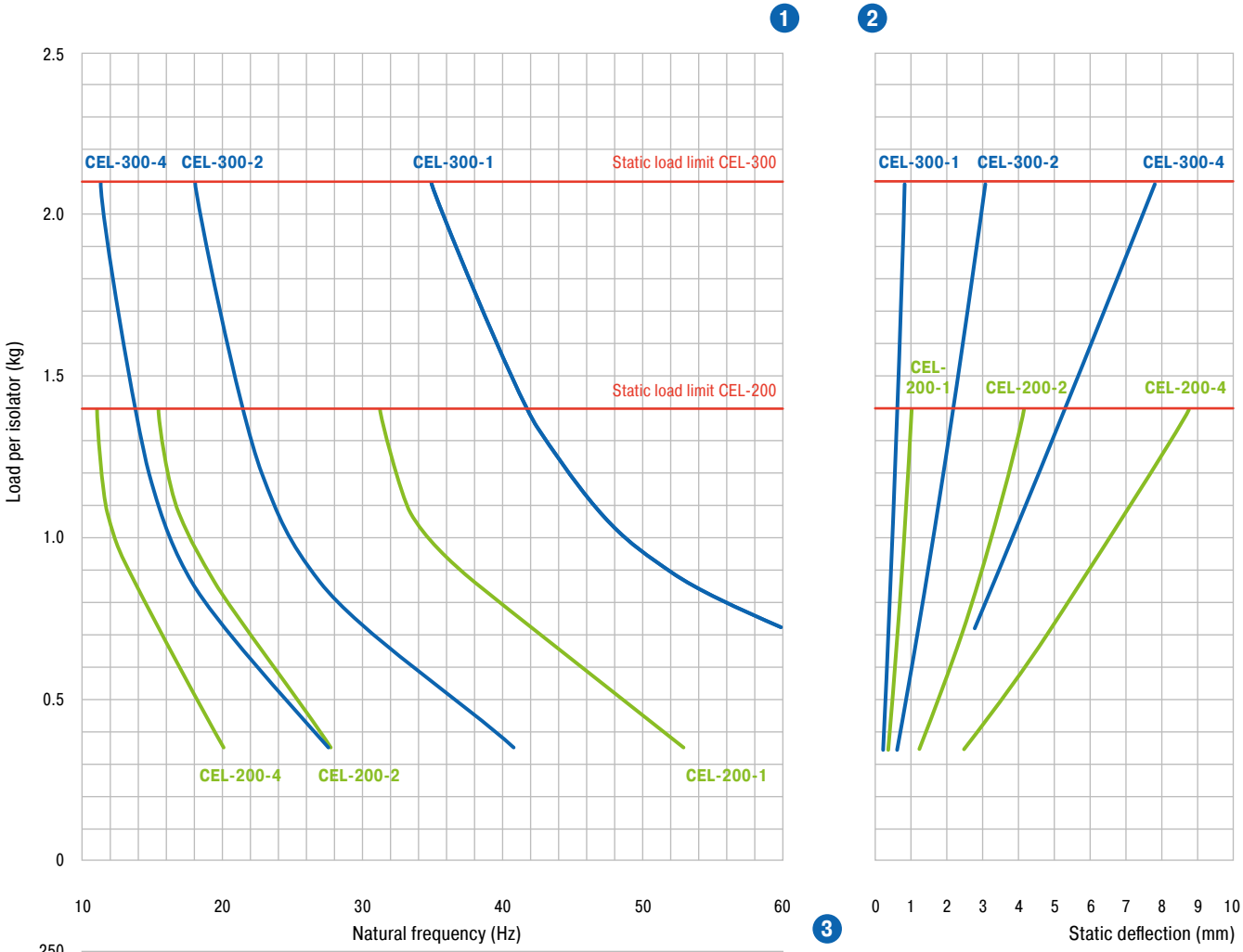
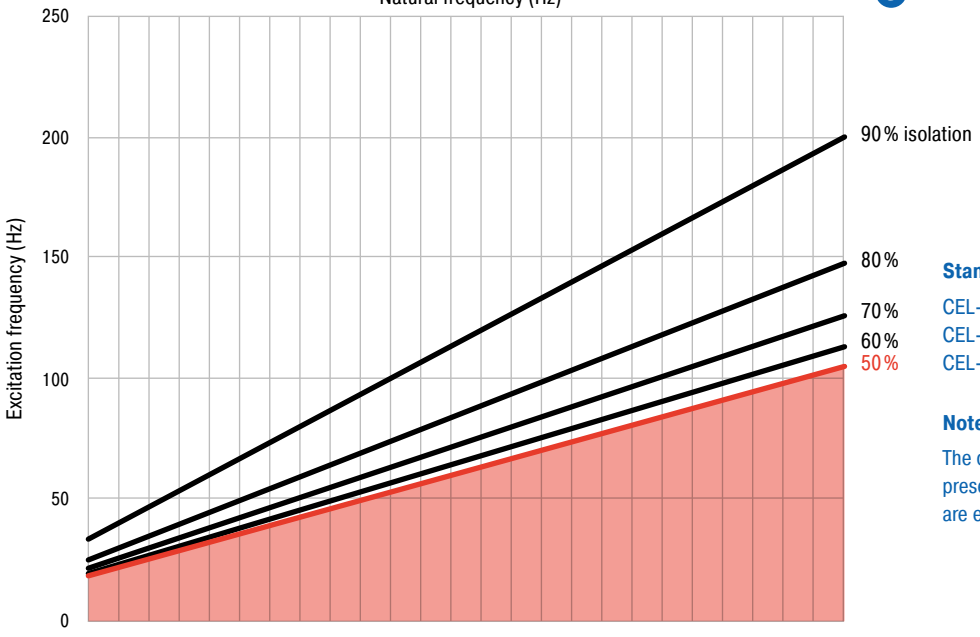
CEL-200 / CEL-300





Standard thicknesses

CEL-xxx-1: 12.7 mm
CEL-xxx-2: 25.4 mm
CEL-xxx-4: 50.8 mm

Notes

The diagrams represent a simplified form of the preselection. Liability and compensation claims are excluded.

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PAD

Rugged Fibre and Elastomer Plates

The PAD fibre and Elastomer Plates combine the positive properties of isolating elastomer bearing surfaces with the reinforcing effect of fibre inlays.

The PADs are rugged damping plate for use in heavy-duty applications, e.g. under crane runways, in steel construction, pipeline construction and the coal, iron and steel industry. Due to their physical properties, the PAD plates provide outstanding damping against shocks and impacts and isolate vibrations and structure-borne noise.

Depending on the shape and selected dimensions, PADs can withstand compressive loads of up to 69 N/mm². In general, the maximum surface pressure is 13.8 N/mm².

Properties

- Rugged
- Can be custom-cut
- Low creep tendency
- Thickness: 1,185 kg/m³
- Operating temperature range -55 °C to +95 °C

Areas of application

- Foundations of presses, plants and machines
- Impact plates
- Pipelines
- Conveying systems
- Pump stations and generators
- Crane runways
- Bridges
- Heavy-duty applications

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Due to the layered structure, the material exhibits excellent compressibility. This allows spring deflections to be reached without material flow (custom-fit installation complying with defined dimensions possible). The excellent material properties are also apparent in the very good creep behaviour under load. For example, under continuous static load, the material only exhibits a creep tendency of approx. 5%.

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

Selection and calculation

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

To measure the kinetic energy, we suggest you to try our shock absorption calculation software which we offer on our website free of charge. No need even to register, you can easily enter the required values here and obtain a suitable solution recommendation.

Our in-house and field application technicians are happy to assist you with this as with other issues.

Note

PADs consist of organic material subject to batch-based fluctuations

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

The PADs are resistant to most oils, water vapour, water, mould and brine. Their operating temperature range is between -55 °C and +95 °C.

The hardness of PADs is 90 ±5 shore A.

The standard plates are available in different thicknesses, graduated between 1.6 and 25.4 mm. Other thicknesses are available by combining the standard thicknesses via gluing. A combination with steel plates or PTFE plates as equal layers is also available on request.

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03

Low-Frequency Air Spring Elements

PLM

Pneumatic Air Spring Elements
For an efficient isolation of measuring equipment, high-speed presses and machines.

PAL

Air Spring Elements with Automatic Level Controls
Isolation against disruptive vibrations and level-adjustment for test and measuring equipment. Isolating at extremely low-frequencies, these components are used in the automotive industry and in aerospace engineering.

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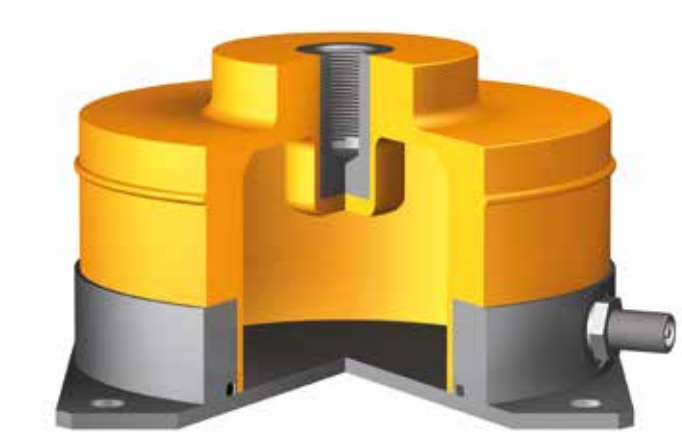

PLM
Air Spring Elements

PLM air spring elements offer low-frequency vibration and shock isolation for measuring stations, coordinate measuring machines, fans, air compressors, motor and generator units, high-speed presses and more.

The PLM air spring series comprises low-frequency vibration and shock isolators which reduce undesirable vibrations while simultaneously levelling the supported devices.

When used as a vibration damper, the internal air chamber already guarantees a significant isolating effect from 5 Hz upwards. In an optimally loaded condition, the natural frequency is 3.0 Hz. PLM air spring elements also isolate in a pressure-free state.

The vertical natural frequency of the elastomer body is approximately 10 Hz, meaning that disturbances above 14 Hz are isolated.
The ratio of vertical to horizontal natural frequency is roughly 1:1 with high horizontal stability.

For applications with shock or impact loads, the elastomer wall design of the PLM air springs offer high dynamic spring deflection. If one wishes simultaneously to retain the low natural frequency of 3 Hz, the use of external arrestors is recommended in order to prevent the air springs from breaking through.

The PLM design features a vulcanised thread insert, by means of which the air springs can be inflated either with a standard tyre valve or a pneumatic fitting. Special connections are not necessary.

The isolators are delivered with a valve. They are inflated and levelled manually with the aid of hand pumps or adaptors connected to an air supply. If a compressed air fitting is mounted on the air springs, they can be connected to the controlled air supply system. This facilitates the pressurisation and the level control. In the event that no level control valve is used, a control unit can be provided to regulate the pressure and the height of the air springs linked to each other.

In addition, the PLM air spring elements can be supplied with automatic level control valves for height regulation. Each master isolator has a built-in level control valve which functions as a load detector and position sensor.

Properties
- 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
- High-speed presses
- Production plants

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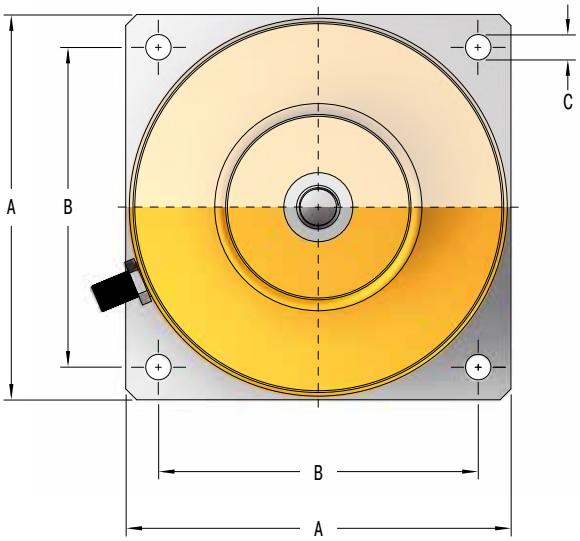
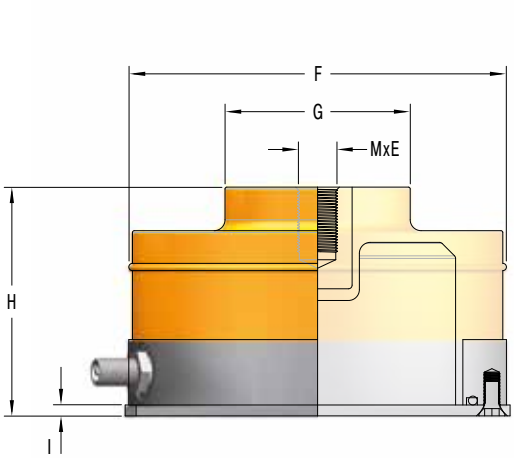
PLM





Type	A mm	B mm	C mm	M	E mm	F mm	G mm	H mm	I mm	Max. Load kg
PLM 1	76	60.5	6.9	M10	12.0	73	25	65	3.2	45
PLM 3	106	89	6.9	M12	13.5	105	56	65	3.2	135
PLM 6	130	108	7.4	M12	13.5	127	60	90	3.2	250
PLM 12	175	152	7.4	M12	13.5	171	100	90	3.2	550
PLM 24	254	216	14.2	M16	19.0	245	138	90	4.8	1100
PLM 48	343	305	14.2	M16	19.0	338	190	90	4.8	2200
PLM 96	470	406	20.6	M24	22.4	468	267	90	6.4	4400
PLM 192	610	508	20.6	M24	22.4	610	400	90	6.4	8800

Any number of parallel air springs can be added in order to increase the loading capacity of the overall system.

Our technicians are happy to assist you in the selection process and provide any support you require.

Selection and calculation

The best isolation values can be achieved for the use of PLM air springs when the maximum load of the individual air spring elements is utilised to the fullest extent possible.

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

Note

When commissioning, please ensure that pressure is first applied on the PLM air spring elements before they are filled to the desired operating pressure (max. 5 bar for sizes 1 and 3; max. 6 bar for the remaining sizes) using the valve.

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

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PAL

Air Spring Elements with Automatic Level Controls

Air spring elements of the PAL series offer superior low-frequency vibration isolation for measuring devices, electron microscopes, MRT equipment, coordinate measuring machines and precision manufacturing machines.

PAL air spring systems use level-controlled air springs. These isolators are ideal for conditions which require a constant level and vibration isolation at the same time. The PAL isolators meet all important requirements for measuring devices, electron microscopes, measuring stations and precision manufacturing machines.

Standard PAL isolators have a natural frequency of up to 1.7 Hz – depending on the height of the isolator. Even lower natural frequencies (up to 0.5 Hz) are possible for isolators manufactured according to customer specifications.

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Properties

- Height-adjustable
- Low-frequency isolation, natural frequencies of up to 0.5 Hz possible

Areas of application

- Test and measuring equipment
- Aircraft and automotive test benches
- Foundation bearing surfaces

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

A complete PAL system consists of at least three master isolators for a 3-point level control. Each isolator has a built-in level control valve which functions as a load detector and height control. Any number of slave isolators can be added in order to bear the overall weight of the equipment.

The scope of supply of a system contains a control unit, automatic level control valves, pneumatic lines and all the additional pneumatic accessories required for a complete system installation.

PAL air springs react quickly to changes in load or balance, with deviations from a preset position being automatically readjusted.

The performance of an air spring system is always a compromise between natural frequency (isolation), the resetting accuracy of the level control valve and the control setting time.

The control setting time is defined as the time required by the isolation system to reach a preset reference value again after a defined disturbance.

The disturbance can be caused by environmental factors or inherent machine forces, such as the movement of the measuring bridge of a measuring machine.

The control setting time is minimised with an optimal damping effect and an adequate flow through the valve. Long control setting times are not acceptable for air springs, as this can induce errors in repeat accuracy in the case of precision measuring devices and positioning machines as well as lower part throughput rates.

Depending on the application, ACE offers many different level control valves. The decisive variables for designing an acceptable solution are the valve flow-through and rigidity, as well as accuracy characteristics. Reset accuracies of +/- 0.15 mm or +/ 0.025 mm are available. The valve flow-through and rigidity are selected on the basis of the air spring design and the damping.

PAL-3 to PAL-9
Small size

PAL-18 to PAL-1000
Large size

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

The figures are not to the same scale.

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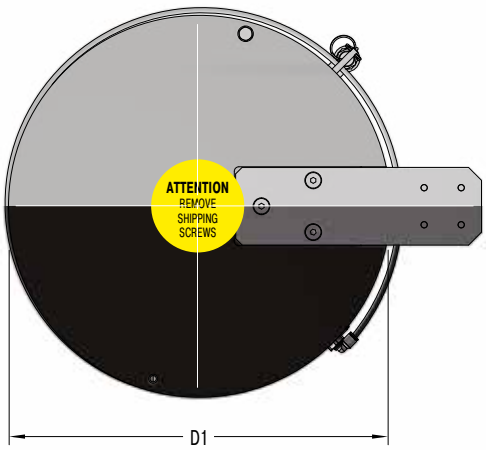
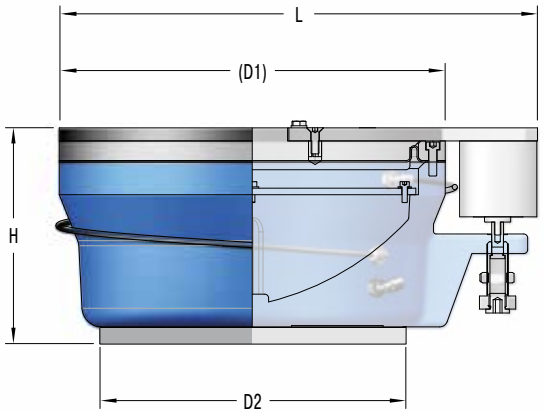
PAL





Type	D1 mm	D2 mm	H (pressureless) mm	H (Max. Stroke) mm	L mm	Max. Load* kg	Special design only on request
PAL 18-6	165	152	153	160	234	800	■
PAL 21-6	200	150	153	163	270	950	
PAL 21-12	200	200	305	315	270	950	■
PAL 36-6	220	190	153	163	290	1630	
PAL 55-6	260	230	153	163	330	2500	
PAL 55-12	260	260	305	315	330	2500	■
PAL 75-6	300	265	153	163	370	3400	
PAL 133-6	380	350	153	163	450	6030	
PAL 133-12	380	380	305	315	450	6030	■
PAL 255-6	530	470	153	165	600	11 560	
PAL 255-12	530	460	305	317	600	11 560	
PAL 416-8	640	585	203	215	710	18 200	
PAL 1000-6	950	910	153	178	1020	42 000	■
PAL 1000-18	914	914	450	475	990	42 000	■
PAL 3-2.5	80	80	64	70	157	126	
PAL 5.5-2.5	100	100	64	70	177	238	
PAL 9-4	130	130	94	98	207	385	
PAL 9-6	130	130	153	159	221	385	

* At a maximum operating pressure of 7 bar

Note

The maximum permissible horizontal movement of the PAL air spring elements can be limited to 3 mm, if necessary.

Isolation properties

Natural frequency	PAL xx-6 Hz	Pal xx-12 Hz
vertical	2.5 - 2.7	1.5 - 1.7
horizontal	2.0 - 4.5	2.0 - 4.5

Damping	PAL xx-6 %	Pal xx-12 %
vertical (adjustable)	6 - 20	6 - 20
horizontal	5 - 6	5 - 6

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Design service and analysis

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

The specifications for the maximum permissible accelerations and vibrations are often prescribed by the manufacturers of testing, measuring and production machines. Our expert team is happy to assist you with analysing the site conditions and selecting the right isolators for complying with the required system parameters.

On request, we execute highly precise measurements on site and document the respective target and actual conditions or develop suitable system solutions with our customers. Requirements and solution models may vary widely from case to case.

Our technicians are happy to assist you in the selection process and provide any support you require.

Application examples

Measuring tables, example: coordinate measuring machine

Test benches, example: street simulation test bench

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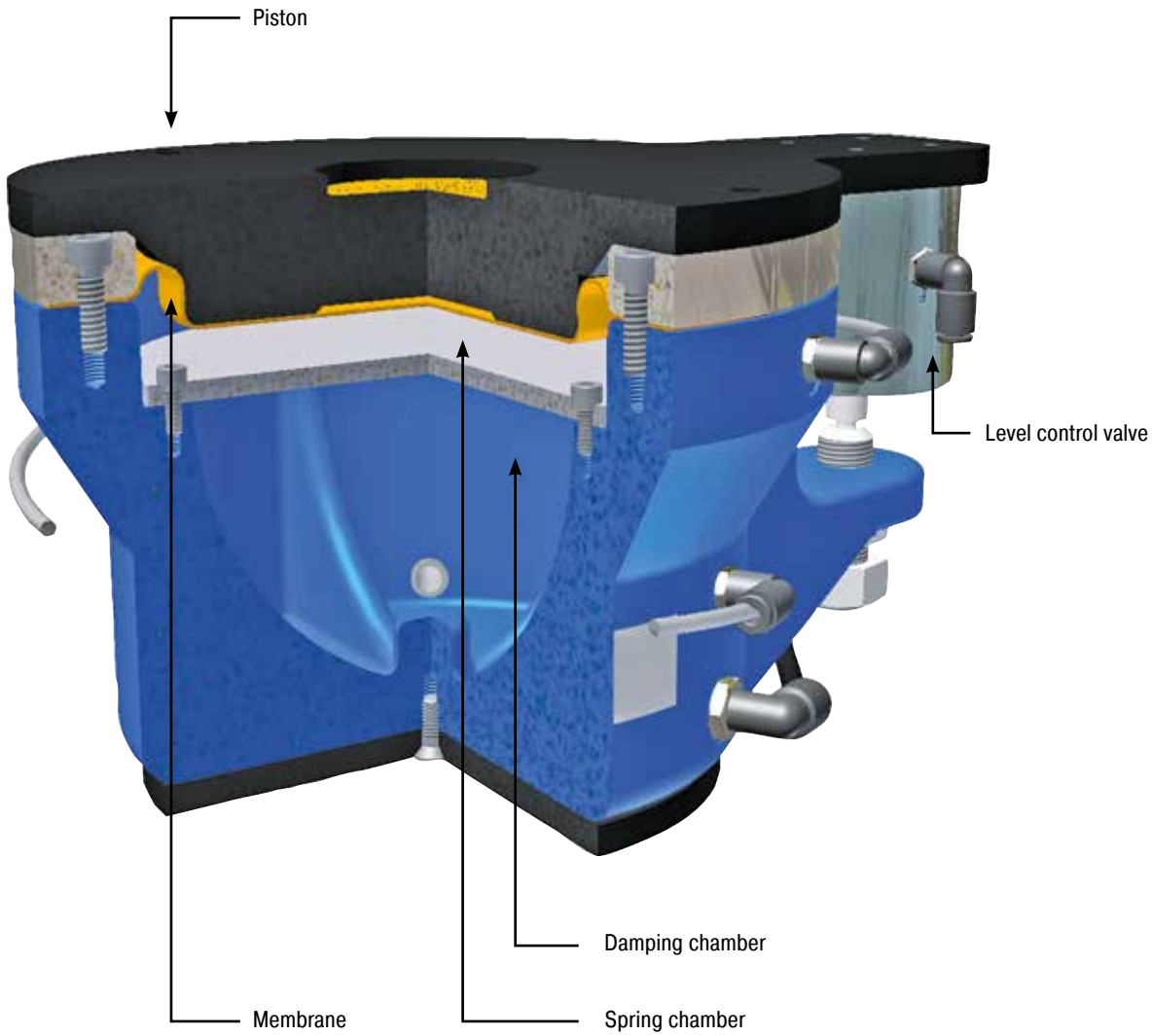
PAL

Air Spring Elements with Automatic Level Control

Structure



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Calculation sheet for your applications

We would be happy to send you a design proposal for your application. In order to obtain a better picture of your application before establishing contact, we would like to ask you to send us the following basic information.

Please send us a sketch or drawing so that our application technicians understand the case. For the drawing, please use the designated field or send us a dimensioned sketch with a copy of the calculation sheet to **mail@aceolator.eu**. You can also simply use our calculation sheet at **www.aceolator.eu**.

Project designation _____

Description of the application _____

_____

Please enter the technical data for the calculation here

Excitation frequency / speed Hz _____ or 1/s _____

Weight of system in kg _____

Weight distribution ☐ centric (please indicate in sketch) ☐ excentric (please indicate in sketch)

Machine dimensions (mm) length _____ width _____ height _____

Number of support points (quantity) _____

Dimensions of the support points (mm) 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 _____

_____

Name _____

Department _____

Street/PO Box _____

Postcode/City _____

Country _____

Telephone _____

E-Mail _____

Please copy, complete and fax to ACE

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Sketch

Box for your sketch

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ACE

Automation Control Equipment

Anti Vibration Mounts

Isolation Products

Vibration Technology

Issue October 2016

Overview

Issue October 2016

Hard Bell Mounts
Mounts

Mounts which allow a high level of insulation especially used on generators, engines and systems with an operating frequency at around 25 Hz (1500 rpm). Axial stresses are perfectly absorbed and side deflections limited to guarantee a good stability. Hard bell mounts are designed with a fail-safe function making it an ideal solution for applications where safety is paramount.

Applications

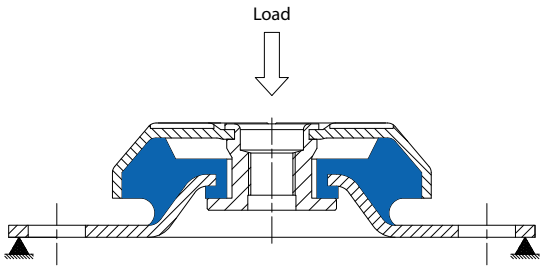
- Gensets
- Engines
- Tooling machinery
- Pumps
- Special equipment
- HVAC

Standard Production

- Bell and flange: DD13 or DC04 steel (UNI EN 10111 o UNI EN 10130)
- Fail-safe device: 11SMnPb37 (UNI EN 10087)
- Natural rubber NR
- Zinc plated in accordance with CE standards CHROME VI free, white
  Stiffness tolerance +/- 15%

Options & Additional Parts

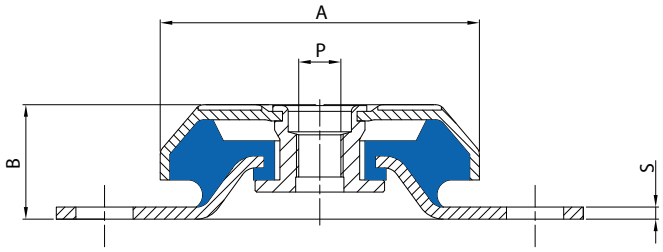
- Stainless steel version
- Height adjuster

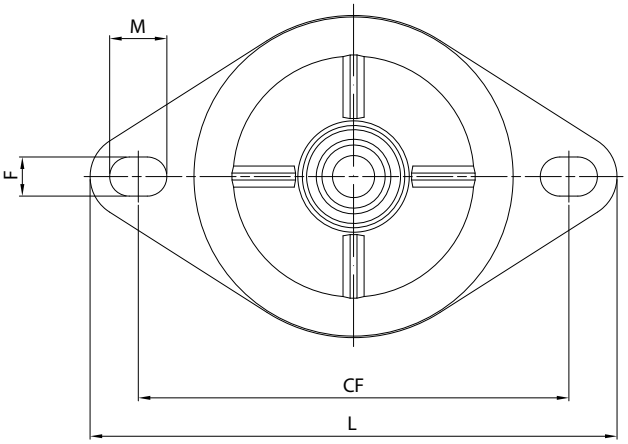


Hard bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing

Issue October 2016

Type CFBMH
Type 1





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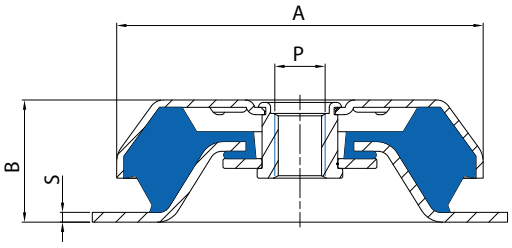
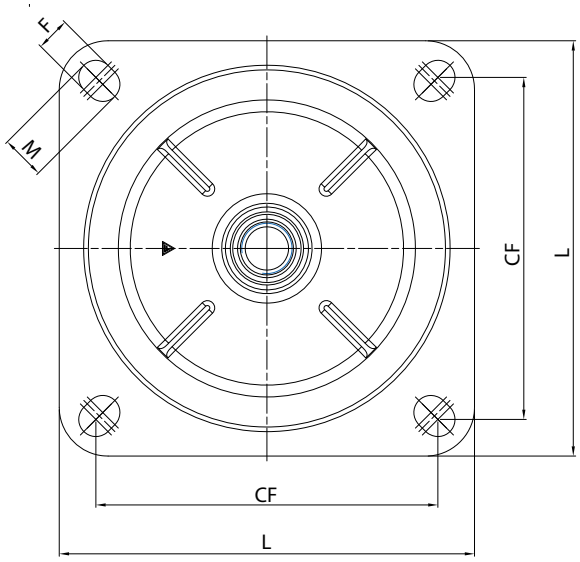
Type 2





Item	Hardness (IRHD)	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Type
CFBMH783010W	45	78	30	M10	9X12	110	135	2,5	47,0	108,0	2,3	1
CFBMH783010M	60								116,0	267,0		
CFBMH783012W	45	78	30	M12	9X12	110	135	2,5	47,0	108,0	2,3	1
CFBMH783012M	60								116,0	267,0		
CFBMH923510W	45	92	35	M10	10X15	123,5	150	3	50,0	175,0	3,5	1
CFBMH923510M	60								90,0	315,0		
CFBMH923512W	45	92	35	M12	10X15	123,5	150	3	50,0	175,0	3,5	1
CFBMH923512M	60								90,0	315,0		
CFBMH1063812W	45	106	38	M12	13X19	143	175	4	70,0	252,0	3,6	1
CFBMH1063812M	60								150,0	450,0	3,0	
CFBMH1063816W	45	106	38	M16	13X19	143	175	4	70,0	252,0	3,6	1
CFBMH1063816M	60								150,0	450,0	3,0	
CFBMH1254316W	45	125	43	M16	14,5X20	156	192	4	88,0	352,0	4,0	1
CFBMH1254316M	60								185,0	740,0		
CFBMH1444816W	45	144	48	M16	14,5X18	182	215	5	100,0	700,0	7,0	1
CFBMH1444816M	60								200,0	1340,0	6,7	
CFBMH1605820W	45	160	58	M20	14,5X18	140	170	5	120,0	840,0	7,0	2
CFBMH1605820M	60								220,0	1540,0		
CFBMH1806620W	45	180	66	M20	14,5X18	160	190	5	160,0	1120,0	7,0	2
CFBMH1806620M	60								320,0	2240,0		

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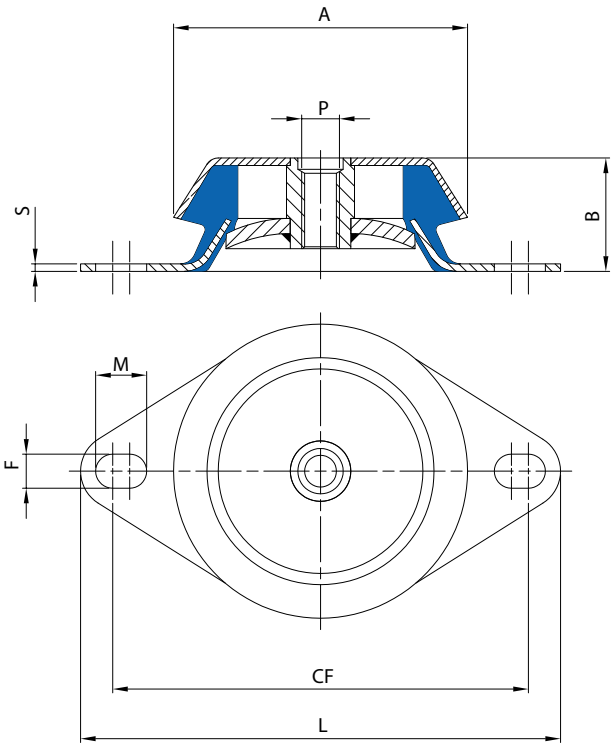
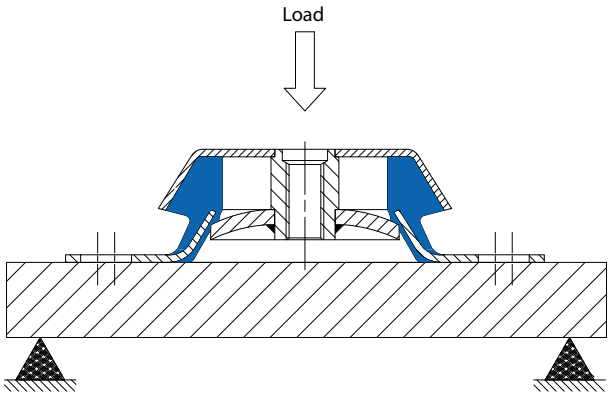
Type CCF





Hard bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing

Item	Hardness (IRHD)	A	B	P	FxM	CF		L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
CCF603510W	45									45,0	110,0	
CCF603510M	60	60	35	M10	8,3X16	75	90	106	2	80,0	190,0	2,4
CCF603510H	70									120,0	290,0	
CCF603512W	45									45,0	110,0	
CCF603512M	60	60	35	M12	8,3X16	75	90	106	2	80,0	190,0	2,4
CCF603512H	70									120,0	290,0	
CCF623110W	45									50,0	125,0	
CCF623110M	60	62	31	M10	8,3X16	75	90	106	3	85,0	212,0	2,5
CCF623110H	70									125,0	312,0	
CCF623112W	45									50,0	125,0	
CCF623112M	60	62	31	M12	8,3X16	75	90	106	3	85,0	212,0	2,5
CCF623112H	70									125,0	312,0	
CCF773010W	45									42,0	147,0	
CCF773010M	60	77	30	M10	9	110		128	2	80,0	280,0	3,5
CCF773010H	70									120,0	420,0	
CCF823510W	45	82	35	M10	11	110		128	2	65,0	200,0	3,0
CCF823510M	60									115,0	345,0	
CCF924512W	45									100,0	300,0	
CCF924512M	60	92	45	M12	10,5	110		138	3	195,0	585,0	3,0
CCF924512H	70									310,0	930,0	
CCF1063812W	45									120,0	420,0	
CCF1063812M	60	106	38	M12	14X18	138	146	172	3	220,0	660,0	3,5
CCF1063812H	70									320,0	960,0	
CCF1063816W	45									120,0	420,0	
CCF1063816M	60	106	38	M16	14X18	138	146	172	3	220,0	660,0	3,5
CCF1063816H	70									320,0	960,0	
CCF1085016/5W	45									120,0	400,0	
CCF1085016/5M	60	108	50	M16	16,5	160		190	5	220,0	660,0	3,3
CCF1085016/5H	70									320,0	960,0	

Issue October 2016

Soft Bell Mounts

Mounts

Mounts which allow a high level of insulation especially used on generators, engines and systems with an operating frequency at around 25 Hz (1500 rpm). Axial stresses are perfectly absorbed and side deflections limited to guarantee a good stability. Soft bell mounts are designed with a fail-safe function making it an ideal solution for applications where safety is paramount.

Applications

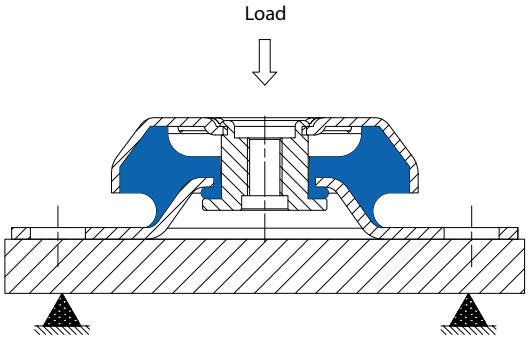
- Gensets
- Engines
- Tooling machinery
- Pumps
- Special equipment
- HVAC

Standard Production

- Bell and flange: DD13 or DC04 steel (UNI EN 10111 o UNI EN 10130)
- Fail-safe device: 11SMnPb37 (UNI EN 10087)
- Natural rubber NR
- Zinc plated in accordance with CE standard CHROME VI free, white
  Stiffness tolerance +/- 15%

Options & Additional Parts

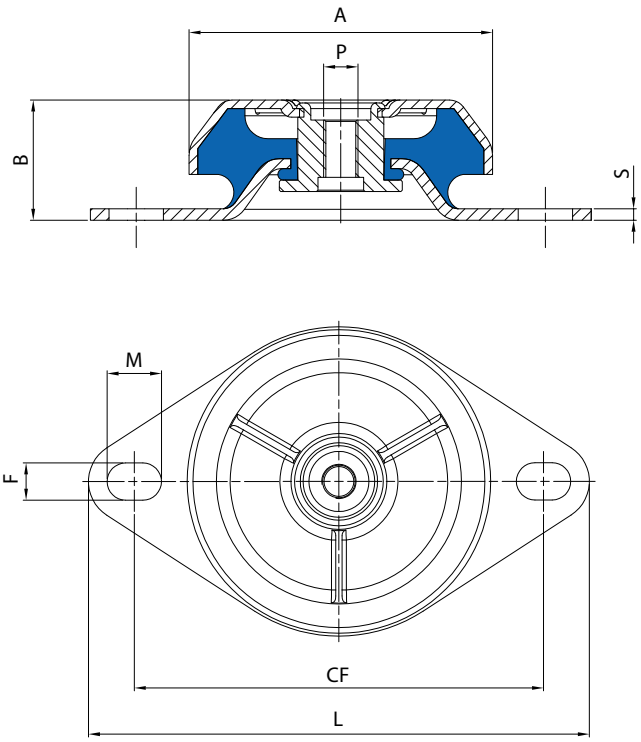
- Stainless steel version
- Height adjuster



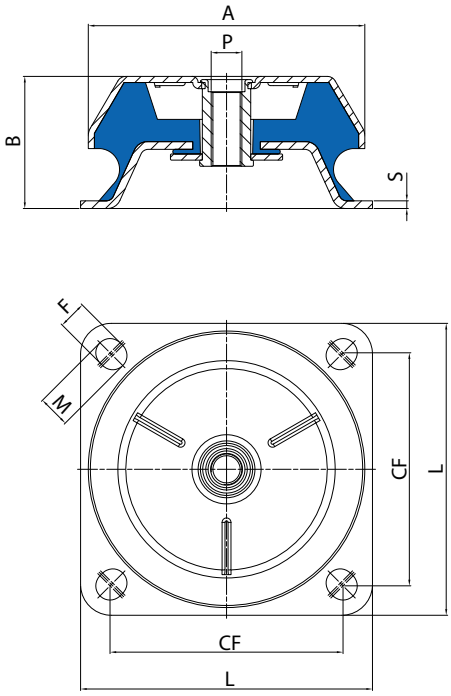
Soft bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing.

Issue October 2016

Type CFBMS
Type 1



Type CFBMS
Type 2

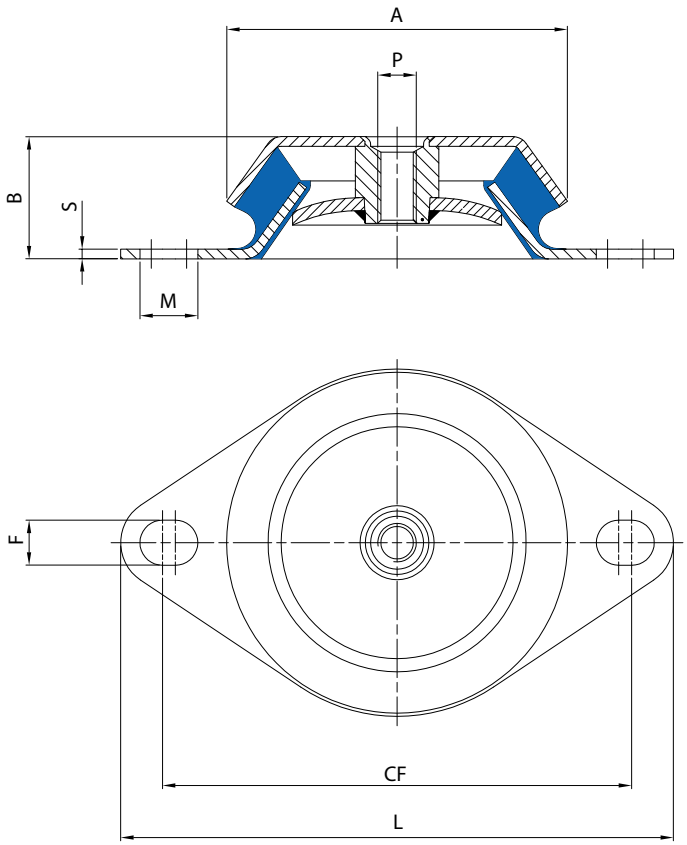


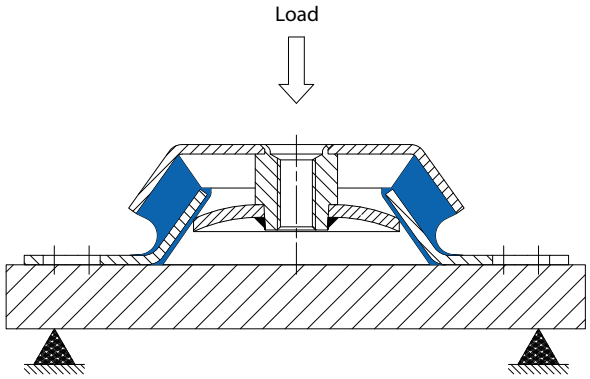
Item	Hardness (IRHD)	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Type
CFBMS633510W	45	63	35	M10	9X12	88	110	2	7,0	30	4,3	1
CFBMS633510M	60								15,8	60	3,8	
CFBMS833510W	45	83	35	M10	11,5X15	110	135	3	17,8	80	4,5	1
CFBMS833510M	60								44,5	180	4,0	
CFBMS833512W	45	83	35	M12	11,5X15	110	135	3	17,8	80	4,5	1
CFBMS833512M	60								44,5	180	4,0	
CFBMS1064212W	45	106	42	M12	13X19	143	175	4	33,5	167	5,0	1
CFBMS1064212M	60								67,0	335	5,0	
CFBMS1064216W	45	106	42	M16	13X19	143	175	4	33,5	167	5,0	1
CFBMS1064216M	60								67,0	335	5,0	
CFBMS1505416W	45	150	54	M16	14X18	182	218	4	37,5	450	12,0	1
CFBMS1505416M	60								78,7	800	10,2	
CFBMS1808620W	45	180	86	M20	14,5X18	146	190	5	59,2	900	15,2	2
CFBMS1808620M	60								127,0	1700	13,4	
CFBMS22010524W	45	220	105	M24	17,5X20	180	220	5	95,0	1700	17,9	2
CFBMS22010524M	60								195,0	3400	17,4	

Issue October 2016

Type CCFS

Type 1

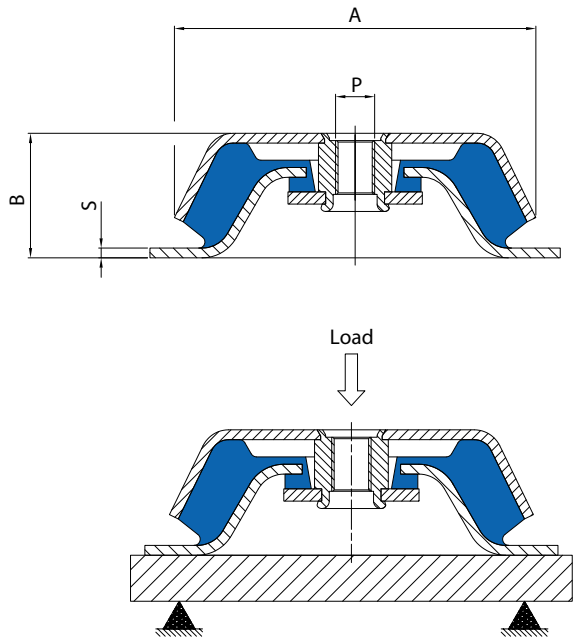


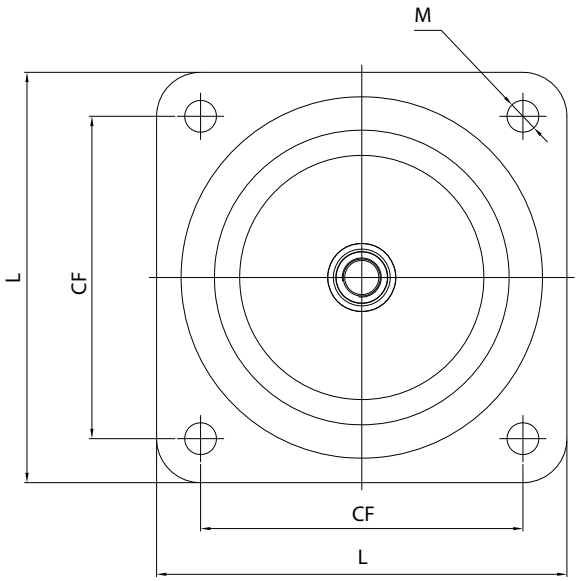


Soft bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing.

Type CCFS

Type 2





Issue October 2016

Item	Hardness (IRHD)	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Type
CCFS823510W	45								12,0	70,0	6,0	
CCFS823510M	60	82	35	M10	11	110	127	2	22,0	130,0	5,8	1
CCFS823510H	70								28,0	160,0	5,5	
CCFS823512W	45								12,0	70,0	6,0	
CCFS823512M	60	82	35	M12	11	110	127	2	22,0	130,0	5,8	1
CCFS823512H	70								28,0	160,0	5,5	
CCFS1063812XW	35								40,0	150,0	3,7	
CCFS1063812W	45	106	38	M12	14X18	138	172	3	55,0	192,5	3,5	1
CCFS1063812M	60					146			100,0	350,0	3,5	
CCFS1063812H	70								150,0	450,0	3,0	
CCFS1063816XW	35								40,0	150,0	3,7	
CCFS1063816W	45	106	38	M16	14X18	138	172	3	55,0	192,5	3,5	1
CCFS1063816M	60					146			100,0	350,0	3,5	
CCFS1063816H	70								150,0	450,0	3,0	
CCFS1064212W	45								28,0	140,0	5,0	
CCFS1064212M	60	106	42	M12	14X18	138	172	3	55,0	275,0	5,0	1
CCFS1064212H	70					146			85,0	425,0	5,0	
CCFS1064212XH	75								120,0	600,0	5,0	
CCFS1064216W	45								28,0	140,0	5,0	
CCFS1064216M	60	106	42	M16	14X18	138	172	3	55,0	275,0	5,0	1
CCFS1064216H	70					146			85,0	425,0	5,0	
CCFS1064216XH	75								120,0	600,0	5,0	
CCFS1214216W	45								125,0	500,0	4,0	
CCFS1214216M	60	121	42	M16	13,5	158	188	3	190,0	760,0	4,0	1
CCFS1214216H	70								290,0	1160,0	4,0	
CCFS1444816XW	35								85,0	527,0	6,2	
CCFS1444816W	45	144	48	M16	14X18	179	216	4	100,0	700,0	7,0	1
CCFS1444816M	60					186			200,0	1340,0	6,7	
CCFS1444816H	70								300,0	1950,0	6,5	
CCFS1505016W	45								110,0	440,0	4,0	
CCFS1505016M	60	150	51	M16	n°4X13	132	168	4	210,0	880,0	4,2	2
CCFS1505016H	70								310,0	1240,0	4,0	

Issue October 2016

Type CCFQ/CFE/CFAB
Mounts

This mount offers a low profile, easy to install design with an integral fail-safe device to provide shock and failure protection for mobile, marine or seismic stationary applications. When the rubber works in shear and compression it provides large static deflections low natural (to 8 hz) and high isolation. Our CCFQ/CFE/CFAB are designed with a fail-safe function making it an ideal solution for applications where safety is paramount.

Applications

- Gensets
- Marine power engines
- Diesel engines
- Pumps
- HVAC

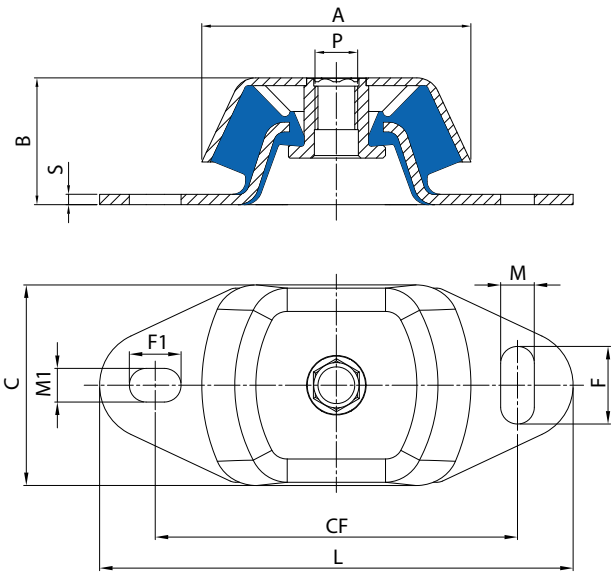
Standard Production

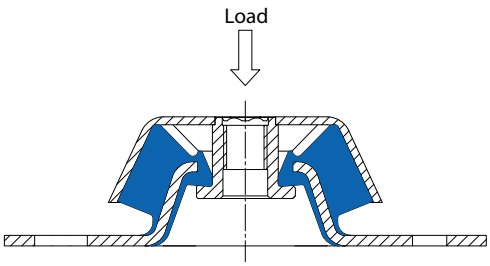
- Bell and flange: DD13 or DC04 steel (UNI EN 10111 o UNI EN 10130)
- Fail-safe device: 11SMnPb37 (UNI EN 10087)
- Natural rubber NR
- Zinc plated in accordance with CE standard CHROME VI free, white Stiffness tolerance +/- 15%

Options & Additional Parts

- Stainless steel version
- Height adjuster

Type CCFQ

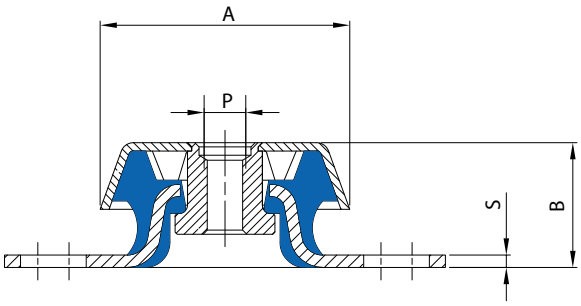


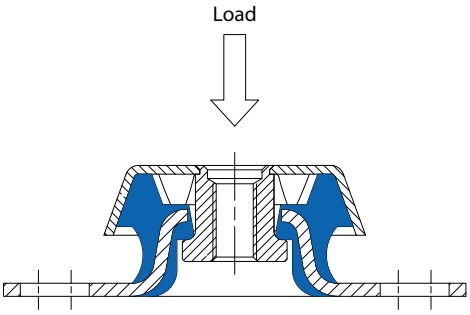


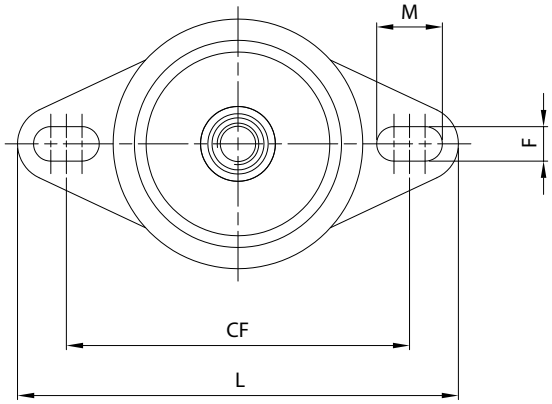
Issue October 2016

Item	Hardness (IRHD)	A	B	C	P	FxM (F1xM1)	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Average weight (kg)
CCFQ804012W	45 IRHD	80	38	60	M12	14X11	100	120	3	9,0	36,0	4,0	0,35
CCFQ804012K	50 IRHD									13,0	52,0		
CCFQ804012M	60 IRHD									16,0	64,0		
CCFQ804012H	70 IRHD									24,0	96,0		
CCFQ1045016XW	35 IRHD	104	49	75	M16	30X13 (20X13)	140	183	4	16,0	80,0	5,0	0,85
CCFQ1045016W	45 IRHD									24,0	120,0		
CCFQ1045016M	60 IRHD									38,0	190,0		
CCFQ1045016H	70 IRHD									60,0	300,0		
CCFQ1045016XH	80 IRHD									95,0	475,0		
CCFQ1307020W	45 IRHD	132	71	112	M20	34X18 (26X18)	182	230	5	55,0	330,0	6,0	2,35
CCFQ1307020M	60 IRHD									90,0	540,0		
CCFQ1307020H	70 IRHD									135,0	810,0		
CCFQ1307020XH	80 IRHD									220,0	880,0	4,0	

Type CFE





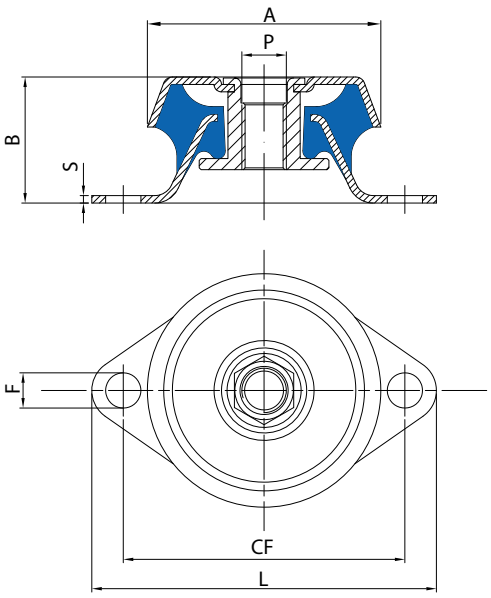


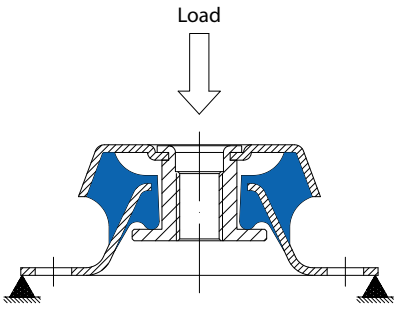
Hard bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing.

Item	Hardness (IRHD)	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
CFE623110XW	35	60	31	M10	8,3X16	75 90	106	3	7,5	25	3,3
CFE623110W	45								10,0	34	3,4
CFE623110K	50								13,0	43	
CFE623110M	60								16,0	53	3,3
CFE623110H	70								25,0	83	
CFE623112W	45	60	31	M12	8,3X16	75 90	106	3	10,0	34	3,4
CFE623112K	50								13,0	43	
CFE623112M	60								16,0	53	3,3
CFE623112H	70								25,0	83	

Issue October 2016

Type CFAB





Hard bell mounts can withstand up to 2g of shock forces or 5g occasional shock forces with regard to the load without permanent deformation or failing.

Item	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
CFAB-3	63	34	M12	9,5	76	93	2	20	70	3,5
CFAB-2	63	34	M12	9,5	76	93	2	30	110	3,5
CFAB-0	63	34	M12	9,5	76	93	2	37	130	3,5

Issue October 2016

Type CF/CFQ
Mounts

Mounts which allow a high level of insulation especially used on generators, engines and sytems with an operating frequency at around 25 Hz (1500 rpm). Axial stresses are perfectly absorbed and side deflections limited to guarantee a good stability. The CF/CFQ are fully bonded and have a threaded insert to allow an easy assembling.

Applications

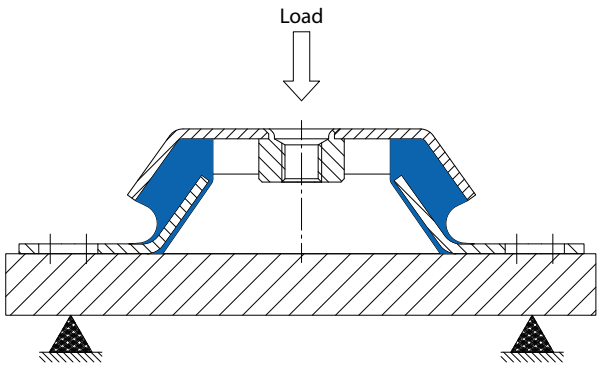
- Gensets
- Engines
- Special equipments
- Tooling equipment
- Pumps
- HVAC

Standard Production

- Bell and flange: DD13 or DC04 steel (UNI EN 10111 o UNI EN 10130)
- Nuts: Resistance class 4
- Natural rubber NR
- Zinc plated in accordance with CE standard CHROME VI free, white
  Stiffness tolerance +/- 15%

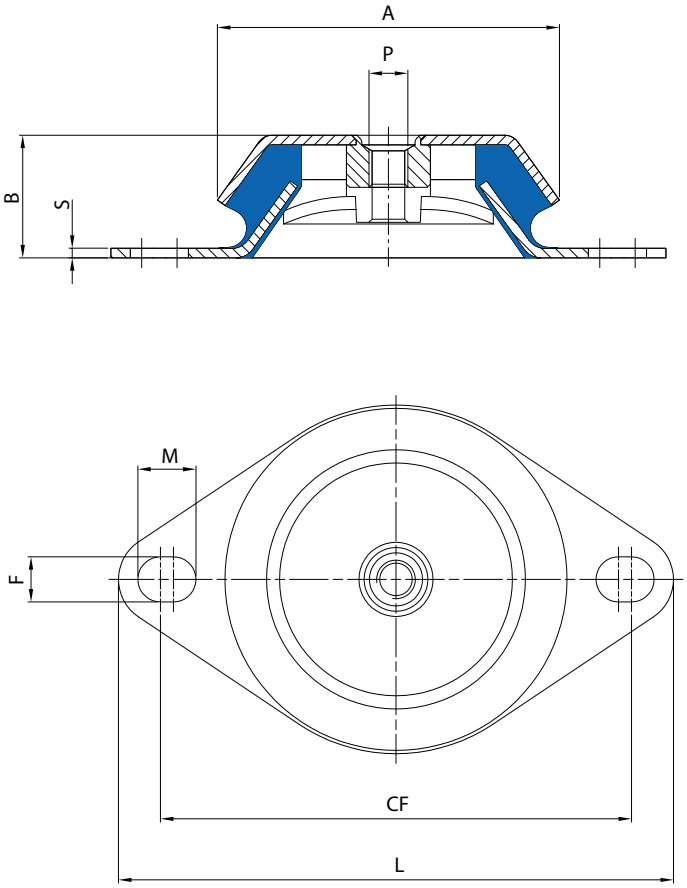
Options & Additional Parts

- Stainless steel version
- Height adjuster

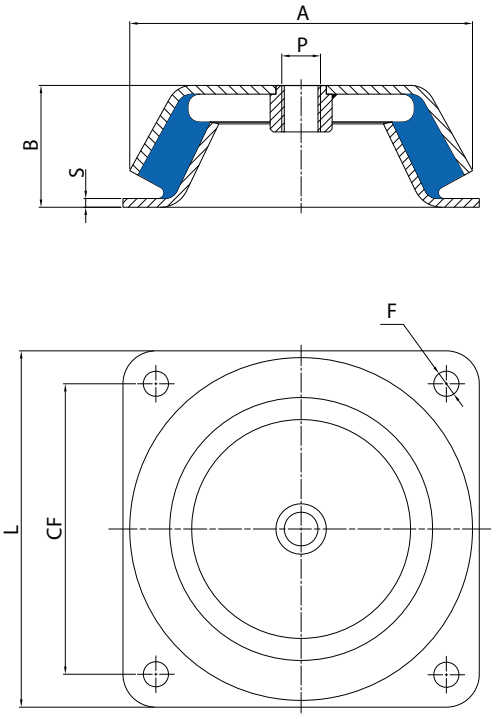


Issue October 2016

Type CF/CFQ
Type 1



Type CF/CFQ
Type 2



Issue October 2016

Item	Hardness (IRHD)	A	B	P	FxM	CF	L	S	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Type
CFS482308W	45	46,5	22,5	M8	6,5	68	81	1,5	23	46	2,0	1
CFS482308M	60								30	60		
CF482308W	45								30	60		
CF482308M	60	48	23	M8	6,5	68	81	1,5	50	95	2,0	1
CF482308H	70								80	150		
CF603510W	45					75			45	110		
CF603510M	60	60	35	M10	8,3X16		106	2	80	190	2,4	1
CF603510H	70					90			120	290		
CF603512W	45					75			45	110		
CF603512M	60	60	35	M12	8,3X16		106	2	80	190	2,4	1
CF603512H	70					90			120	290		
CF623110W	45					75			50	125		
CF623110M	60	62	31	M10	8,3X16		106	3	85	213	2,5	1
CF623110H	70					90			125	313		
CF623112W	45					75			50	125		
CF623112M	60	62	31	M10	8,3X16		106	3	85	213	2,5	1
CF623112H	70					90			125	313		
CF773010W	45								42	147		
CF773010M	60	77	30	M10	9	110	128	2	80	280	3,5	1
CF773010H	70								120	420		
CF823510W	45	82	35	M10	11	110	128	2	65	200	3,0	1
CF823510M	60								115	345		
CF924512W	45								100	300		
CF924512M	60	92	45	M12	10,5	110	138	3	195	585	3,0	1
CF924512H	70								310	930		
CF924514W	45								100	300		
CF924514M	60	92	45	M14	10,5	110	138	3	195	585	3,0	1
CF924514H	70								310	930		
CF1063812W	45					138			120	420	3,5	
CF1063812M	60	106	38	M12	14X18		172	3	220	660	3,0	1
CF1063812H	70					146			320	960		
CF1063816W	45					138			120	420	3,5	
CF1063816M	60	106	38	M16	14X18		172	3	220	660	3,0	1
CF1063816H	70					146			320	960		
CF1085014/5W	45								120	400	3,3	
CF1085014/5M	60	108	50	M14	16,5	160	190	5	220	660	3,0	1
CF1085014/5H	70								320	960		
CF1085016/5W	45								120	400	3,3	
CF1085016/5M	60	108	50	M16	16,5	160	190	5	220	660	3,0	1
CF1085016/5H	70								320	960		
CFQ1505016W	45								150	600	4,0	
CFQ1505016M	60	150	51	M16	n°4X13	132	168	4	260	1092	4,2	2
CFQ1505016H	70								350	1365	3,9	
CFQ1776020W	45								210	756	3,6	
CFQ1776020M	60	177	62	M20	n°4X13	150	184	4	340	1326	3,9	2
CFQ1776020H	70								530	2014	3,8	

Issue October 2016

Universal Mounts
Mounts

The CTC/T/CGM/FBF range provides excellent fail-safe dynamic insulation particularly in vertical direction, both in traction and in compression. They significantly reduce vibrations and absorb considerable levels of shocks to provide an excellent all-round solution to a wide range of applications on agricultural machines, tractors, off-road machines and military equipment.These mounts are specially suitable for insulating structures where through assembly in required.

Applications

- Engines
- Radiators
- Cabs

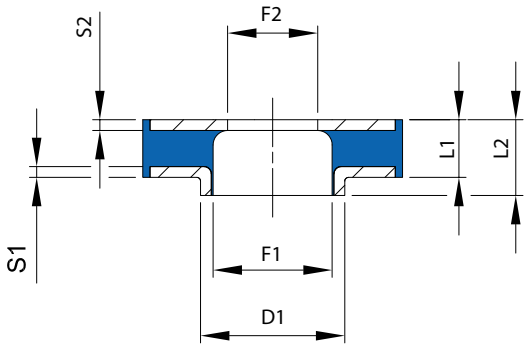
Standard Production

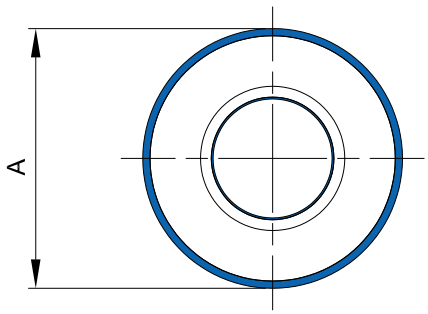
- Washer and flange: DD12 or DD13 steel (UNI EN 10111)
- Tube: Fe 360 Steel (ISO 3305/3306)
- Natural rubber NR
- Zinc plated in accordance with CE standards CHROME VI free, white
  Stiffness tolerance +/- 15%

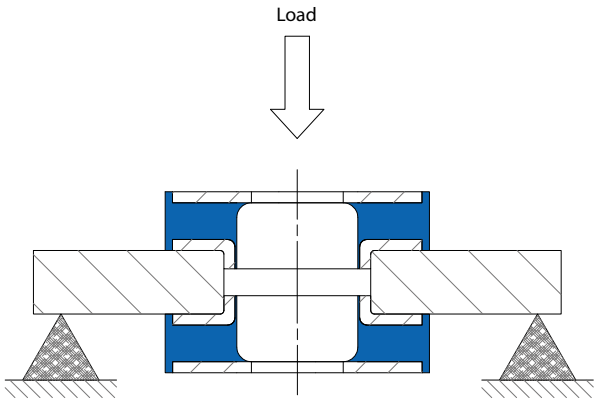
Options & Additional Parts

- NEOPREN CR and Anti-oil NBR version

Type CGM







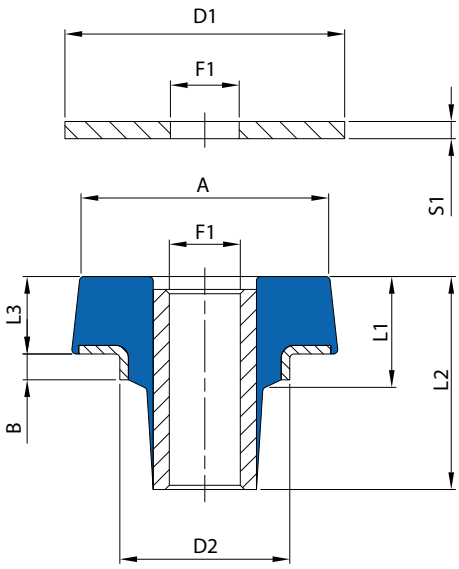
N.B. Mounts are sold individually, but need to be installed in pairs as above, to provide the Isolation Characteristics.

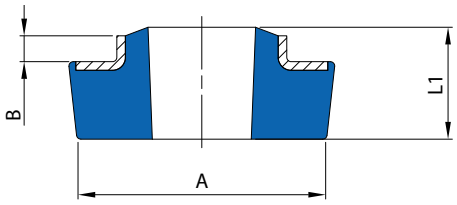
Issue October 2016

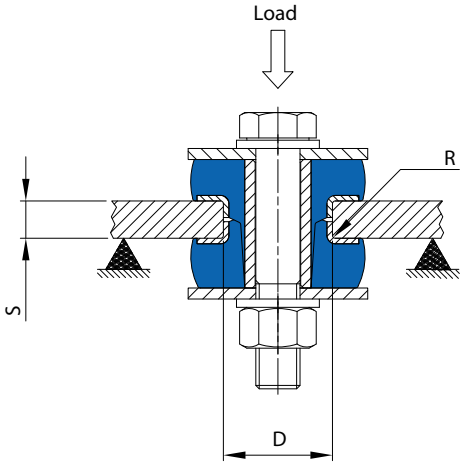
Item	Hardness (IRHD)	A	D1	F1	F2	L1	L2	S1	S2	Average Stiffness [compression] (daN/mm)	Max. Load [compression] (daN)	Max Deflec. [compression] (mm)
CGM3611W	45									90,0	81,0	
CGM3611M	60	36	20	16,5	16,5	8	10,5	1,5	1,5	150,0	135,0	0,9
CGM3611H	70									230,0	207,0	
CGM3614W	45									70,0	84,0	
CGM3614M	60	36	18	12	8,5	10	14	1,5	1,5	110,0	132,0	1,2
CGM3614H	70									170,0	204,0	
CGM5023W	45									80,0	120,0	
CGM5023M	60	50	23	20	16,5	13	22,5	1,5	1,5	140,0	210,0	1,5
CGM5023H	70									210,0	315,0	
CGM6017W	45									110,0	209,0	
CGM6017M	60	60	27	24	20,5	13	17	1,5	1,5	210,0	399,0	1,9
CGM6017H	70									310,0	589,0	
CGM6023W	45									110,0	209,0	
CGM6023M	60	60	27	24	20,5	13	23,5	1,5	1,5	210,0	399,0	1,9
CGM6023H	70									310,0	589,0	
CGM6034M	60	60	27	24	21	30	34	1,5	1,5	70,0	245,0	3,5

Type CTC

Type 1







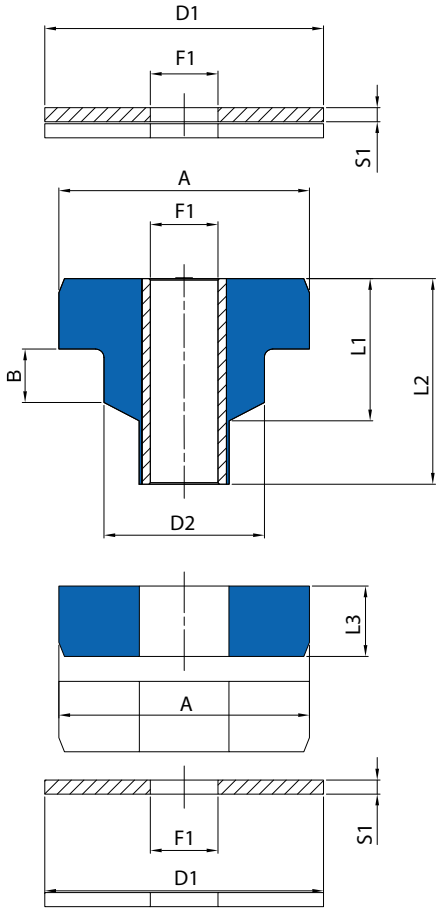
The data related to the average stiffness, maximum load and maximum deflection refer to the assembling scheme shown.

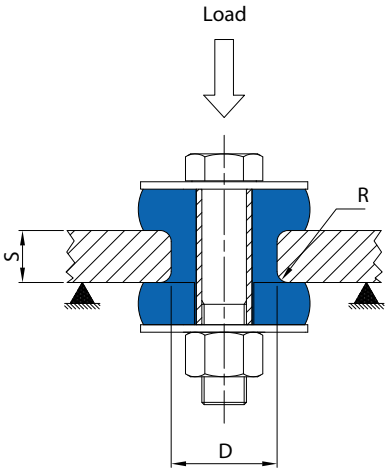
Item	Hard-ness (IRHD)	A	B	D2	L1	L2	L3	D1	F1	S1	D	S	R	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Mounts						Washers			Support					
CTC6050W	45													68,0	102,0	
CTC6050M	60	58	6	39.5	26	49.5	18	65	16	4	41	15	1	135,0	202,0	1,5
CTC6050H	70													210,0	315,0	

Issue October 2016

Type CTC

Type 2



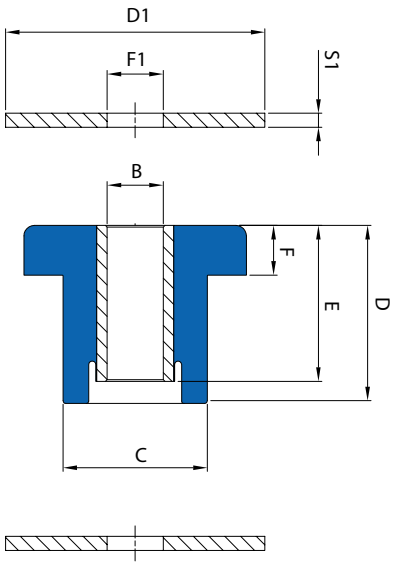


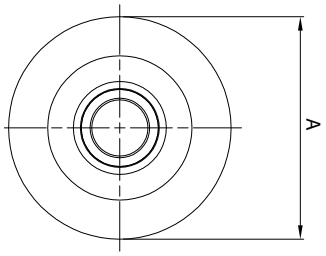
The data related to the average stiffness, maximum load and maximum deflection refer to the assembling scheme shown.

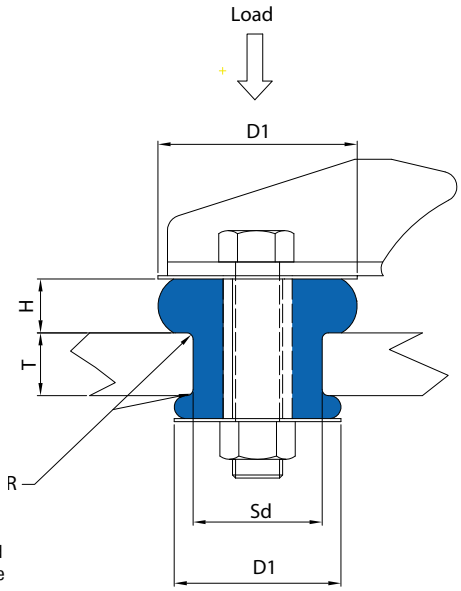
Item	Hardness (IRHD)	A	B	F1	D2	L1	L2	L3	D1	F1	S1	D	S	R	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Mounts							Washers			Support					
CTC5050W	45	50	10	13	32	30	50	20	55	12,2	3,5	31	15	1,5	43,0	80,0	1,9
CTC5050M	60														86,0	130,0	1,5
CTC6562W	45	65	16	16,5	40	42	61,7	23	70	16	4	39	22	2,3	58,0	120,0	2,1
CTC6562M	60														140,0	260,0	1,9
CTC8973W	45	89	19	24	57	50,5	73	25	99	24	4	57	28	3	130,0	260,0	2,0
CTC8973M	60														240,0	450,0	1,9

Issue October 2016

Type T



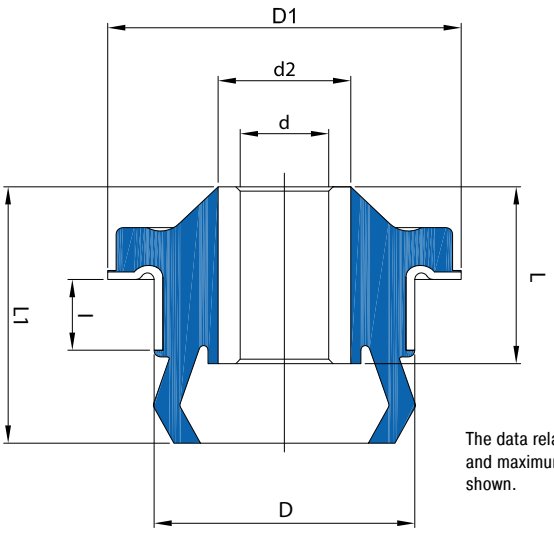


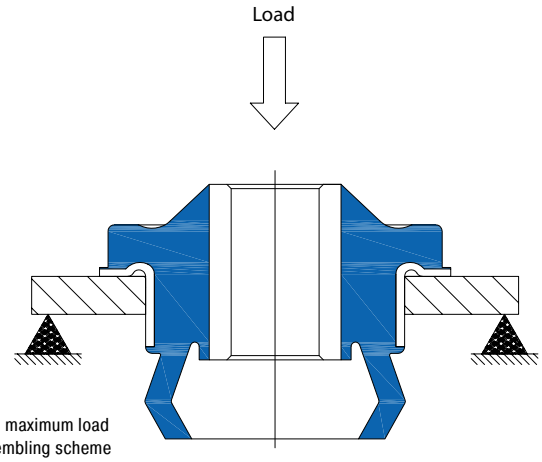


The data related to the average stiffness, maximum load and maximum deflection refer to the assembling scheme shown.

Item	Hard-ness (IRHD)	A	B	C	D	E	F	H	D1	SD	R	T	D1	F1	S1	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Mounts						Installation					Washers					
T3027M	55	32	10	24	36	27,2	14	13	38	22,7	1,5	9,7	38	10	2	22	50	2,3
T5137K	50	51	13	35	51	37	19	17,5	65	31,8	1,5	12,7	65	12	3	45	135	3,0
T6038K	50	60	17,1	37	53	39,2	17	16	70	35,1	1,5	15,7	70	16	4	75	225	3,0
T6344K	50	63,5	16	41,2	50,8	44,5	14,2	14,2	74	38,1	1.5	19,1	74	16	4	115	210	1,8

Type FBF





The data related to the average stiffness, maximum load and maximum deflection refer to the assembling scheme shown.

Item	d	D	I	L	d2	L1	D1	D3	D4	S	S1	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
	Mounts							Installation						
FBF1659.1640	16,2	59	16	40	25	58	80	60	85	16	min 5	450	1200	2,7
FBF1659.1640W												240	720	3,0
FBF2059.1640	20	59	16	40	30	58	80	60	85	16	min 5	500	1250	2,5
FBF2059.1640W												265	800	3,0

Issue October 2016

Cones
Mounts

These mounts have a particular rubber section made for shear and compression stresses which allows good axial deflections. Cone mounts are low cost isolators that have high load carrying capacity within a compact size that provides a stable solution for a wide number of applications. This design of mount is ideally suited for isolating cabs of trucks, bus engines, radiators etc... The mounts are assembled with two safety washers to minimize overloads. The CNA version is characterized by two different radial stiffnesses.

Applications

- Gensets
- Engines
- Special equipments
- Compressors
- Pumps
- HVAC

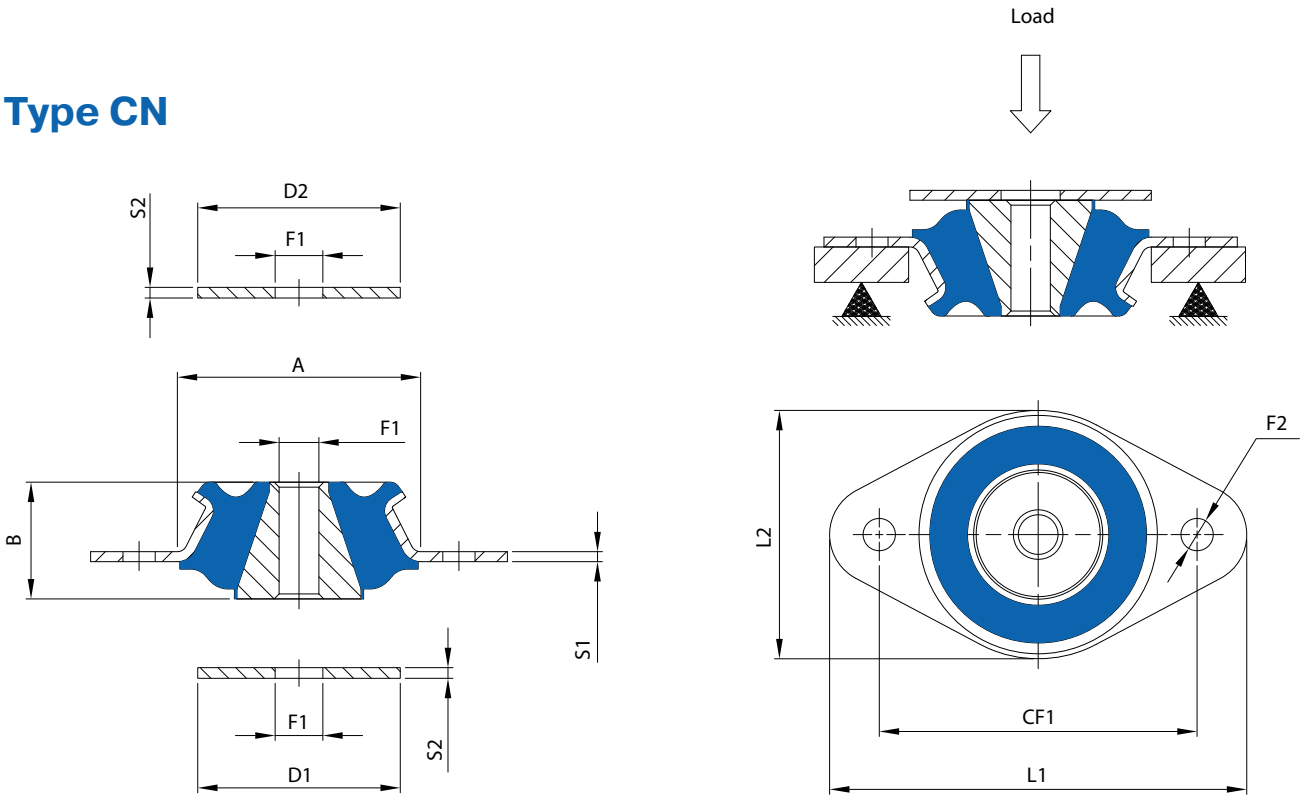
Standard Production

- Cone and flange: DD13 or DC04 steel (UNI EN 10111 o UNI EN 10130)
- Washers: DD12 Steel UNI 10111
- Natural rubber NR
- Zinc plated in accordance with CE standards CHROME VI free, white Stiffness tolerance +/- 15%

Options & Additional Parts

- Alternative elastomeric compounds available

Type CN



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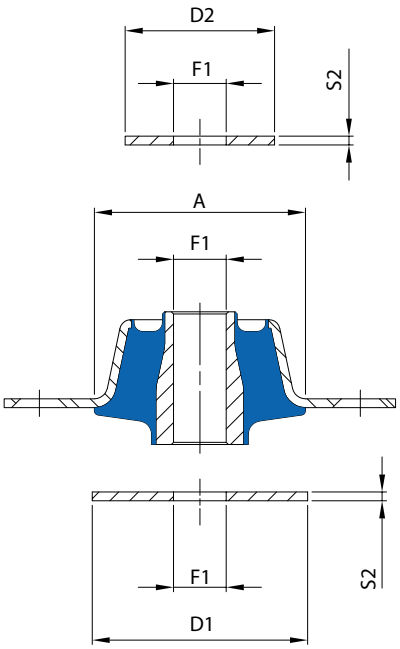
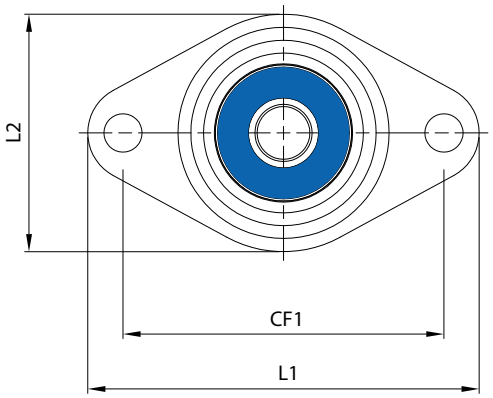
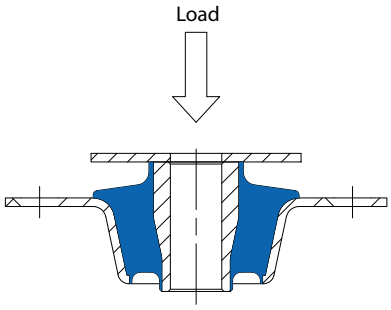
Item	Hardness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	F1	S2	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
4623CN08W	45														12,5	37,5	
4623CN08M	60	46	23,5	64	-	84	50	8	2	6,5	40	40	8	2	22	66	3
4623CN08H	70														36	108	

The item code means the cone mount with washers; it's possible to order only the cone mount.

Type CN





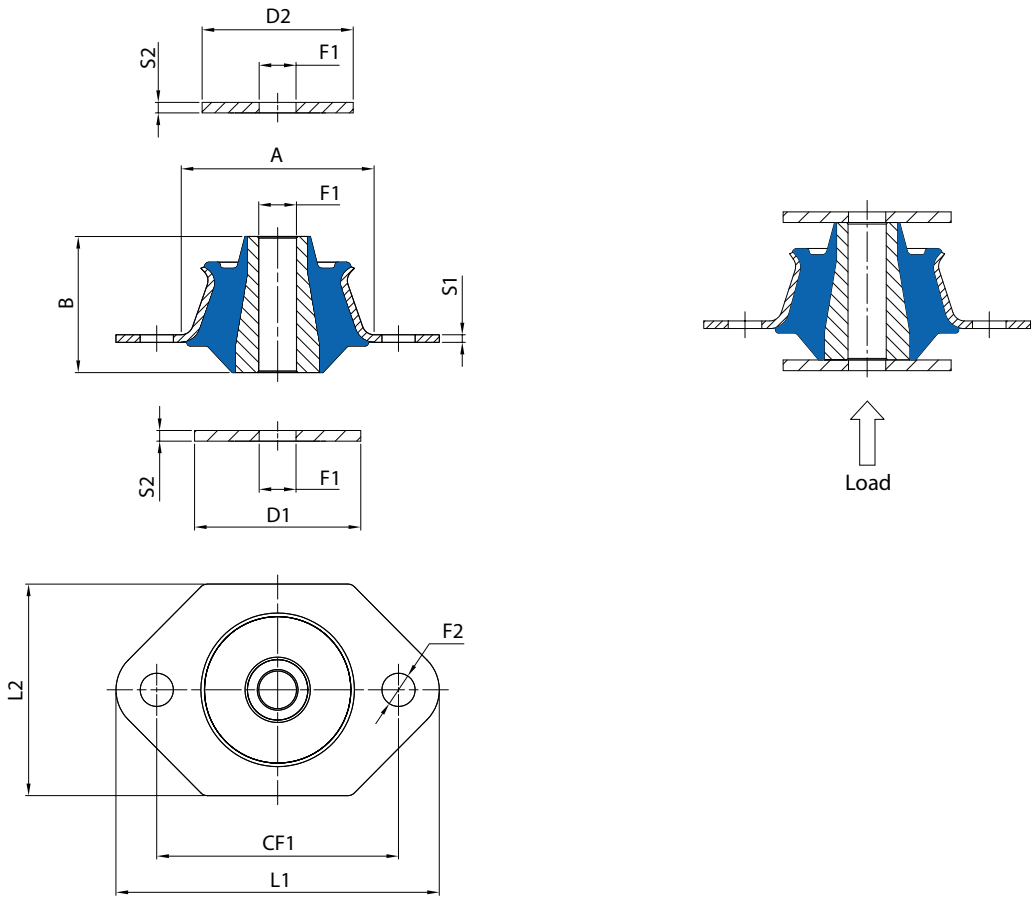


Item	Hardness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	F1	S2	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
4830CN12/1W	45														9	36	
4830CN12/1M	60	48	30,2	73	-	89	54	12	2	8,7	49	34	12	2	15	60	3
4830CN12/1H	70														21	84	

The item code means the cone mount with washers; it's possible to order only the cone mount.

Issue October 2016

Type CN

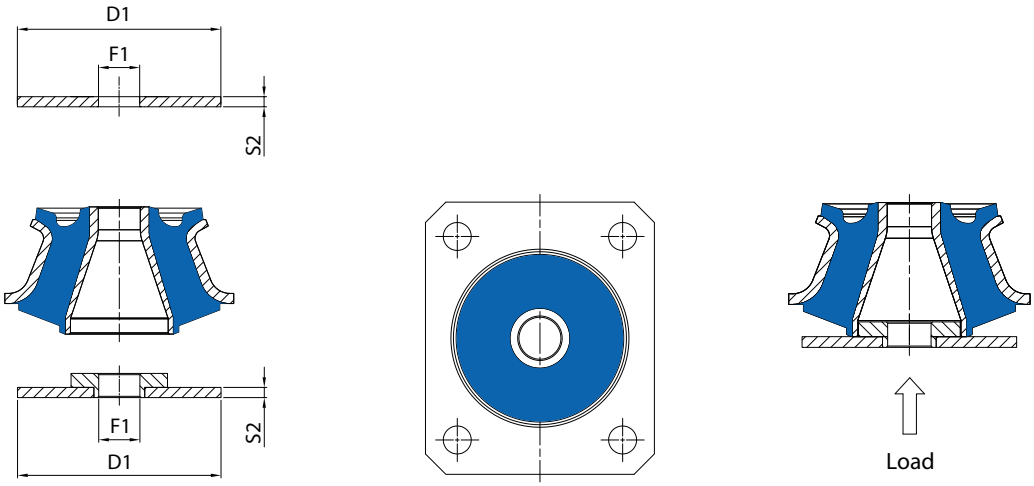


Item	Hardness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	F1	S2	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
6051CN12W	45														20	100	
6051CN12M	60	60	45	80	-	107	68	12,1	2,5	11	55	50	12,2	3,5	34	170	5
6051CN12H	70														50	250	

The item code means the cone mount with washers; it's possible to order only the cone mount.

Issue October 2016

Type CN

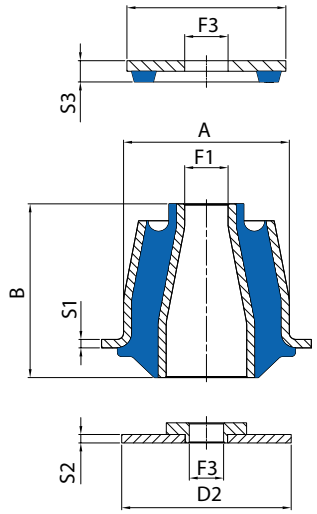


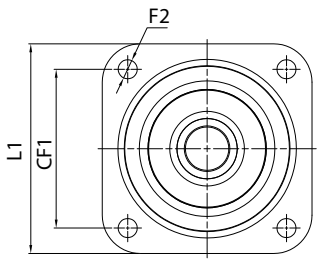
Item	Hardness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	S2	F1	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
7856CN16W	45														32	160	
7856CN16M	60	78	50	80	65	107	90	16,5	4	11	80	65	4	16	60	350	5
7856CN16H	70														98	488	
7856CN20W	45														32	160	
7856CN20M	60	78	50	80	65	107	90	20	4	11	80	65	4	20	60	350	5
7856CN20H	70														98	488	

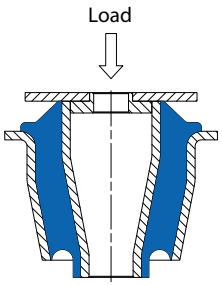
The item code means the cone mount with washers; it's possible to order only the cone mount. For the right working of the mount, the cone must be assembled with the ringed washer.

Issue October 2016

Type CN



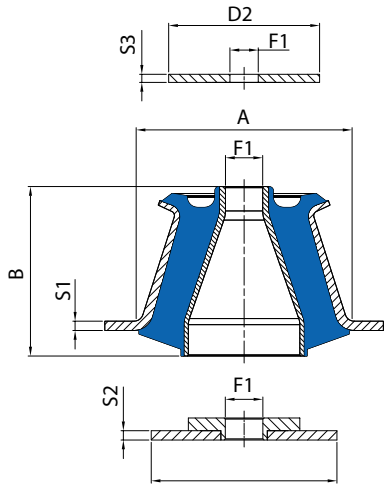


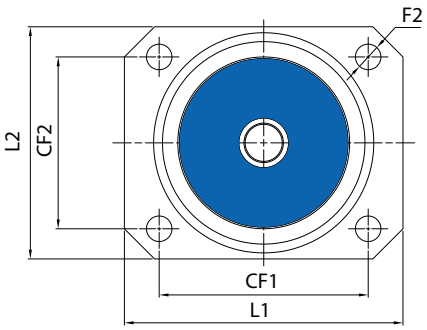


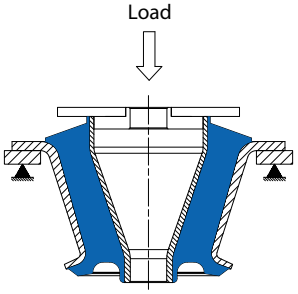
Item	Hardness (IRHD)	A	B	CF1	F1	F2	S1	L1	D2	S2	D3	S3	F3	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone							Washers							
7882CN20W	45													42	336	
7882CN20M	60	78	82	75	20,5	9	4	99	80	4	74	10	20,5	85	680	8
7882CN20H	70													132	1056	

The item code means the cone mount with washers; it's possible to order only the cone mount. For the right working of the mount, the cone must be assembled with the ringed washer.

Type CN





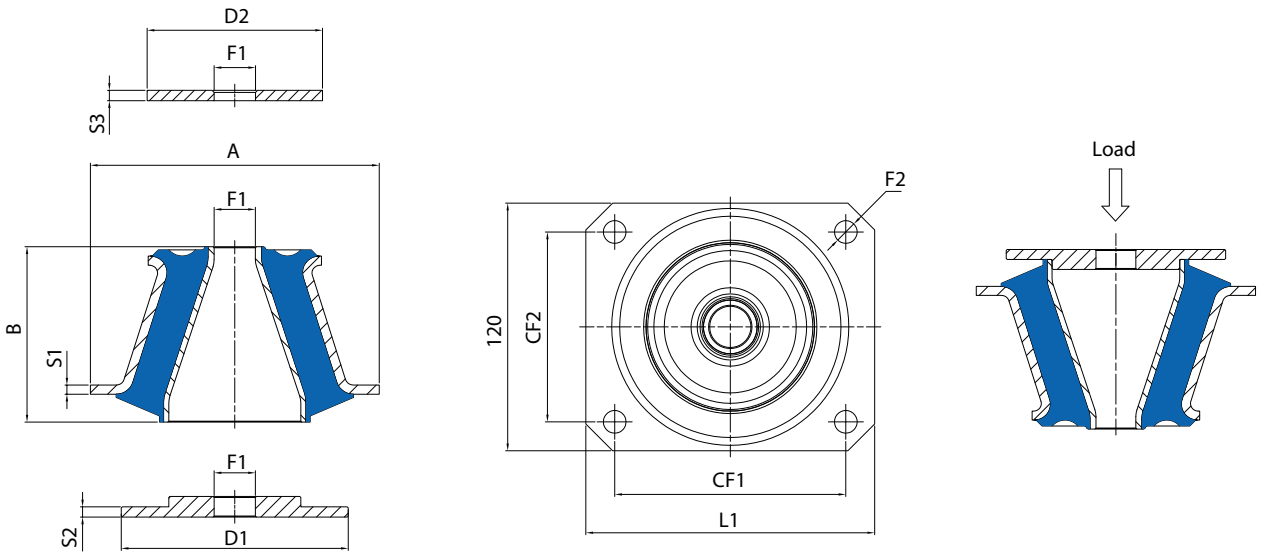


Issue October 2016

Item	Hardness (IRHD)	A	B	CF1	CF2	F1	F2	S1	L1	L2	D1	D2	S2	S3	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
9381CN16W	45														75	450	
9381CN16M	60	93	73	90	74	16	11	4	120	100	85	70	5	4	140	840	6
9381CN16H	70														235	1410	

The item code means the cone mount with washers; it's possible to order only the cone mount. For the right working of the mount, the cone must be assembled with the ringed washer.

Type CN

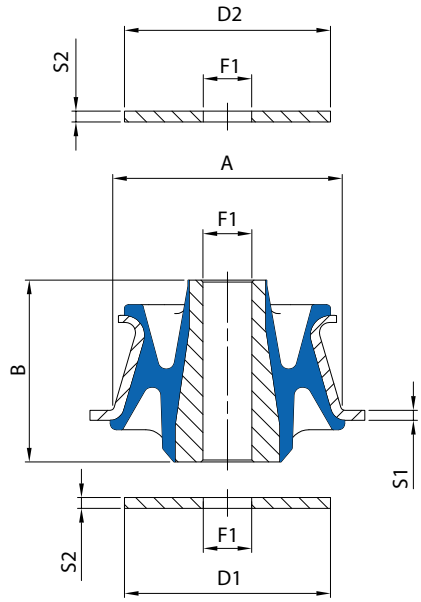


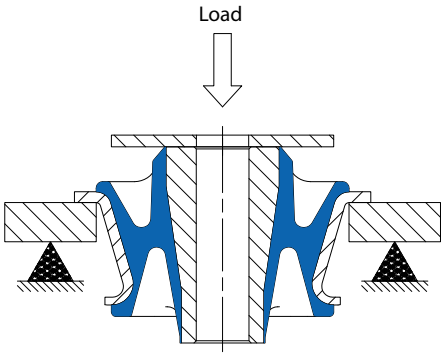
Item	Hardness (IRHD)	A	B	CF1	CF2	F1	F2	S1	L1	L2	D1	D2	S2	S3	Average Stiffness (daN/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers						
10995CN20W	45														115	460	4
10995CN20M	60	109	85	112	92	20	11	4.5	140	120	110	80	5	5	250	1125	4,5
10995CN20H	70														370	1850	5

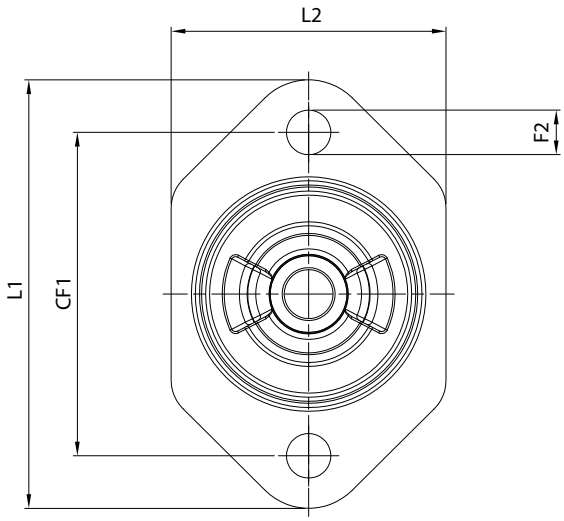
The item code means the cone mount with washers; it's possible to order only the cone mount. For the right working of the mount, the cone must be assembled with the ringed washer.

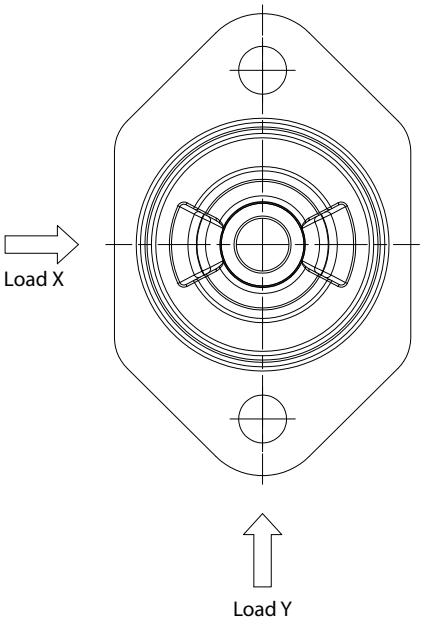
Issue October 2016

Type CNA







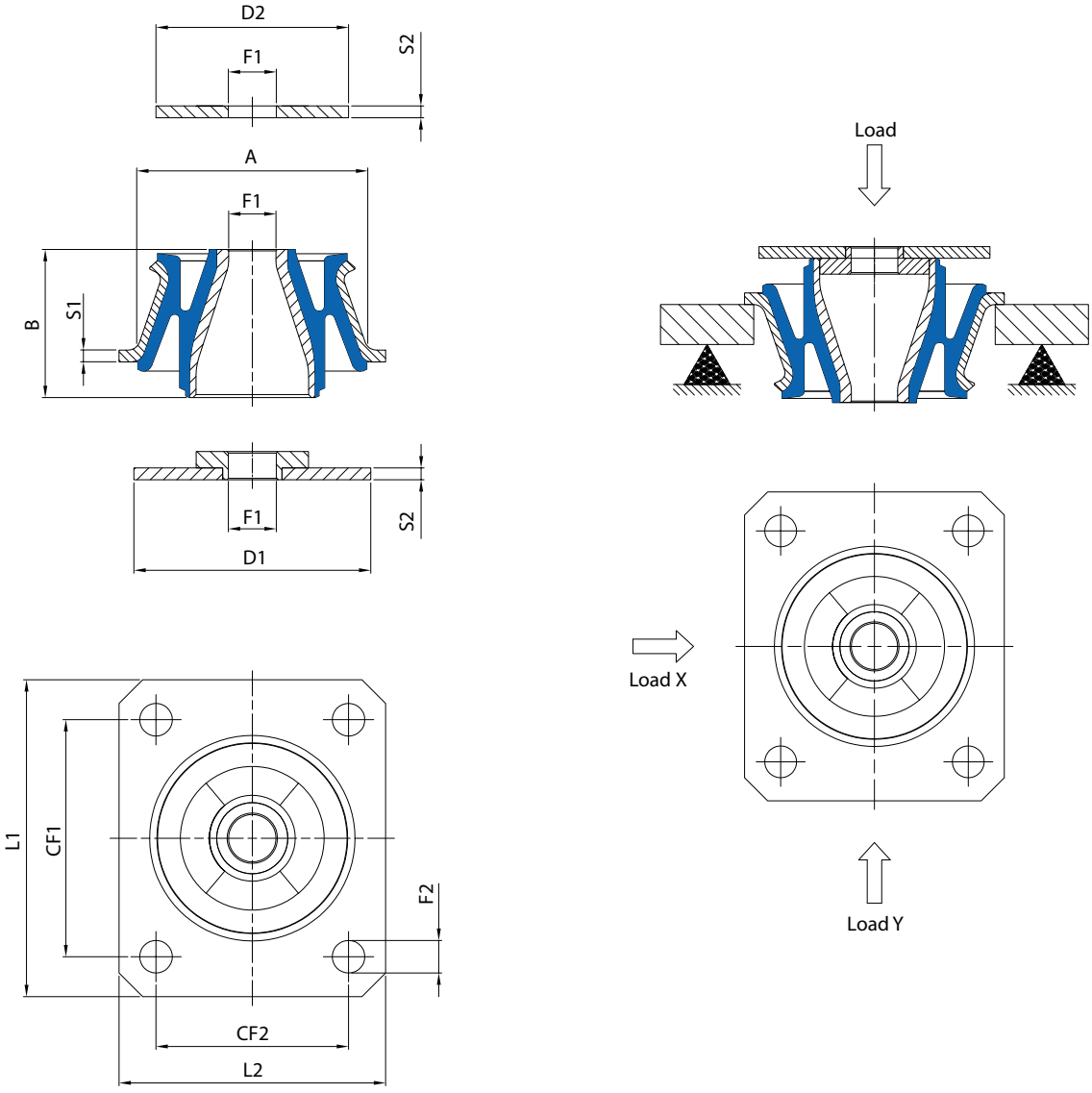


Item	Hard-ness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	F1	S2	Average Stiffness Z (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Average Stiffness X (daN/mm)	Average Stiffness Y (daN/mm)
		Cone									Washers								
6051CNA12W	45														15,5	92,5		31	53
6051CNA12M	60	60	45	80	-	107	70	12,1	2,5	11	55	50	12,2	3,5	28	140	5	56	85
6051CNA12H	70														40	200		80	120

The item code means the cone mount with washers; it's possible to order only the cone mount.

Issue October 2016

Type CNA

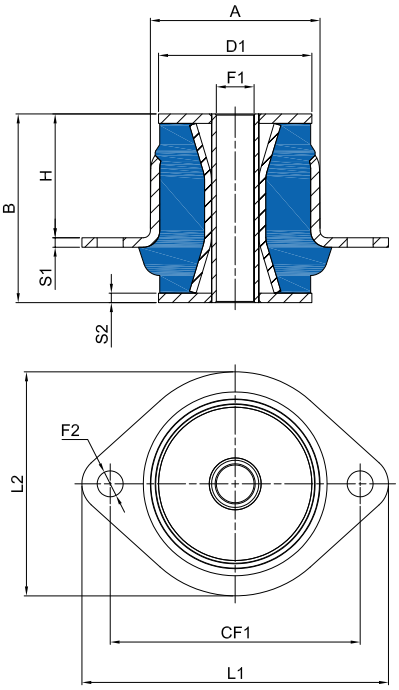


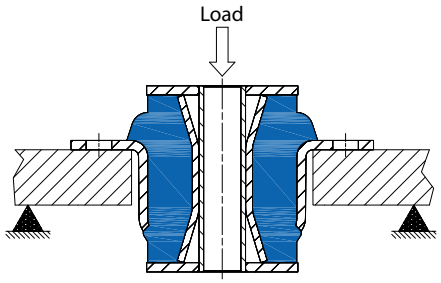
Item	Hard-ness (IRHD)	A	B	CF1	CF2	L1	L2	F1	S1	F2	D1	D2	F1	S2	Average Stiffness Z (daN/mm)	Max. Load (daN)	Max Deflec. (mm)	Average Stiffness X (daN/mm)	Average Stiffness Y (daN/mm)
		Cone									Washers								
7856CNA16W	45	78	50	80	65	107	90	16,5	4	11	80	65	16	4	24	120	5	31	61
7856CNA16K	50														33	165		36	71
7856CNA16M	60														42	210		51	100
7856CNA16H	70														56	270		84	160

The item code means the cone mount with washers; it's possible to order only the cone mount. For the right working of the mount, the cone must be assembled with the ringed washer.

Issue October 2016

Type FSMR

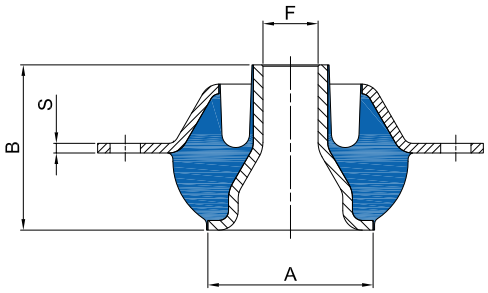


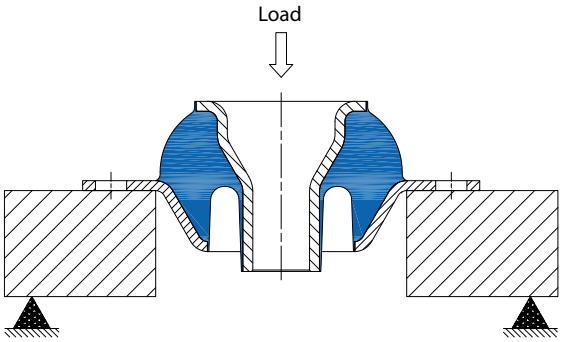


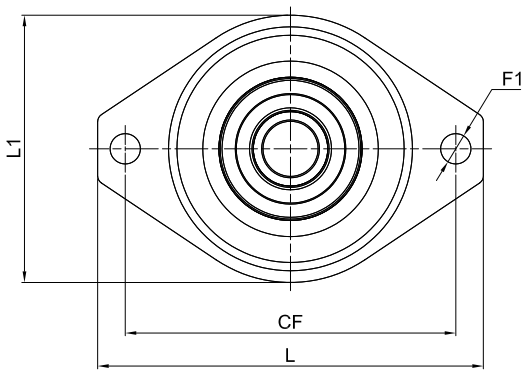
Item	Hardness (IRHD)	A	B	H	CF1	D1	F1	F2	L1	L2	S1	S2	Average Stiffness (Kg/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone									Washers				
FSMR6070W	45												35	245	
FSMR6070M	60	60	70	43	98	55	12	11	120	80	3	4	65	455	7
FSMR6070H	65												100	700	
FSMR7280W	45												50	300	6
FSMR7280M	60	72	80	53	106	65	16	11	130	95	4	4	95	570	
FSMR7280H	65												170	850	5

Issue October 2016

Type TE







Item	Hardness (IRHD)	A	B	CF	L	L1	S	F	F1	Average Stiffness (Kg/mm)	Max. Load (daN)	Max Deflec. (mm)
		Cone										
TE-3074W	45									30	240	
TE-3074M	60	60	60	120	140	97	3.5	11	20	56	450	8
TE-3074H	70									86	670	

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Height Adjuster
Mounts

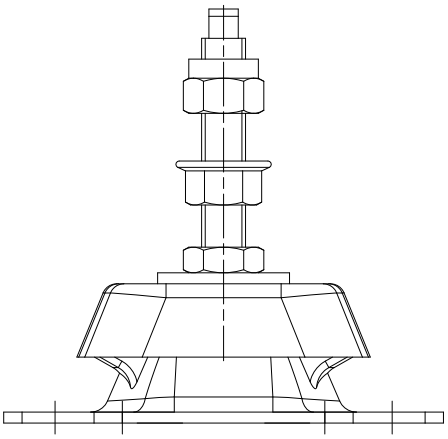
Height adjusters are available in various sizes to suit a wide range of mounts as listed in the table. The kits are supplied complete with washer and nut for fastening to the mounting, and also two nuts c/w lock washer for the engine foot fastening.

Standard Production

- Washers: Steel DD12 (UNI EN 10111)
- Nuts: Resistance class 4 Bolts: Resistance class 4.8
- Zinc plated in accordance with CE standard CHROME VI free, white

Options & Additional Parts

- Stainless steel version
- Screws and nuts higher class resistance version



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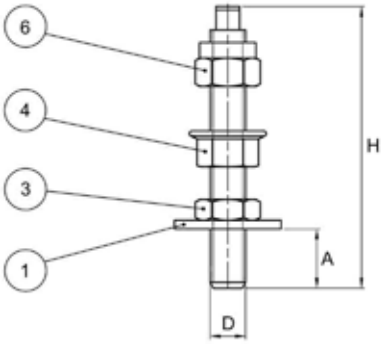
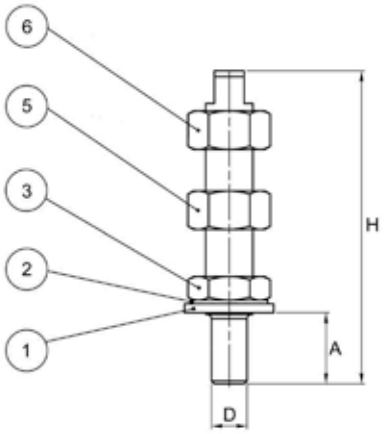
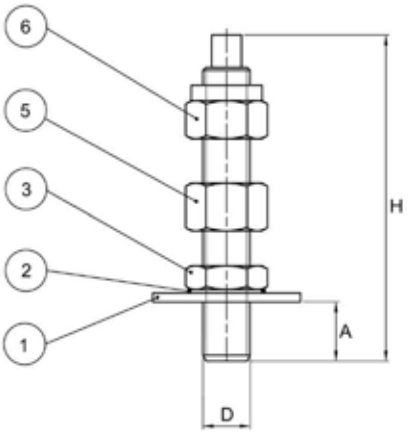
KIT12/12/95



KIT12/16/105.5



KIT16/16/110
KIT20/20/135



Nr.	Item	H	D	A	1 washer	2 locking washer	3 bottom nut	4 flange nut	5 adjusting unit	6 top nut
1	KIT12/12/95	95	M12	20	36X14X3	-	M12	M12	-	M12
2	KIT12/16/105.5	105,5	M12	24	28X15X2,5	●	M16	-	M16	M16
3	KIT16/16/110	110	M16	20	48X17X3	●	M16	-	M16	M16
4	KIT20/20/135	135	M20	30	60X22X4	-	M20	-	M20	M20

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The shortest way to the perfect shock absorber

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