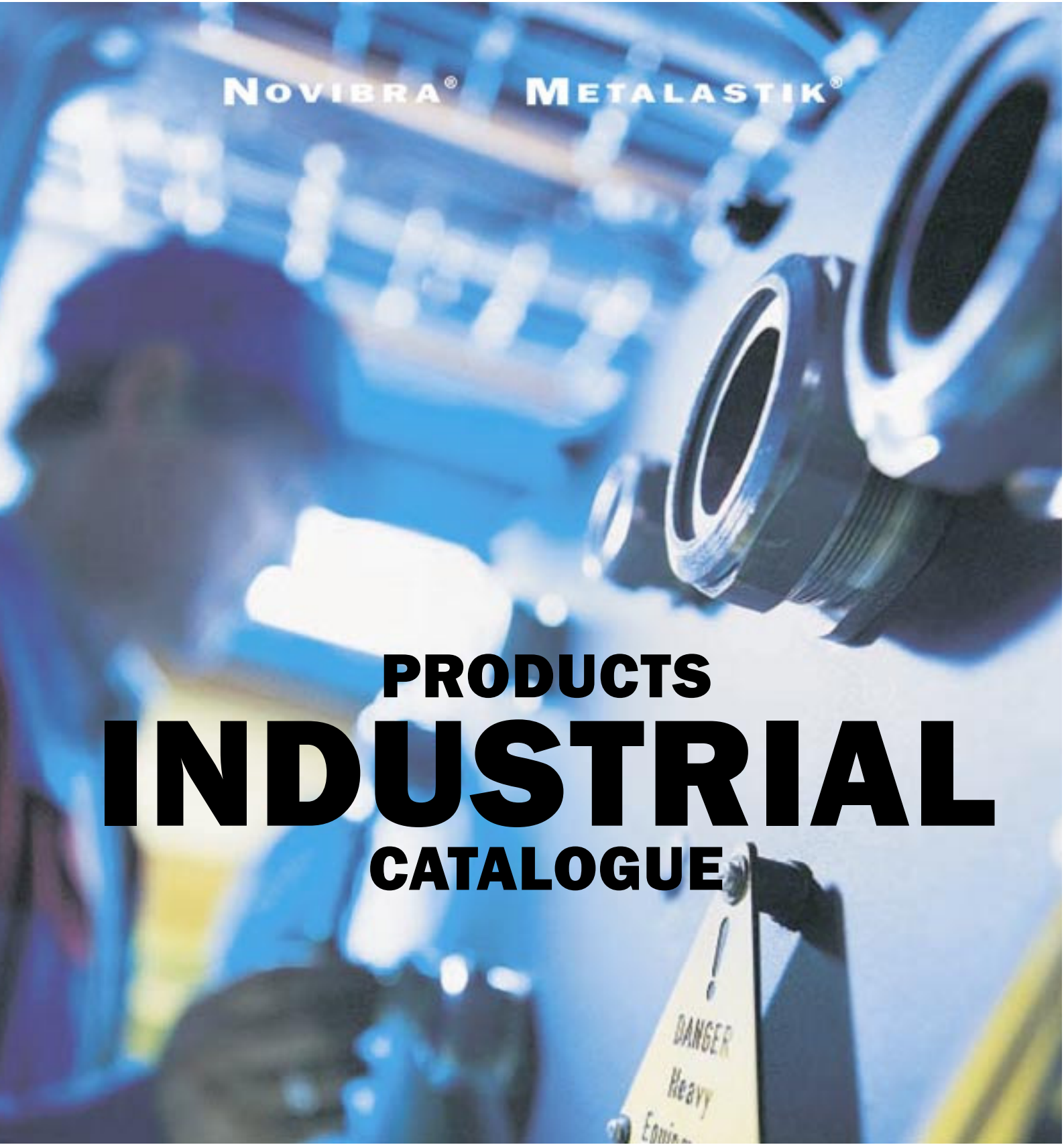
NOVIBRA® METALASTIK®



PRODUCTS
INDUSTRIAL
CATALOGUE

TRELLEBORG

Trelleborg's Novibra® division and Metalastik® have joined forces to become Trelleborg Industrial AVS. A world leader in the design and manufacture of rubber to metal bonded components for antivibration applications and suspension systems used in rail, marine, industrial and civil engineering applications. Our strength is that we can offer a wide range of isolators in combination with the specialised expertise that is needed to achieve a total solution. We use data-based surveillance software, conduct tests, and provide full technical support.

Trelleborg Industrial AVS employs approximately 500 people and its head office, research and development units are located in Leicester, UK while production is divided between Leicester and two Swedish factories at Trelleborg and Sjöbo. There are regional offices in Belgium, France, Germany, Italy, the Netherlands, Sweden and the United States.

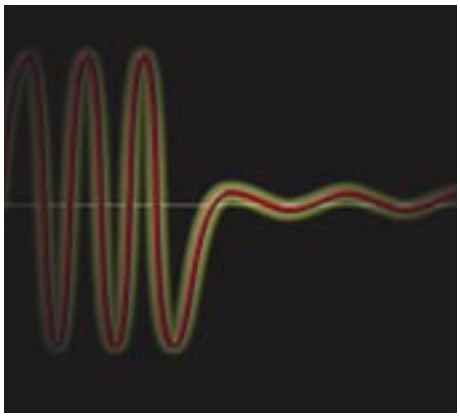
The Trelleborg Group is a global group with 15 000 employees in 40 countries and an annual turnover of 2 000 MEuro.

Solutions for

vibration & shock

– worldwide

All machinery vibrates and causes noise and structure-borne sound. At Trelleborg Industrial AVS we solve this type of problem all the time, and we know it pays off. The working environment can be improved, which among other things means fewer industrial injuries to the people who work with the machinery; and the economic benefits are considerable, less wear, lower maintenance costs and increased lifetime of the machinery.



It is always worth taking care of a vibration problem. Both people and machines perform better if vibrations are kept to a minimum.

Two vibration problems are never alike. We always analyse the problem carefully before we start to work on a solution. During the design and development phases we transform our ideas into reality and thus create effective vibration solutions.

Contents

Trelleborg Industrial AVS – Product Description

Expansion Joints are available for the UK market. Please contact the Leicester office.

Trelleborg Industrial AVS – Provides a healthier environment

Trelleborg Industrial AVS's antivibration mountings primary task/function is to eliminate harmful vibration and to effectively reduce structure-borne sound.

Our mission

To be our customers' preferred choice for engineered solutions in Industrial, Rail and Marine markets.

Our polymer technologies enable the control of vibration and movement for the protection of people, equipment and the environment.

World-wide solutions to exceed our customers expectations

Trelleborg Industrial AVS is a well-recognized supplier of antivibration mountings. With decades of experience of vibration problems all over the world, Trelleborg Industrial AVS today covers a wide spectrum of applications. Our principal markets are Industrial, Rail and Marine.

In the industrial sector we have satisfied the requirements of manufacturers of fans, compressors, separators, generators, pumps, wind generators, off-road vehicles, material handling equipment, buildings and bridges.

Complete solution of the vibration problem

Trelleborg Industrial AVS offers more than just a complete solution. We perform computer-managed calculations to achieve the optimum technical solution, we educate and train in vibration techniques to increase the understanding and knowledge of vibration problems.

We make FFT measurements on site to analyse the vibration problems.

Delivery of Trelleborg Industrial AVS mountings for industry is effected directly from stock to customer in order to minimize lead-time.

Our principal markets are Industrial, Rail and Marine.

From R & D to finished product

Being a member of the Trelleborg Group enables Trelleborg Industrial AVS to be in a position of full control of the complete production process and all vital raw materials.

The Trelleborg Group has its own rubber mixing departments and laboratories with complete test equipment for measurements of raw materials and finished products. Our laboratories continuously measure and control specifications of the raw material and finished products. Trelleborg Industrial AVS has an R&D department, production facilities in the UK and Sweden, and follows the product all the way to the customer. Total control, in accordance with ISO 9001, of this process, results in the quality of the product required by the customer.

Environmental policy – ISO 14000

Trelleborg Industrial AVS is working in the same way as its customers with the development of environmental friendly solutions and production processes, implementing an environment management system according to ISO 14000.

This means, for example, elimination of solvents in the vulcanising process of composite material and solvent free adhesive to eliminate hazardous discharge.

At Trelleborg Industrial AVS we are convinced that a safe and healthy working and living environment provides good job satisfaction and higher productivity.

Trelleborg Industrial AVS – A safe choice

Technical solutions

Vibration problems are often complicated and Trelleborg Industrial AVS has a technical department with the ability to help customers analyse and evaluate in order to achieve the perfect solution to their vibration problem. Our advanced computer based programs are designed in cooperation with technical universities.

Our long in depth knowledge of vibration technology guarantees the optimum solution to our customers' vibration problems. We commit ourselves to all kinds of issues.

Training and test

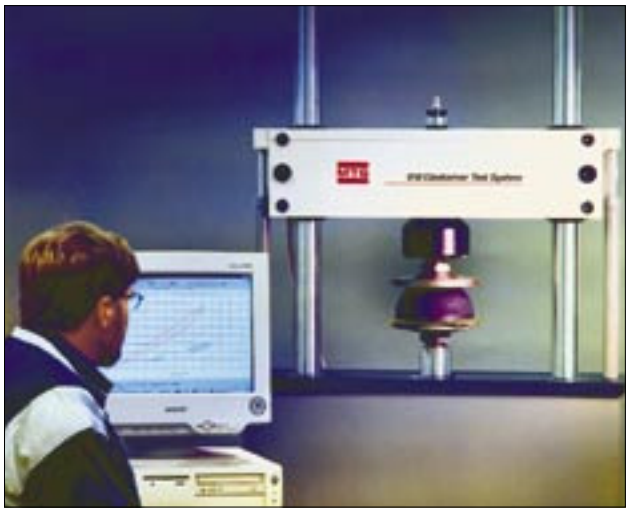
Trelleborg Industrial AVS has possibilities to perform analysis with FFT technology. In such cases we perform measurements, analyse the application and recommend the best solution.

To increase the knowledge of vibration issues and Trelleborg Industrial AVS solutions, we conduct training and education courses for our customers and distributors.

Our Technical Centre with advanced testing facilities provides to Trelleborg Industrial AVS excellent opportunities for product development.

Volvo articulated hauler

Dynamic stiffness test



Trelleborg Industrial AVS – Vibration technology

VIBRATION CAUSES STRUCTURE-BORNE NOISE

Vibration is generated by all kinds of machinery particularly those with rotating or reciprocating movements. Solidly mounted, these generated motions would be transmitted directly to the foundations giving rise to irritating noise to the immediate surroundings where the machine is installed.

Noise may also occur in areas some distance away, transmitted through the structure. This is normally referred to as "structure-borne noise" (structural noise). In addition to noise, the creation of vibration can cause serious problems to sensitive machinery.

The human body, too, can be affected negatively and this manifests itself in reduced working capacity, tiredness, and headaches caused by both high and low frequencies. Extremely low frequencies with considerable movement cause motion sickness and sea-sickness.

The harmful effects of noise can be eliminated by:

1. Reducing imbalance in the machine and the machine´s natural vibrations to a minimum by applying greater accuracy in manufacture, suitable design of cutting tools, etc.
2. Vibration-isolating the machine to prevent vibrations from being transmitted to surrounding areas.
3. Vibration-isolating the machine to prevent the effect of outside interference.
4. Sound-insulating the machine with suitable sound insulation and absorbing material to combat air-borne noise.

TRELLEBORG INDUSTRIAL AVS REDUCES THE TOTAL COST

The manufacturing costs related to extremely accurate balancing of machines are very high and may rise quickly with increasingly finer balancing. Since vibration isolation of the entire machine may still have to be considered, Trelleborg Industrial AVS antivibration mountings can be cost effective by reducing the need for intensive balancing requirements.

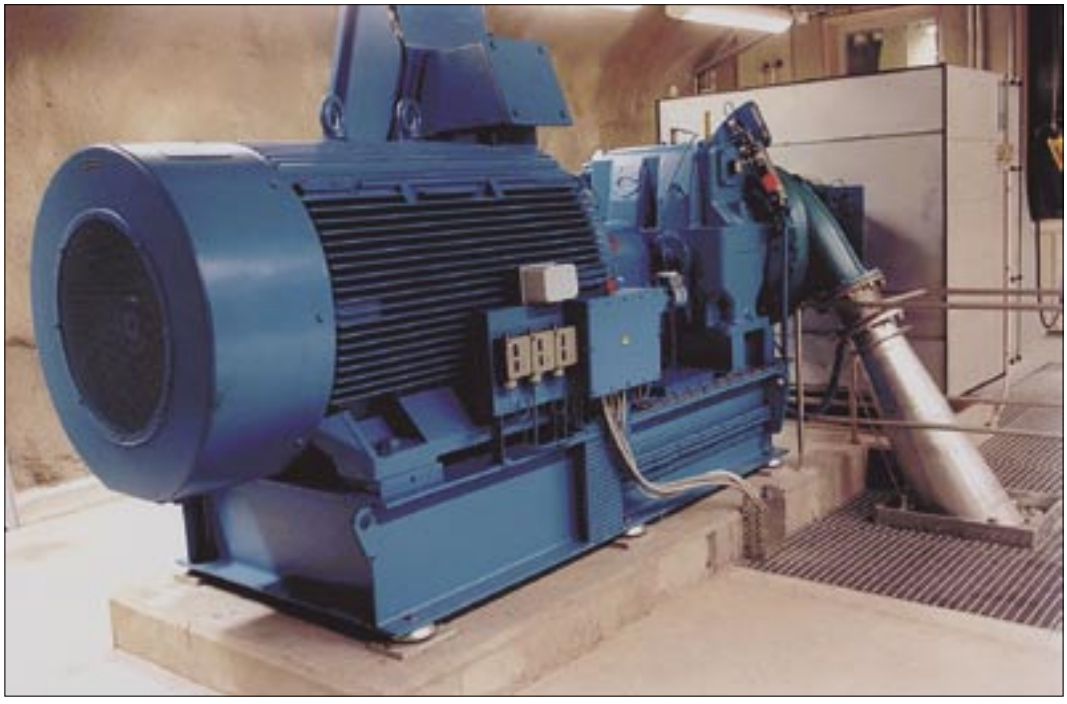


Fig 1. High pressure compressor mounted on Novibra© type RA.

THE PROPERTIES OF RUBBER MAKES IT PARTICULARLY SUITABLE AS A SPRING MATERIAL

Vibration isolation is based on installing machinery on springs or resilient material of known stiffness. The types of spring material which are used most often are rubber and steel. Another alternative is air springs.

Rubber has high load bearing capacity with an ability to accommodate overload conditions without the catastrophic failures associated with steel and other materials. It can carry complex loadings more easily and economically than other alternatives.

The bonding of rubber to a rigid material creates a product, which can accommodate movement without any sliding or rotating surfaces that require lubrication. This allows operation in many harsh environments without concern and with substantially reduced maintenance requirements.

Components can be designed to integrate with the space limitations of the application and provide control in all six modes of freedom.

Steel springs are normally used in the form of coil springs or leaf springs. The benefit of these is that they permit relatively high deflections, but their disadvantage is that they provide very little damping. Due to this, excessive movement occurs when passing through the resonance range. Often special devices are installed in order to limit deflections.

To allow their properties to be utilised in a satisfactory way, Trelleborg Industrial AVS rubber mountings are available in various hardness grades and polymer types.

Rubber has many unique properties, including acoustic damping characteristics, which assist the installation designer in keeping noise levels inside and outside passenger accommodations to a minimum.

Fig 2. Chemical ingredients

RUBBER AS AN ENGINEERING MATERIAL

Compared with other engineering materials, rubber is very ductile. In some cases, the elongation may be higher than 1000%, and by far the highest proportion of this strain is elastic. Metals, on the other hand, have very small strains below the elastic limit. Compared with metals, the tensile strength of rubber is low. The maximum level that can be achieved with rubber is 25-30 MPa. However, because of the high strain, rubber has a very large work absorption capacity compared with the best grade of steel.

If a material is subjected to a load below the elastic limit, the deformation will, according to Hooke´s law, be proportional to the load. This does not apply to rubber under tension or compression. This means that rubber does not have any constant tensile or compression modulus of elasticity. Metals will normally be softer towards the end of a tensile test, while the opposite is often the case with rubber. Rubber does not have a yield point, and the modulus is increased until there is abrupt failure.

THE MOST IMPORTANT PROPERTIES FOR RUBBER

High elastic ductility

High elastic ductility is, therefore, the most pronounced feature of rubber. Just how easy it is to deform rubber is shown by the fact that the modulus of elasticity of compression for rubber within the normal hardness range, 30-80° IRH, is between 2 and 12 MPa; while the modulus of elasticity of steel is 210 000 MPa, This means that rubber is about 100 000 times softer than steel.

Damping capacity

Damping capacity is an additional important feature of compounded rubber. This is of particular importance when operating a machine that is supported on springs through the resonance range. In **fig. 3.** you can see the principal difference between an almost ideal spring and a rubber spring. The resonance deflection with rubber springs is only 1/5 to 1/50 compared with the deflection when using steel springs with the same stiffness, see **fig. 4.** With a spring made of natural rubber working with compression or shear load, the direct loss of energy is between 6 and 30% depending on the hardness of the rubber. This energy loss is such that it is possible in many cases to use rubber springs as dampers. Care must be taken when it comes to damping in a rubber element. If the element works with high amplitudes, a substantial amount of energy is converted into heat, and the heat which is generated may cause the rubber element to be destroyed. See **fig. 5.** In the case of simple impact, the vibrations sequence will be as shown in **fig. 6.** The left-hand curve represents a steel spring, while the right-hand curve represents a rubber spring. These two curves clearly show how quickly the vibrations degenerate in the rubber, while in steel springs they diminish slowly.

Sound-insulating

As sound-insulating material, rubber is one of the very best. The effect of sound insulation increases with the thickness of the rubber. Rubber is an excellent absorber of impact sound, which occurs in foundations, floors, buildings, etc.

Environmental Conditions

Trelleborg products are manufactured in a wide range of rubber compound types. A range of hardnesses is available in each compound type to allow the required stiffness to be achieved.

Each compound is carefully formulated to obtain the best performance for specific properties. The compound chosen depends upon the most important properties for the application's requirement. Strength and fatigue requirements, operating temperature, environmental conditions and potential contaminates must be considered. Most Trelleborg rubber compounds are based on polyisoprenes, offering high strength and excellent performance characteristics. A range of synthetic rubber compounds is also available for special applications where resistance to continuous high temperatures (>75°C) or other harsh environmental conditions is required. Anti-oxidants and anti-ozonants are included in many formulations to provide resistance against ozone and ultra violet rays.

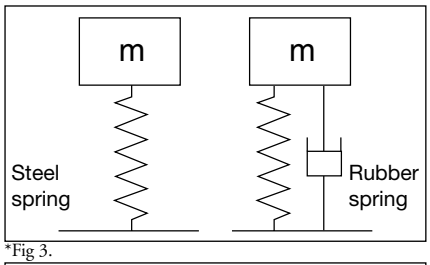


*Fig 3.

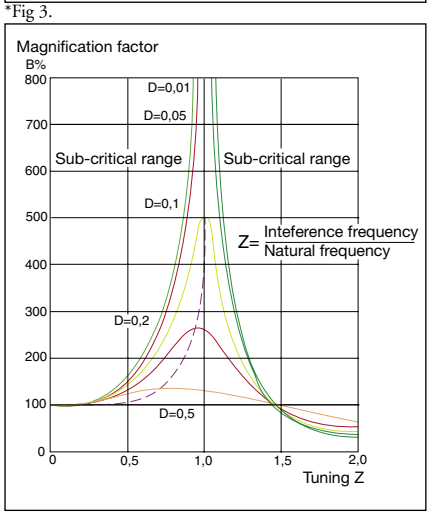


Fig. 4.
Resonance curve for spring material with different internal damping.

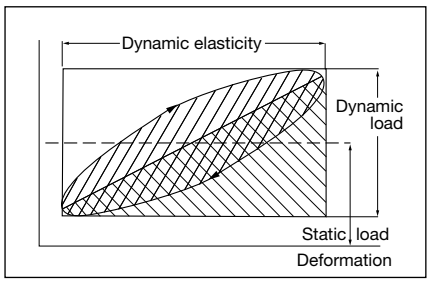


Fig. 5.
Schematic representation of the internal damping properties of rubber. The elliptical area indicates the loss of energy.

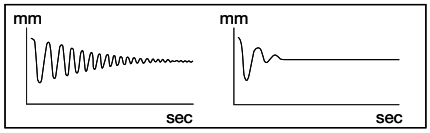


Fig. 6.
Vibrations sequence with single impact for steel and rubber springs.

***Fig 3.** Schematic difference between rubber spring and steel spring.

Commercial Name International Designation	Butyl Rubber IIR	Acrylonitrile Butadiene Rubber NBR	Natural Rubber NR
Hardness Range IRH	45 - 70	40 - 70	35 - 80
Temperature Range	-40 à +120°C	-40 + 130°C	-40 à +70°C
Properties			
Creep Performance	Moderate	Moderate	Good
Fatigue Performance	Good	Moderate	Very good
High Temperature Performance	Good	Good	Moderate
Low Temperature Performance	Good	Good	Good
Physical Strength	Good	Good	Excellent
Resistant to			
Acids	Very good	Conditional	Conditional
Oil and greases	Not suitable	Excellent	Not suitable
Ozone	Very good	Moderate	Moderate
Petrol	Not suitable	Excellent	Not suitable
Solvents, Aliphatic	Not suitable	Very good	Not suitable
Solvents, Aromatic	Not suitable	Conditional	Not suitable
Solvents, Halogen	Not suitable	Bad	Not suitable
Water	Good	Good	Good
Wear and Tear	Good	Very good	Very good

Table 1. Typical properties for rubber compounds used in antivibration mountings.

SPRING COEFFICIENTS

A rubber spring has different charactistics for static and dynamic conditions. A constant load causes a deflection, and the inclination/deflection gives the static spring coefficient. When the spring from equilibrium is loaded with a dynamic force, the response is a higher spring coefficient.

Static Stiffness

The stiffness of a spring is a measure of applied force (P) against a resulting Deflection (X). Measurements taken at a continuous feed rate (usually in the order of 1mm/sec velocity) provide static (or pseudo static) characteristic. The curves in fig. 7 show alternative methods of determining stiffness.

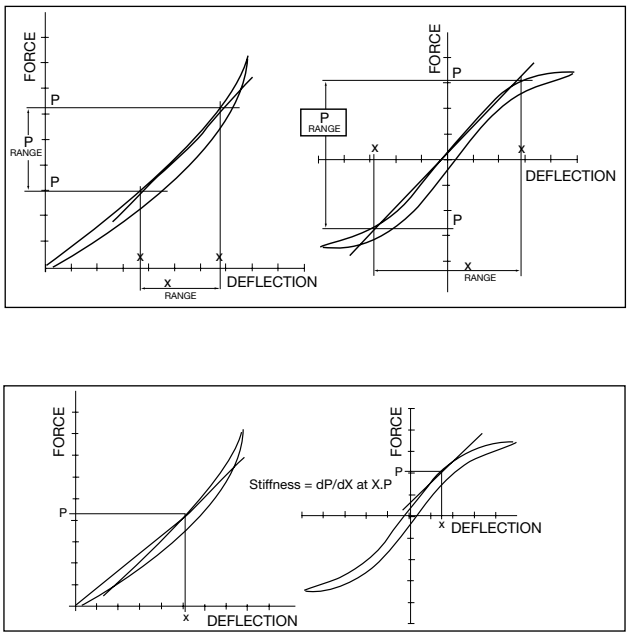


Fig. 7.
dP/dX at XP average gradient over P (or X) range (usually derived by least squares method of curve fitting).

Dynamic Stiffness

The stiffness of a rubber spring changes when a dynamic force is applied. This is known as the dynamic (or complex) stiffness. The dynamic stiffness is usually higher than the pseudo-static stiffness, (the difference being referred to as the dynamic to static ratio) and is affected by several factors including changes in frequency, temperature and amplitude. See **fig. 8.**

The dynamic stiffness is considered to be unchanged between 5Hz and 80Hz under constant conditions. Above this frequency range, the dynamic stiffness of the spring will deviate from the ideal 'massless' spring stiffness. This is due to the mass effects of standing waves. "Wave effect" changes of dynamic stiffness are generated when the rubber section dimensions become comparable with multiples of the half wavelength of the propagated wave passing through the spring. Calculations of the deviation from ideal "massless" spring dynamic stiffness due to wave effect are complex and are normally obtained from test measurement. A typical stiffness curve for a large section rubber to metal bonded spring is shown below. In **fig. 9.**

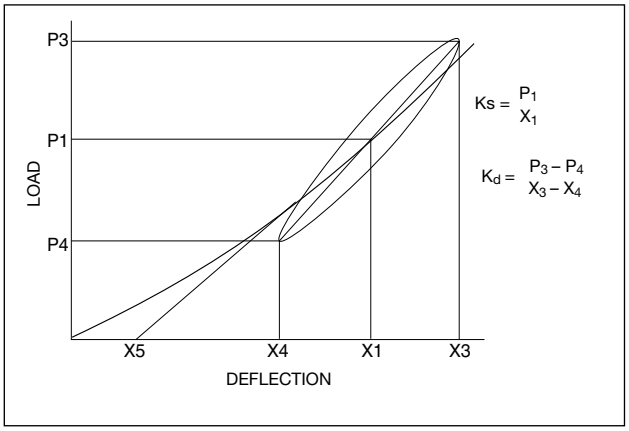


Fig. 8

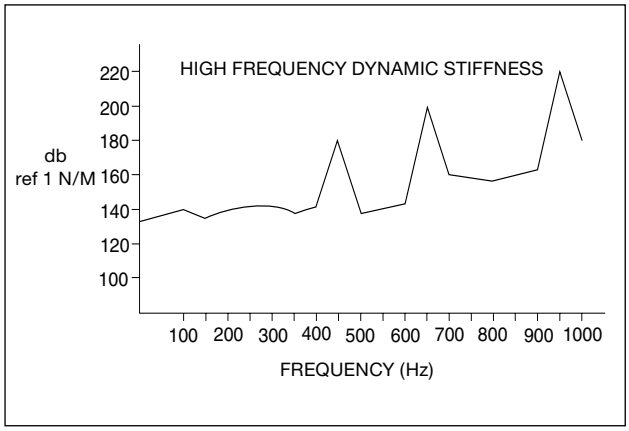


Fig. 9.

Creep Performance

When a rubber spring is subjected to a constant load, the resultant deflection continues to increase with time. An example of creep that occurs in a pair of inclined springs is shown on the graph in **fig. 10.**

A typical creep characteristic for rubber used in antivibration mountings is 3-5% per time decade.

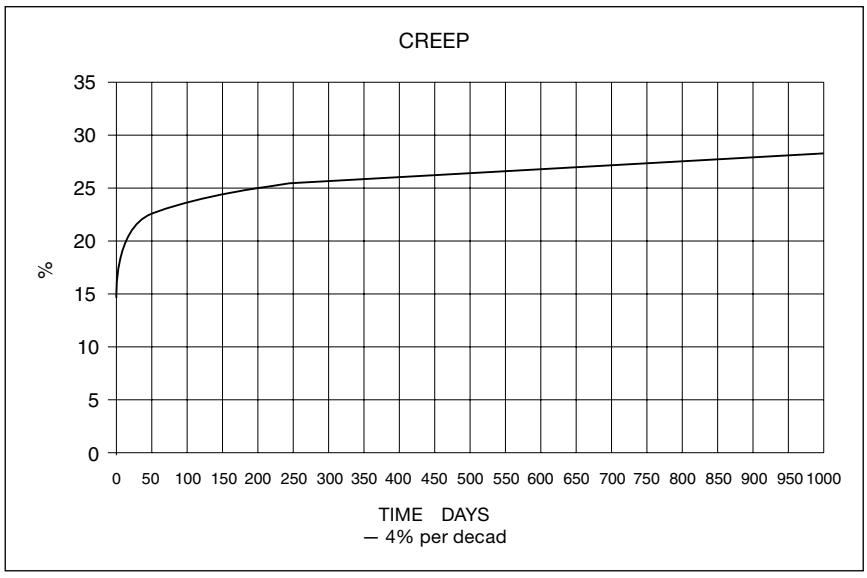


Fig. 10.

Joule effect

Changes in temperature cause small changes in the deflection of loaded rubber springs. This change in deflection, which is reversible with temperature, is known as the Joule effect. For pairs of springs shown a 10°C rise in temperature will cause an increase in clearance by approximately 4.5% of the nominal static deflection.
See **fig. 11** and **12**.

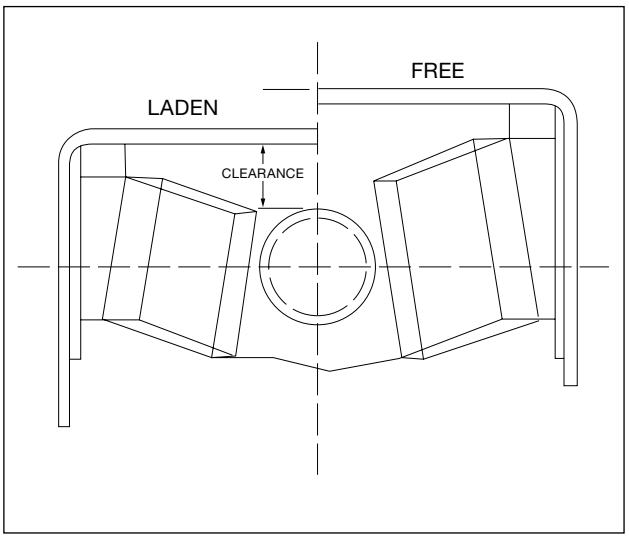


Fig. 11.

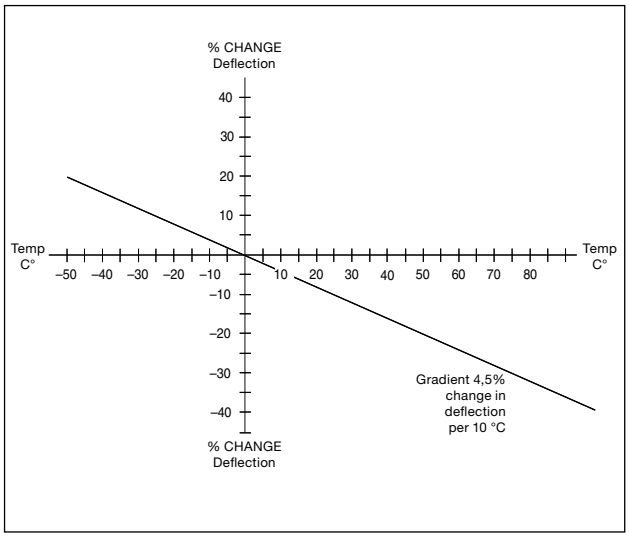


Fig. 12.

STIFFNESS OF A RUBBER SPRING

When calculating compression characteristics of rubber, it should be noted that the deflection is not directly proportional to the load, as the modulus of elasticity in compression increases with the degree of stress. The modulus of shear, however, remains constant for normal stresses.

The factor with the most effect on stiffness is the ratio between loaded and free surface area of rubber. This is the so-called shape factor (often designated S). With thin rubber sections, a very high modulus of elasticity can be achieved. In other respect, the stiffness of a rubber spring is determined by the dimensions and the hardness of the rubber.

Fig. 13 illustrates the relationship between rubber hardness and shear modulus, and **fig. 14** the dependence of the bulk modulus on the shape factor. The latter curve applies at 10% deformation.

The curves show that rubber at a shape factor of 0.25 for shear is about 6-8 times softer than compression for the same rubber hardness. Since only 3-4 times the stress value in compression can be considered, it may be said that rubber is best used in shear to achieve large deflections and good isolation properties, particularly at low interference frequencies.

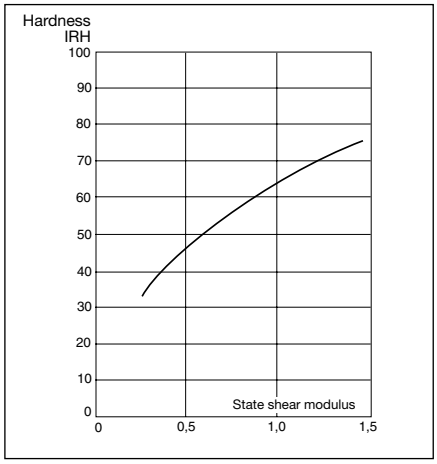


Fig. 13.
Relationsip between rubber hardness and shear modulus.

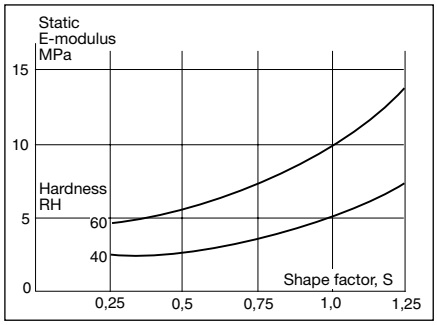


Fig. 14.
The dependence of the compression modulus upon the shape factor.

SELECTION OF ANTIVIBRATION MOUNTINGS

The principle relating to vibration isolation with springs is that they are placed between the machine and the base or plinth. To ensure effective isolation, the springs must be selected carefully, otherwise the result could be impaired performance. In favourable cases, the transmitted force can be reduced to only 2 or 3% of that of a rigidly mounted machine. In such cases, the vibrations are practically eliminated.

SOME VIBRATION DEFINITIONS

Amplitude mean	A	(m)	The magnitude of the displacement of a vibration deflection from the position. The total vibration is thus twice the amplitude.
Interference frequency	f	(Hz)	Is essentially the same as the frequency of the rotational speed of the machine or a harmonic.
Frequency	f_o	(Hz)	The number of vibrations in a freely-oscillating system per unit of time.
Mass	m	(Kg)	The mass of the oscillating system.
Spring force	F	(N)	The force emanating from a spring on the machine or the reverse.
Deflection	d	(m)	The deformation of the spring from the neutral position.
Static spring stiffness	Kstat	(N/m)	The force required in Newtons to compress the mounting 1 m.
Dynamic spring stiffness	Kdyn	(N/m)	Spring stiffness when an alternating force is applied.
Tuning ratio	Z	(-)	The ratio between interference frequency f and natural frequency f_o.
Interference force	F_s	(N)	The force transmitted to the base of an isolated machine.
Impulse force	F_i	(N)	The force transmitted to the base of a rigidly mounted machine.
Magnification factor	B	(-)	The part of the impulse force which is transmitted as a vibration force. Indicates the relation between the interference force F_s and impulse force F_i.
Level of isolation isolation,	I	(-)	The part of the impulse force which is eliminated by the vibration (1-B) or, if B is expressed as a percentage, (100-B).
Damping coefficient	c	(Ns/m)	The linear viscous damping coefficient.
Critical damping	c_{kr}	(Ns/m)	The linear viscous damping coefficient at critical damping. A system is said to be critically damped if it returns to its initial static position without any over-oscillation after a displacement.
Damping factor	D	(-)	The ratio between c and c_{kr}.
Reduction	R	(dB)	Isolation expressed in decibels.
Deflection	δstat	(mm)	The static deflection for a spring.

Calculation of deflection

When calculating deflection the following formula shall be used.

$$\delta_{stat} = \frac{F}{K_{stat}}$$

Calculation of isolation degree

The following formulas are used for calculating the isolation degree for a given spring.

The natural frequency:

$$f_o = \frac{1}{2\pi}\sqrt{\frac{K_{dyn}}{m}}$$

Tuning: $Z = f/f_o$

Magnification factor:

$$B = \frac{F_s}{F_i} = \sqrt{\frac{1+4D^2Z^2}{(1-Z^2)^2+4D^2Z^2}}$$

The factor D depends on the internal damping of the spring material. In rubber D has the value 0.04-0.1 depending on hardness of the rubber. The term $4D^2 \cdot Z^2$ can generally be neglected completely except in the resonance range, that is, when Z=1. If Z=1, that is, the machine speed (rpm) = the natural vibrations of the system, it is said that there is resonance, and the vibrations will be infinitely large if there is no damping. Here, then, a rubber spring has a district advantage over a steel spring, which has minor internal damping and in which the amplitude, in theory, grows to a very high value in the resonance point. Refer to fig. 4 on page 10.

Isolation degree I=(1-B) or as percentage, I=(1-B)x100

Reduction in dB R=20log(1/B)

The relative magnitude of the transmission of force depends entirely on the tuning ratio Z. If Z is high, the force transmission percentage will be small.
As can be seen in **fig. 15**, B at $Z=\sqrt{2}$ has dropped to 100% and when Z is further increased, B drops rapidly. Vibration isolation is therefore of significance first when the operating frequency considerably exceeds the natural frequency. For practical applications, Z should be between 3 and 5, which means that 88 and 96 % of interference forces are eliminated.

Generally, the operating speed of a machine (interference frequency) is given. If the system´s natural vibration coefficient can be modified, and influence Z, it is possible to change the force transmitted. This is exactly what happens when vibration isolation is achieved. The low elasticity and shear moduli of rubber are used to achieve a low natural frequency.

To summarize, transmission of vibration forces can be effected in three ways:

1. Rigidly mounted machines transmit vibration forces in unchanged form to the base, which is therefore forced to be a part of the movement of the machine. The magnification factor can be regarded as being 100%.

2. In the case of an unsuitable spring system, the magnification factor will increase considerably and may amount to several hundred percent.

3. The force transmission percentage is reduced substantially by correct calculation and suitable mountings being installed between the machine and base. Typical reductions can be from 100 down to 10%, but in favourable circumstances can be as low as 2%.

All machines have more than one resonance point as, through many interacting movements, they can vibrate in different modes. The resonance points can be determined, but the methods of calculation are often difficult. Experience has shown that all resonance velocities that may arise do not need to be clarified. It is usually sufficient to calculate the more significant ones which can be determined easily. The desired level of isolation and the interference frequency determine where the resonance frequency shall be.

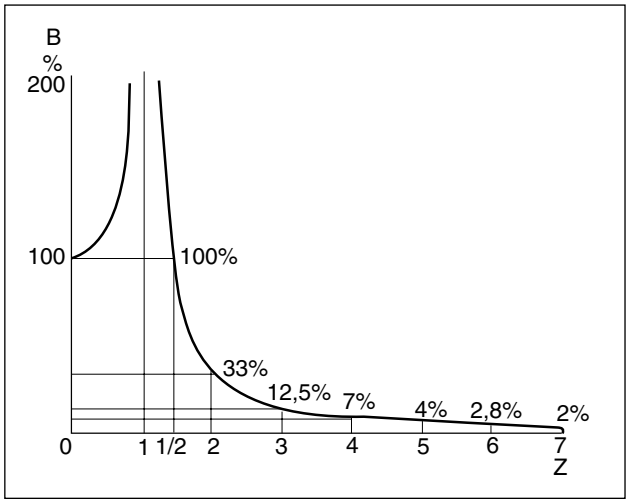


Fig. 15 Resonance curve.

SHOCK ISOLATION

Shock is usually described as a transient phenomenon as opposed to a vibration, which is a continuous process.

A shock pulse can normally by described by parameters such as maximum amplitude (acceleration, for example), duration (in milliseconds, for example), and the shape of the pulse. The pulse may be a half sine wave, rectangular, saw tooth or other shape of wave.

The basic principle for achieving good shock isolation is to mount the machine on mountings that are soft enough to give a low natural frequency, and which can offer relatively large mounting deflections.

If the duration of a shock pulse is τ seconds, and the natural frequency of the set up is f_o Hz, then the product must be τf_o <approx. 0.25 if the isolation is to provide protection against the shock.

The value 0.25 is not an absolute value but depends on the shape of the shock pulse.

STORAGE

There may be changes in appearance and physical properties of rubber products during storage, particularly if adverse condition apply. BS3574 provides an ideal guide to the most suitable storage conditions, including:

– Moderate temperature (ideally 20°-30°).
– Low humidity.
– Protection from intense light, radiation and high ozone concentrations.
– It is recommended that the storage period does not exceed five years.

Unit conversion

Multiply	by	to obtain
feet	0.30480	meters
inches	0.02540	meters
pounds	0.453	kilograms
pound/force	4.45	Newtons
feet second	0.3048	meters/second
inches/second	0.0254	meters/second
feet/second^2	0.3048	meters/second^2
inches/second^2	0.0254	meters/second^2

GENERAL SET UP

1. The various parts of the machine are combined on a common base.
2. The entire machine is isolated by means of suitable Trelleborg Industrial AVS anti-vibration mountings.
3. Flexible connections to the machine are required in order to achieve effective isolation. The application of Trelleborg expansion joints can be recommended.
4. If required, there should be grounding for removing static electricity.

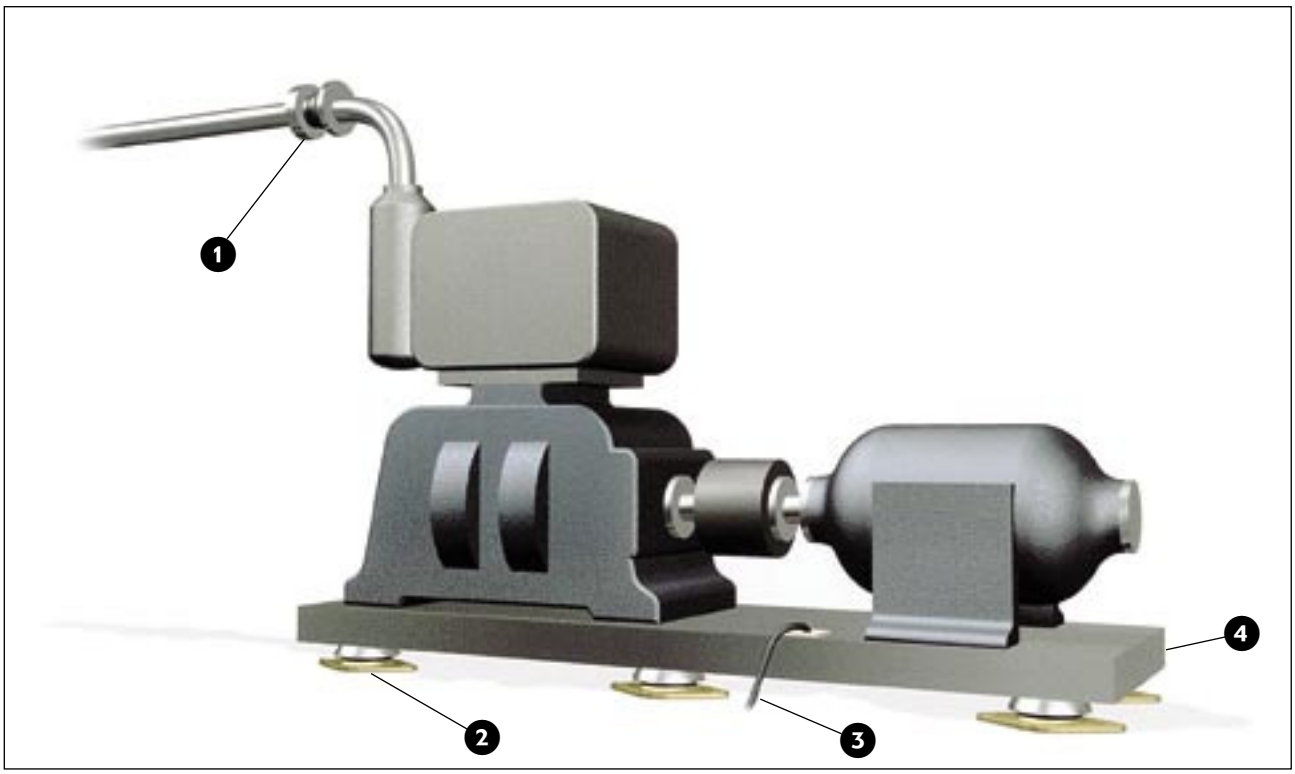
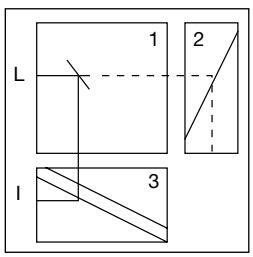
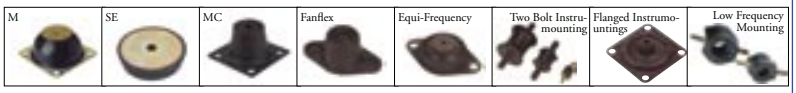
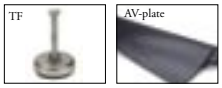


Fig. 16. General set up.

Assistance when choosing antivibration mountings

Type of machine	Type of mounting	How to choose
Rotating Equipment		
Stationary installations Combustion engines Compressors, Generators		Important information • Weight • Number of mounts • Rotational speed • Environment See corresponding product data sheet: To select correct mounting, the following data are needed: 1. Load per mounting (kg) 2. Interfering frequency (Hz) (Hz = rpm/60) Select correct load line in diagram 1 and correct interference line in diagram 3. The load line intersects with required type of mounting. Connect this intersection point vertically down to the interference line in diagram 3. Here, on the sloping curve, the isolation degree is indicated. For static deflection, see diagram 2. 
Mobile installations Vehicle engines, Compressors, Generators, Marine engines		
Sensitive Equipment Electronics, Cameras, Fans, Small Pumps		
Transit Protection Computers, Test Equipment		
Vehicles Engines, Cabs, ROPS cage		
Instrument mountings Electronic Racks, Radio TX/RX, Mobile Computer Systems		
Heavy Duty Isolators Off Highway Vehicles, Vibratory Screens, Large Engines, Public Service Vehicles		
Building and Construction Inertia Blocks, Heavy Plant, Ductwork, Suspended Ceilings		
Machine Tools Lathes, Punch Presses, Grinders, Woodworking Equipment		
Motion Control Rebound, Motion Limitation		
Vehicle Suspension Pivot Arms, Trunnion Mounts, Gearbox Mountings		
General purpose mounts Exhaust systems, Small fans, Instrument panels		

RA & Fail Safe EF

Novibra® type RA and Metalastik® type Fail Safe EF

For effective isolation of vibration and noise on machines with rotating movements, e.g.

- Compressors
- Combustion engines
- Generators
- Converters
- Pumps
- Industrial and marine gen-sets
- Fans

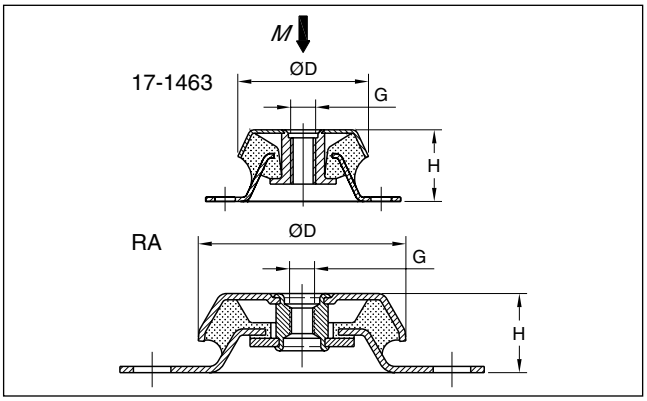
Also suitable for use with presses, punches and other workshop machines.

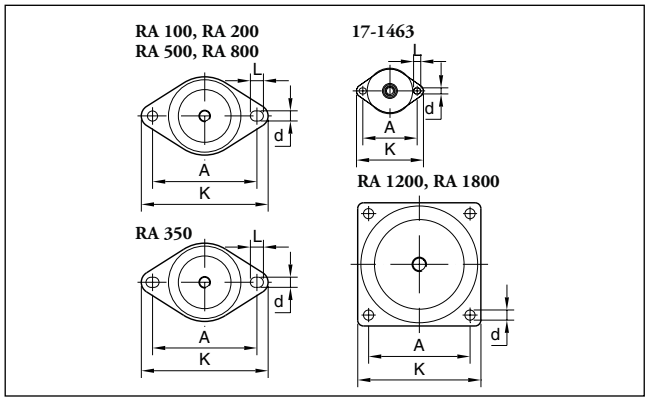
Features

RA and EF uses the rubber profile in shear and compression, obtaining good vertical flexibility with the advantage of horizontal stability. For normal speeds of approx. 1500 rpm, the RA and EF type provides a degree of isolation of 75-85%. For better isolation, the alternative RAEM or M can be chosen.

Its unique construction and the latest production methods make Novibra® type RA and EF a high performance mounting having a number of advantages:

- Rubber features are utilised effectively combining compression and shear.
- Wide load rating options, 40-2100 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn8C as per ISO 2081).
- Fitted as standard with an integral fail-safe design device with resilient stop, making RA and EF ideal for use in mobile applications. The RA/EF-mounts can accomodate occasional shock loads to 5 g reference to the weight in hardness 60° IRH. The mount will withstand shock loads up to 2 g without plastic deformation.
- Clear and durable product marking so that mountings can be identified even after several years in operation.
- Domed shape cover to protect against oil contamination.

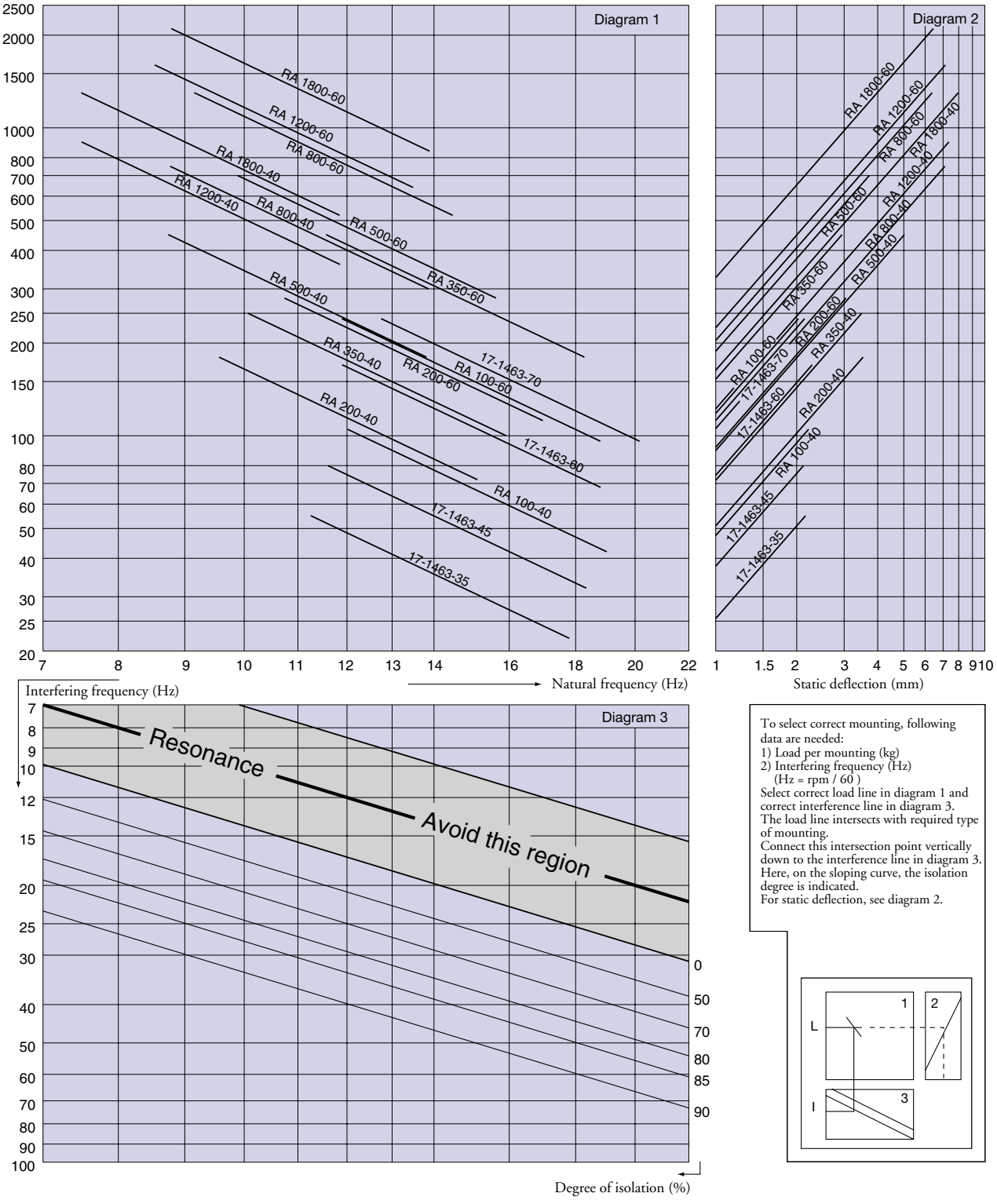




Type	Part no. 40° IRH	Part no. 60° IRH	D	A	H	K	d	L	G	Weight (kg)	*M*-Max (kg) 40° IRH	*M*-Max (kg) 60° IRH
			Dimensions in mm									
RA 100/M10	10-00106-01	10-00107-01	79	110	30	130	9	12	M10	0.33	105	240
RA 100/M12	10-00166-01	10-00167-01	79	110	30	130	9	12	M12	0.33	105	240
RA 200/M10	10-00110-01	10-00111-01	94	124	35	150	10	15	M10	0.47	180	280
RA 200/M12	10-00165-01	10-00091-01	94	124	35	150	10	15	M12	0.47	180	280
RA 350/M12	10-00172-01	10-00173-01	101	140-148	38	175	14	18	M12	0.74	250	450
RA 350/M16	10-00112-01	10-00113-01	101	140-148	38	175	14	18	M16	0.74	250	450
RA 500	10-00116-01	10-00117-01	123	158	42	192	14	18	M16	1.02	450	700
RA 800	10-00118-01	10-00119-01	144	182	46	216	14	18	M16	1.59	750	1300
RA 1200	10-00154-01	10-00155-01	161	140	58	170	14		M20	2.19	900	1600
RA 1800	10-00156-01	10-00157-01	181	160	66.5	190	14		M20	2.33	1300	2100
Fail Safe EF												
17-1463-35		10-00503-01								0.22		55
17-1463-45		10-00504-01	65	76.2	35	94	8.5	10	M12	0.22		80
17-1463-60		10-00505-01								0.22		170
17-1463-70		10-00506-01								0.22		240

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

RAEM

Novibra® type RAEM

For effective isolation of vibration and noise on machines with rotating movements, e.g.

- Compressors
- AC units
- Industrial fans
- Generators
- Combustion engines
- Emergency power sets
- Large milling machinery
- Industrial and marine gen sets
- Refiners
- Defibrators

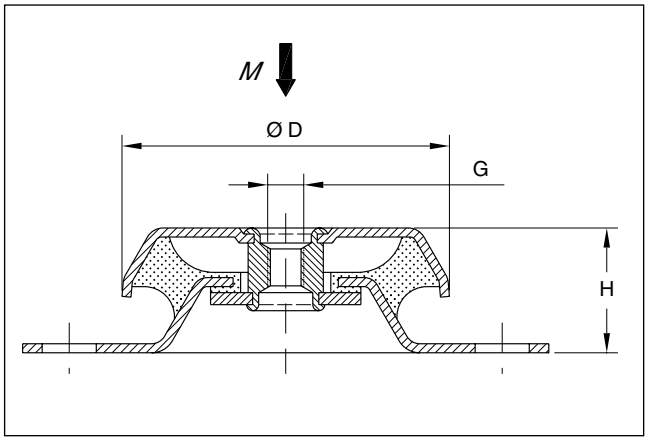
Features

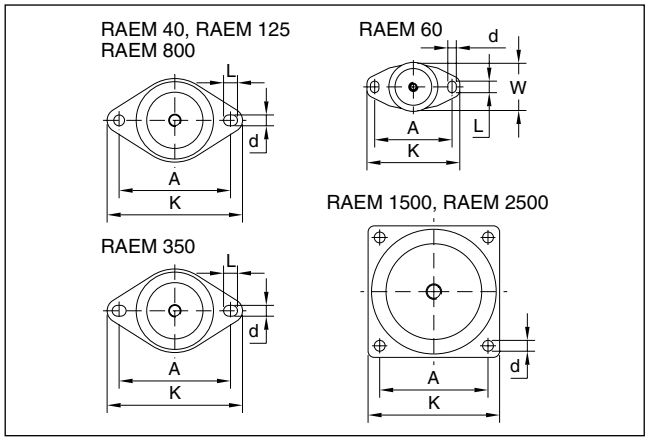
RAEM is a universal mounting for applications demanding maximum isolation. It is a further development of RA, where EM stands for “extra soft”. Suitable for both light and heavy machines.

For normal speeds of approx. 1500 rpm the RAEM type provides a degree of isolation of 85-95%, and gives good isolation with low frequency machines.

Its unique construction and the latest production methods make Novibra type RAEM a high performance mounting having a number of advantages:

- Rubber features are utilised effectively combining compression and shear.
- Wide load rating options, 10-3400 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn8C as per ISO 2081).
- Fitted as standard with an integral fail-safe design with resilient stop, making RAEM ideal for use on mobile applications. The RAEM mounts can accomodate occasional shock loads to 5 g reference to the weight in hardness 60° IRH. The mount will withstand shock loads up to 2 g without plastic deformation.
- Clear and durable product marking so that mountings can be identified even after several years in operation.
- Domed shape cover to protect against oil contamination.

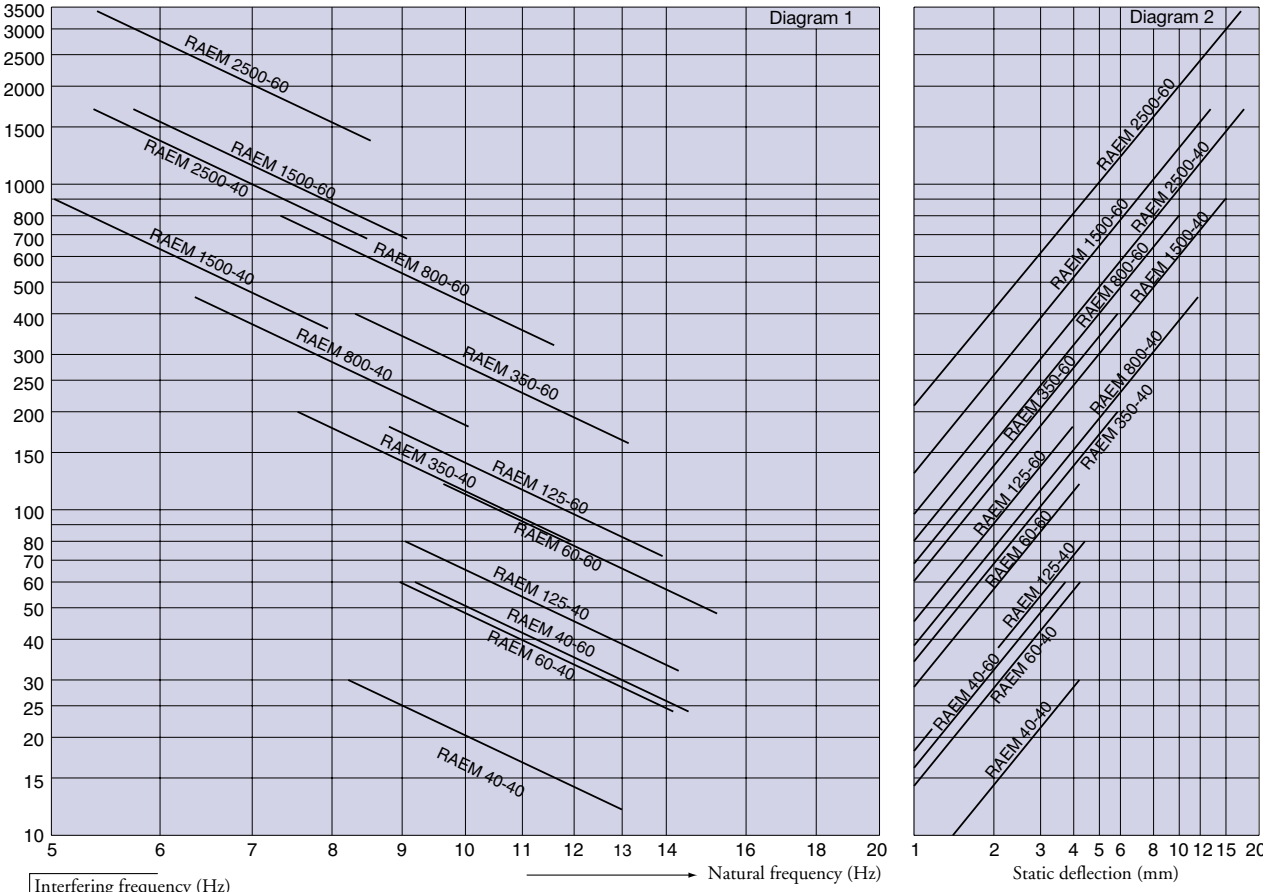


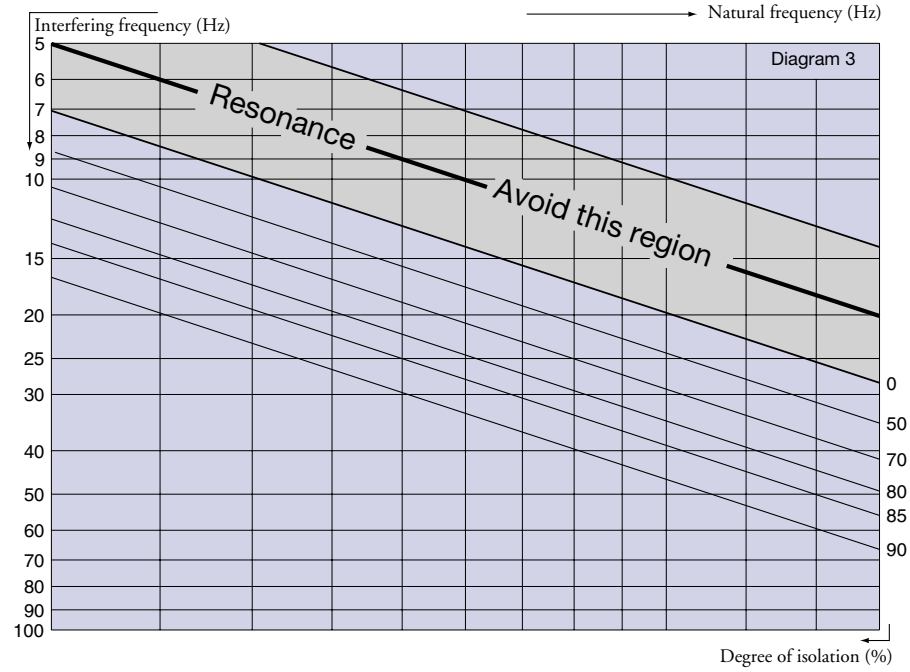


Type	Part no. 40° IRH	Part no. 60° IRH	D	Dimensions in mm A	W	H	K	d	L	G	Weight (kg)	*M*-Max(kg) 40° IRH	60° IRH
RAEM 40	10-00122-01	10-00123-01	64	88		35.5	110	9	12	M10	0.26	30	60
RAEM 60	10-00183-01	10-00184-01	63	100	61	35.5	120	11	15	M12	0.30	60	120
RAEM 125 M10	10-00108-01	10-00109-01	84	110		35.5	135	11	15	M10	0.37	80	180
RAEM 125 M12	10-00168-01	10-00169-01	84	110		35.5	135	11	15	M12	0.37	80	180
RAEM 350 M12	10-00174-01	10-00175-01	110	140-148		42	175	14	18	M12	0.80	200	400
RAEM 350 M16	10-00114-01	10-00115-01	110	140-148		42	175	14	18	M16	0.80	200	400
RAEM 800	10-00120-01	10-00121-01	155	182		54	216	14	18	M16	1.8	450	800
RAEM 1500	10-00158-01	10-00159-01	182	146		85	180	14		M20	3.0	900	1700
RAEM 2500	10-00160-01	10-00161-01	224	180		105.5	220	17.5		M24	4.6	1700	3400

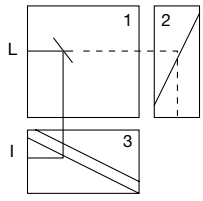
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



RAB

Novibra® type RAB

Effective isolation of vibration and noise on different machinery with rotating movements, e.g.

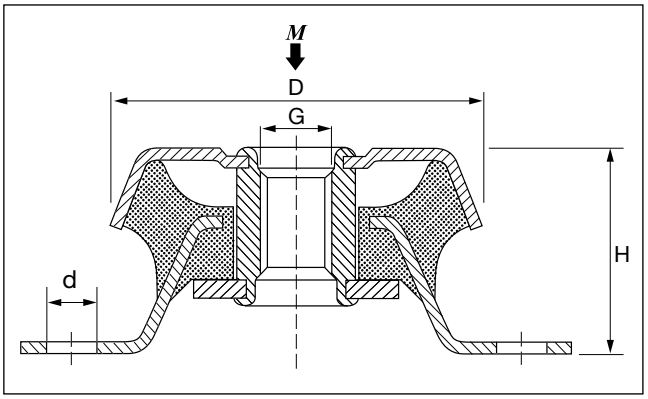
- Diesel engines
- Combustion engines
- Emergency power packs
- Pumps
- Industrial gensets
- Marine gensets

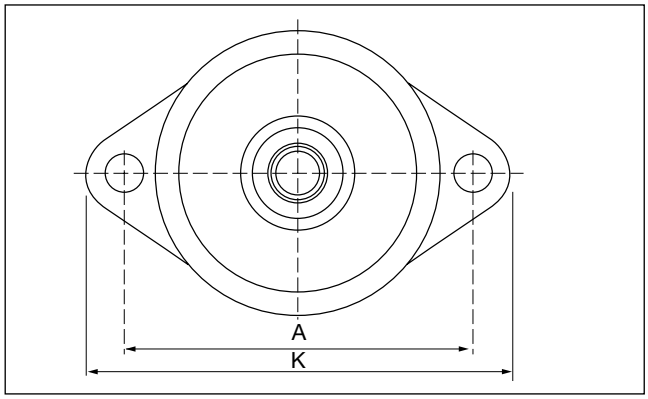
Features

Similar in design to the RA/RAEM range, type RAB uses rubber in shear and compression for optimum stiffness characteristics and horizontal stability. Especially effective on small 1, 2 and 3 cylinder diesel engines where the special compound employed provides effective isolation of vibration while eliminating much of the excessive movement normally associated with 1–3 cylinder engines.

Its unique construction and the latest production methods make Novibra® type RAB a high performance mounting having a number of advantages:

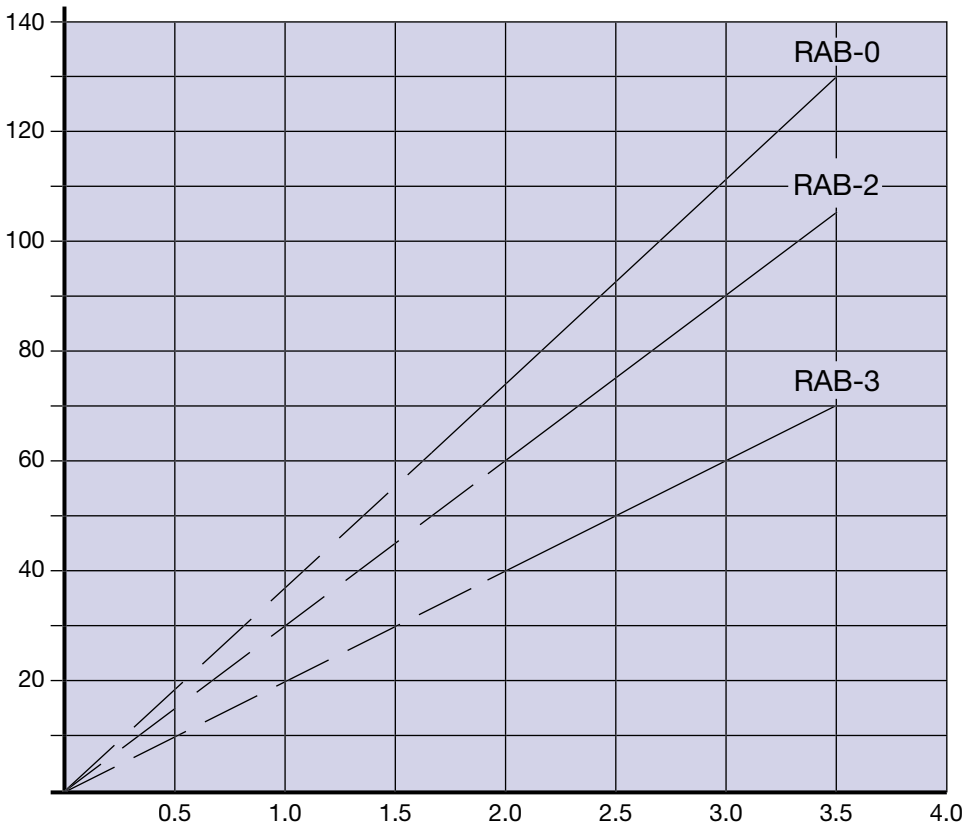
- Rubber features are utilised effectively combining compression and shear.
- Tight tolerances on dynamic stiffness rate for accurate vibration calculations.
- Load rating options, 10-130 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn8C as per ISO 2081).
- Fitted as standard with a shock-proof device with resilient stop, ideal for mobile or marine use. The RAB-mounts can accomodate occasional shock loads to 5 g reference to the weight. The mount will withstand shock loads up to 2 g without plastic deformation.
- Clear and durable product marking so that mountings can be identified even after several years in operation.
- Domed shape cover to protect against oil contamination.



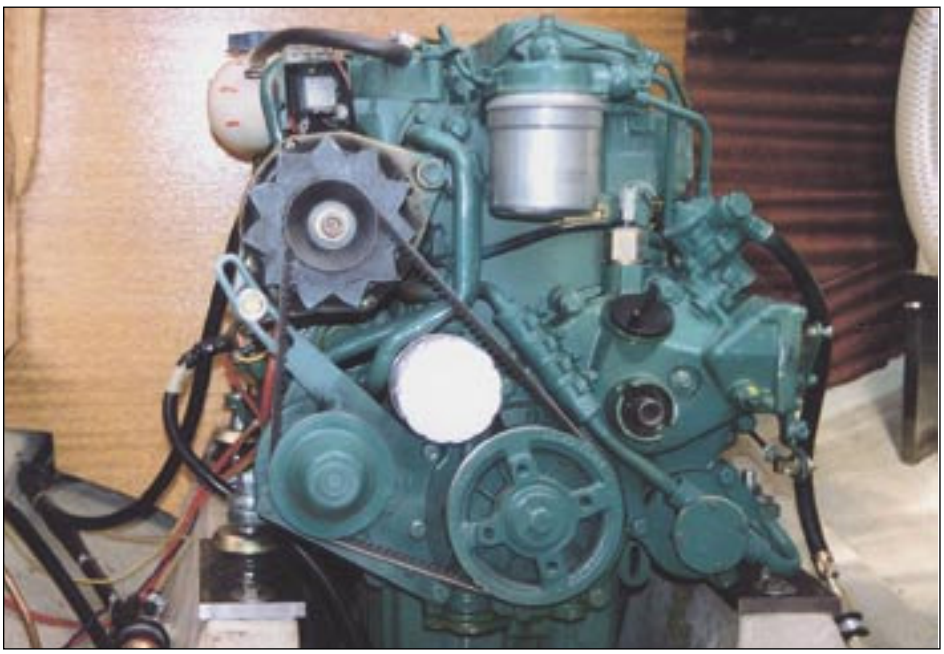


Type	Part no. 55° IRH	D	A	H	K	d	G	Weight kg	*M*-Max (kg)
		Dimensions mm							
RAB- 0	10-00178-01	63	76	35	93.5	8.5	M12	0.22	130
RAB -2	10-00179-01	63	76	35	93.5	8.5	M12	0.22	105
RAB -3	10-00180-01	63	76	35	93.5	8.5	M12	0.22	70

Load per mounting (kg)



Fully approved by NATO and Europe's leading manufacturers of 1- 2- and 3-cylinder versions of compact diesel engines.



Example of RAB-installation on a 3-cylinder diesel engine power pack.

Cushyfloat™ Mountings

Metalastik® type Cushyfloat™

The Cushyfloat™ mounting is an ideal general purpose unit designed to provide effective isolation of vibration and noise arising from many types of static and mobile equipment including:

- Marine, industrial and vehicle engines
- Generator sets
- Pumps
- Compressors

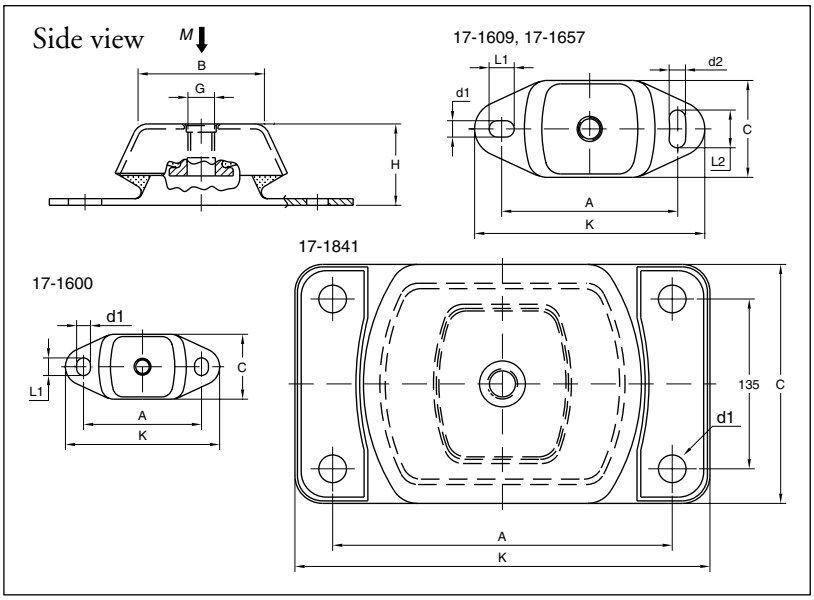
Features

Originally designed for use with marine engines, this compact low profile mounting is easy to install. It combines 3 way control of the suspended equipment with relatively large static deflections where the rubber is loaded in shear and compression.

The design incorporates bump and rebound control features which limit excessive movements under shock loading. Top metal cover gives protection against oil contamination.

Protective finish resists corrosion attack. Propeller thrust on marine applications is accommodated. There are four sizes in the standard range which with varying degrees of rubber hardness cater for point loads from 32 kg to 3000 kg. Natural frequencies as low as 8 Hz are possible.

N.B. When used in marine engine applications with thrust forces involved, the maximum load capacity is substantially reduced, see table below!

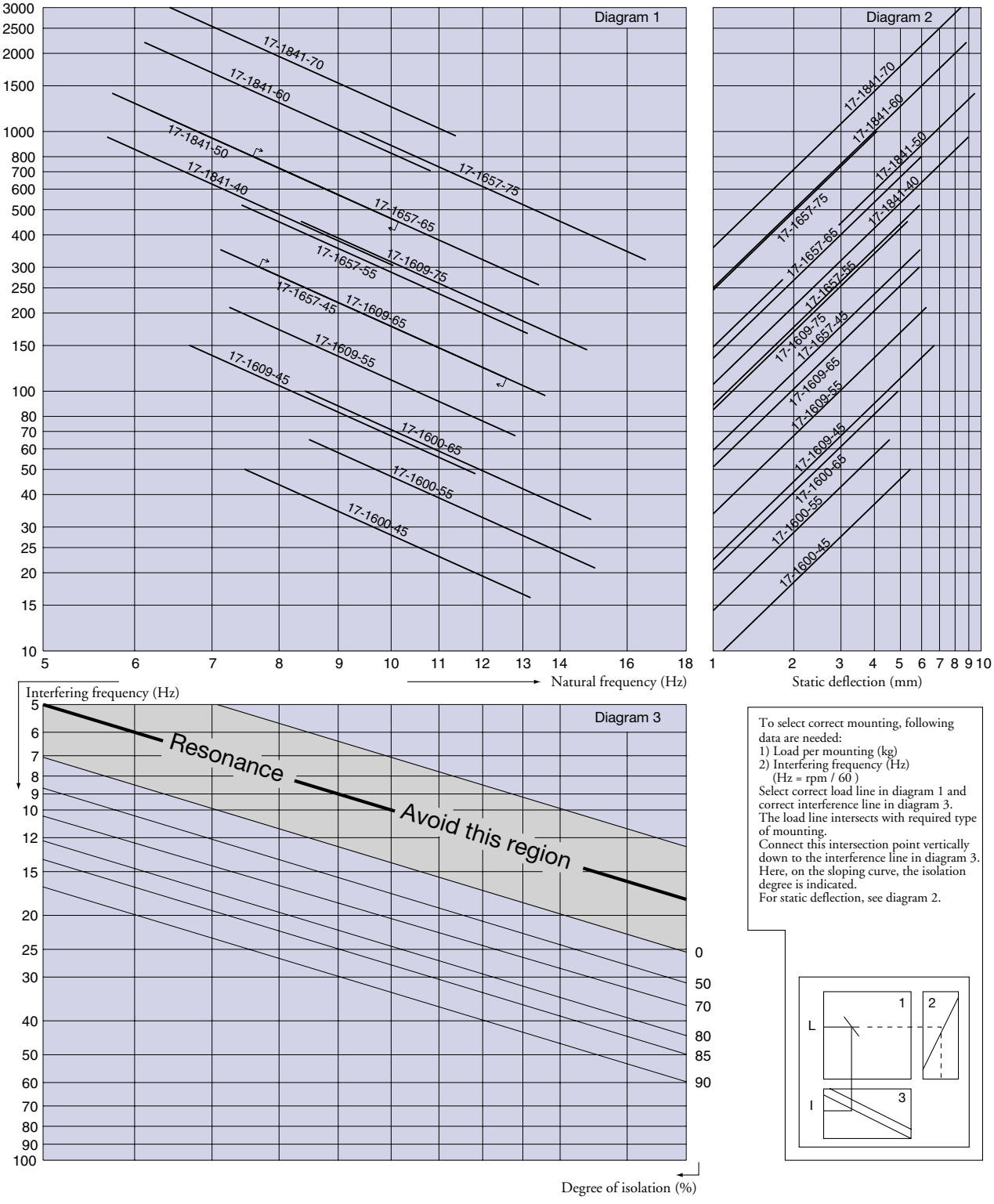


Cushyfloat Type	Part no.	Dimensions in mm B	C	A	K	H	d1	L1	d2	L2	G	Weight (kg)	*M*-max (kg)	**M*-max (kg)	Max longitudinal force, F (N)
17-1600-45	10-00535-01												50	35	370
17-1600-55	10-00536-01	60	60	100	120	38	11	14			M12	0.3	65	55	560
17-1600-65	10-00537-01												100	80	830
17-1609-45	10-00545-01												150	95	1000
17-1609-55	10-00546-01												210	140	1500
17-1609-65	10-00547-01	75	75	140	183	50	13	20	13	30	M16	0.9	300	210	2300
17-1609-75	10-00548-01												450	315	3300
17-1657-45	10-00557-01												350	250	2800
17-1657-55	10-00558-01												520	370	4200
17-1657-65	10-00559-01	80	112	182	230	70	18	26	18	34	M20	2.4	800	560	6400
17-1657-75	10-00560-01												1000	700	11800
17-1841-40	10-00605-01												950	630	5300
17-1841-50	10-00606-01												1400	945	7100
17-1841-60	10-00607-01	221	190	270	330	110	Ø22				M24	9.6	2200	1575	12500
17-1841-70	10-00608-01												3000	2100	18000

**Marine engine applications with thrust forces M-max (kg)*

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

SIM™

Novibra® type SIM™

Type SIM™ is used for vibration isolation of small to medium sized machines:

- Fans
- Pumps
- Compressors
- Refrigeration and air-conditioning
- Engines
- Measurement equipment
- Marine propulsion engines

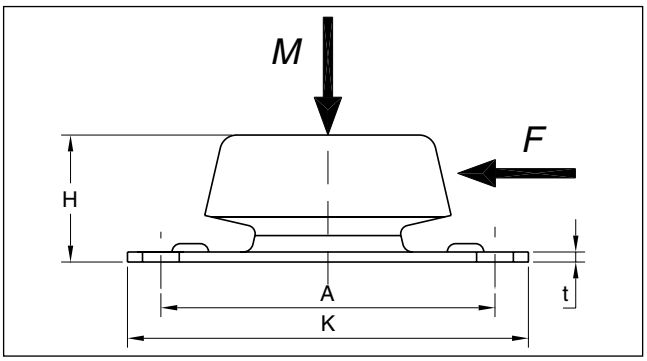
Features

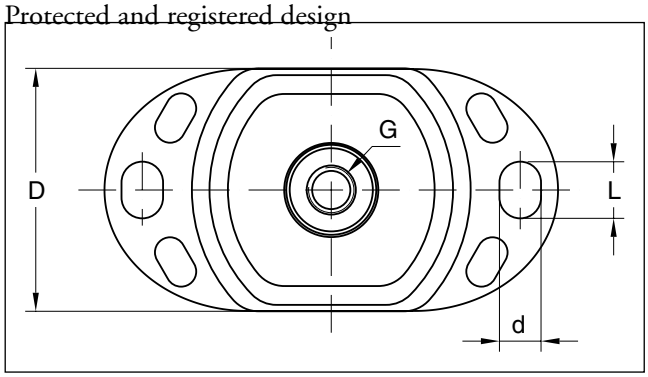
SIM is a mounting for mobile applications. The strong metal parts and the soft vertical stiffness combined with high stiffness in the longitudinal direction makes it suitable for suspension of marine engines both with and without thrust bearing.

Its unique construction and the latest production methods make Novibra type SIM a high performance mounting having a number of advantages.

- Low vertical natural frequency 8-9 Hz combined with high longitudinal stiffness, ratio approx kl/kv=3.5-5.5.
- Special designed stronger bottom plate and top cover to withstand high shock loads from tough mobile applications.
- Load range from 50-580 kg.
- Fitted as standard with a shock proof device (up to 5 g) with resilient stop.
- Corrosion protected to cope with arduous environments with treatment Fe/Zn8C as per ISO 2081.
- SIM can be delivered with two types of height adjusters, one standard type HA and one special for higher load requirements.
- Clear and durable product marking. Mountings can be identified after several years in operation.
- Domed shape top cover to protect against oil contamination.

Protected and registered design

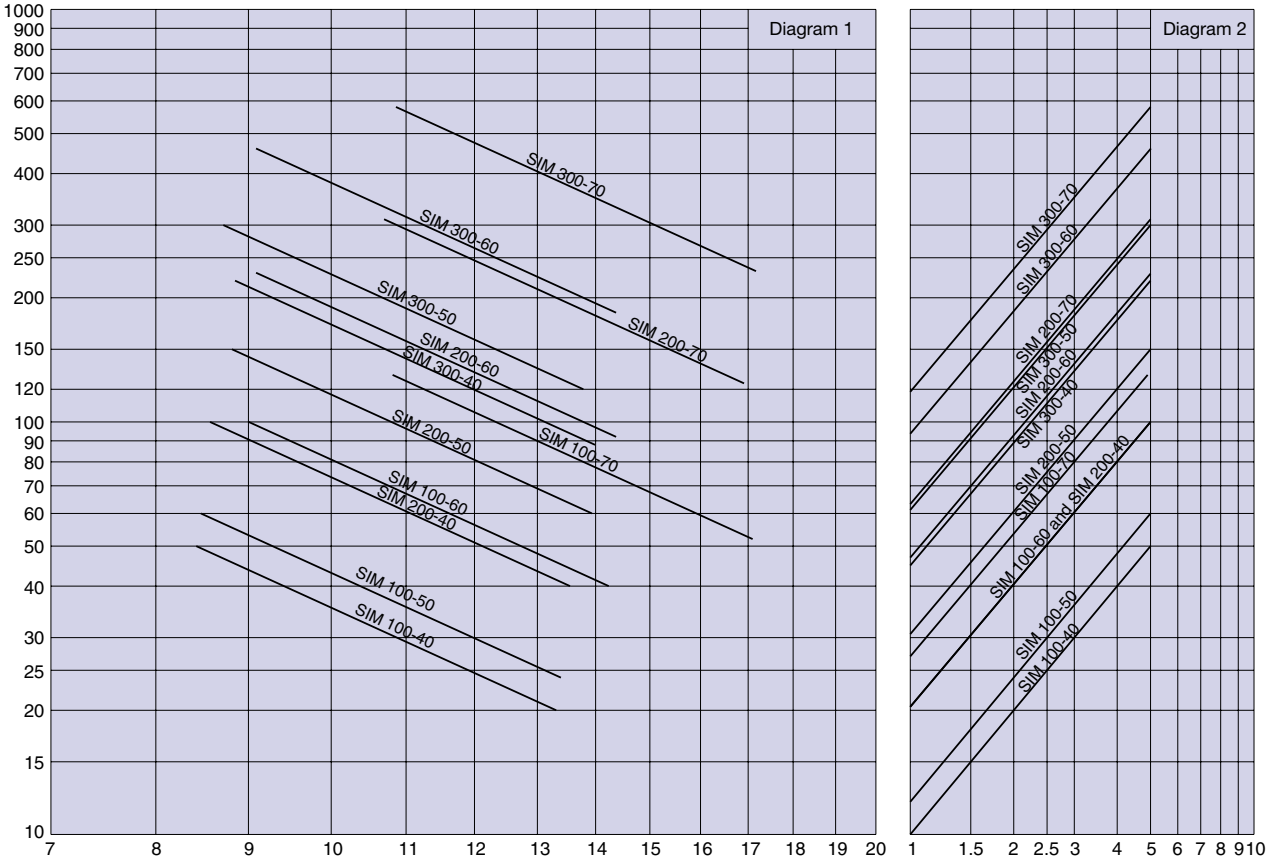


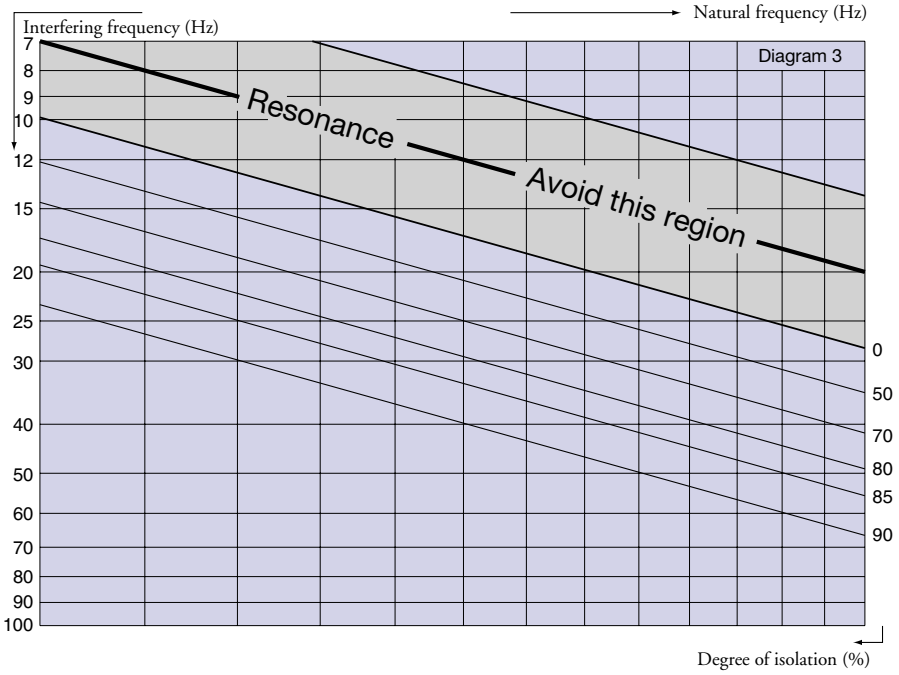


Type	Part no.	Max load *M* (kg)	Max longitudinal force *F* (N)	Dimensions in mm D	A	K	H	d	L	t	G	Weight (kg)
SIM 100-40	10-00043-01	50	750									
SIM 100-50	10-00046-01	60	1000	64	100	120	38	11	15	3	M12	0,35
SIM 100-60	10-00044-01	100	1400									
SIM 100-70	10-00045-01	130	2000									
SIM 200-40	10-00047-01	100	2000									
SIM 200-50	10-00050-01	150	3000	75	140	175	50	13	20	4	M16	0,75
SIM 200-60	10-00048-01	230	4500									
SIM 200-70	10-00049-01	310	6000									
SIM 300-40	10-00051-01	220	5000									
SIM 300-50	10-00054-01	300	6500	112	182	216	70	18	26	5	M20	2,03
SIM 300-60	10-00052-01	460	9000									
SIM 300-70	10-00053-01	580	12000									

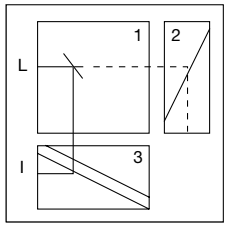
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Cushyfoot™

Metalastik® type Cushyfoot™

Cushyfoot™ mountings are suitable for many different types of machinery, e.g. diesel engines, generator sets, compressors, fans, hydraulic units and lift machinery.

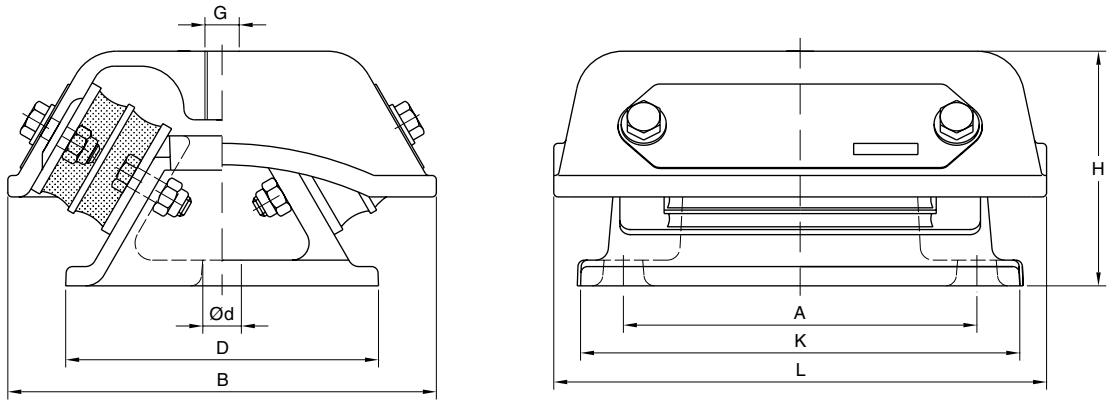
Features

Cushyfoot™ mountings have two rubber elements, used in shear and compression, to provide excellent stiffness characteristics for the isolation of a wide range of vibration frequencies.

There are three sizes, 17-0290 for loads up to 230 kg per mounting, 17-0213 for loads up to 1250 kg and 17-0346, which will carry up to 1280 kg per mounting, but will provide up to 16 mm static deflection.

The Cushyfoot™ mounting has the following features:

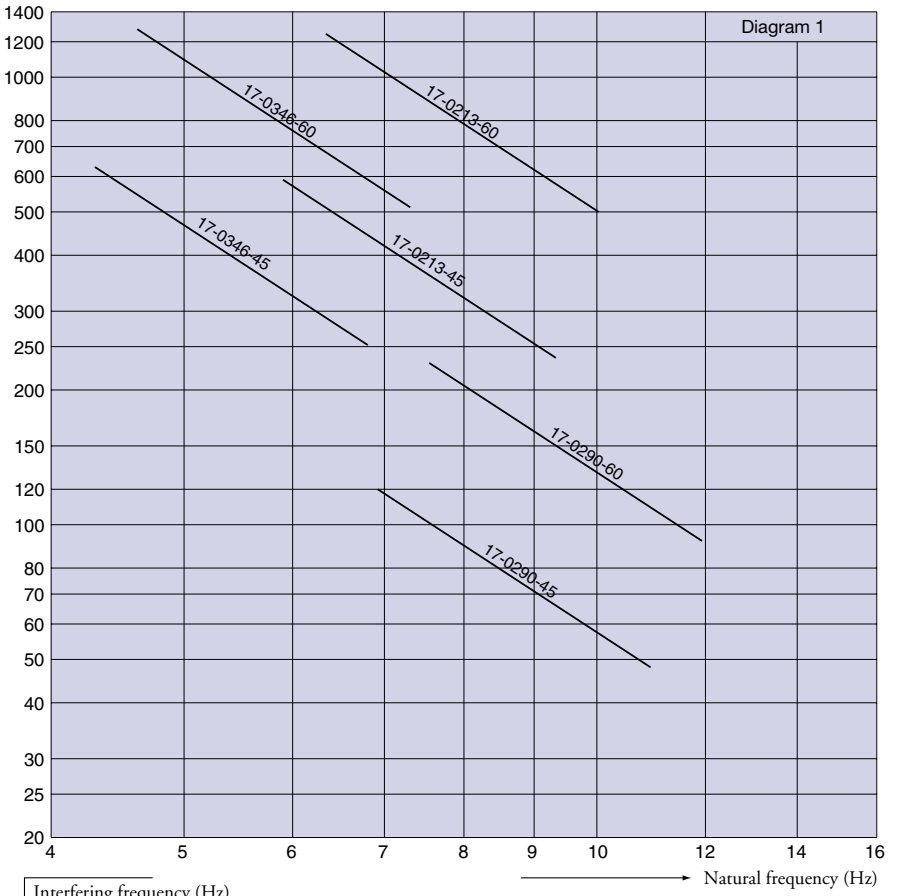
- A wide load range from 50 to 1280 kg.
- Stamped identification plates for product identification.
- Strong castings for safety and reliability.
- Dissimilar horizontal stiffnesses give optimum vibration isolation and motion control.

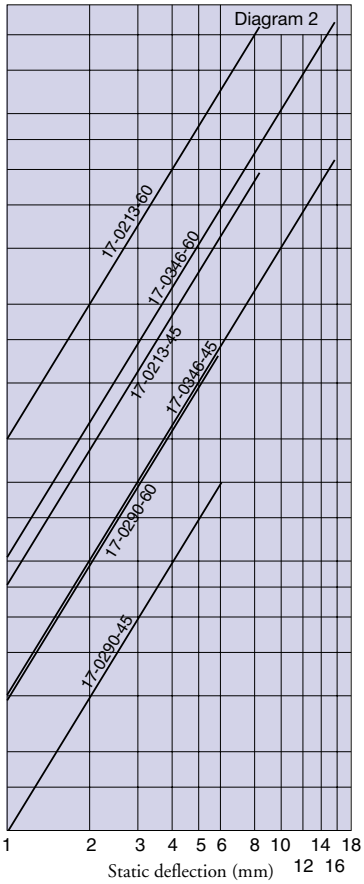


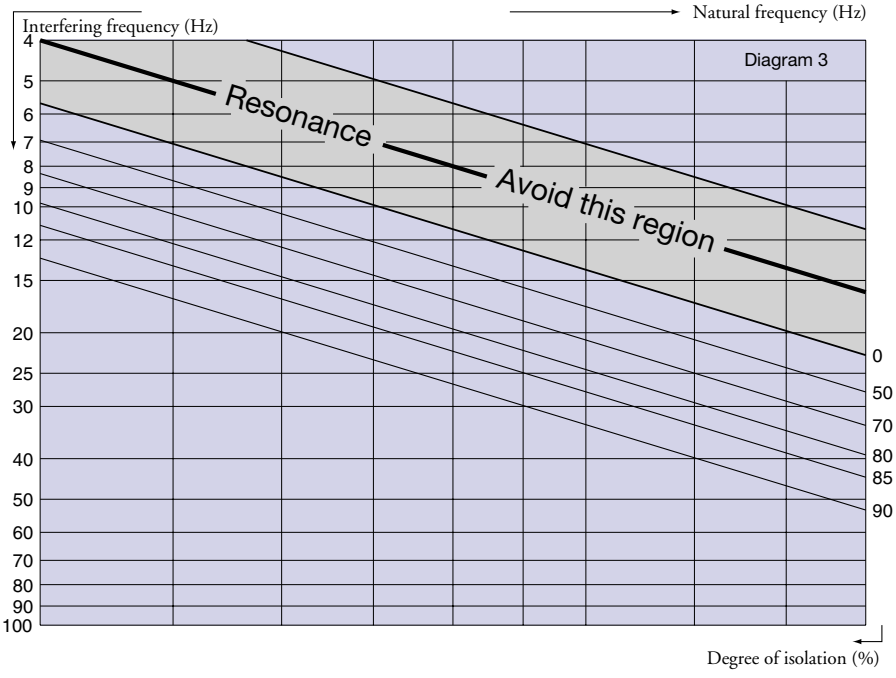
Cushyfoot™ mountings		Dimensions in mm								Max vertical	Weight
Type	Part no.	L	B	A	K	H	D	d	G	load (kg)	(kg)
17-0290-45	20-00689-01	122	132	90	114	72	82	13	M16	120	2.3
17-0290-60	20-00690-01	122	132	90	114	72	82	13	M16	230	2.3
17-0213-45	20-00687-01	230	204	165	205	110	148	18	M16	590	10
17-0213-60	20-00688-01	230	204	165	205	110	148	18	M16	1250	10
17-0346-45	20-00691-01	230	204	165	205	123	148	18	M16	630	9.5
17-0346-60	20-00692-01	230	204	165	205	123	148	18	M16	1280	9.5

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

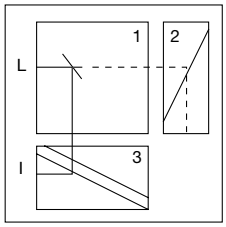
Load
per mounting (kg)







To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Vee Mountings

Metalastik® type Vee Mountings

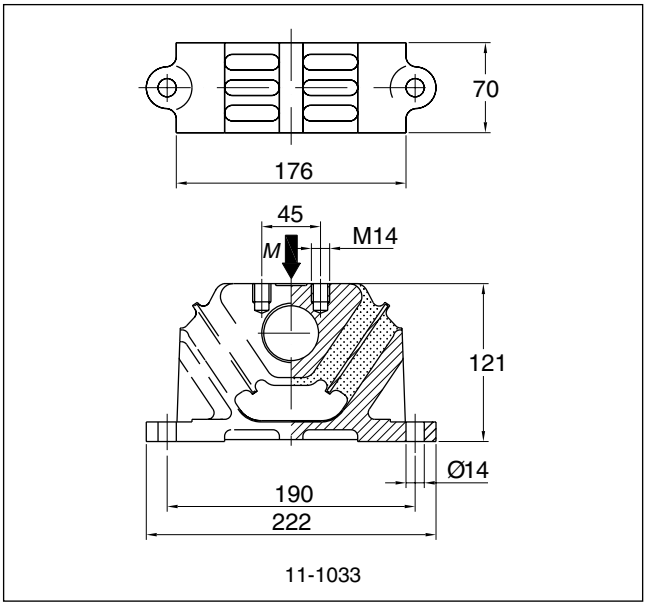
A high load capacity mounting with relatively large rubber volume providing a high degree of vibration and noise isolation and makes it ideally suited for suspending engines installed in public service and goods vehicles.

Features

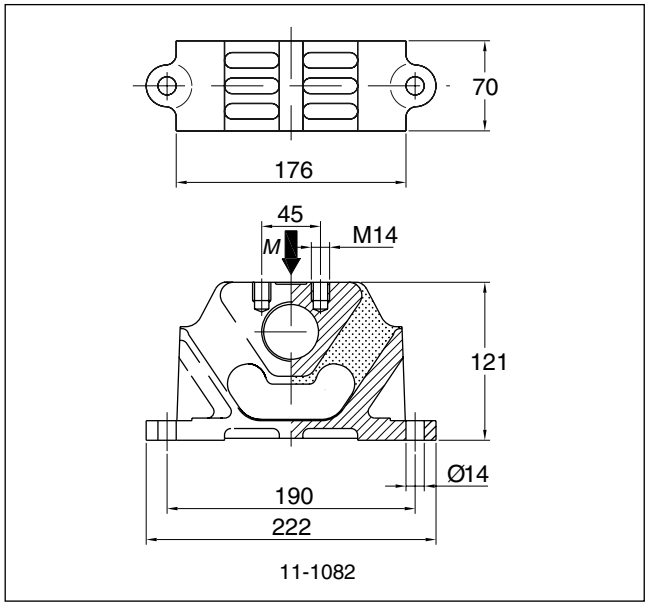
Vee mountings have ideal stiffness characteristics for rail vehicle engine suspensions. The vertical stiffness rate ensures that when the mounting is properly loaded, the vertical natural frequency doesn't coincide with the body bending frequency. The high longitudinal stiffness controls shunting shock motion. The mounting is usually connected to the sole bars via the base casting, and a buffer is attached to the Vee section casting to limit tensile loades.

The Vee mounting has the following features:

- Three dissimilar translational stiffnesses for the best vibration isolation and motion control.
- Strong castings for safety and reliability.



11-1033

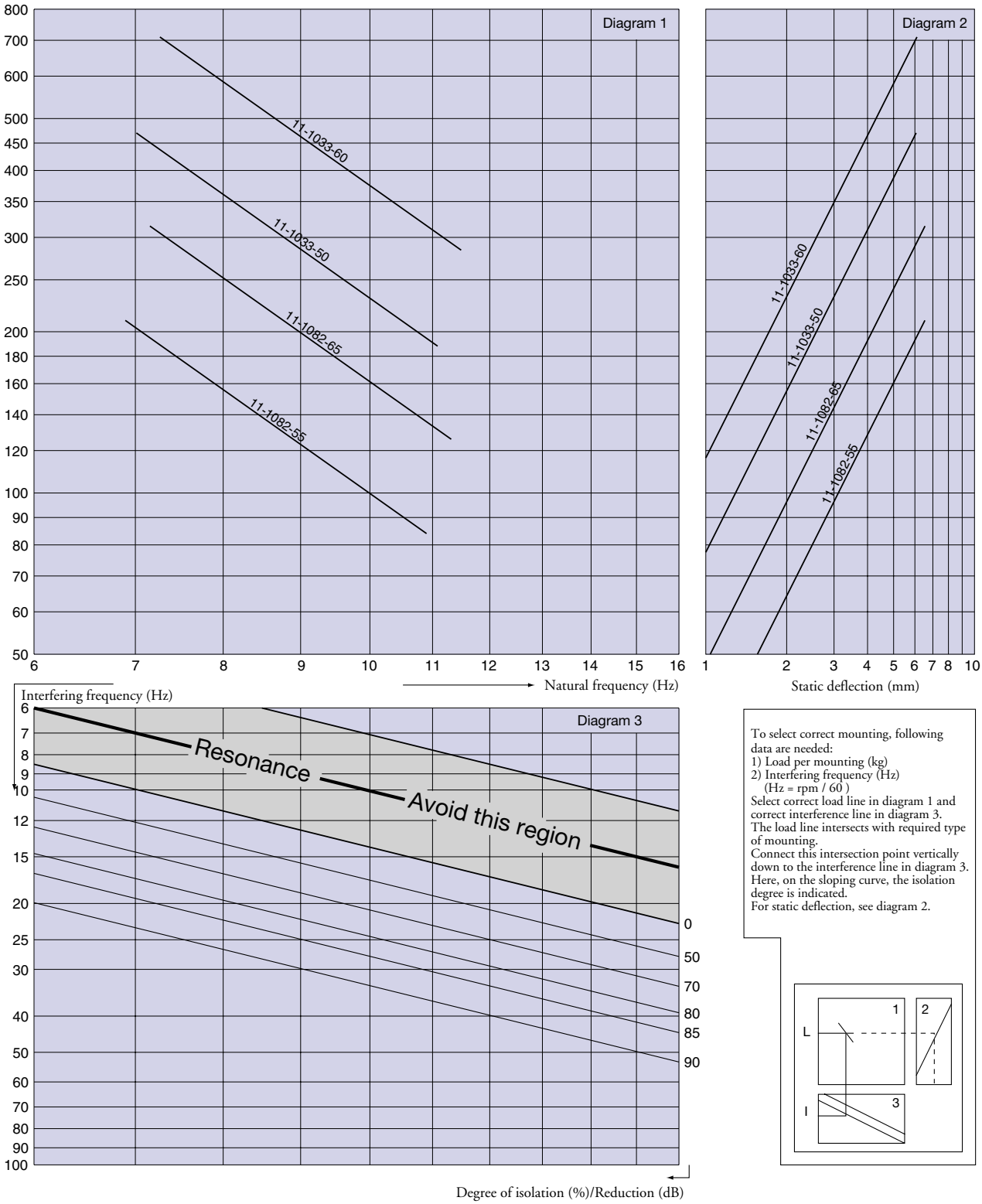


11-1082

Type	Part no.	*M*-Max (kg)	Weight (kg)
11-1082-55	10-00205-01	210	4.2
11-1082-65	10-00206-01	315	4.2
11-1033-50	10-00196-01	470	4.5
11-1033-60	10-00197-01	710	4.5

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

M

Novibra® type M

Type M is ideal for applications involving isolation of low frequency vibrations in all planes. Also suitable for shock attenuation due to the designed ability to offer large deflection. Provides passive vibration isolation on electronic instruments, measuring equipment and test cells.

Specific fields of application are:

- Compressors
- Refrigerators
- AC-units
- Ventilators
- Fans
- Powder handling machinery
- Vibratory screens
- Packaging applications
- Electric motors
- Weighing scales
- Test cell equipment
- Noise control units
- Pumps
- Food processing equipment

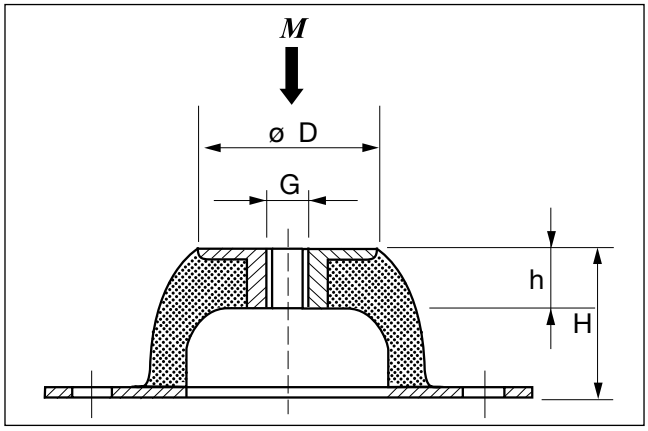
Features

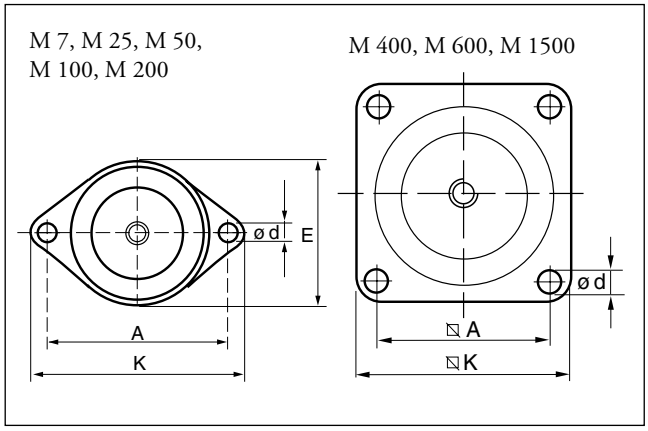
Novibra® type M is specifically designed to give large deflection at low loads. Although the mount design allows high deflection, the mountings are compact in weight and easy to install.

Its unique construction and the latest production methods make Novibra® type M a high performance antivibration mounting having a number of advantages:

- Tight tolerances on dynamic stiffness rate for accurate vibration calculations.
- Wide load rating options, 3.5–2500 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn8C2 as per ISO 2081).
- Clear and durable product marking so that mountings can be identified even after several years in operation.

When using M mount together with the height adjuster HA, it is necessary to use a washer. The diameter of the washer must be 20% larger than the diameter of the upper plate (D).

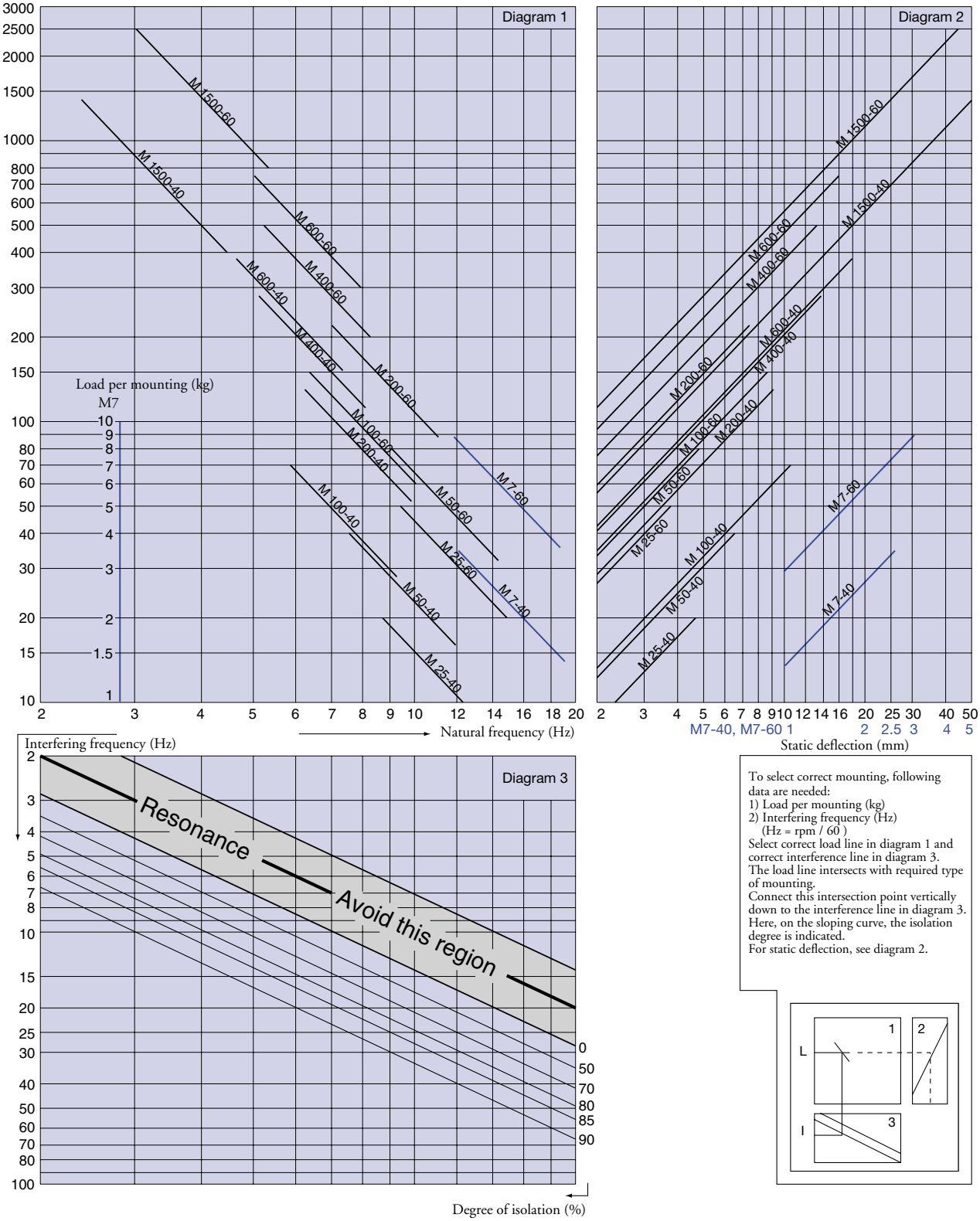




Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm D	E	A	K	H	h	d	G	Weight (kg)	*M*-Max(kg) 40° IRH	60° IRH
M 7	10-00139-01	10-00140-01	18	43	50	64	20	7	7.0	M 6	0.02	3.5	9
M 25	10-00094-01	10-00095-01	33	56	66	85	25	11	8.0	M 8	0.07	20	50
M 50	10-00096-01	10-00097-01	45	76	92	114	35	14	10.0	M 10	0.16	40	80
M 100	10-00100-01	10-00099-01	53	96	110	136	40	15	11.5	M 10	0.26	70	150
M 200	10-00102-01	10-00103-01	58	101	124	151	45	13	11.5	M 10	0.42	130	220
M 400	10-00104-01	10-00105-01	78		120	150	63	18	14.5	M 12	1.06	280	500
M 600	10-00080-01	10-00081-01	100		160	200	85	25	14.5	M 16	2.35	380	750
M 1500	10-00082-01	10-00083-01	186		250	310	160	43	18.0	M 24	9.43	1400	2500

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load per mounting (kg)
M25 – M1500



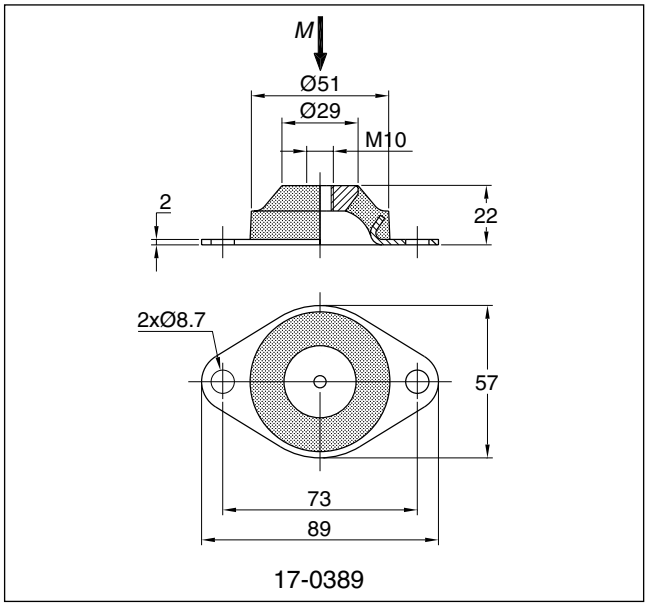
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

Equi-frequency Mountings

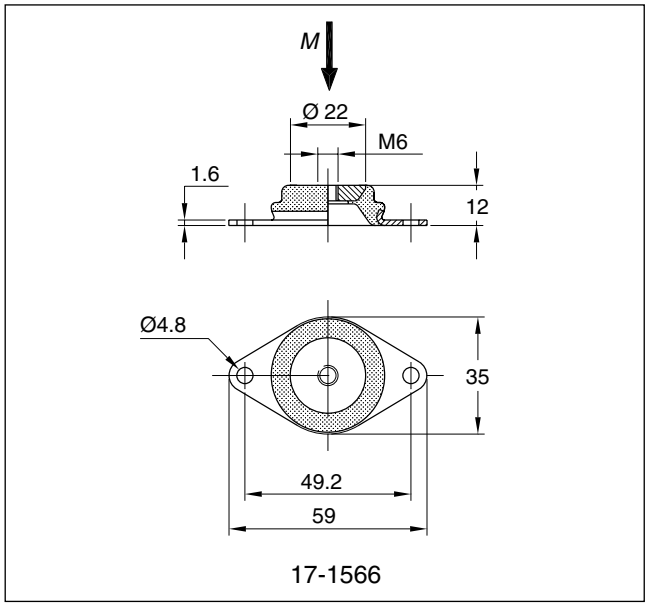
Features
Each design has substantially the same stiffness in vertical and horizontal directions. Load range 11 kg to 54 kg. Can be used as small anti-shock mounting when static loadings are derated.

Metalastik® type Equi-frequency Mounting
General purpose low profile mounting for use where space is restricted. Suitable for stationary applications. May also be used to protect delicate or sensitive equipment from external shock or disturbances.

Typical applications include:
- Instrument panels
- Small fan sets
- Small vacuum pumps
- Small reciprocating engines



17-0389

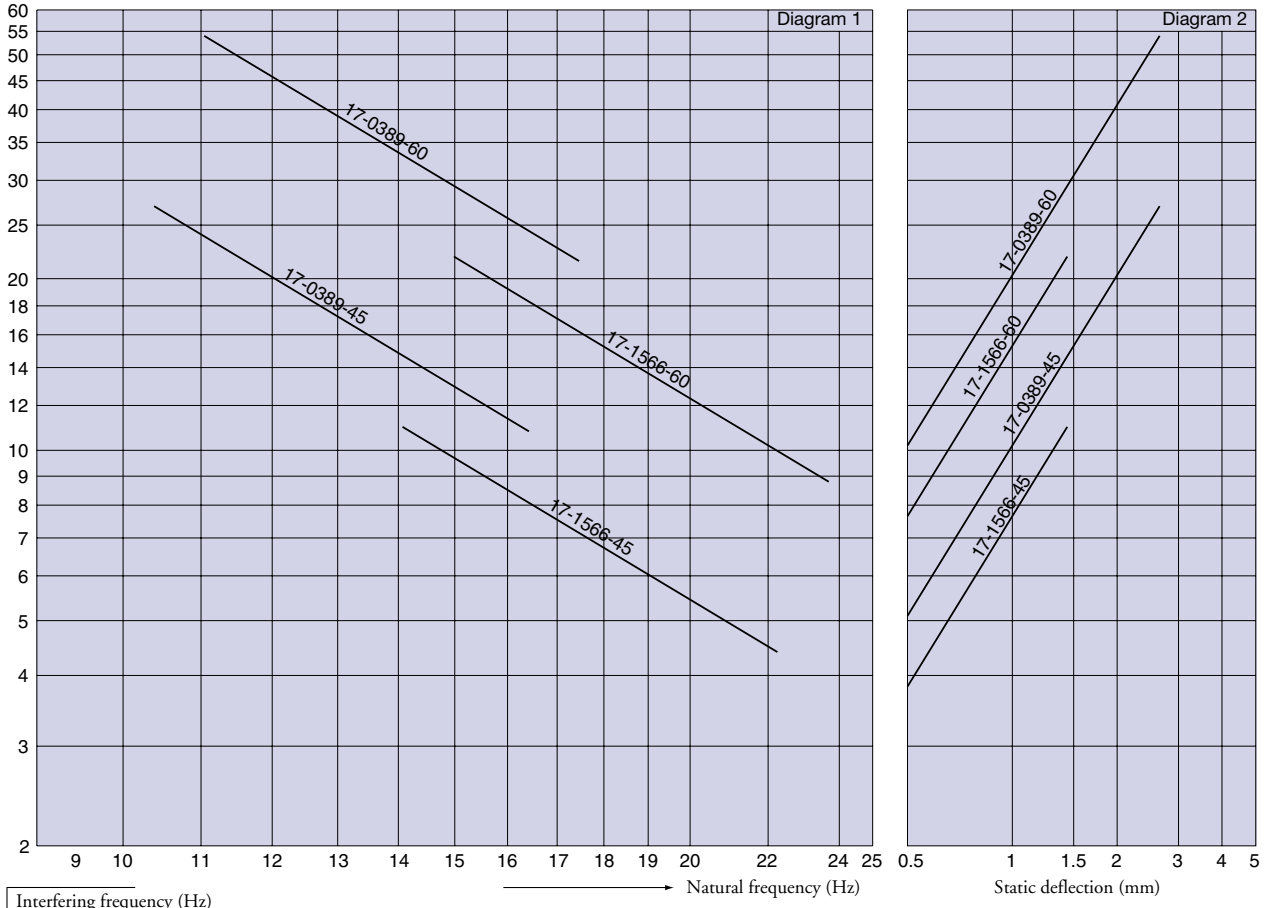


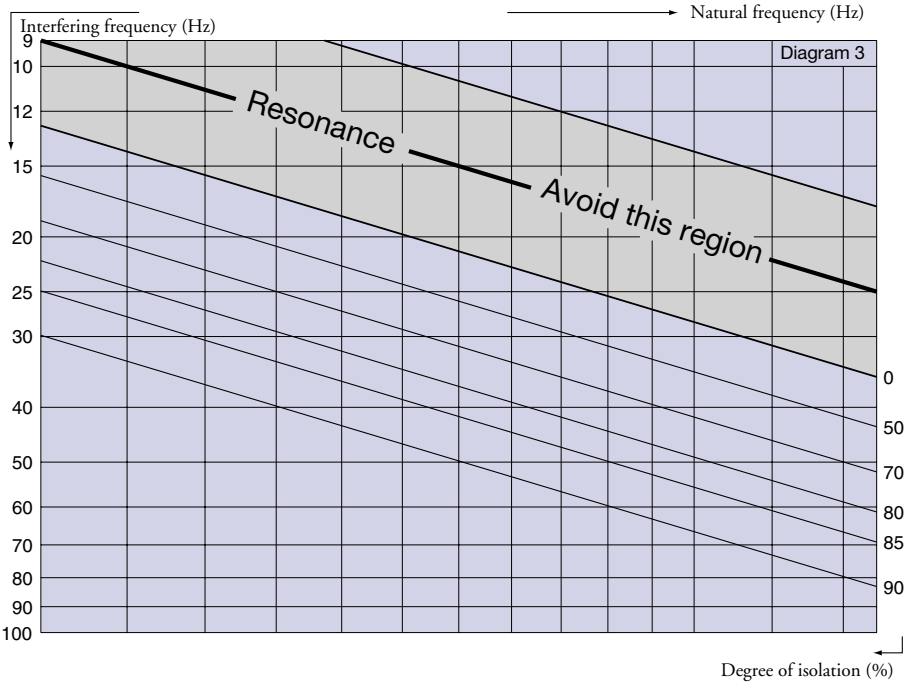
17-1566

Type	Part no.	*M*-Max (kg)	Weight (kg)
17-1566-45	10-00529-01	11	0.024
17-1566-60	10-00530-01	22	0.024
17-0389-45	10-00406-01	27	0.10
17-0389-60	10-00407-01	54	0.10

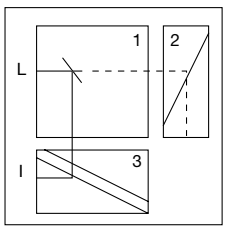
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Fanflex™

Features

Simple design with metal parts encapsulated in high grade oil-resisting rubber compound giving good environmental resistance.

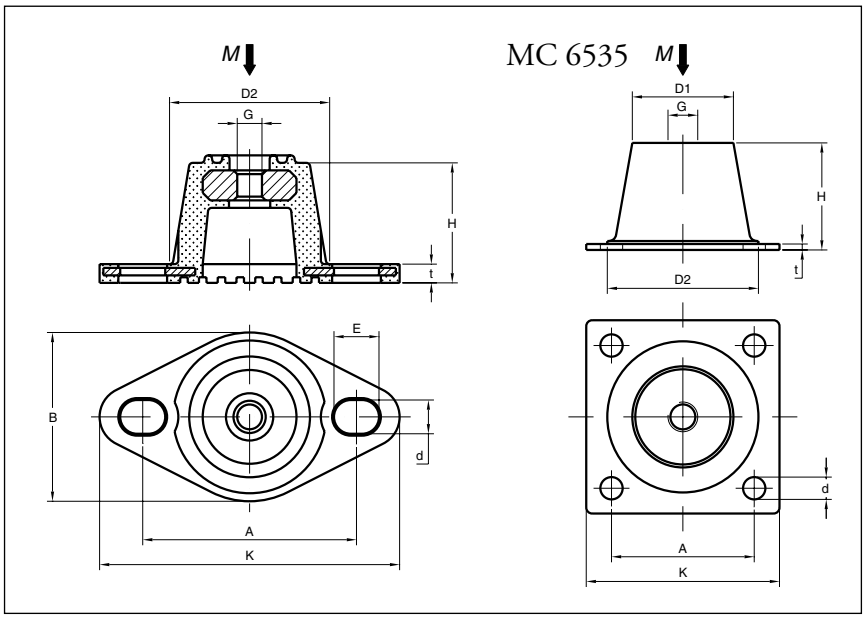
Provides relatively large static deflections and hence a high degree of vibration attenuation - 90% isolation for disturbing frequencies of 15 Hz (900 c.p.m).

Range gives capacity for point loads of 35 kg to 350 kg.

Metalastik® type Fanflex™

A simple mounting designed predominantly for the suspension of heating, ventilating and air conditioning equipment.

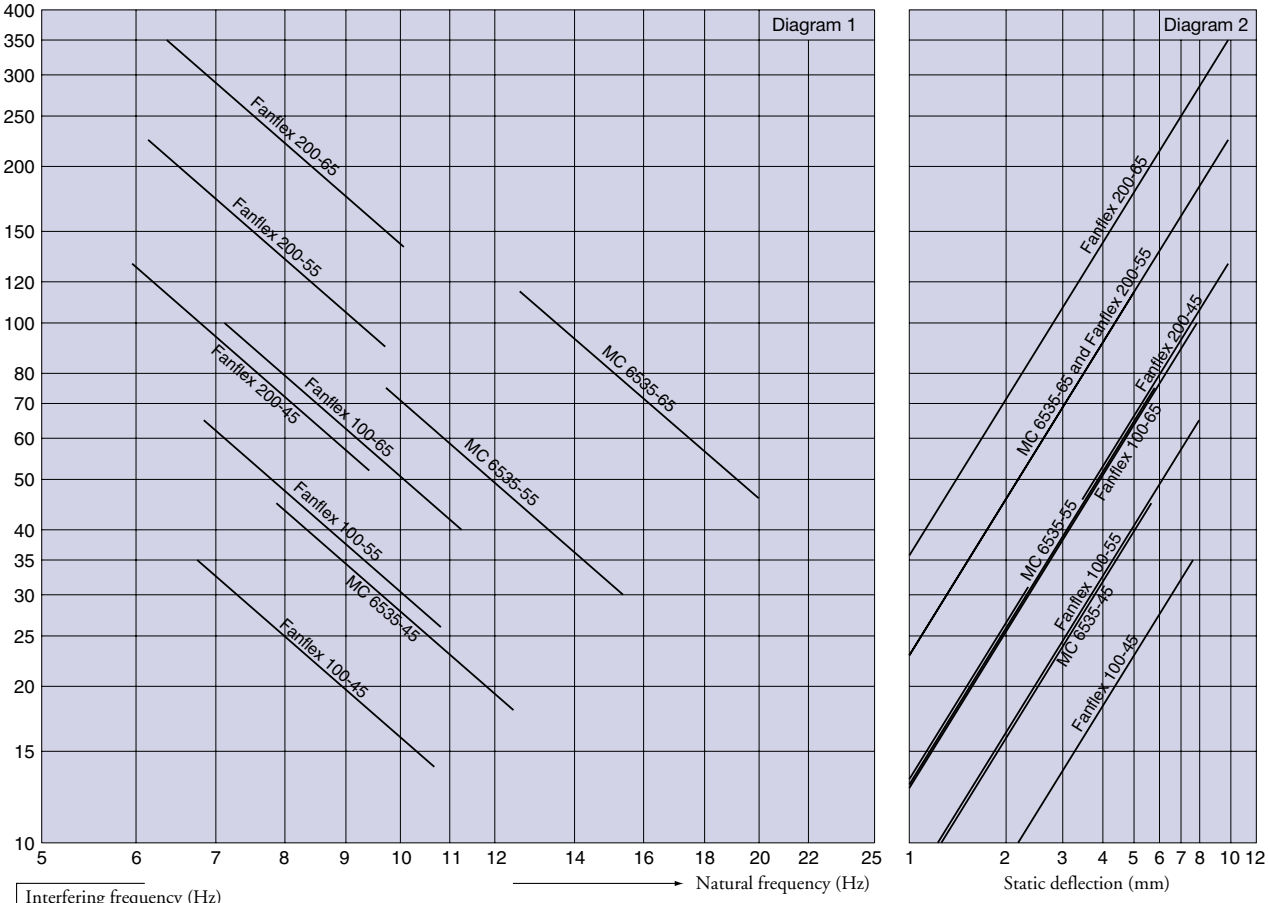
May be used for:
Pumps, fans, compressors and control cabinets.

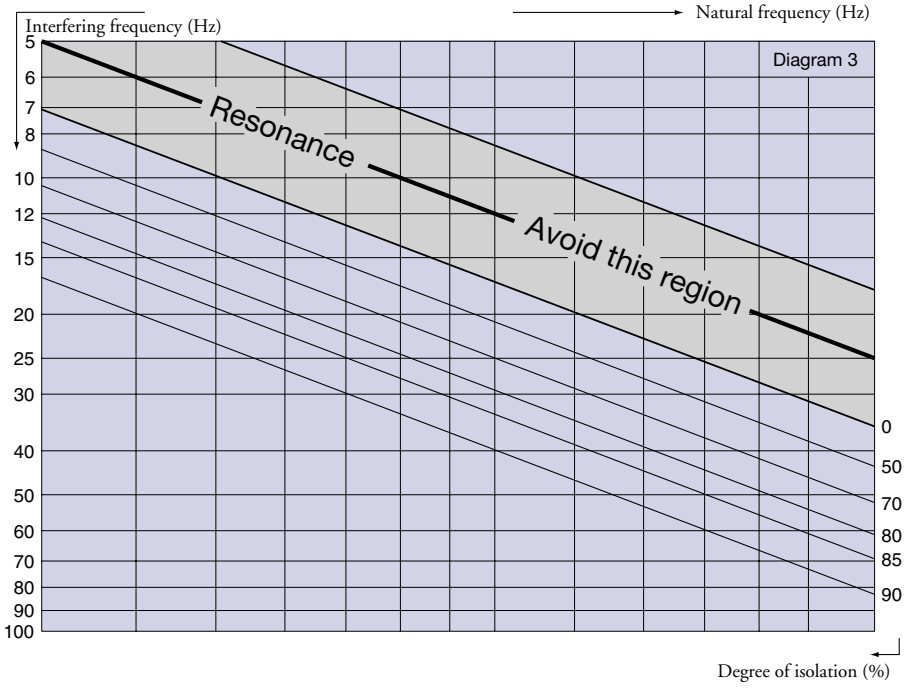


Type	Part no.	Dimensions in mm A	K	H	B	D1	D2	E	G	d	t	Weight (kg)	*M*-Max (kg)	Colour code
Fanflex 100-45	20-00518-01	57	80	32	45		41	12	M8	9	5	0.09	35	yellow
Fanflex 100-55	20-00519-01	57	80	32	45		41	12	M8	9	5	0.09	65	blue
Fanflex 100-65	20-00520-01	57	80	32	45		41	12	M8	9	5	0.09	100	red
Fanflex 200-45	20-00521-01	71	95	45	60		56	14	M10	9	5	0.22	130	yellow
Fanflex 200-55	20-00522-01	71	95	45	60		56	14	M10	9	5	0.22	225	blue
Fanflex 200-65	20-00523-01	71	95	45	60		56	14	M10	9	5	0.22	350	red
MC 6535-45	20-00662-01	48	65	36		34	51	8	M10	7.5	2	0.12	45	white
MC 6535-55	20-00663-01	48	65	36		34	51	8	M10	7.5	2	0.12	75	red
MC 6535-65	20-00664-01	48	65	36		34	51	8	M10	7.5	2	0.12	115	black

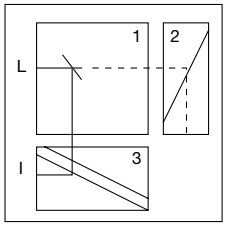
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



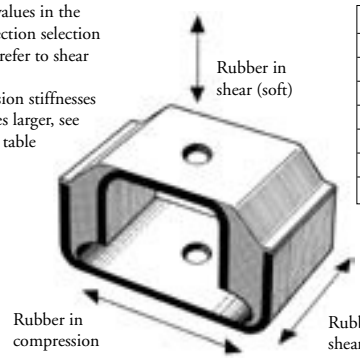


To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



BA & Double U-Shear

Stiffness values in the load-deflection selection diagrams refer to shear mode.
Compression stiffnesses are n times larger, see adjoining table



	n
17-1492	3.5
17-1480	6
17-1479	8
17-1482	3.5
BA 20	2.3
BA 50	3
BA100	3.4

Novibra® type BA and Metalastik® type Double U-Shear

Novibra® type BA and Metalastik® type Double U-Shear are equally suitable for isolating vibrations from low speed machines and equipment. Protects sensitive and light-weight units from external shocks and vibrations.

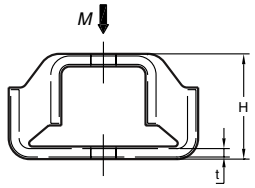
Type BA and Double U-Shear are easy to install and ideal for applications e.g.

- Light fans and compressors
- Portable gensets and pumps
- Computers and electronic units
- Transit cases
- Measuring and test instruments
- Gauging equipment

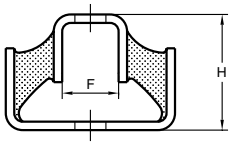
Features

Novibra® type BA and Metalastik® type Double U-Shear mountings utilise bonded rubber in shear to permit relatively high deflections. Provides excellent isolation of low frequencies. (Type BA 20/2 is a half section suitable for very light loads). On rotating equipment applications the soft axis should be at right angles to the shaft. On mobile applications the stiff axis should be aligned in the direction of travel. For transit case applications the mountings need to be arranged so that the horizontal stiffness is the same in all directions.

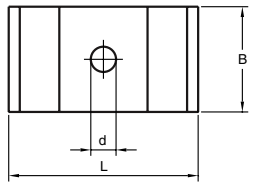
BA 20 - BA 100



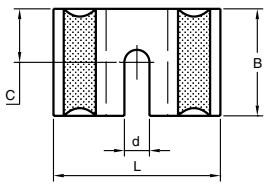
17-1492, 17-1480, 17-1479, 17-1482



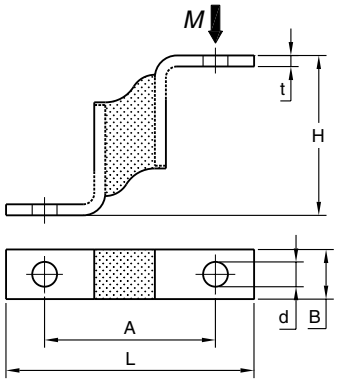
BA 20 - BA 100, 17-1482



17-1492, 17-1480, 17-1479



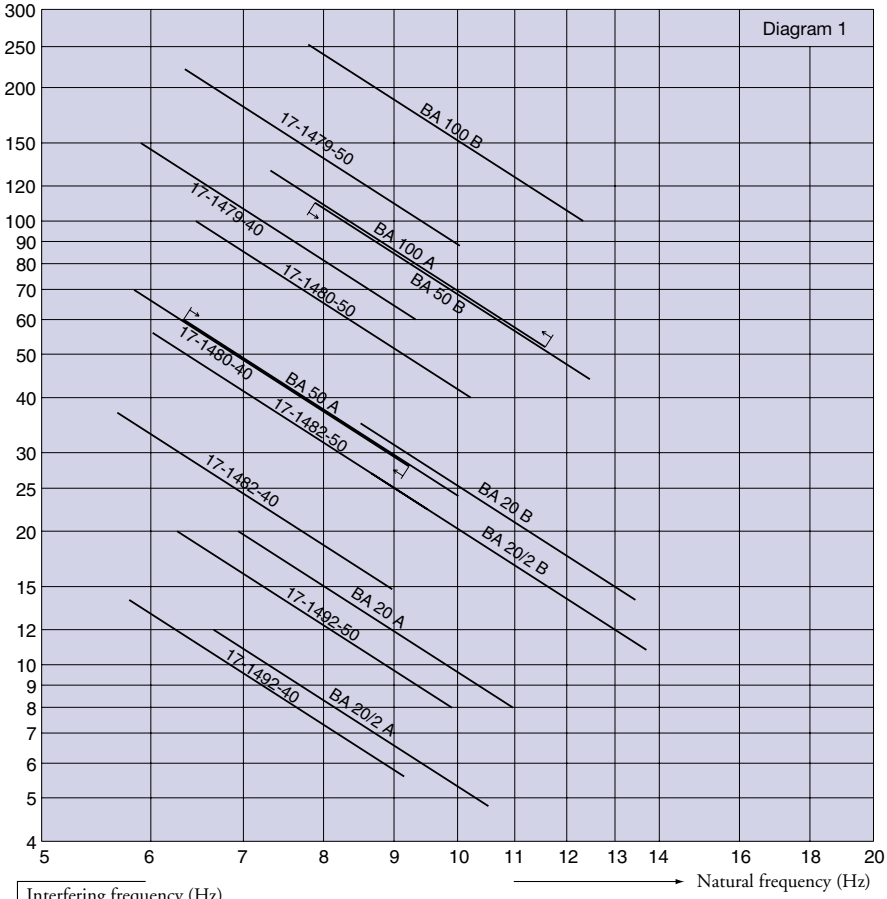
BA 20/2

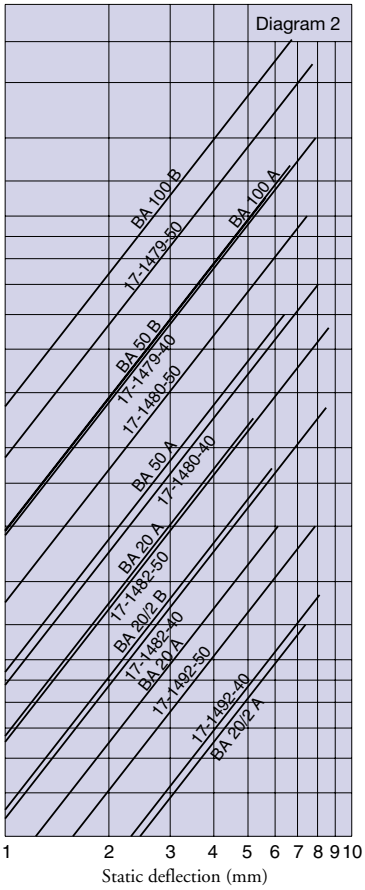


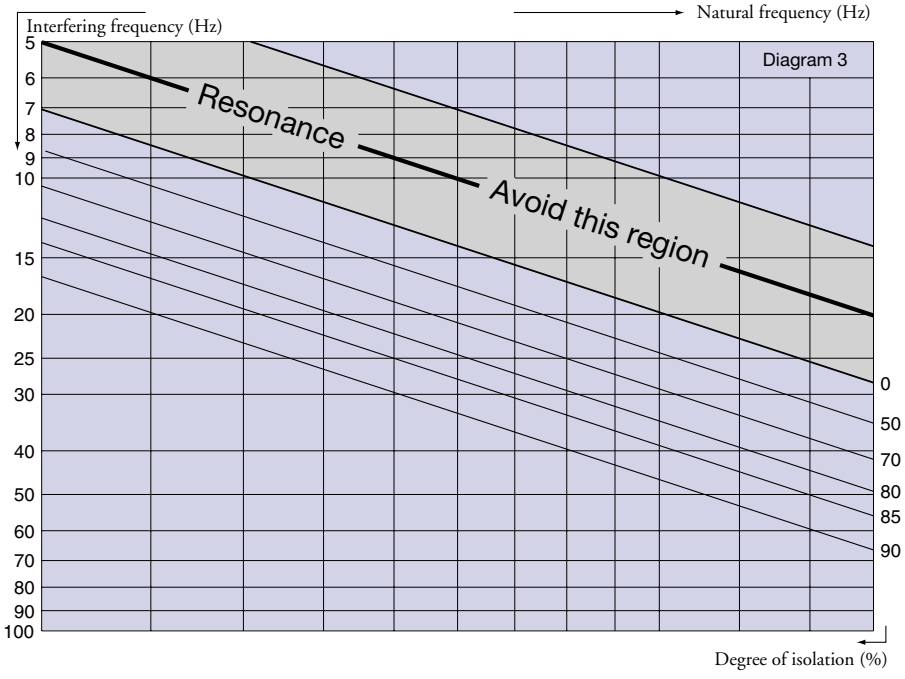
Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm B	L	H	A	F		d	t	Weight (kg)	*M*-Max (kg) 40° IRH	60° IRH
BA 20/2	10-00005-01	10-00006-01	20	90	58	62			8	4	0.09	12	27
BA 20	10-00145-01	10-00146-01	20	90	50				10	4	0.16	20	35
BA 50	10-00147-01	10-00148-01	50	90	50				12	4	0.42	60	110
BA 100	10-00149-01	10-00150-01	100	90	50				15	4	0.83	130	250
Double U-shear	**40° IRH**	**50° IRH**						**C**				**40° IRH**	**50° IRH**
17-1492	10-00518-01	10-00519-01	19	60	43		19	10.3	6.7		0.09	14	20
17-1480	10-00511-01	10-00512-01	51	80	78		32	25	13		0.6	70	100
17-1479	10-00509-01	10-00510-01	64	86	108		38	32	16.7		1.1	150	220
17-1482	10-00515-01	10-00516-01	51	60	41		20		11		0.2	37	56

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

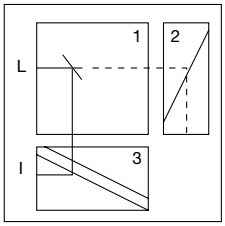
Load
per mounting (kg)







To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Metacone™ & HK

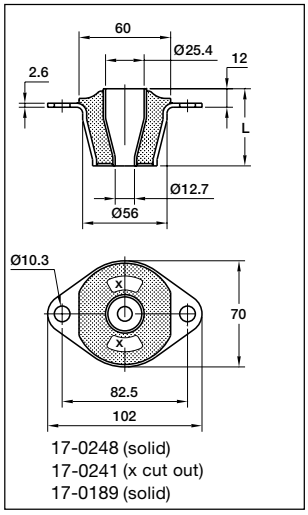
Metalastik® type Metacone™ and Novibra® type HK

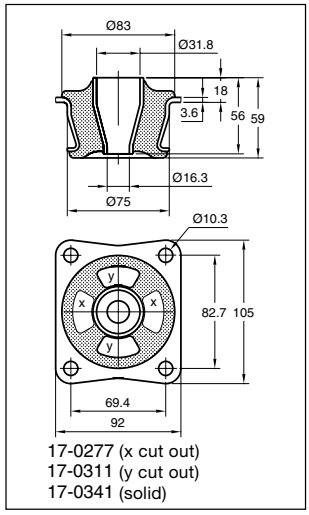
A range of mountings designed for high load capacity with relatively large static deflections. The high loading for a given size is achieved by utilising the rubber to best advantage in shear and compression. Normally, mountings are assembled with overload and rebound washers to control and limit movement of the suspended equipment under shock loads. Centre fixing bolts should be torque tightened to the recommended values.

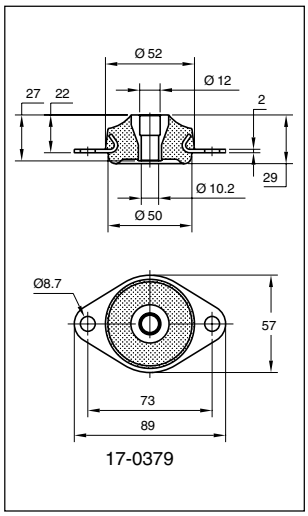
Applications include suspensions for:
- Off-road and road vehicle engines
- Vehicle Cabs
- Oil Tanks/Tankers
- Mobile applications

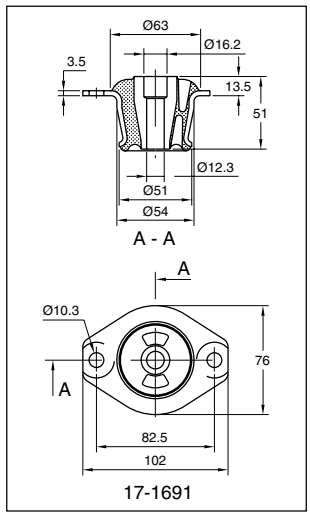
Features

A compact fail safe design, available for a wide range of loadings with in some cases alternative fixings.
Cutouts in rubber section on various sizes provide different vertical/horizontal stiffness ratios.
Most sizes can be supplied complete with overload and rebound washers.

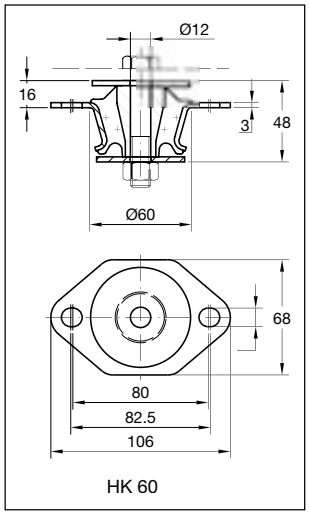








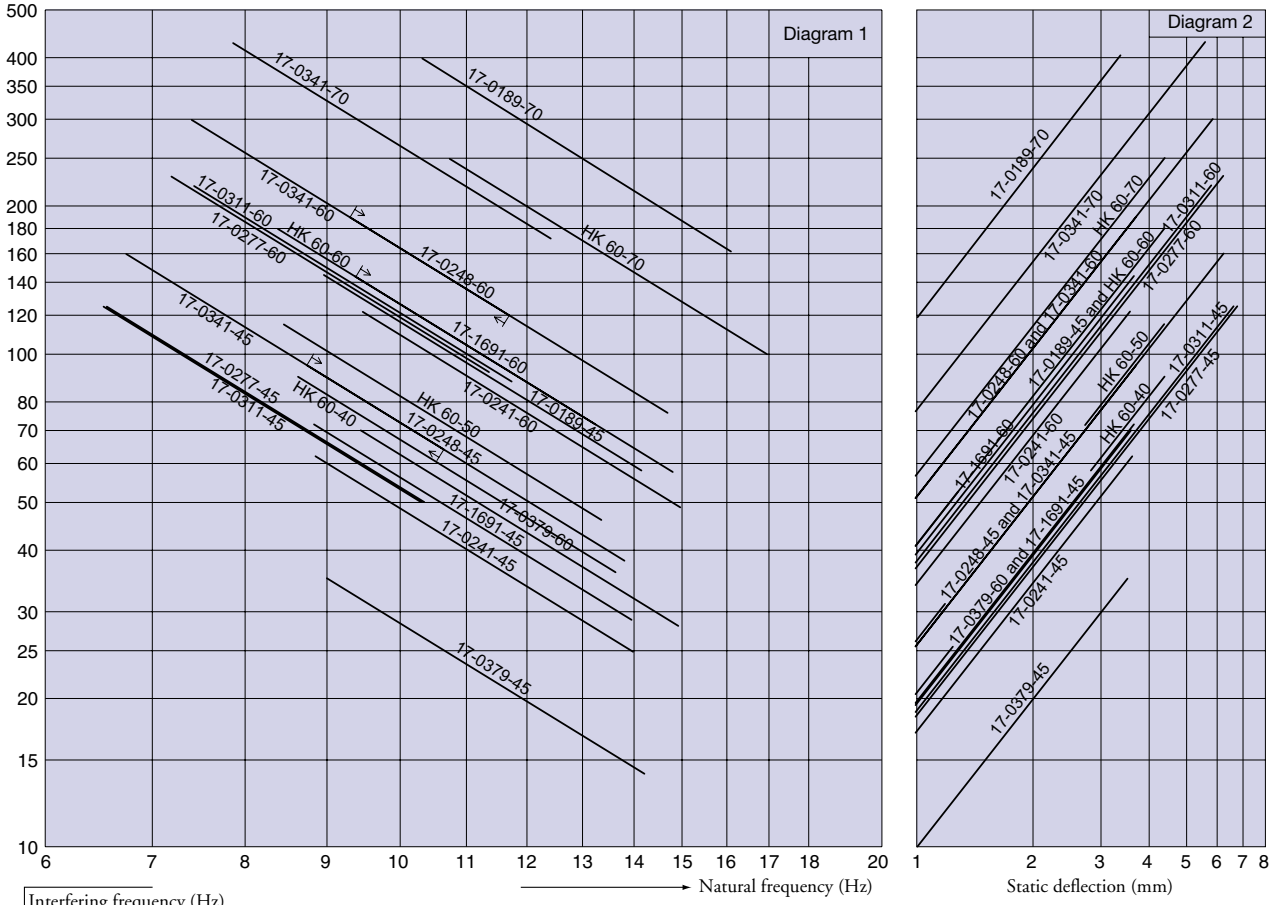
Type Metacone™	Part no.	Max vert. load (kg)	Weight (kg)
17-0189-45	10-00365-01	145	0.28
17-0189-70	10-00367-01	400	0.28
17-0241-45	10-00374-01	62	0.18
17-0241-60	10-00375-01	122	0.18
17-0248-45	10-00379-01	95	0.19
17-0248-60	10-00380-01	190	0.19
17-0277-45	10-00385-01	125	0.56
17-0277-60	10-00387-01	230	0.56
17-0379-45	10-00402-01	35	0.12
17-0379-60	10-00404-01	70	0.12
17-0341-45	10-00394-01	160	0.54
17-0341-60	10-00395-01	300	0.54
17-0341-70	10-00396-01	430	0.54
17-0311-45	10-00391-01	125	0.58
17-0311-60	10-00392-01	220	0.58
17-1691-45	10-00566-01	72	0.44
17-1691-60	10-00567-01	144	0.44
HK 60-40	10-01119-01	90	0.24
HK 60-50	10-01122-01	115	0.24
HK 60-60	10-01120-01	180	0.24
HK 60-70	10-01121-01	250	0.24

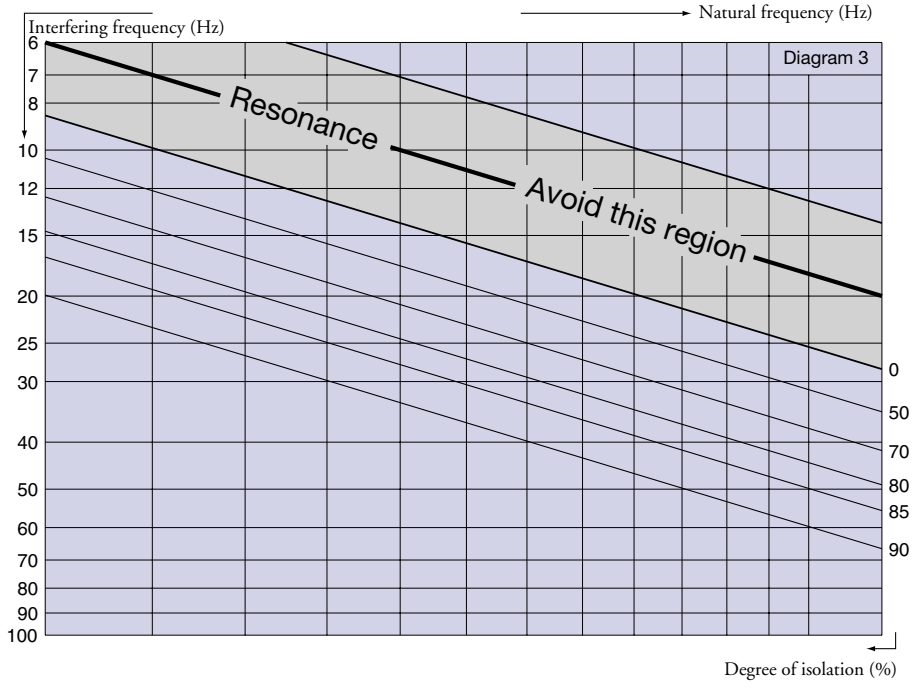


Type	Cone mount	Top washer Part no.	Bottom washer Part no.
Metacone™	17-0189	20-00529-01	10-03666-01
	17-0241	20-00529-01	10-03666-01
	17-0248	20-00529-01	10-03666-01
	17-0277	20-00773-01	20-00532-01
	17-0379	20-00531-01	20-00531-01
	17-0341	20-00773-01	20-00532-01
	17-0311	20-00773-01	20-00532-01
	17-1691	20-00535-01	20-00536-01
HK	HK 60	20-01103-01	20-00416-01

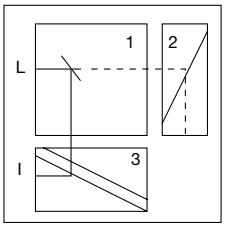
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



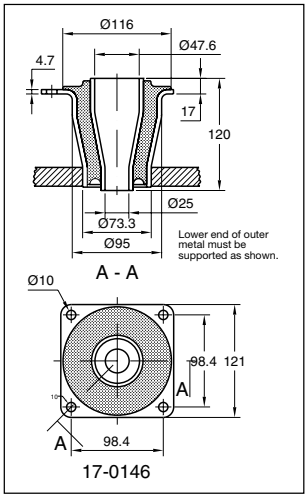


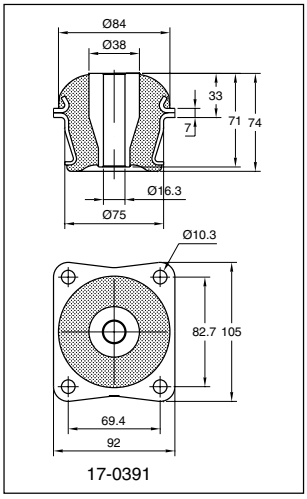
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

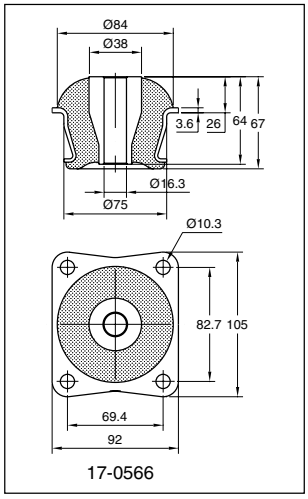


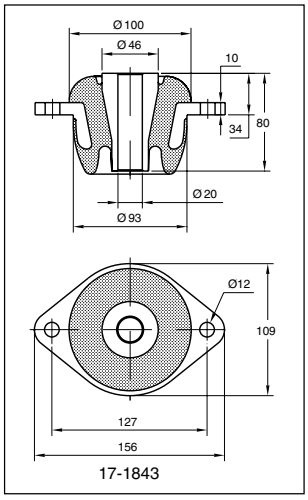
Metacone™ & HK

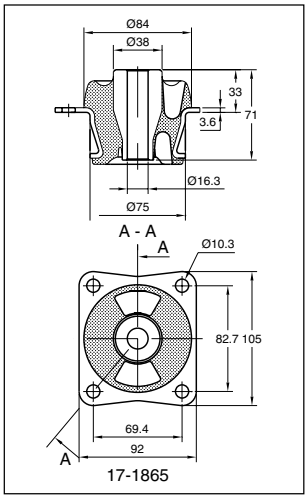
**Metalastik®
type Metacone™
and Novibra® type HK**

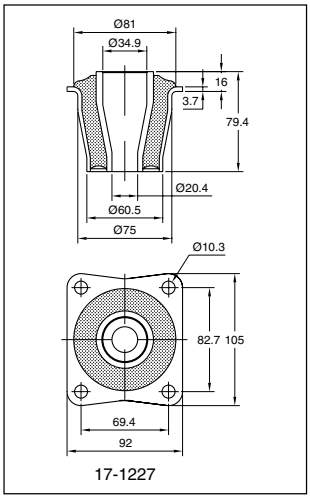


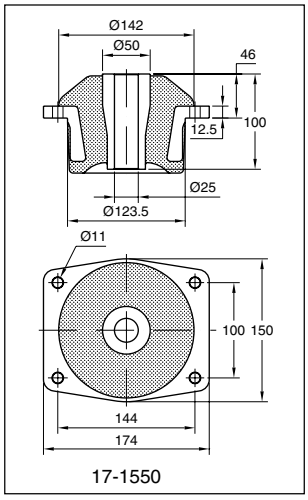




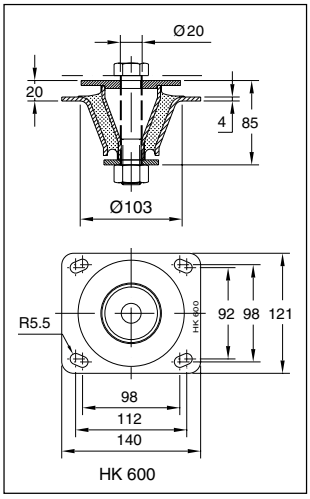


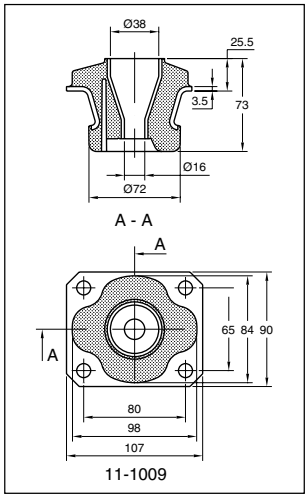






Type Metacone™	Part no.	Max vert. load (kg)	Weight (kg)
11-1009-45	10-00192-01	140	0.59
11-1009-55	10-00193-01	200	0.59
17-0391-45	10-00411-01	290	1.1
17-0391-60	10-00414-01	500	1.1
17-0391-70	10-00415-01	610	1.1
17-0566-45	10-00433-01	200	0.82
17-0566-60	10-00434-01	380	0.82
17-0566-70	10-00435-01	525	0.82
17-1227-45	10-00459-01	560	1.1
17-1227-60	10-00460-01	1000	1.1
17-1550-45	10-00524-01	720	4.4
17-1550-60	10-00526-01	1250	4.4
17-1843-45	10-00609-01	320	1.7
17-1843-60	10-00610-01	600	1.7
17-1865-55	10-00615-01	180	0.86
17-0146-45	10-00360-01	950	2
17-0146-60	10-00361-01	1700	2
HK 600-40	10-00190-01	940	1.0
HK 600-60	10-00191-01	1700	1.0

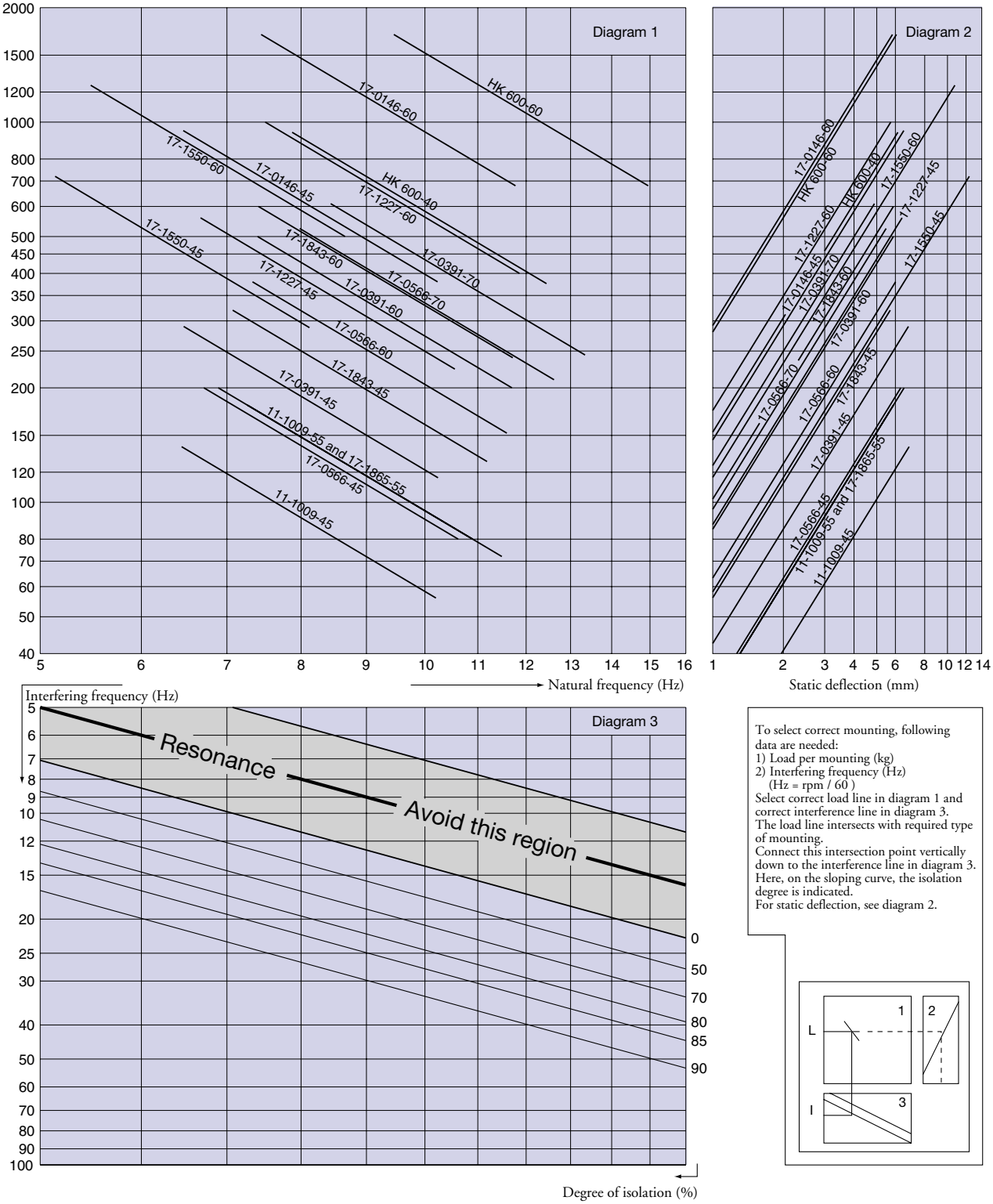




Type	Cone mount	Top washer Part no.	Bottom washer Part no.
Metacone™	11-1009	20-00532-01	20-00532-01
	17-0391	20-00532-01	20-00532-01
	17-0566	20-00532-01	20-00532-01
	17-1227	20-00528-01	10-03707-01
	17-1550	20-00534-01	20-00534-01
	17-1843	20-00533-01	20-00533-01
	17-1865	20-00532-01	20-00532-01
	17-0146	20-00527-01	20-00525-01
HK	HK 600	20-00643-01	20-00644-01

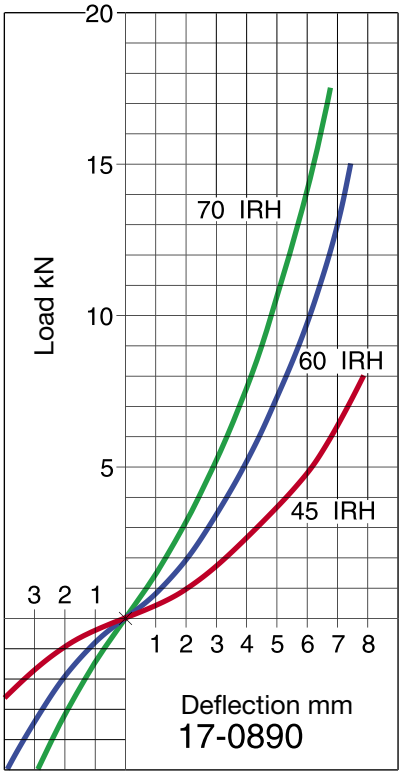
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)

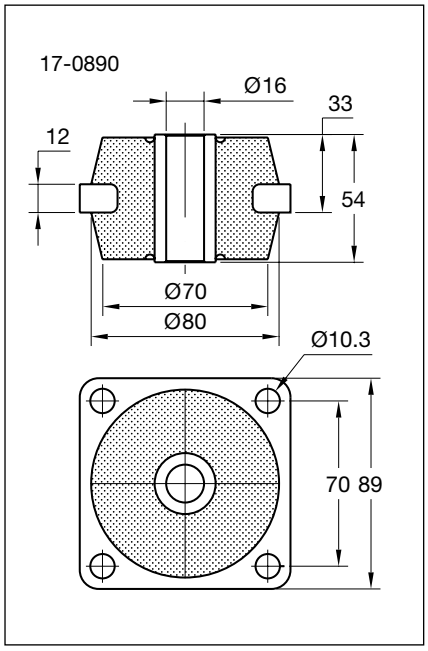


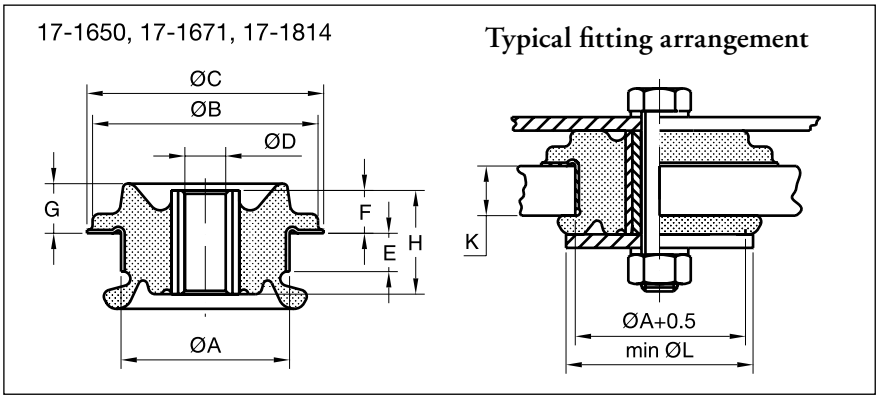
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

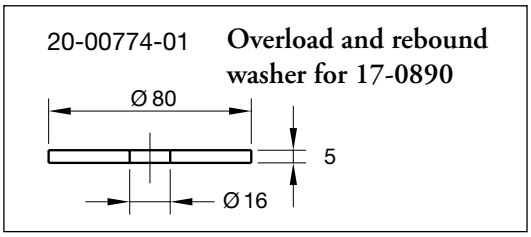
Cab Mountings



Metalastik® type Cab Mountings
Specially profiled rubber section together with bump and rebound washers provide optimum suspension characteristics for cabs on commercial vehicles, tractors and other off-road vehicles, earthmoving equipment and construction plant.



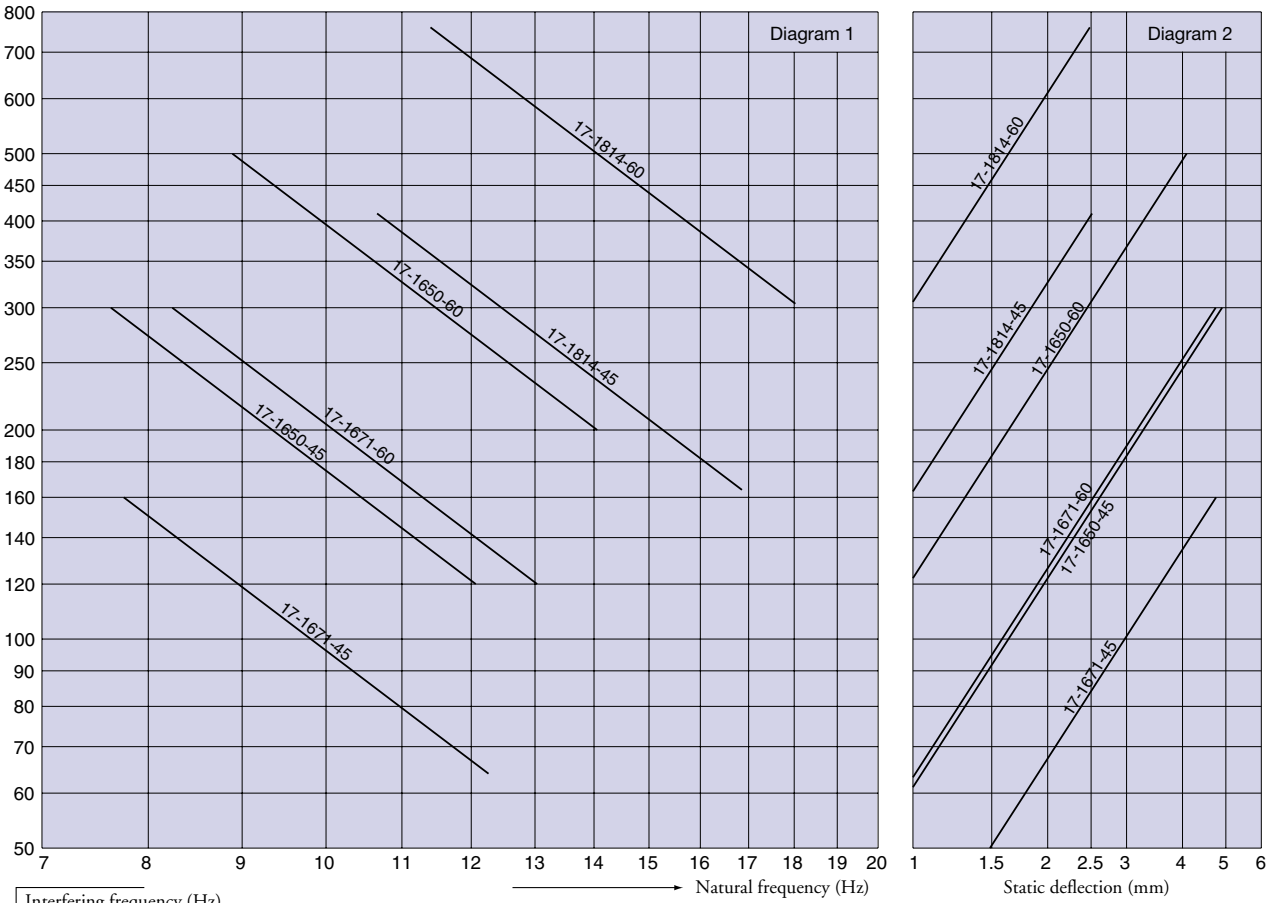


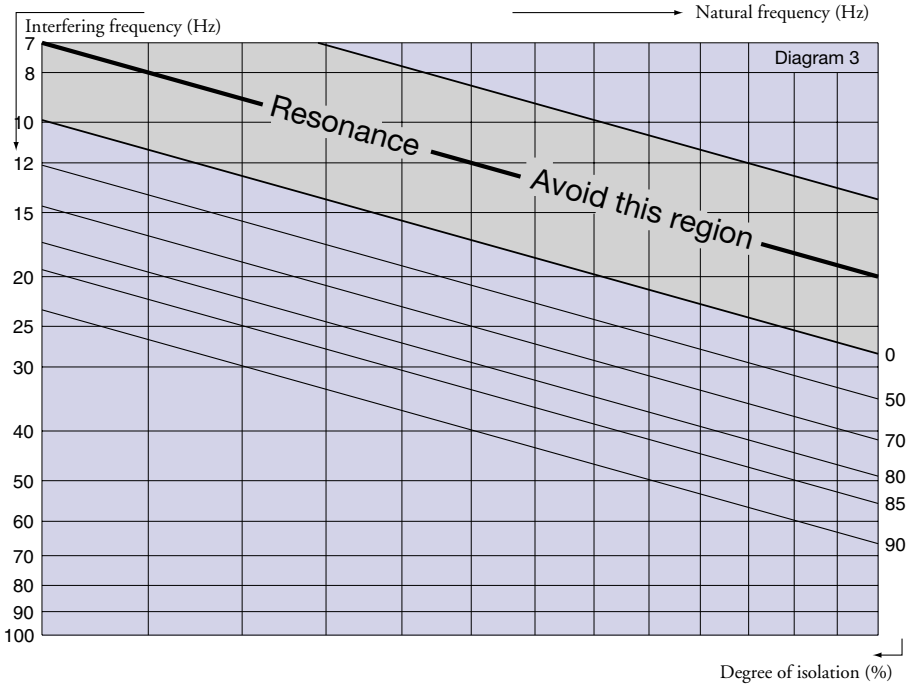


Type		Dimensions in mm										Max load	Radial stiffness	Weight
Cab mountings	Part no.	A	B	C	D	H	F	E	G	K	L	(kg)	(N/mm)	(kg)
17-1671-45	10-00563-01	75	100	105	16.5	46	19	17	22	20	105	160	500	0.45
17-1650-45	10-00554-01	75	100	105	16.5	46	19	17	22	20	105	300	650	0.46
17-1650-60	10-00555-01	75	100	105	16.5	46	19	17	22	20	105	500	1300	0.46
17-1814-45	10-00598-01	89	115	120	25	47	13	23	21	25	120	410	700	0.63
17-1814-60	10-00603-01	89	115	120	25	47	13	23	21	25	120	760	1400	0.63
17-0890-45	10-00440-01											Max static		0.83
17-0890-60	10-00441-01					See drawing						deflection		0.83
17-0890-70	10-00442-01											5 mm		0.83
Washer	20-00774-01													

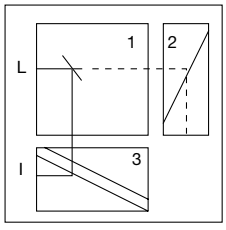
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



EH

Novibra® type EH

Type EH mountings are designed to achieve effective vibration isolation on engines, operator cabins and other ancillary units.

Typical applications can be found in the following areas:

- Off-road equipment
- Military vehicles
- Transport machinery
- Construction equipment
- Agricultural vehicles
- Industrial mobile machinery

Max tightening torque

- EH 4850: 40 Nm
- EH 6463: 80 Nm
- EH 9075: 200 Nm

Features

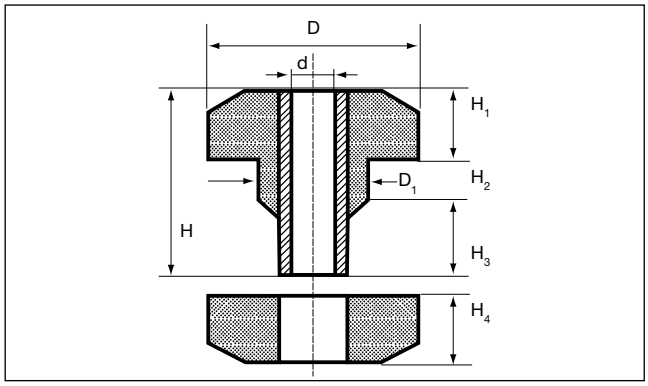
Type EH is designed primarily for mobile applications where high dynamic and shock forces are encountered.

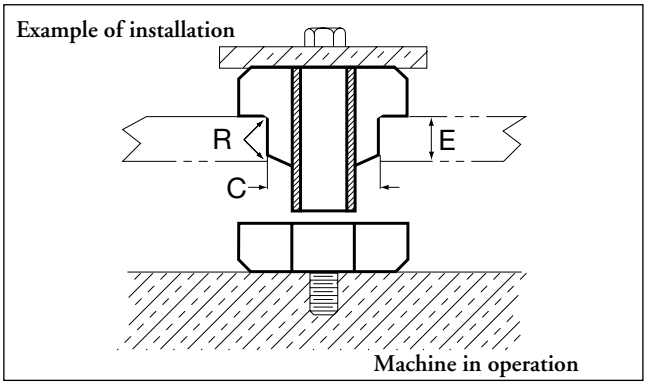
Dynamic vertical movements in both the directions are restricted and excellent horizontal stability is provided.

Stress on brackets are optimized while at the same time obtaining vibration isolation and shock absorption.

The function of EH includes features as:

- Dynamic efficiency in all directions
- Attenuation of structure-borne noise
- Accommodation of misalignment and distortion
- Simple design – easy to install
- Fail-safe installation
- Wide load range, 80 to 450 kg





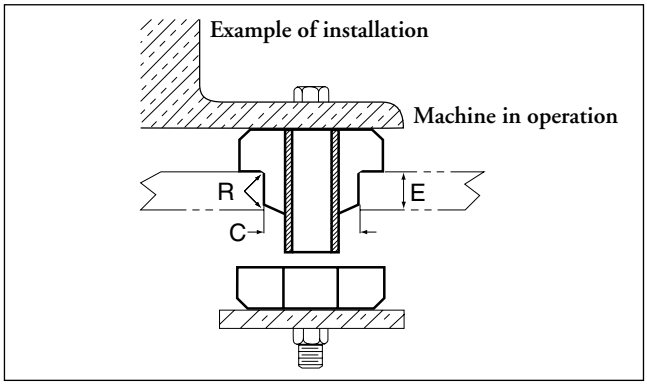


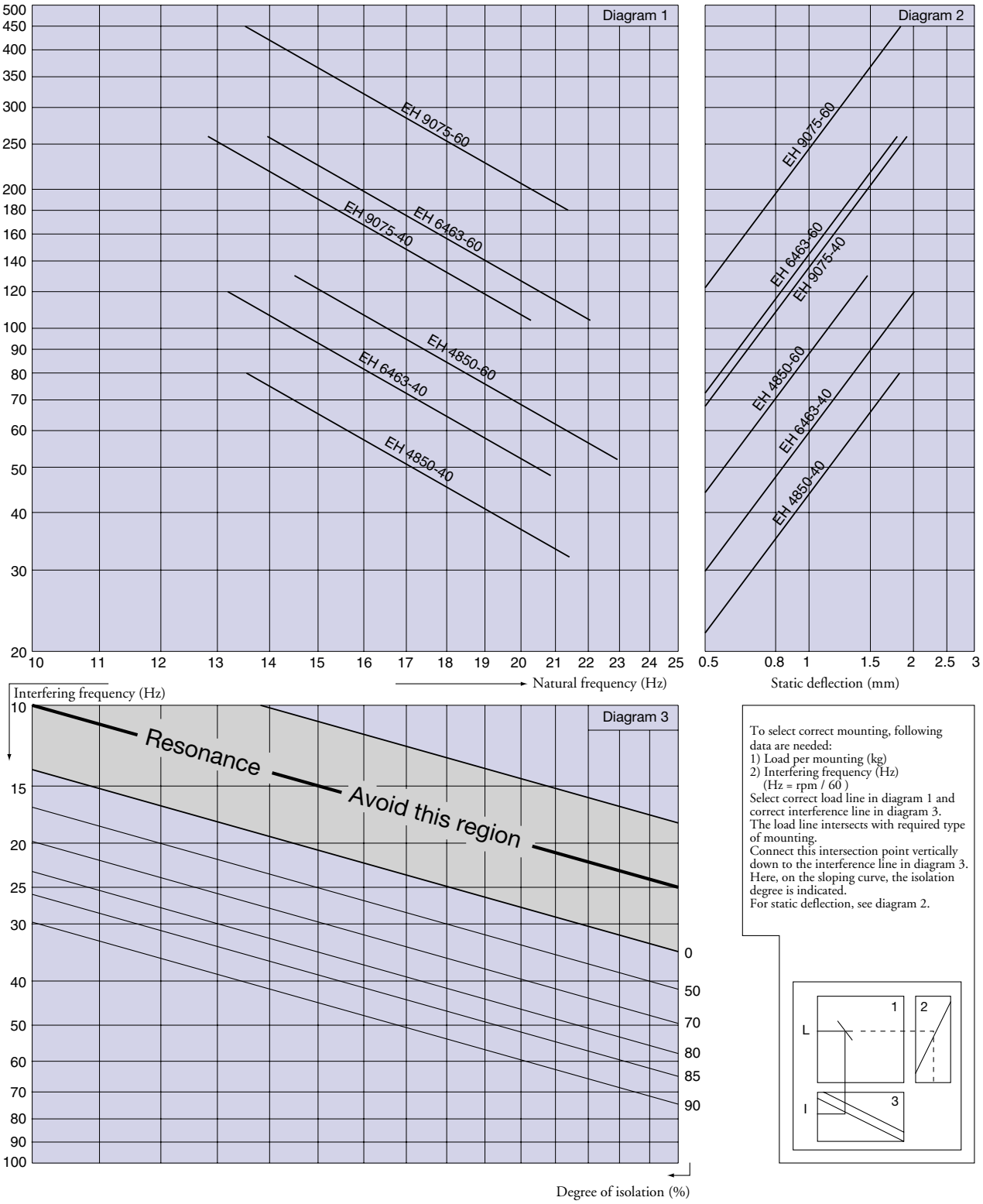
Table of dimensions for installation

Type	Dimensions in mm C	E	R	Top & Bottom Washer
EH 4850	31.0	15.0	1.5	20-00416-01
EH 6463	39.0	22.0	2.3	20-00532-01
EH 9075	56.5	28.0	3.0	20-00533-01

Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm d	D	D1	H	H1	H2	H3	H4	Max load (kg) 40° IRH	60° IRH
EH 4850	20-00621-01	20-00620-01	13.0	50	32	50	20	10	20	20	80	130
EH 6463	20-00619-01	20-00618-01	17.0	64	40	62	23	14	25	23	120	260
EH 9075	20-00617-01	20-00616-01	23.0	89	58	73	25	19	29	25	260	450

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)



UH

Novibra® type UH

Mounting type UH is particularly suitable for the suspension of both mobile and static cabs as well as platforms on agricultural vehicles.

Effectively isolating vibration and noise, the UH-mounting also protects tanks and ancillary equipment against metal fatigue caused by chassis distortion.

Specific applications can be found on:

- Tractors
- Combine harvester
- Wheeled loaders
- Street sweepers
- Compactors
- Lifting cranes
- Construction vehicles
- Forestry vehicles
- Off-road equipment
- Fork-lift trucks
- Excavators

Features

UH is an anti-vibration mounting designed to accommodate axial static and shock loads in both directions. The dynamic natural frequency is constant irrespective of the static load.

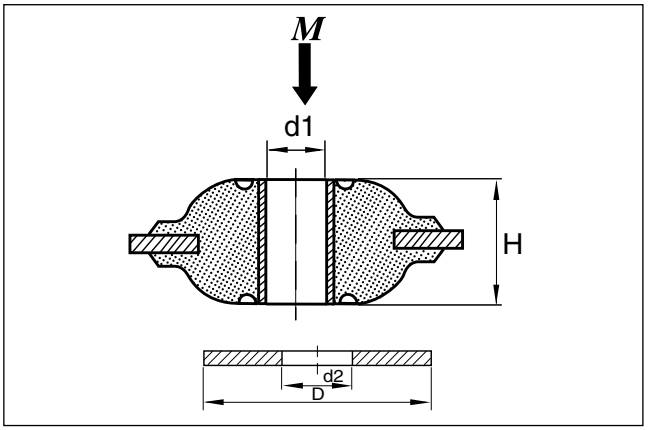
When fitted with overload/rebound washers, a high strength fail-safe installation is provided. Moreover, it is possible to alter the characteristics of the mounting by providing a dome-shaped washer at the upper rubber section. This will provide impact resistance to deflection beyond the permissable limit.

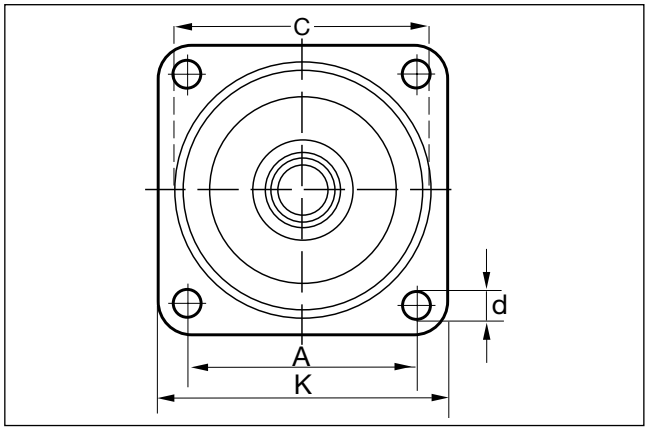
Installation reduces build tolerances.

UH is available in 2 standard versions allowing different maximum loads i.e. type UH 50 to a load of 250 kg and type UH 70 to 400 kg per mounting.

Note: Maximum tightening torque of bolts:

- UH 50 80 Nm
- UH 70 120 Nm

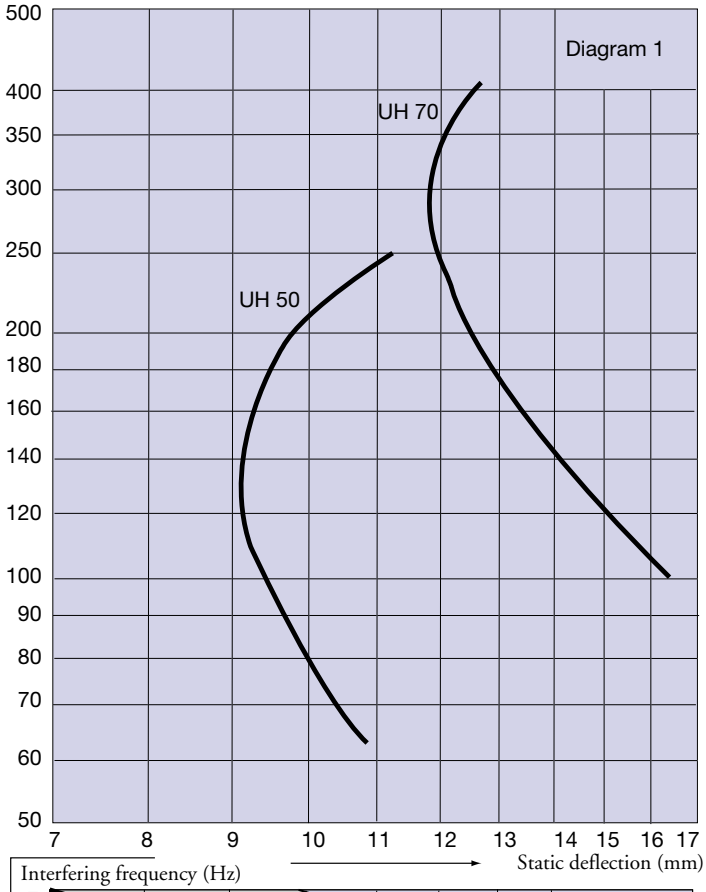


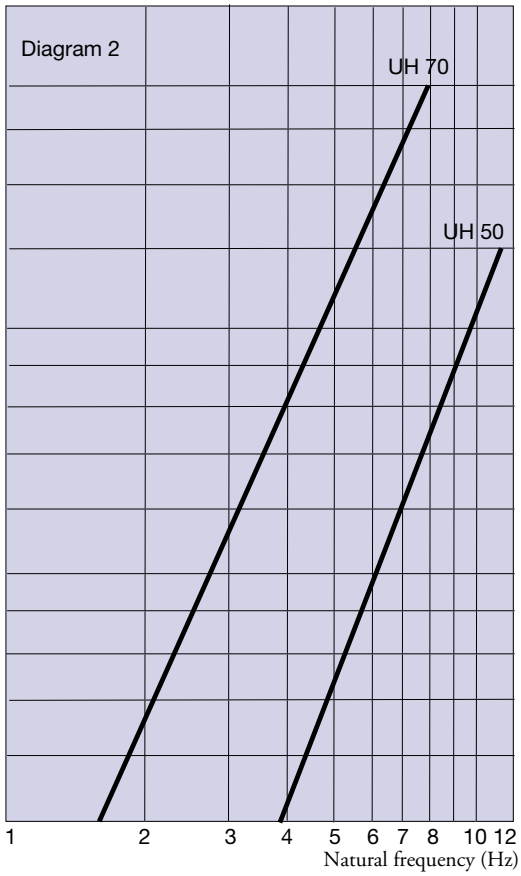


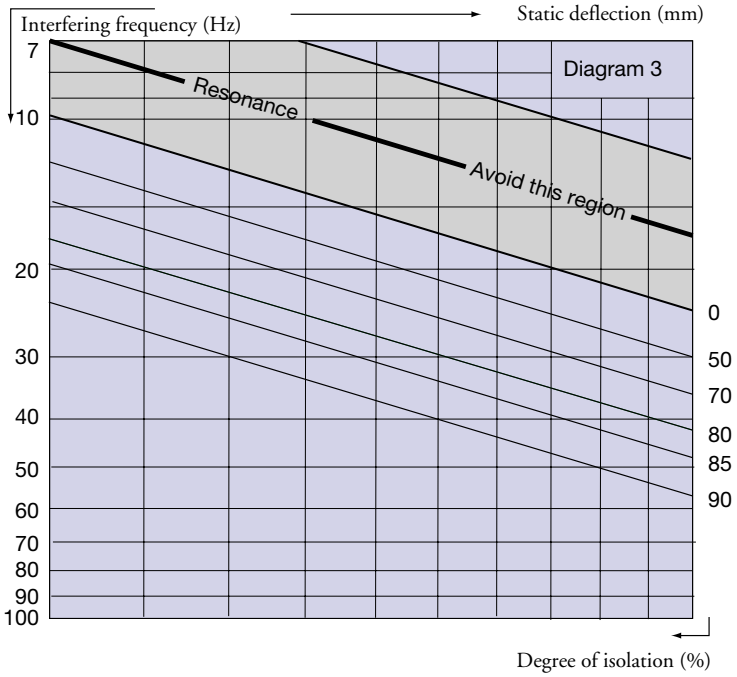
Type	Part no.	Dimensions in mm K	A	H	C	d	d_1	Weight (kg)	*M*-Max (kg)
UH-50	10-00086-01	100.5	80.4	37	91	10.5	15	0.41	250
UH-70	10-00088-01	100.5	80.4	37	91	10.5	17	0.41	400
		d_2	D	t					
UH Washer	20-00608-01	17	75	6					

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

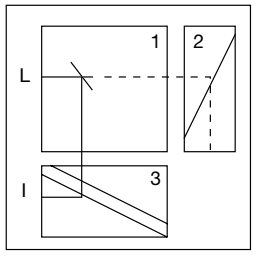
Load
per mounting (kg)







To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Metaxentric™ Bushes

Metalastik® type Metaxentric™ Bushes

Similar to conventional Ultra Duty Bushes but with inner and outer sleeves offset radially. This feature provides a greater rubber thickness and hence increased flexibility in the normal direction of loading while maintaining control in other modes and still allowing torsional movement.

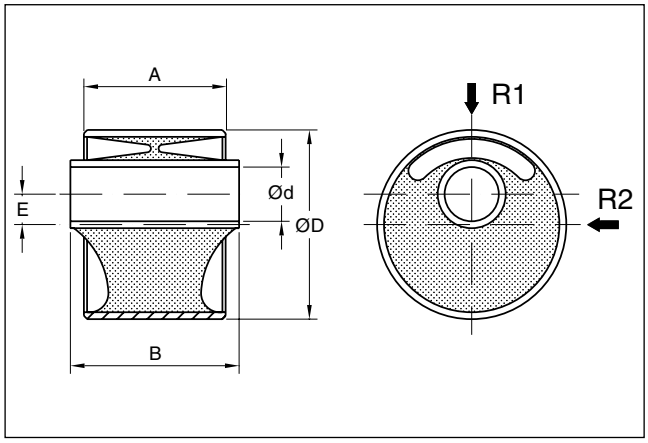
The rubber section is relieved to eliminate harmful tensile stresses.

Applications
- Vehicle spring eye mounting
- Tilt Cab pivot bush
- Engine mounting

Features

Metaxentric™ bushes have a large rubber section with the central pin offset towards one radial plane. These bushes can provide a relatively large radial deflection, but have excellent motion control characteristics.

The Metaxentric™ bush has the following features:
- Three dissimilar translational stiffnesses for the best vibration isolation and motion control.
- Load range from 130 to 400 kg.
- 'Rising rate' stiffness characteristics for overload conditions help to limit motion and transmitted acceleration.
- Robust and fail-safe, suitable for ROPS and FOPS cab structures.
- Simple to fit, the housing lends itself to robust structures.



Type		Dimensions					Radial properties Dir R1		Radial properties Dir R2	Dir R1	Weight
Metaxentric™	Part no.	d	D	A	B	E	Stiffn M/m	Max def.	Stiffn N/mm	Max load(kg)	(kg)
13-1270-50	10-00252-01	16	47.6	50.8	63.5	7.1	675	2	1600	135	0.18
13-2174-60	10-00297-01	24	75.3	50.8	70	10.5	910	3.5	1200	318	0.59
13-1165-50	10-00244-01	25.4	88.9	66.7	79.4	14.3	475	3.8	640	180	0.86
13-1165-65	10-00245-01	25.4	88.9	66.7	79.4	14.3	900	3.8	990	340	0.86
13-1355-60	10-00263-01	43.7	101.6	63.5	72.4	9.5	1300	3.5	2200	482	1.1

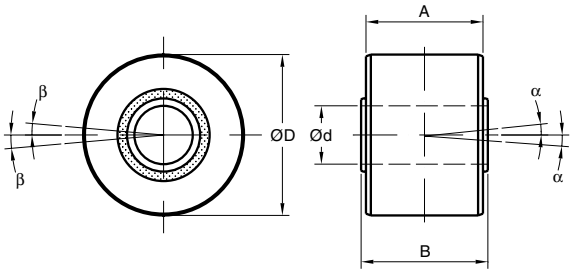
Features

A heavy duty flexible bearing which combines high load capacity with the ability to accommodate torsional and angular movements in all planes without lubrication and metal to metal wear. It is available with centre bore or solid member depending on fixing requirements.

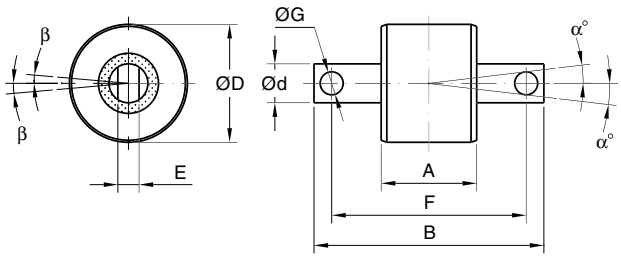
Metalastik® type Spherilastik™ Bearings

Typical uses include traction and braking reaction rods for rail, road and off-road vehicles, hydraulic damper fixings and other applications where a high duty bearing of compact size is required.

Spherilastik™ bearings, centre bore type



Spherilastik™ bearings, trunnion type



Type	Part no.	Dimensions in mm d	D	A	B	E	F	G	Radial Stiffness kN/mm	Radial Max load kN	Torsion Stiffness kNm/rad	Torsion ±ß degrees	Bending Stiffness kNm/rad	Bending ±α degrees	Weight (kg)
Spherilastik™ bearings															
13-1316-60	10-00257-01	25.4	66.7	47.6	54				70	34	0.9	8	0.9	6	0.84
13-1006-60	10-00237-01	28.6	90.5	70	76.2				93	58	2.8	8	2.8	6	2.5
Centre bore type															
13-2106-60	10-00291-01	28.6	84	63	76.2				100	58	2.8	8	2.8	6	1.8
13-1285-60	10-00255-01	38.1	104.8	76.2	82.6				90	78	4.5	8	3.8	7	3.4
Trunnion type															
13-2202-60	10-00302-01	35	66.7	47.6	120	20	90	13	70	34	0.7	8	0.9	6	1.2
13-2033-60	10-00283-01	40	84	65	155	20	120	16.5	150	75	2.8	6	2.8	6	2.8

VP & UD Bushes

Features

Novibra® type VP and Metalastik® type UD consist of two concentric sleeves with rubber securely bonded between them. Designed to accomodate torsional movements and axial and radial loads. The rubber is prestressed to give maximum dynamic strength and durability.

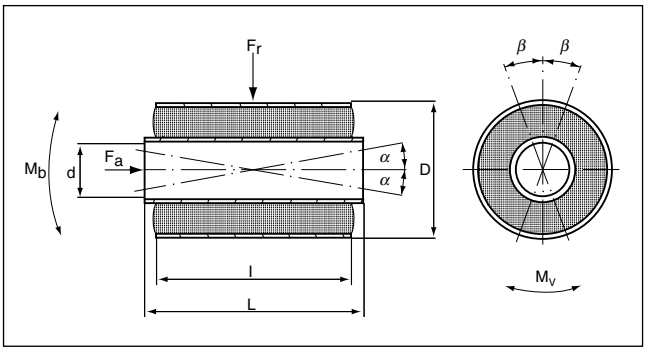
The bonded rubber takes up the full movement. Lubrication or other bearing maintenance is not required. The bush has excellent sound and vibration isolation characteristics, enabling structures fitted with Novibra® type VP and Metalastik® type UD sleeves to be silent and vibration free.

Novibra® type VP and Metalastik® type UD Bushes

For vehicle suspension, pivot arms and all types of mechanical linkage, permits oscillating movement through the deflection of rubber in shear. Suitable to replace roller bearings where small motions are required (up to 20 degrees). Reduces shock loads and noise transmission in structures.

Applications

- Vehicle suspension arms
- Vibratory feeders
- Conveyer tracks
- Mechanical linkages
- Pivot bearings



Designation Type	Part no. 60° IRH	Dimensions in mm d	D	L	l	Max Mv Nm/ degr.	Torsion Max β degr.	Stiffness Nm/degr.	Max Mb Nm	Conical Max α degr.	Stiffness Nm/degr.	Axial load Max Fa N	Stiffness N/mm	Radial load Max Fr N	Stiffness N/mm	Weight (kg)
VP 10/2525	10-00021-01	10	25	25	20	5.0	15	0.3	6.0	8	0.7	750	170	2300	2000	0.04
VP 10/2540	10-00022-01	10	25	40	35	6.0	15	0.4	38.0	8	4.8	1500	380	3800	2350	0.06
VP 15/3530	10-00023-01	15	35	30	25	9.0	15	0.6	12.0	8	1.5	1500	220	3500	3000	0.08
VP 15/3550	10-00024-01	15	35	50	45	15.0	15	1.0	120.0	8	15.0	2500	520	6000	6500	0.12
VP 20/4540	10-00025-01	20	45	40	35	24.0	15	1.6	45.0	8	5.6	2600	330	6800	4000	0.16
VP 20/4575	10-00026-01	20	45	75	70	48.0	15	3.2	365.0	8	46.0	5500	820	13500	8000	0.32
VP 25/5045	10-00027-01	25	50	45	40	46.0	14	3.3	96.0	8	12.0	3800	450	9000	4500	0.21
VP 25/5085	10-00028-01	25	50	85	80	69.0	14	4.9	730.0	8	92.0	7500	960	18000	10500	0.42
VP 30/6055	10-00029-01	30	60	55	45	78.0	14	5.6	135.0	8	17.0	5100	530	12000	5000	0.34
VP 35/6560	10-00031-01	35	65	60	50	93.0	12	7.7	180.0	6	23.0	6600	720	16000	8500	0.43
VP 40/7065	10-00033-01	40	70	65	55	138.0	12	11.5	290.0	7	41.0	8300	870	20500	17000	0.56
VP 45/7570	10-00035-01	45	75	70	60	240.0	12	20.0	320.0	7	45.0	10000	1100	24000	20000	0.67
VP 50/8075	10-00037-01	50	80	75	65	275.0	11	25.0	700.0	7	100.0	12000	1350	28500	30000	0.77

Type UD bushes	Part no.	Dimensions in mm d	D	1	L	Torsion Stiffness Nm/rad	±ß degrees	Axial Stiffness N/mm	Max defl. mm	Radial Stiffness N/mm	Max load kN	Weight (kg)
13-1232-60	10-00250-01	8	20	15	17	10	13	205	1.3	2000	0.7	0.02
13-1230-55	10-00249-01	10	24	15	18	14	13	180	1.7	1300	0.5	0.02
13-1782-60	10-00277-01	12.7	38.2	25.4	31.8	30	22	220	3.3	1200	1.1	0.08
13-1657-60	10-00271-01	12.7	38.2	44.5	50.8	42	22	330	3.3	2100	2.2	0.14
13-0785-60	10-00215-01	14.3	30.2	44.5	50.8	86	13	640	1.9	11000	6	0.11
13-0797-60	10-00218-01	15.9	33.4	60.3	65	140	13	960	2.1	18800	9.5	0.16
13-1004-60	10-00235-01	15.9	47.7	44.5	50.8	74	20	330	4.2	2500	2.5	0.20
13-1698-60	10-00276-01	35	71.2	41.1	45	395	14	550	5.1	3800	4.5	0.39

Novibra® type SAW

Novibra® elements type SAW are heavy duty mountings for static and shock loads in compression. Provides high isolation in the horizontal shear direction.

Typical fields of application are:

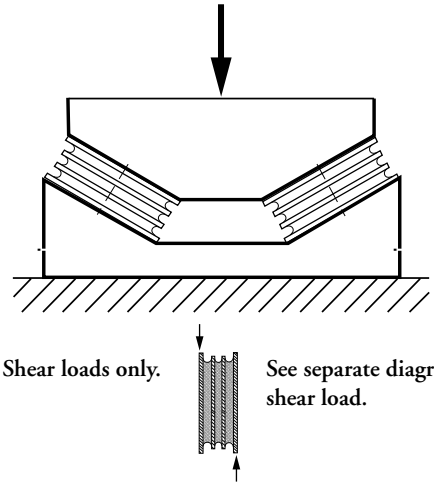
- Crushers
- Edge runners
- Mills
- Hoppers and feeders
- Grinders
- Vibratory rollers
- Screens
- Other very heavy machines and equipment

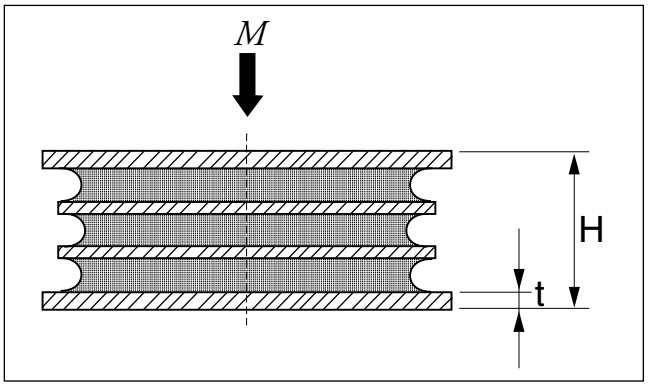
Features

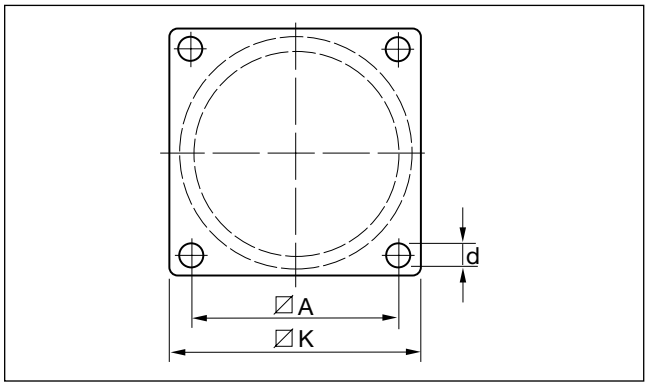
Novibra® type SAW mountings consist of a cylindrical shaped rubber section with integrally bonded interleaf metal plates bonded to two square heavy duty outer metal fixing plates. Designed for large compressive forces with minimum deformation, while providing low shear stiffness rates.

The combination of a stable low installation height, high compressive strength and low shear stiffness makes Novibra® type SAW a versatile high performance antivibration mounting. Ease of installation due to 4 clearance holes in each fixing plate.

By connecting 2 SAW-elements in series, i.e. one on top of the other, an increased isolation efficiency is achieved in both shear and compression planes. Where larger deflections are required in the vertical plane, Novibra® type SAW mountings are mounted at a calculated angle configuration to provide the optimum spring rate.

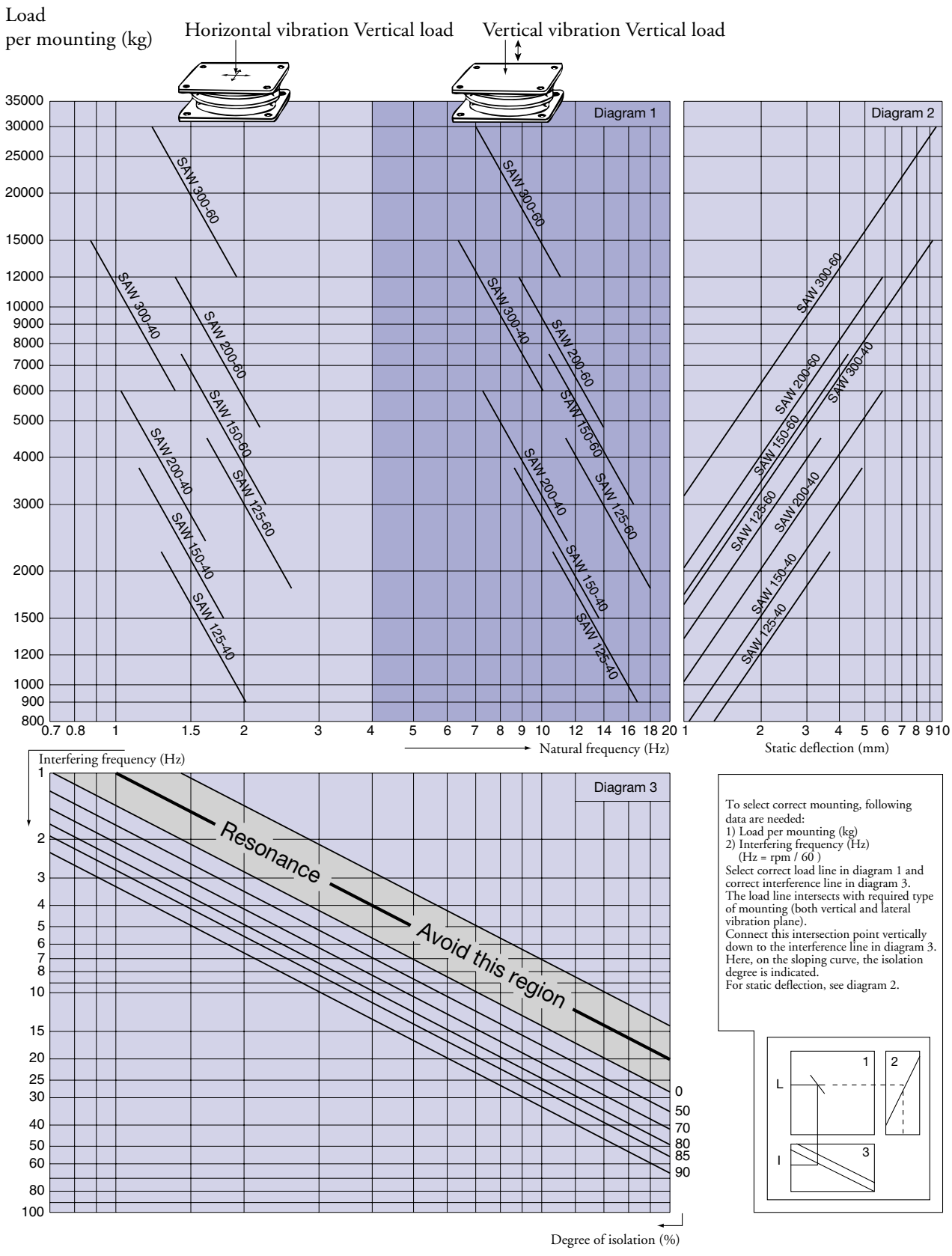






Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm A	K	H	d	t	Weight (kg)	*M*-Max(kg) 40° IRH	60° IRH
SAW 125	10-00141-01	10-00142-01	118	148	52	13.5	5	2.6	2250	4500
SAW 150	10-00143-01	10-00144-01	136	166	63	13.5	6	4.1	3750	7500
SAW 200	10-00075-01	10-00076-01	184	220	82	17.0	8	9.2	6000	12000
SAW 300	10-00077-01	10-00078-01	270	310	120	22.0	10	27.0	15000	30000

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.



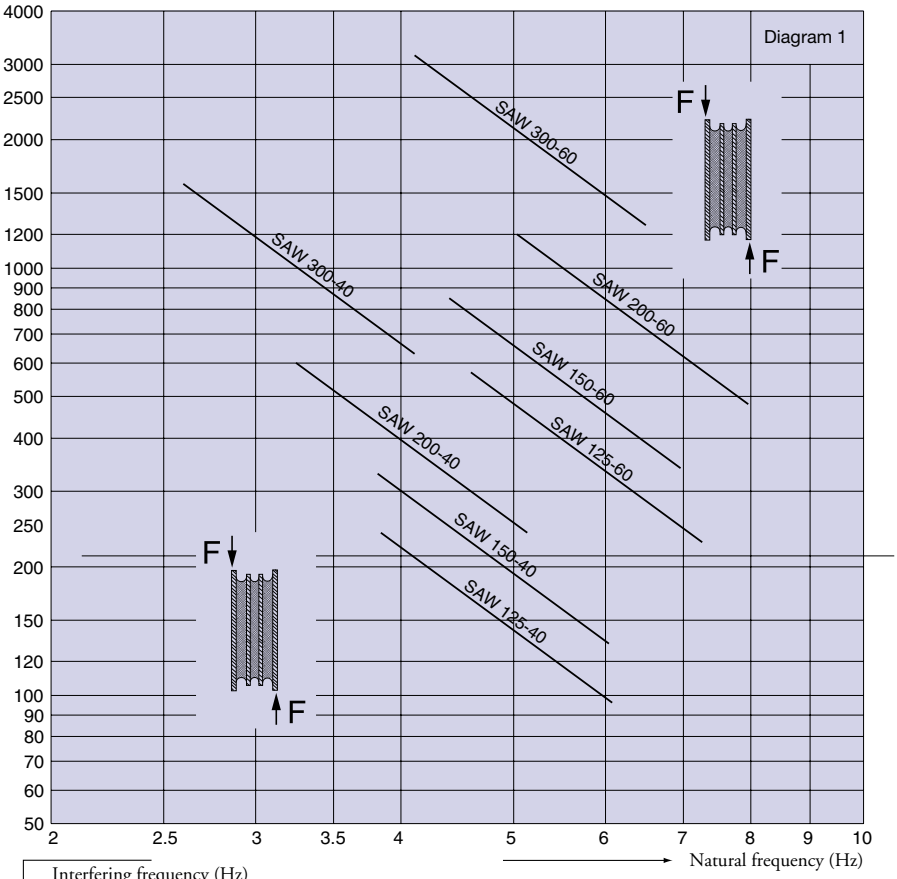
To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting (both vertical and lateral vibration plane).
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

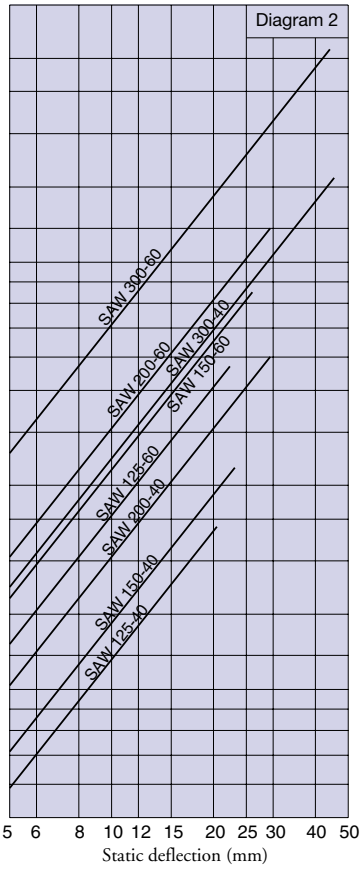
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

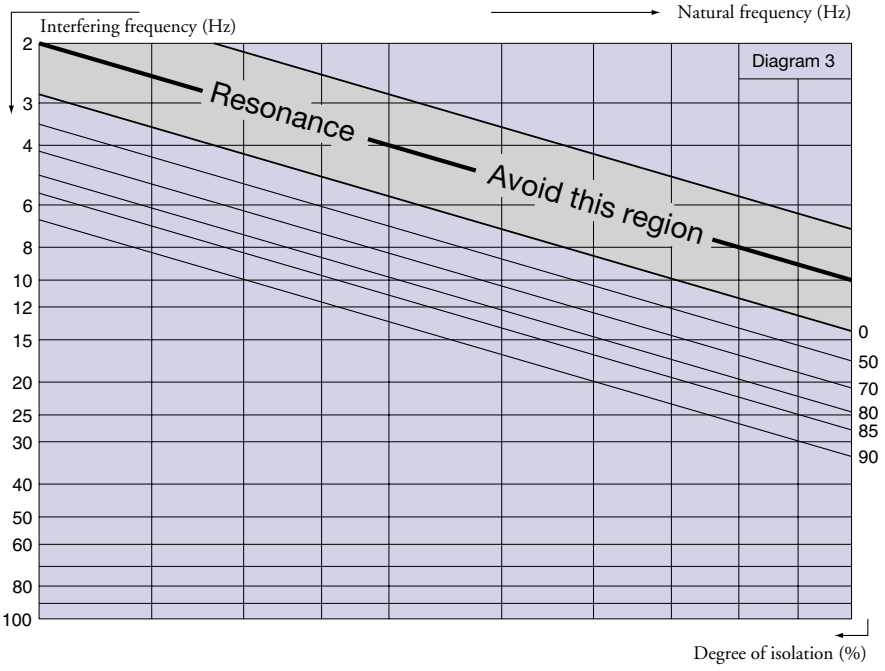
F max (kg)	40° IRH	60° IRH
SAW 125	240	570
SAW 150	330	850
SAW 200	600	1200
SAW 300	1575	3150

This page refers to shear load characteristics only!

Load per mounting (kg)







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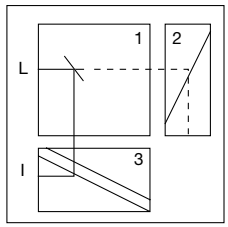


Rectangular SAW Mountings

Metalastik® type Rectangular SAW Mountings and Novibra® type 3” COMP

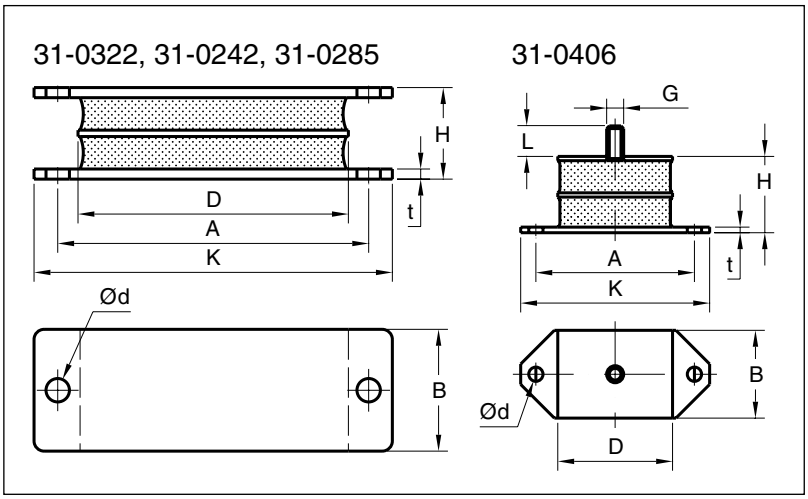
Widely used for suspending engines on road vehicles and may also be employed as springs for vibratory equipment.

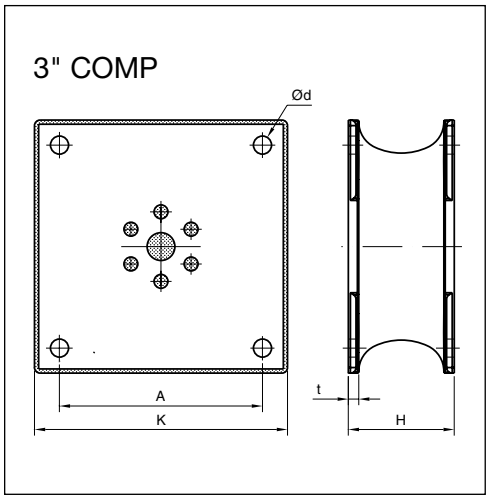
Features

Rectangular SAW mountings are also known as ’Sandwich’ mountings because they feature a rubber section sandwiched between plates of metal. This arrangement allows a large difference between the compression and shear stiffnesses, thus providing the potential to ’tune’ a mounting system by rotating the mountings. These mountings are commonly installed in a ’Vee’ formation to utilise this feature.

The Rectangular SAW Mountings has the following features:

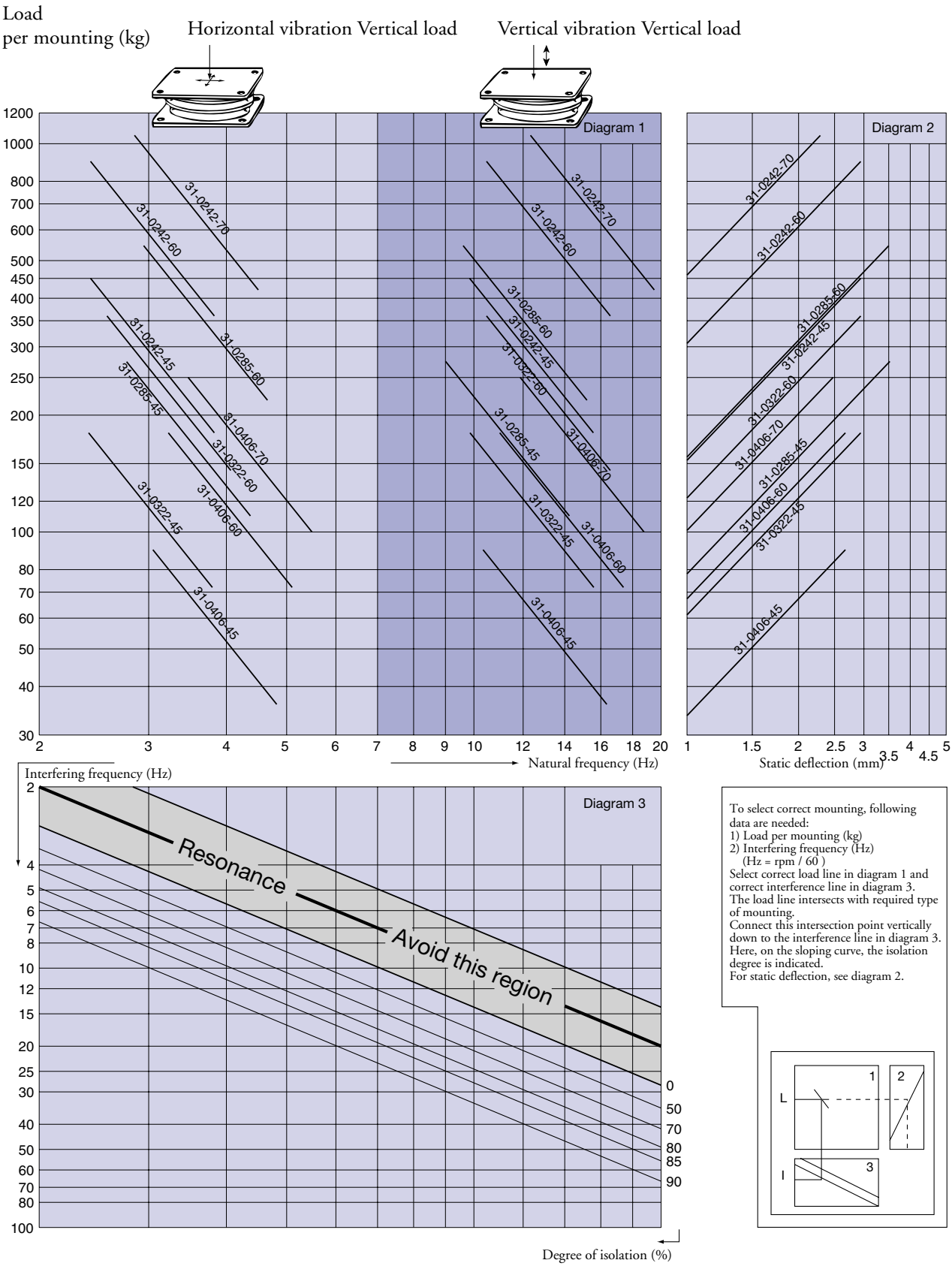
- Available with plate or stud fixings.
- Can be loaded in compression or shear, or a combination of both, for example in a ’Vee’ arrangement.
- Can be manufactured with or without interleaves to change the ratio of shear to compression stiffness.





Rectangular SAW mountings		Dimensions in mm									Max load in	Max load in	Weight
Type	Part no.	A	B	K	H	D	d	t	G	L	compression (kg)	shear (kg)	(kg)
31-0322-45	10-00658-01	89	57	108	43	63.5	11	5			180	50	0.65
31-0322-60	10-00659-01	89	57	108	43	63.5	11	5			360	75	0.65
31-0242-45	10-00648-01	146	57	168	43	127	11	5			450	120	1.1
31-0242-60	10-00651-01	146	57	168	43	127	11	5			900	150	1.1
31-0242-70	10-00652-01	146	57	168	43	127	11	5			1050	150	1.1
31-0406-45	10-00661-01	74.5	41	89	36	54	6.5	2.5	M8	14	90	40	0.23
31-0406-60	10-00971-01	74.5	41	89	36	54	6.5	2.5	M8	14	180	70	0.23
31-0406-70	10-00663-01	74.5	41	89	36	54	6.5	2.5	M8	14	250	90	0.23
31-0285-45	10-00656-01	146	57	168	43	127	11	5			275	150	0.9
31-0285-60	10-00657-01	146	57	168	43	127	11	5			546	150	0.9
3"COMP-55	10-00067-01	146		182	76		13	7.5				220	3.4
3"COMP-60	10-00065-01	146		182	76		13	7.5				280	3.4
3"COMP-65	10-00066-01	146		182	76		13	7.5				340	3.4

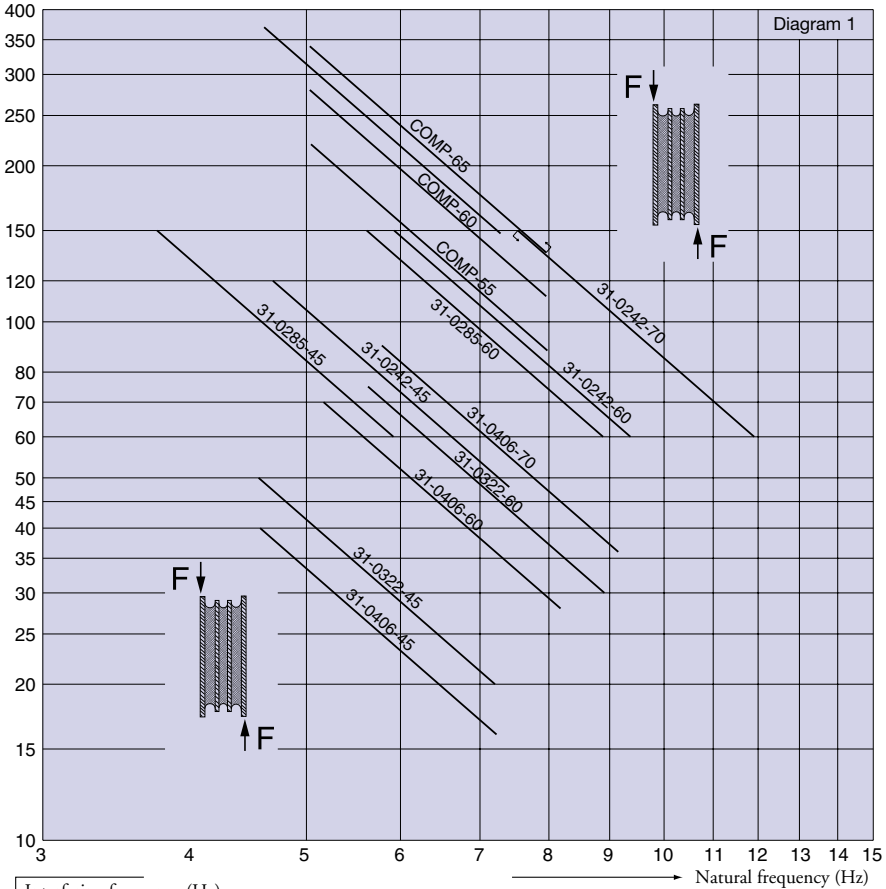
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

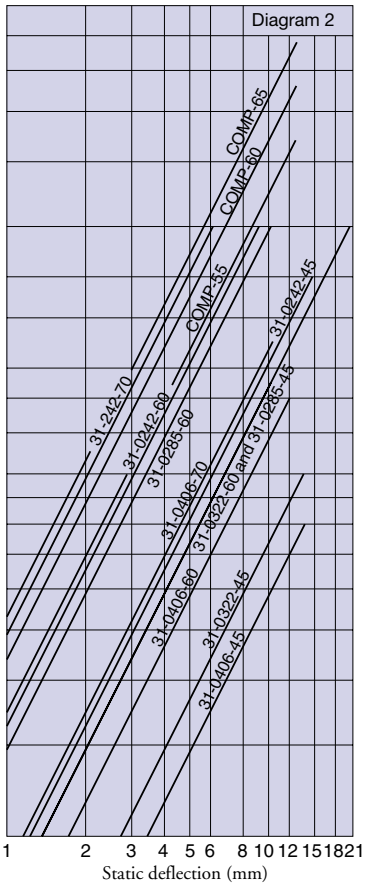


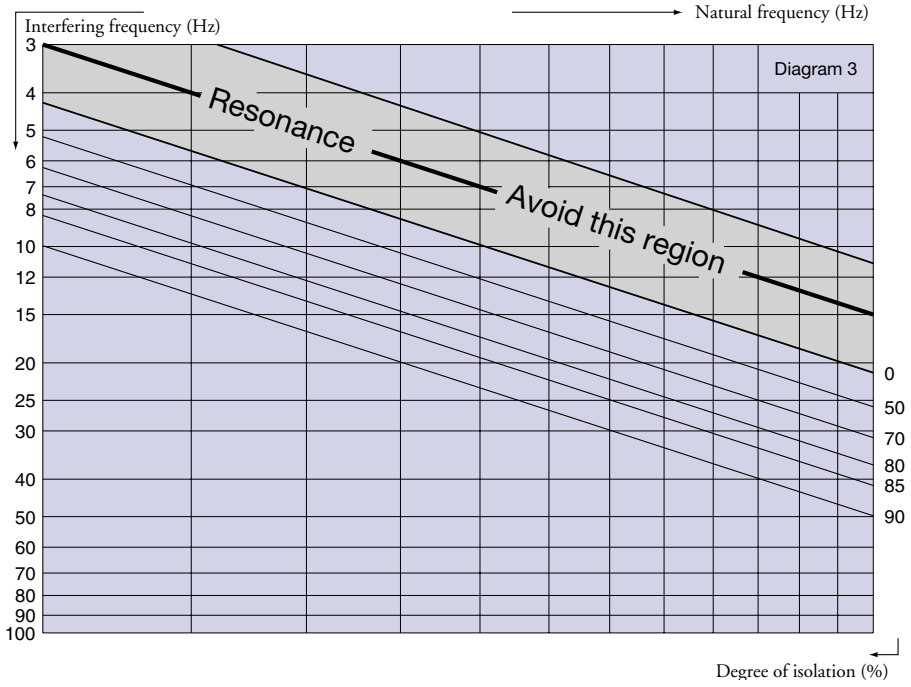
Rectangular SAW Mountings

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

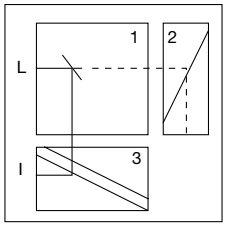
Load
per mounting (kg)







To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

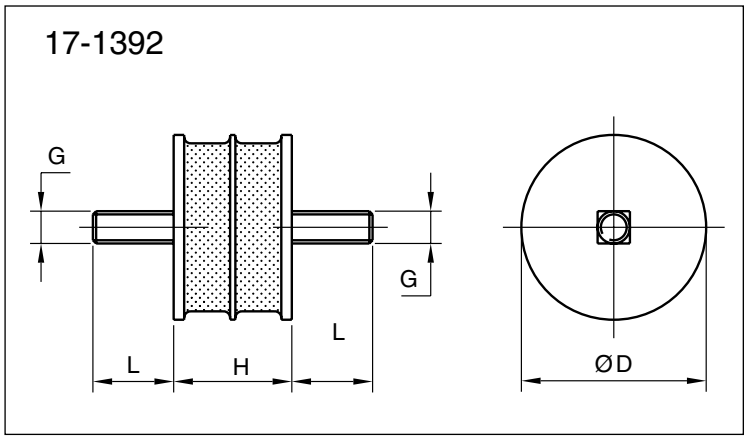


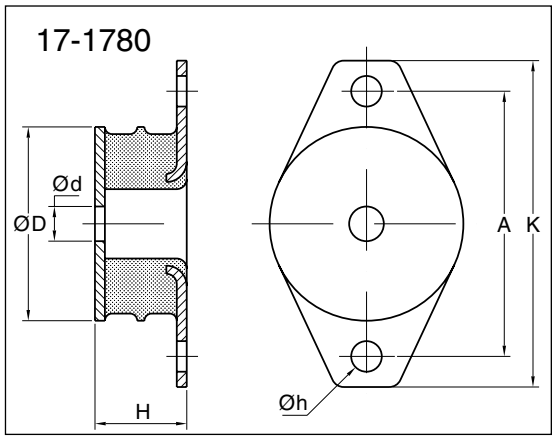
Metalastik® type Circular SAW Mountings
Used in a variety of industrial applications including vibratory rollers and small screens or for the suspension of smaller type I.C. engines.

17-1780 can be fitted with a rebound washer for mobile applications.

Features
The metal interleaf incorporated (17-1392) in the design provides a higher compression to shear stiffness ratio, thereby increasing the load capacity in the compression or combined compression and shear modes.

The 17-1780 engine mounting features a void in the rubber section to allow the use of a central snubber device.

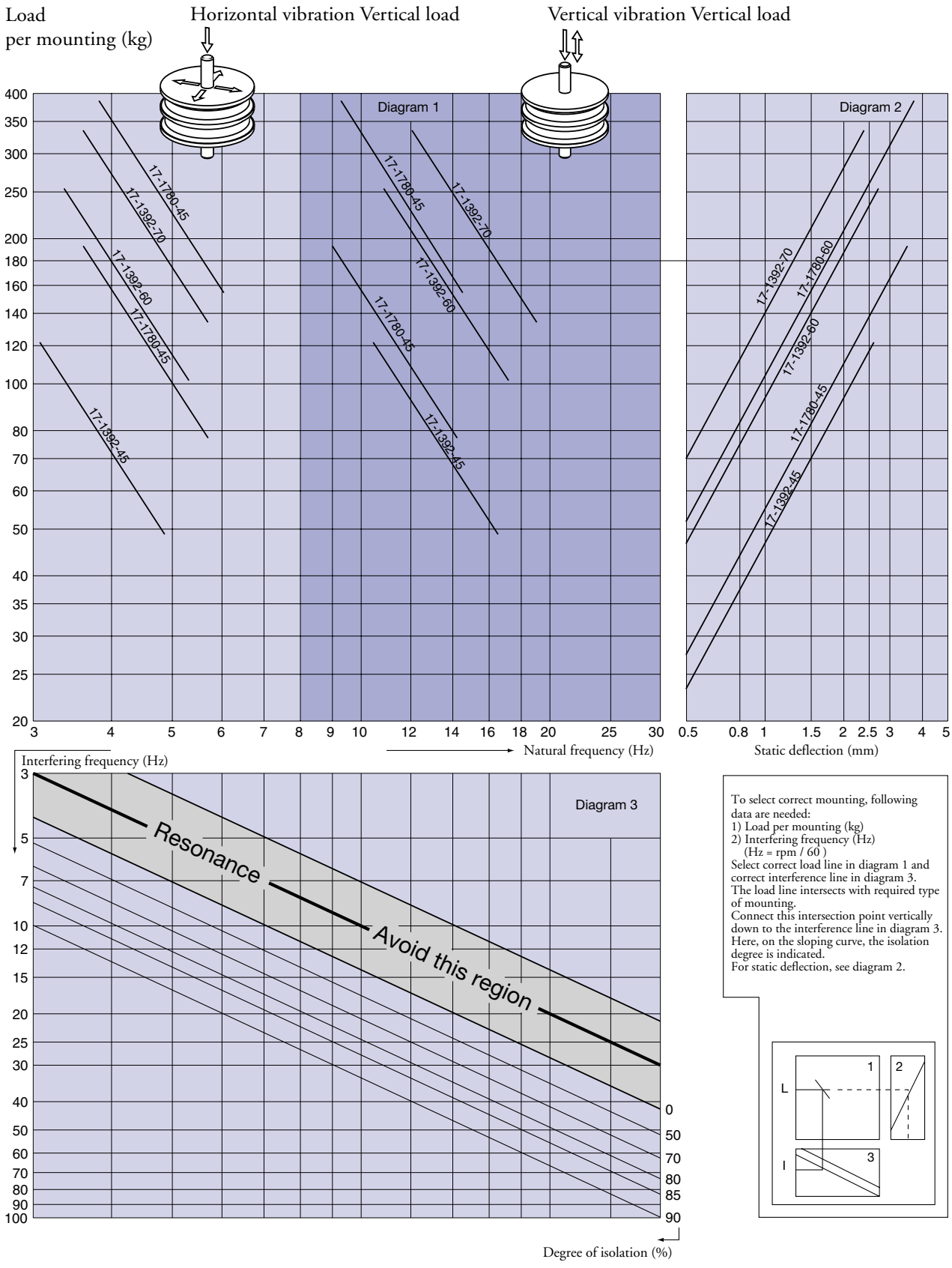




Cirkular SAW mountings		Dimensions in mm								Max load in	Max load in	Weight
Type	Part no.	D	H	L	G	A	K	d	h	compression (kg)	shear (kg)	(kg)
17-1392-45	10-00492-01	57	37	25	M10					120	90	0.28
17-1392-60	10-00493-01	57	37	25	M10					250	90	0.28
17-1392-70	10-00494-01	57	37	25	M10					330	90	0.28
17-1780-45	10-00577-01	95	45			130	160	17	15	190	135	0.81
17-1780-60	10-00578-01	95	45			130	160	17	15	380	160	0.81

Circular SAW Mountings

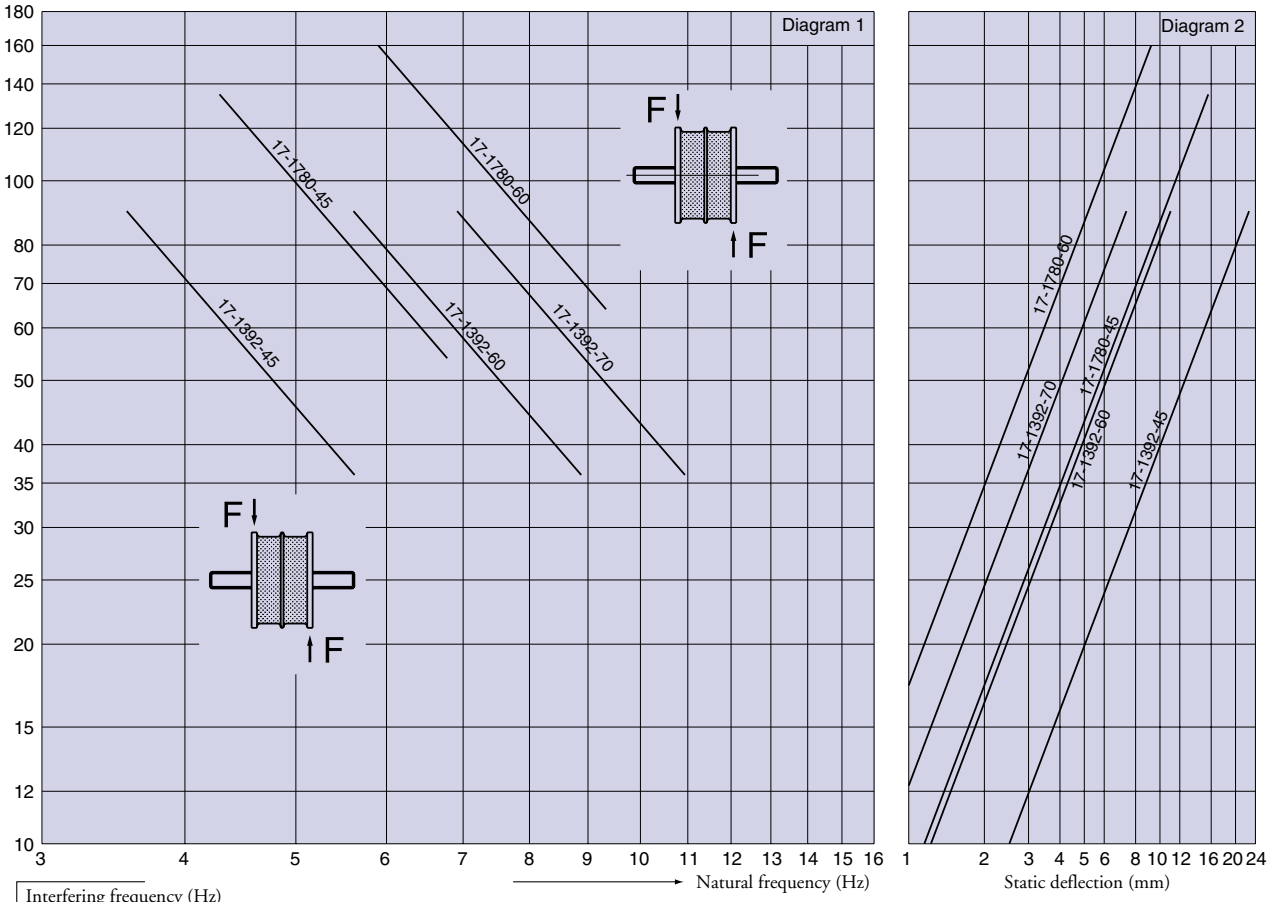
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

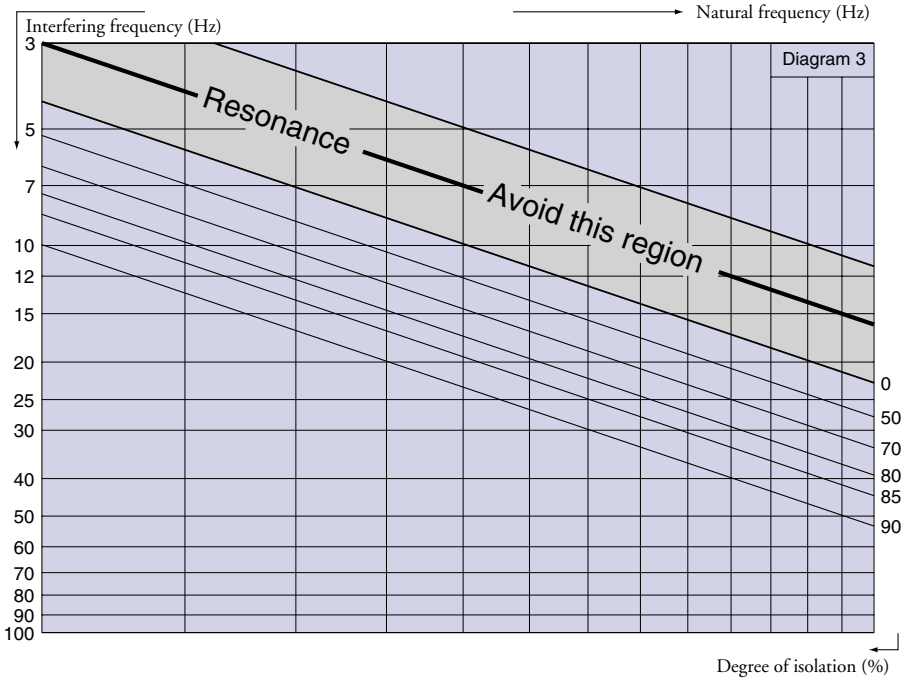


To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





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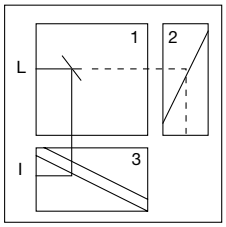
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



GK

Novibra® type GK

Mounting type GK is specifically designed for isolation of heavy machinery with low interfering frequencies. It is widely used under concrete foundations supporting heavy machinery.

The long narrow section enables type GK to be suitable for fitting under a common structural frame supporting different equipments.

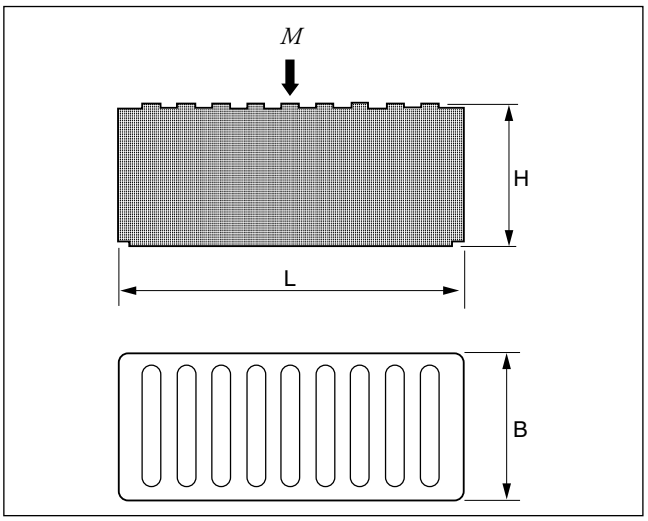
Typical fields of application are:

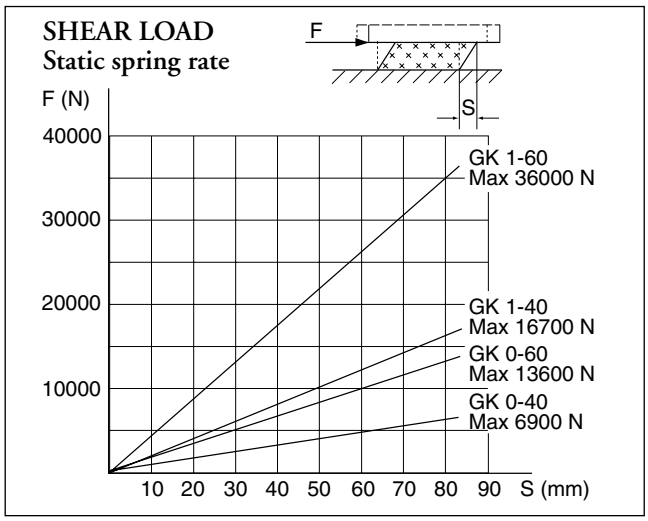
- Rolling mills
- Mixers
- Gearboxes
- Industrial fans
- Paper mills
- Converters
- Sound enclosures
- Floating structures

Features

Type GK is a heavy duty mounting with excellent flexible characteristics in both vertical and lateral planes. Deflection up to 30 mm is possible making type GK suitable for installations with low disturbing frequencies.

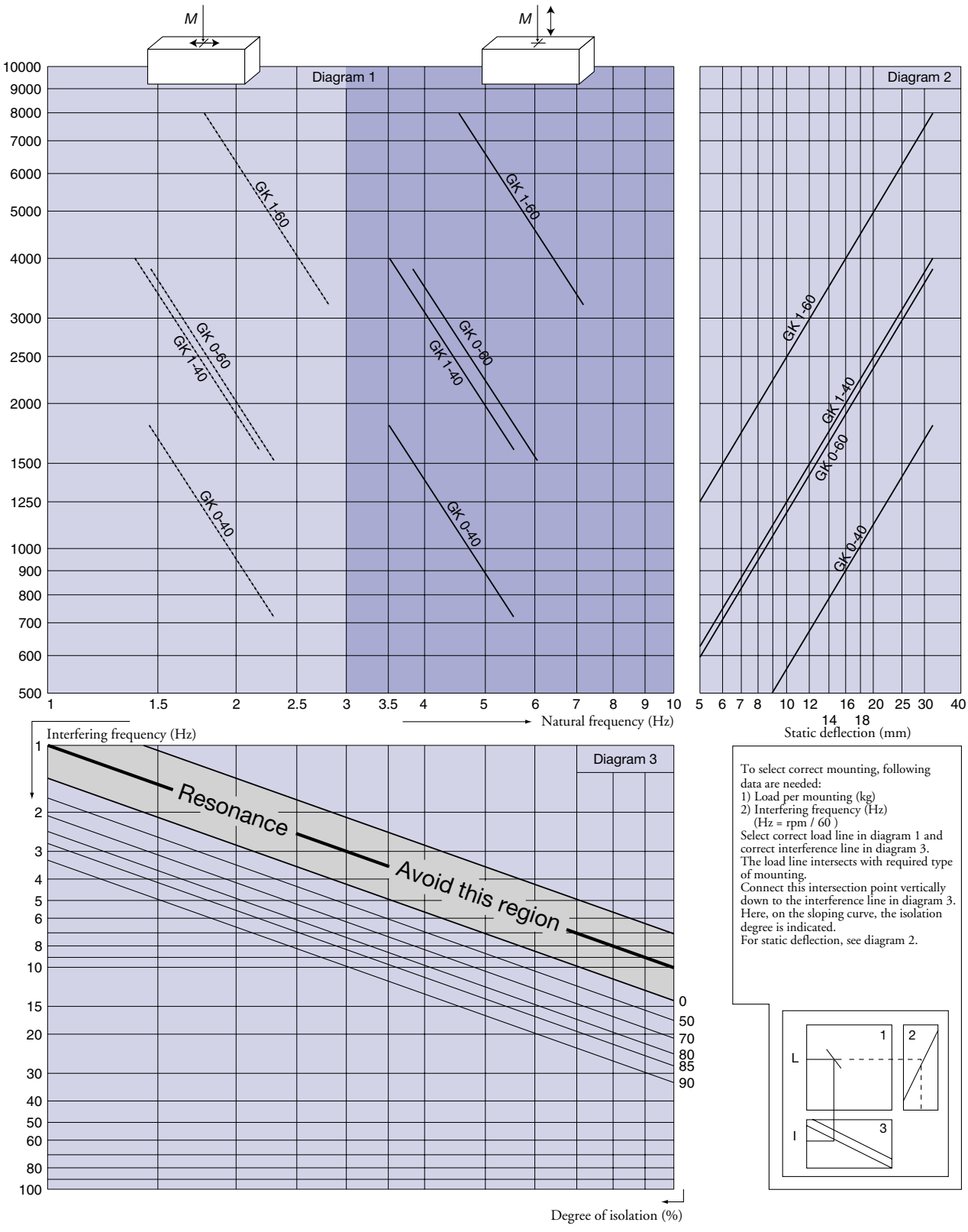
Installation is simple, eliminating traditional methods of attachment to machinery or support structure.



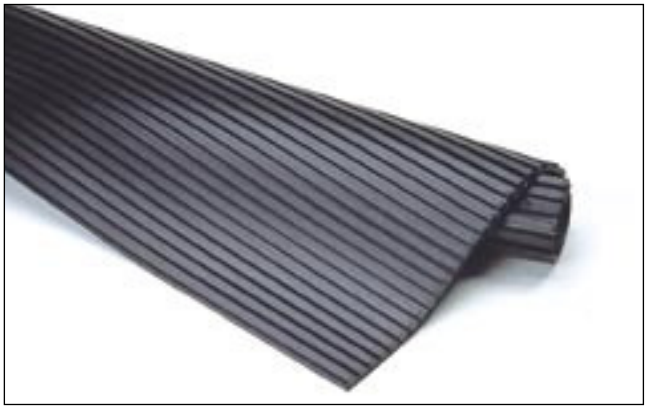


Type	Part no.	Dimensions in mm L	B	H	Weight (kg)	*M*-Max(kg)
GK 0-40	10-00085-01	195	175	150	5.2	1800
GK 0-60	10-00101-01	195	175	150	5.7	3800
GK 1-40	10-00008-01	400	175	150	10.7	4000
GK 1-60	10-00009-01	400	175	150	11.8	8000

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.



Novibra® AV Plate



Features

The AV Plate, made of oil and grease resistant rubber material, is available either as a single (4.5 mm) or as a double (8 mm) version. The single version has ribs on one side only, while the double has ribs on both sides applied at a 90 degree angle to each other.

Good performance is obtained when using the Novibra® AV Plate in the building and construction industry as support pads between flooring and joists. This application provides for cushioning of loads and isolation of high frequency vibrations within the building.

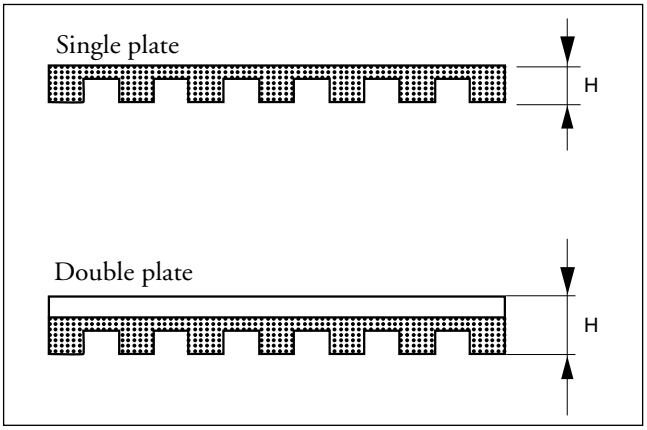
Novibra® type AV Plate

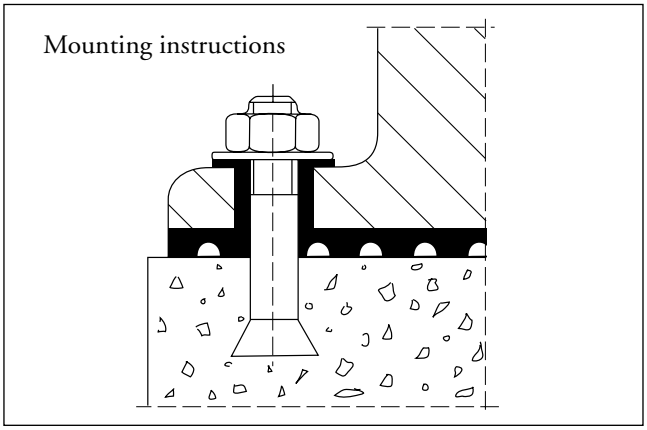
The Anti-Vibration Plate is intended, primarily, for applications with low requirement for vibration isolation. Typical installations are machinery generating vibrations in the high frequency range, and tall unstable installations, requiring secure attachments to the foundation.

If insufficient deflection is achieved with a single layer, multiple layers can be used by separating each layer with a weight distributing steel plate. In order to avoid direct contact between machine and foundation, a rubber bushing (e.g. rubber hose) should be installed in the mounting holes prior to installation of bolt and rubber washer. See "Mounting instructions" on this page.

Suitable applications are:

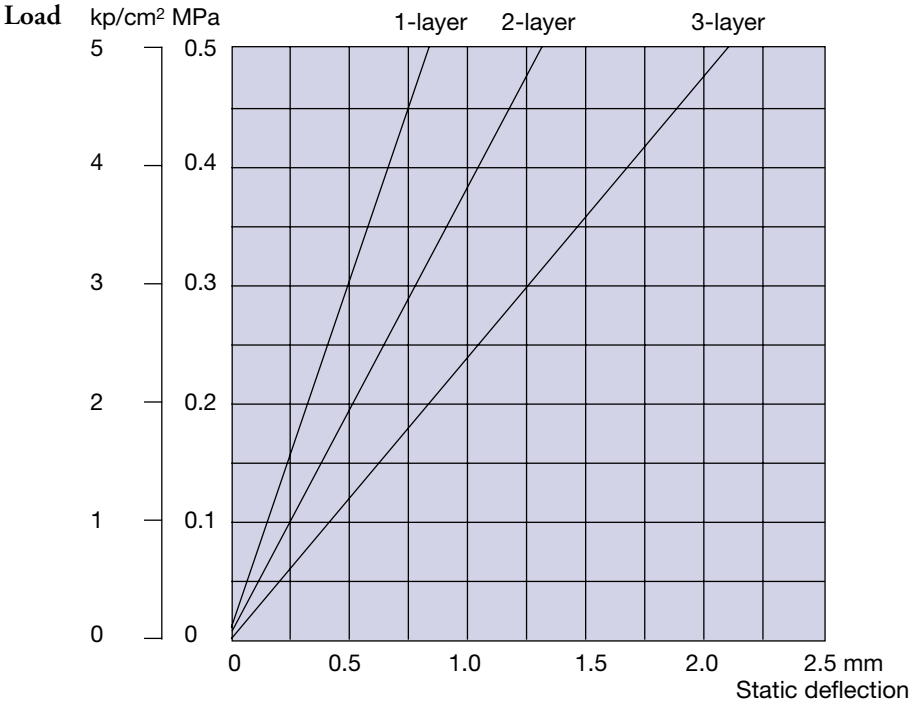
- Pillar drills
- Transformers
- Large pumps
- Printing presses
- Industrial fans
- Horizontal drill presses
- Textile machinery
- Large forging presses



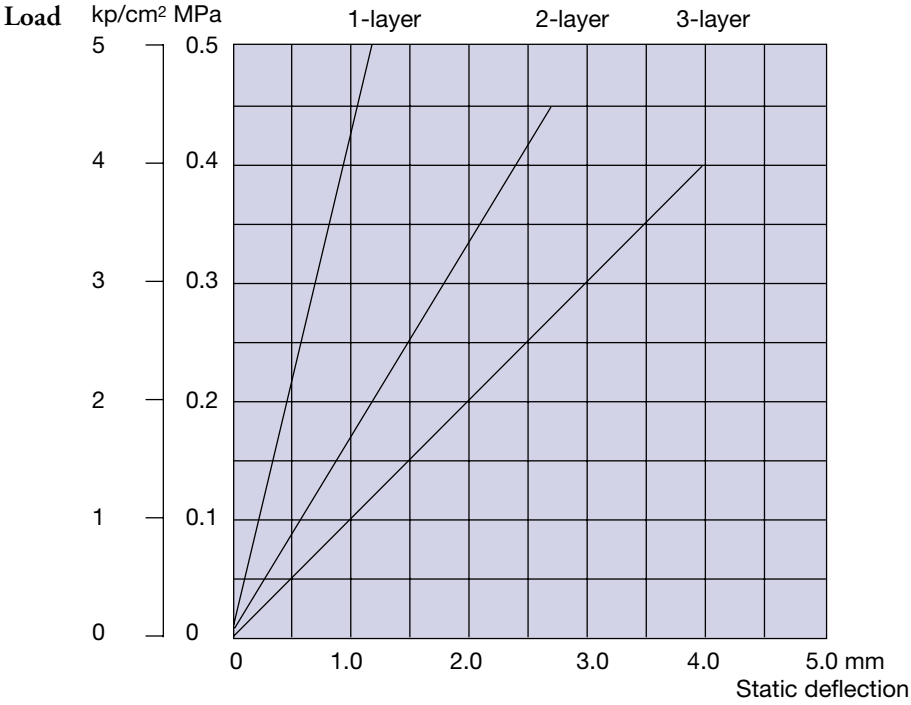


Type	Part no.	Dimensions in mm LxB	H	Weight (kg)	*M*-max load kg/cm²
Single plate	10-00019-01	600x500	4.5	1.210	5
Double plate	10-00020-01	600x500	8.0	1.815	5

Single Novibra® AV Plate



Double Novibra® AV Plate



TF

Features

The TF mounting is installed in minutes by following the instructions provided. There is no need to fix the machines to the floor since the rubber base of the mounting keeps the machine in place. Whenever necessary, the machine can easily be re-positioned. The level is adjusted with load applied.

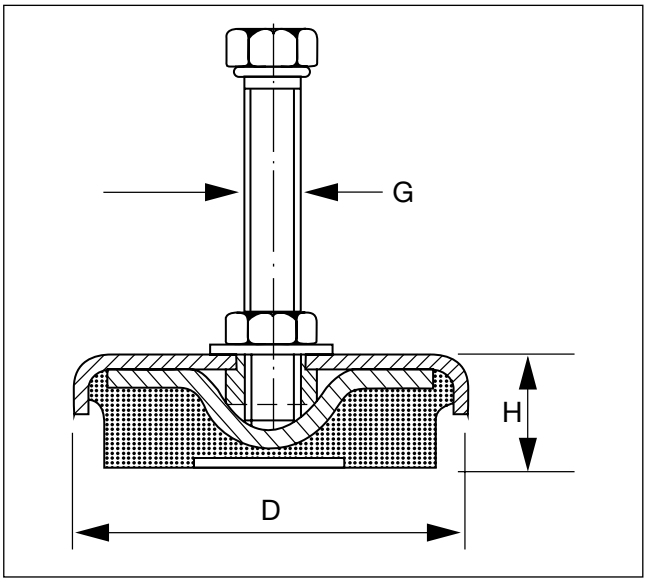
The rubber element of the TF mounting is oil and chemical resistant. All metal parts are zincplated and chromated for protection against corrosion.

Models TF 250, TF 600 and TF 1200, also available in S/S (ISO 2604/11, BS 3605:1).

Novibra® type TF

Novibra® type TF with level adjuster is suitable for a wide range of free standing workshop machines, e.g.

- Lathes
- Milling machines
- Grinding machines
- Multiple operation machinery
- Presses
- Plate shears
- Nibbling machines
- Punches and cutters
- Woodworking machines
- Plastic moulding machinery



Type	Part no.	Dimensions in mm D	H min	H max	Overall bolt length	Thread G	Weight (kg)	Max load (kg)
TF 250	20-00623-01	69	23	1)	100	M 12	0.40	250
TF 250 S/S	20-00678-01	69	23	1)	100	M 12	0.40	250
TF 600	20-00624-01	81	25	1)	100	M 12	0.49	600
TF 600 S/S	20-00679-01	81	25	1)	100	M 12	0.49	600
TF 1200	20-00625-01	108	29	1)	100	M 16	1.0	1200
TF 1200 S/S	20-00680-01	108	29	1)	100	M 16	1.0	1200
TF 3000	20-00626-01	151	35	1)	120	M 20	2.2	3000
TF 4000	20-00627-01	170	39	1)	120	M 20	2.9	4000
TF 6000	20-00628-01	205	44	1)	150	M 24	4.8	6000

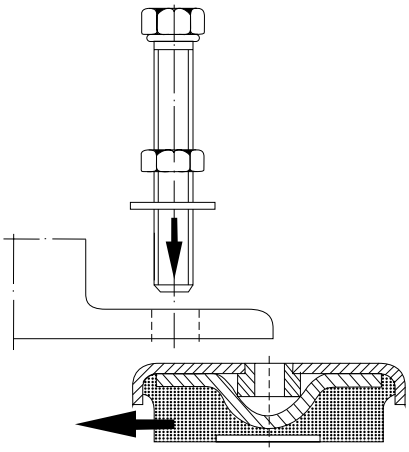
1) Levelling of the bolt up to its total length.

Loading range per mounting (kg)

Type of machinery / Mounting	General work-shop machines		Presses and punches Numbers of strokes per minute							
			1–	125	126–	175	176–	225	226–	275
TF 250		250	25–	125	20–	100	15–	85	10–	60
TF 600	251–	600	126–	300	101–	240	86–	200	61–	150
TF 1200	601–	1200	301–	600	241–	480	201–	400	151–	300
TF 3000	1201–	3000	601–	2400	481–	1600	401–	1000	301–	750
TF 4000	3001–	4000	2401–	3200	1601–	2100	1001–	1300	751–	1000
TF 6000	4001–	6000	3201–	4800	2101–	3200	1301–	2000	1001–	1500

Mounting instructions

1



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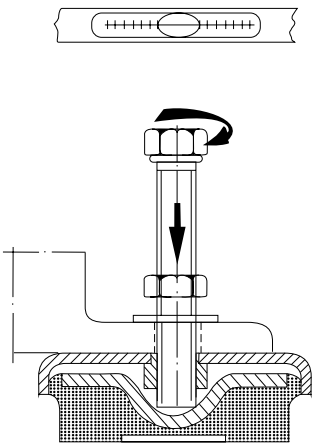

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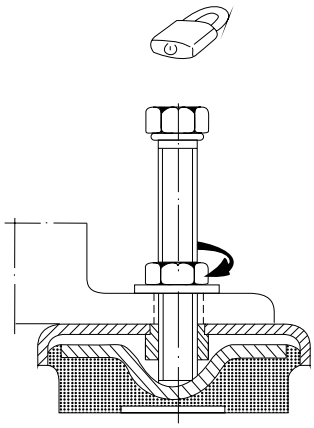
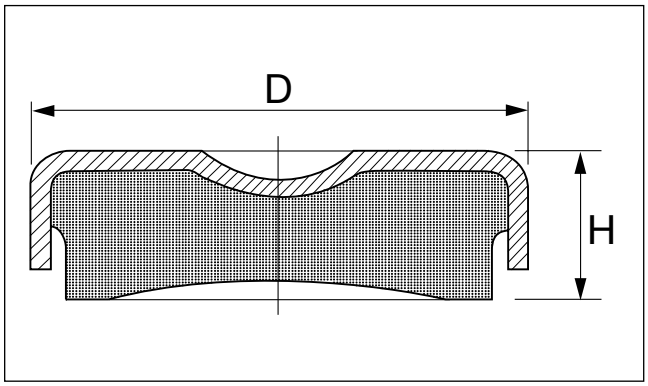


TFE



Mounting TFE is a simpler version of type TF without level adjuster. It is used for machines which do not require height adjustment or where such a feature is already provided, e.g. by an adjusting screw in the machine.

Both models also available in S/S (ISO 2604/11,BS 3605:1)

Type	Part no.	Dimensions in mm D	H	Weight (kg)	Max load (kg)
TFE 601	20-00629-01	80	25	0.375	800
TFE 1201	20-00630-01	109	29	0.925	1600

Buffers

Features

Circular and rectangular types are easily fitted. Reduction of transmitted shock loads enables equipment to be designed more economically.

The rising stiffness properties enable vehicle suspension characteristics to be optimised.

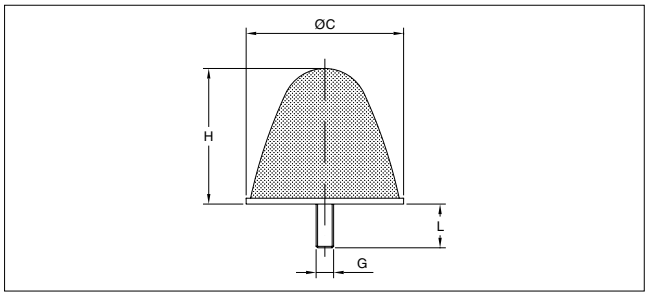
ANB - R is made in oil and chemical resistant Nitrile Rubber.

Metalastik® type Buffers

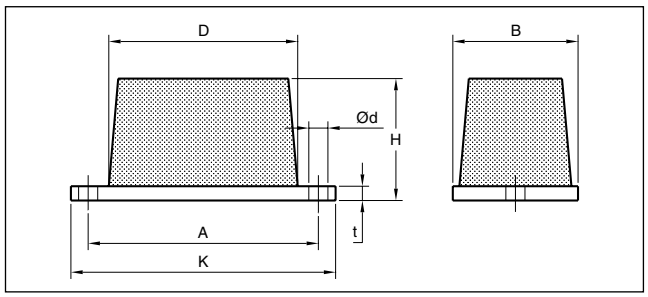
Buffers are designed to protect structures and equipment from impact forces. They are usually fitted as non-metallic stops or incorporated in vehicle suspension systems to provide progressive stiffening under increasing load.

Typical applications:
- Dump trucks
- Off-road vehicles
- Cranes
- Handling equipment
- Vehicle suspensions

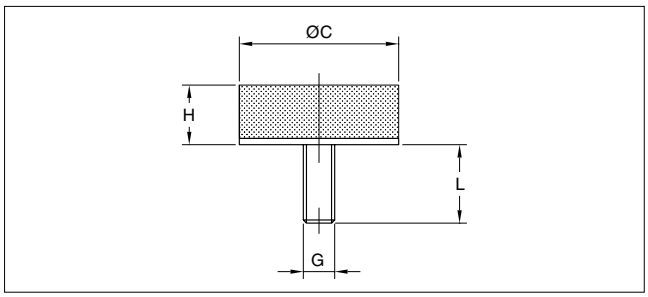
Conical



Rectangular



Cylindrical

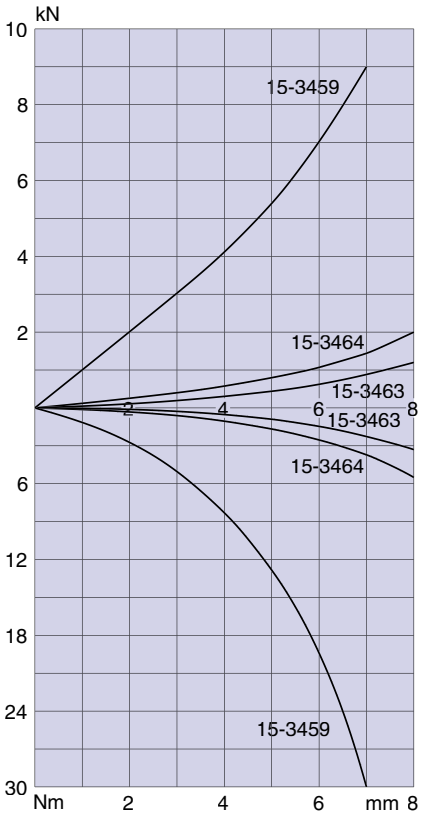


Type		Part no.	Dimensions in mm C	H	G	L	Weight (kg)
Cylindrical buffers	15-1363-60	10-00341-01	21	19	M6	15	0.02
	15-3464-60	10-00342-01	32	21	M8	20	0.05
	15-3459-60	10-00337-01	51	19	M10	25	0.1
Conical buffers	15-3462-60	10-00340-01	28.5	37	M6	15	0.03
	15-3458-60	20-00686-01	32	28.5	M8	20	0.04
	15-3461-60	10-00339-01	38	38	M8	20	0.06
	15-3435-60	10-00334-01	48	51	M10	25	0.12
	15-3460-60	10-00338-01	70	46	M12	30	0.27
	15-3445-60	0-00336-01	108	95	M12	30	0.79
	15-3443-60	10-00335-01	108	121	M12	30	0.99

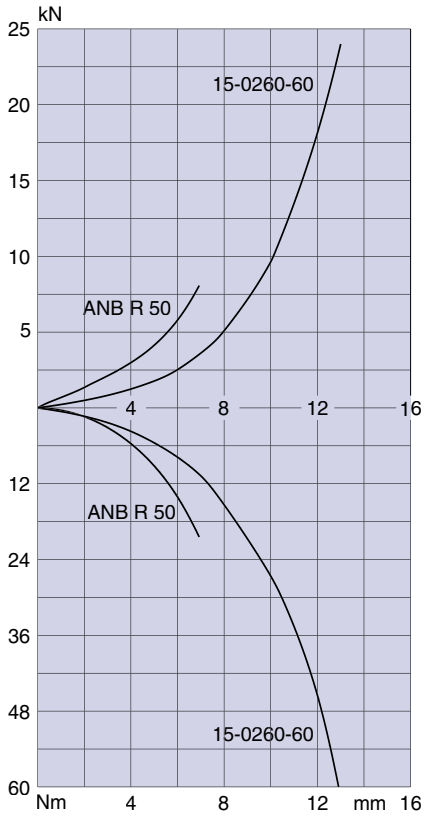
Type		Part no.	Dimensions in mm K	A	B	H	D	d	t	Weight (kg)
Rectangular buffers	15-0437-60	10-00322-01	121	105	48	56	86	8.6	6.3	0.48
	15-0238-60	10-00315-01	121	105	57	56	86	8.6	6.3	0.55
	15-0260-60	10-00317-01	156	127	64	37	89	13.5	6.3	0.57
ANB R-50*		20-00417-01	84	68.5	32	22	51	6.7	3	0.06

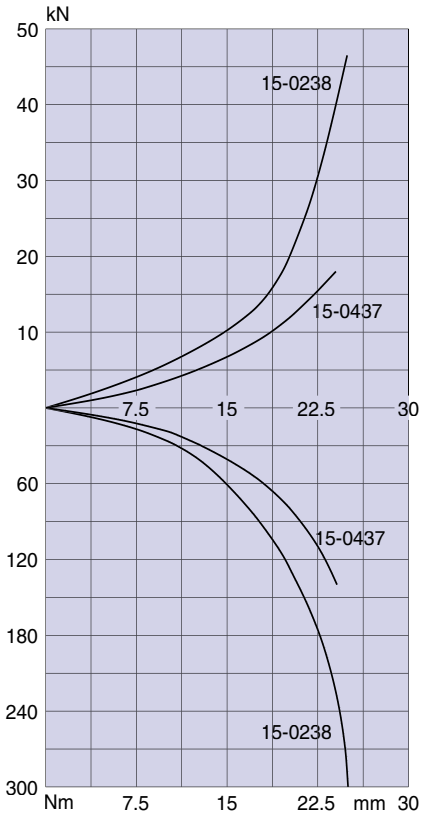
** Manufactured in 70° IRH Nitrile Rubber*

Cylindrical

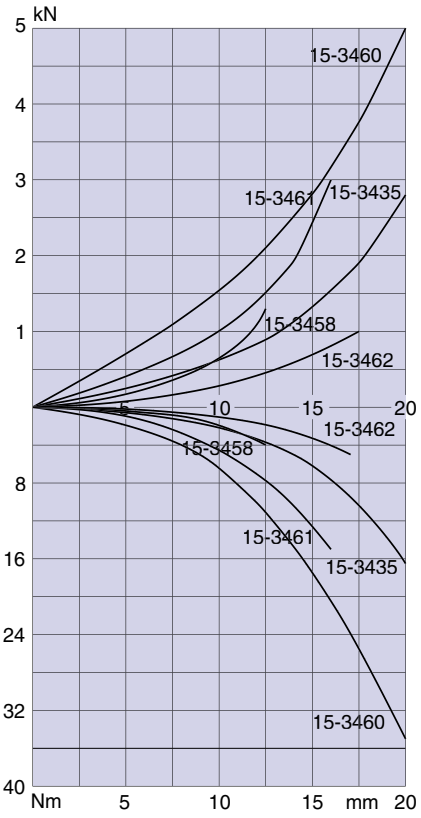


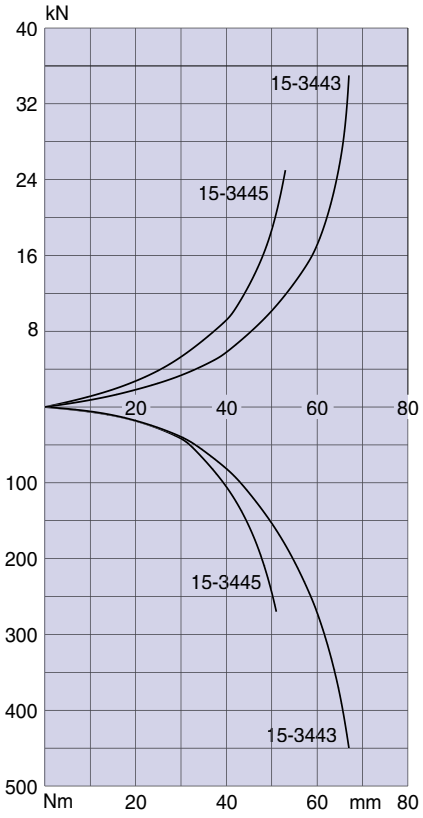
Rectangular





Conical





ANB

Features

Buffer type ANB consists of a cylindrical rubber body bonded to a square baseplate of steel. Each corner of the baseplate has a fixing hole.

Special high-hysteresis rubber compound is used to ensure as much energy absorption as possible. The volume of the rubber is used at optimum efficiency.

For new machine developments simpler designs and lighter calculated forces can be considered enabling a lower cost.

Novibra® type ANB

The shockbuffer type ANB is used to effectively limit movement of equipment or machine components.

Typical field applications would be:

- Wagons
- Traversing cranes
- Lifting cranes
- Working beams
- Falling goods
- Container handling equipment
- Cabinets
- Forestry vehicles
- Off-road material handling equipment

Through the low resilience of the rubber a high degree of energy absorption is achieved. The rubber is stiffer under dynamic conditions compared to static or pseudo static loading; hence more energy is absorbed for a given deformation. Diagram 4 shows the effect of the energy factor.

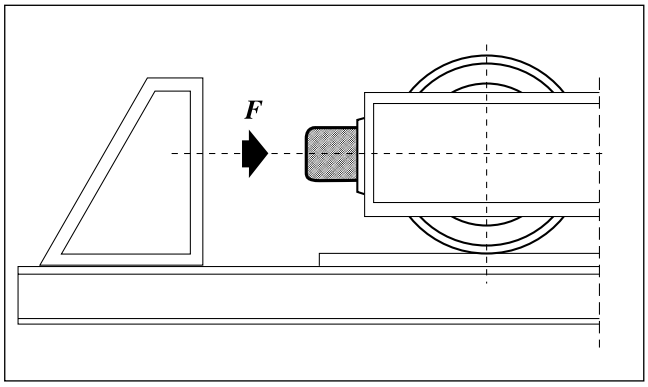


Fig. 1. Traverse crane with shock buffer ANB.

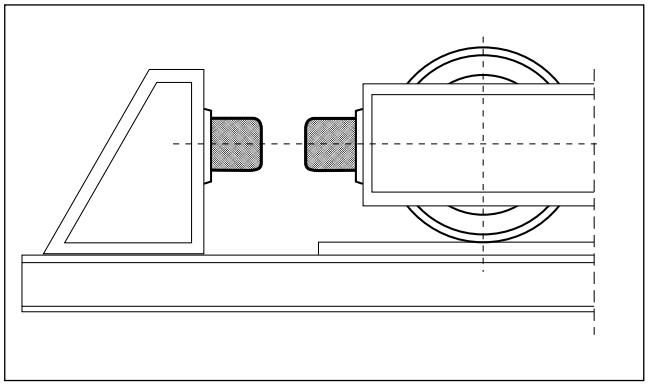


Fig. 2. Traverse crane with 2 ANB buffers connected in series.

Type	Part no.	Dimensions in mm K	A	D	d	H	t	Weight (kg)	*F*-Max (N)
ANB 50	10-00151-01	70	50	50	7	43	3	0.2	8000
ANB 75	10-00152-01	100	75	75	9	63	3	0.5	20000
ANB 100	10-00153-01	130	100	100	11	84	4	1.2	41000
ANB 150	10-00010-01	185	150	150	13.5	126	6	3.9	90000
ANB 200	10-00011-01	240	200	200	13.5	168	8	9.1	180000

For calculation purposes the following equations can be used:

$E = \frac{m \cdot v^2}{2}$ (1)

$E = F \cdot s$ (2)

$F = m \cdot a$ (3)

$s = \frac{a \cdot t^2}{2}$ (4)

$v = \sqrt{a \cdot t}$ (5)

$v = \sqrt{2 \cdot a \cdot s}$ (6)

$v = \sqrt{2 \cdot g \cdot h}$ (7) applicable in free fall

Equation (4)- (7) valid for initial velocity = 0

E = energy in Nm
m = mass in kg
v = velocity in m/s
F = force in N
s = distance in m
a = acceleration in m/s^2
t = time in s
g = acceleration due to gravity 9.81 m/s^2
h = height in m
d = spring travel in m

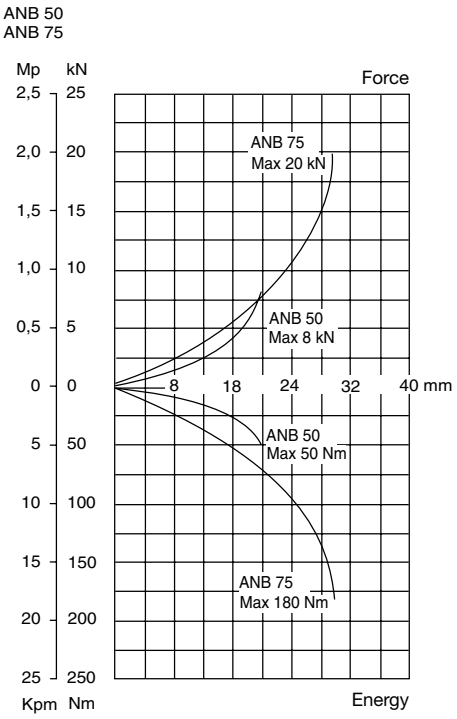


Diagram 1

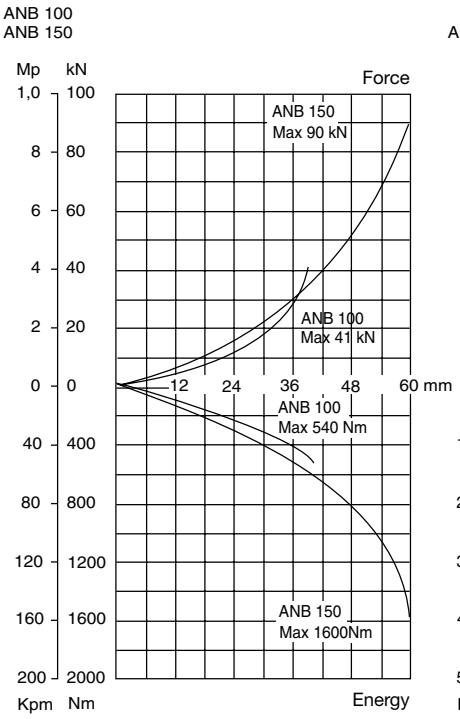


Diagram 2

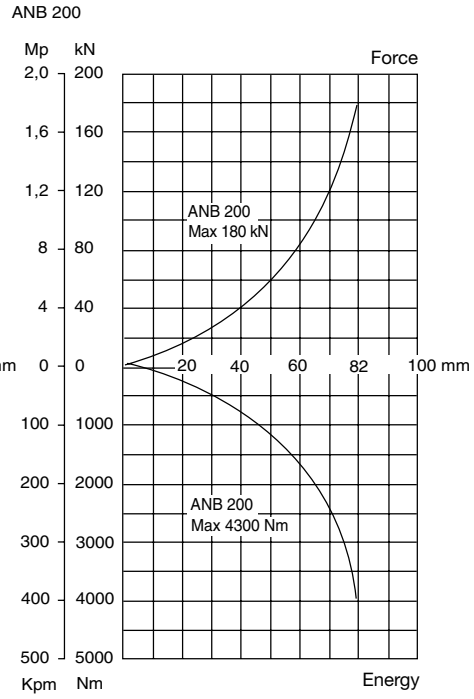
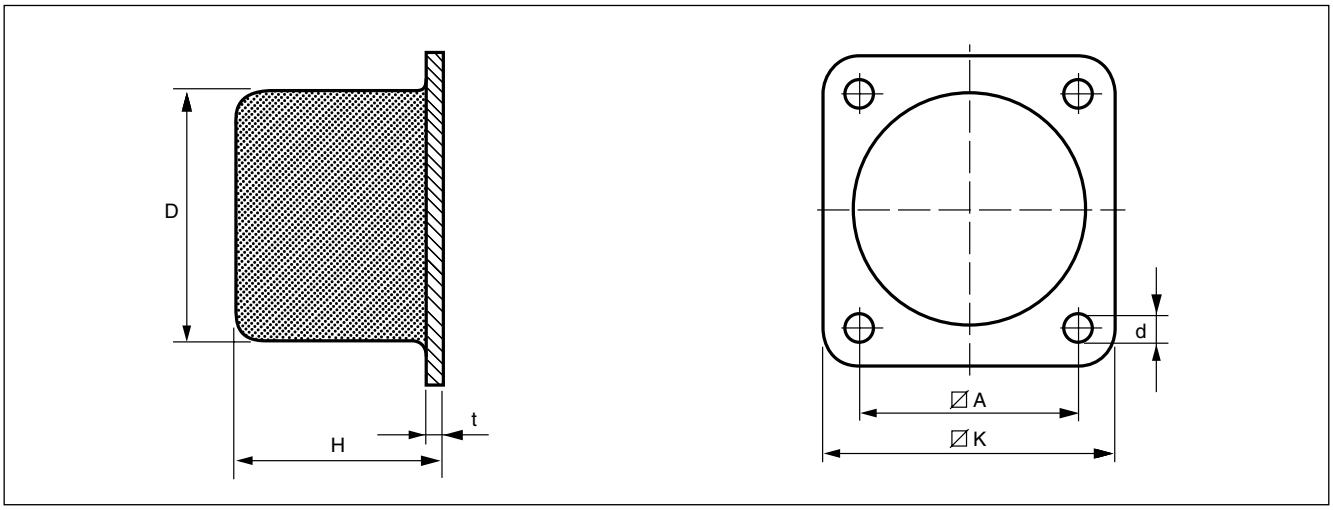


Diagram 3



CALCULATION EXAMPLES

The figures in parenthesis refer to the equations.

EXAMPLE 1: FREE FALL CALCULATION

1850 kg weight is to be dropped 1.83 metres onto 4 ANB buffers. What size ANB should be used? What force will be transmitted to the floor?

Energy E = F · s (2) = 1850 · 9.81 · 1.83 = 33212 Nm

Velocity at impact (shock velocity) v =
$\sqrt{2 \cdot g \cdot h}$ (7)= $\sqrt{2 \cdot 9.81 \cdot 1.83}$ = 6 m/s.

REFER TO ENERGY FACTOR GRAPH

If 50% deformation is allowed, the energy factor at 6 m/s is 0.4. Then dynamic energy 33212 Nm corresponds to 33212 · 0.4 = 13285 Nm static energy and for 4 buffers the static energy per buffer is 3320 Nm.

REFER TO FORCE-ENERGY DIAGRAM

Select ANB 200 which can each absorb up to 4300 Nm at 80 mm compression (which is 50% of static height) or will compress 76 mm at 3320 Nm.

Force at impact surface
= force at 76 mm deflection / 0.4
= 150 / 0.4 =375 kN per buffer
= 1500 kN for 4 buffers

Hence if 1850 kg is dropped 1.83 metres onto 4 x ANB 200 buffers they will each compress 76 mm and the total force on the floor will be 1500 kN.

EXAMPLE 2A: CRANE BUFFER CALCULATION

A crane weighs 2000 kg and travels at 1.6 m/s. What size ANB buffers should be used to stop it and what will the final force be?

The dynamic or kinetic energy

$$E = \frac{m \cdot v^2}{2} = \frac{2000 \cdot 1.6^2}{2} = 2560 \text{ Nm (1)}$$

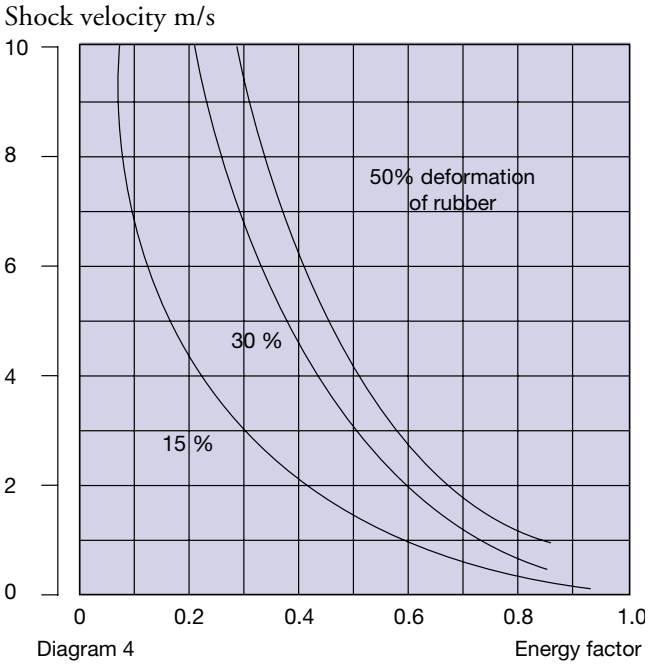
REFER TO ENERGY FACTOR GRAPH

Assuming a 50% deformation, the energy factor = 0.75 at 1.6 m/s. Hence the equivalent static energy is 2560 · 0.75 = 1920 Nm. Then for 2 buffers the static energy is 960 Nm per buffer.

REFER TO FORCE-ENERGY DIAGRAM

ANB 150 buffers can be chosen with a deflection at 960 Nm of 49 mm, which is only 41% of a free height of 120 mm, whereas 50% had been assumed. With the energy factor reduced to 0.72 (for 41% deflection at 1.6 m/s) the static energy is:

2560/2 x 0.72 = 922 Nm



REFER TO FORCE-ENERGY DIAGRAM FOR ANB 150

At 922 Nm static energy, the deflection is 48.5 mm (close to 49 mm). Then the static force at 48.5 mm deflection is about 51 kN. Therefore the dynamic load (Force at impact) = 51 / 0.72 = 71 kN. Hence 2 x ANB 150 buffers will deflect 48.5 mm and transmit a force of 71 kN or 7240 kg each, i.e. the structure must withstand 14.6 tons.

EXAMPLE 2B: CRANE BUFFER CALCULATION

How can the dynamic force calculated in example 2a be reduced, and by how much?

The force will be reduced and the deflection will be increased if ANB 150 buffers are connected in series (i.e. 4 buffers instead of 2) as illustrated by **fig. 2.**

Then, assuming 30% deformation the energy factor at 1.6 m/s = 0.68.

Hence the equivalent static energy is 2560 · 0.68 = 1740 Nm and for 4 buffers the static energy is 435 Nm per buffer.

The force-Energy diagram shows that at 435 Nm, buffer ANB 150 deforms 35 mm. This corresponds to 29.2% of a free height of 120 mm which is close to assumed value 30%.

Then the static force at 35 mm deformation is 26 kN and the dynamic load at impact will be:

26 / 0.68 = 38 kN

Hence 4 x ANB 150 buffers connected 2 + 2 will give a total deflection of 70 mm with a final force per double arrangement of 38 kN or 3870 kg, i.e. the structure must withstand 7.7 tons.

Features

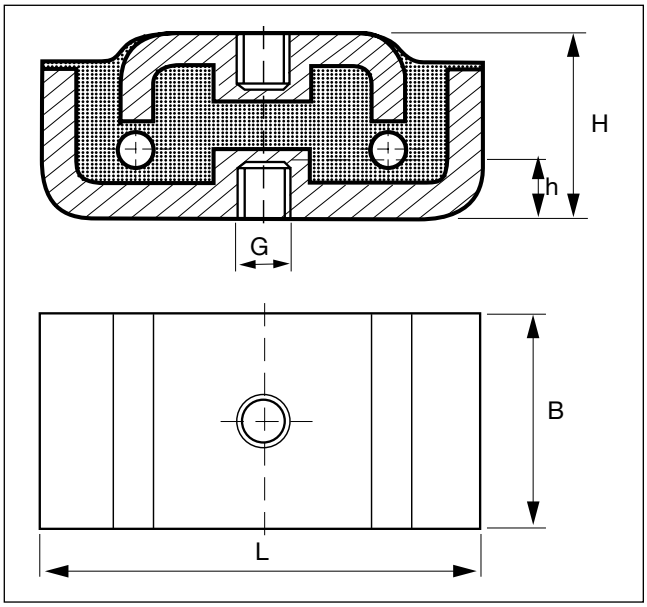
Type U is a robust element consisting of 2 solid U-shaped steel parts securely bonded to the rubber section.
To achieve higher flexibility, two holes in the rubber are provided between the metals. The upper metal plate is fixed to the underside of the machine foot or baseplate by means of a bolt, while the bottom plate should be secured to the floor by an expansion bolt. For certain applications a dowel pin may be adequate.

Novibra® type U

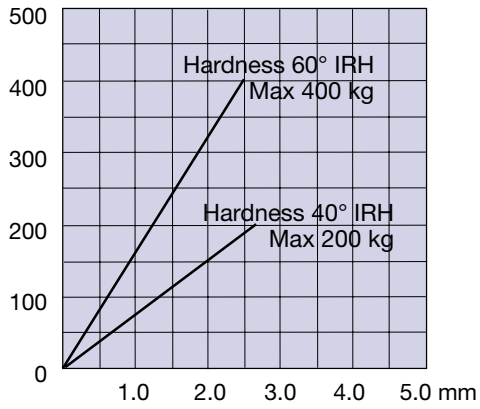
Type U provides for a stable machine installation and is particulary suitable for the vibration isolation of heavier machinery with relatively high interfering frequencies.

Typical applications can be found on:

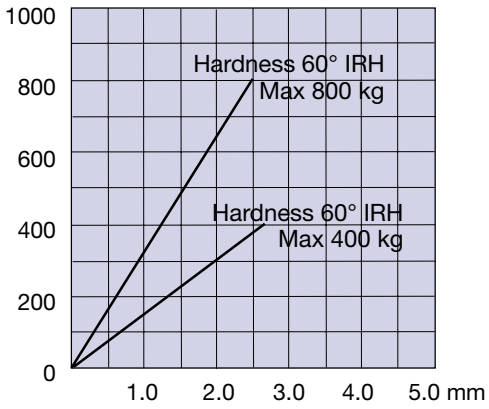
- Presses
- Punches
- Weaving machines
- Woodworking machines
- Church bells
- Transformers
- Printing machinery
- Other heavy, high-speed machines



U 100
Load per mounting (kg)



U 130
Load per mounting (kg)



Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm B	L	H	h	G	Weight (kg)	*M*-Max(kg) 40° IRH	60° IRH
U 100	10-00001-01	10-00002-01	50	100	42	12	M12	0.650	200	400
U 130	10-00003-01	10-00004-01	70	130	54	12	M12	1.318	400	800

SE

Features

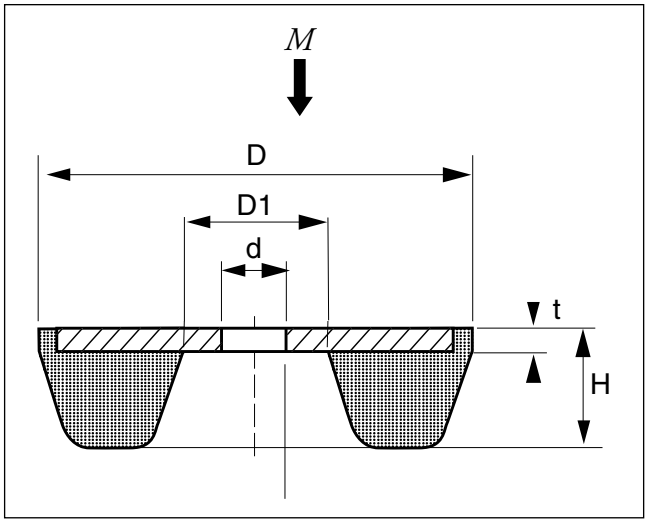
The SE-mounting consists of an annular rubber section, securely bonded to a single steel support plate. A clearance hole is provided which can either be left plain or tapped to suit the application.

As the rubber element is in direct contact with the supporting surface, friction is normally sufficient to prevent the suspended equipment from "walking".

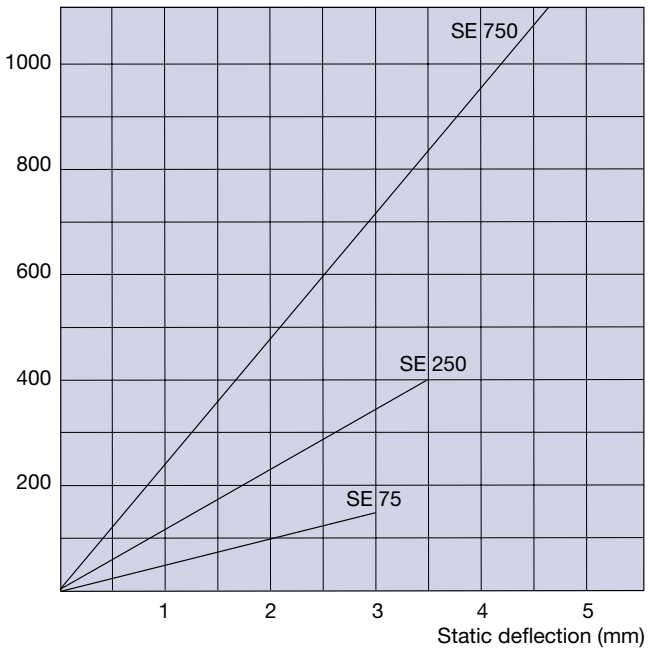
Novibra® type SE

Type SE is suitable for the isolation of high frequency disturbances and provides reduction of structure-borne noise.

Specific applications are:
- Office equipment
- Textile machinery
- Domestic appliances
- Electric motors
- Weighing equipment



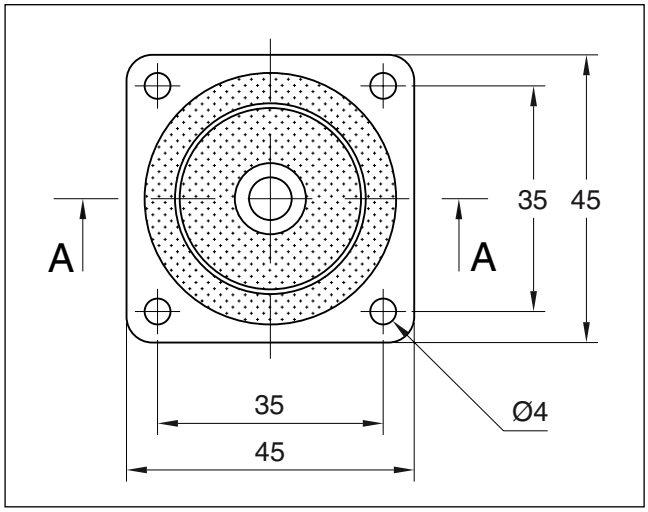
Load per mounting (kg)

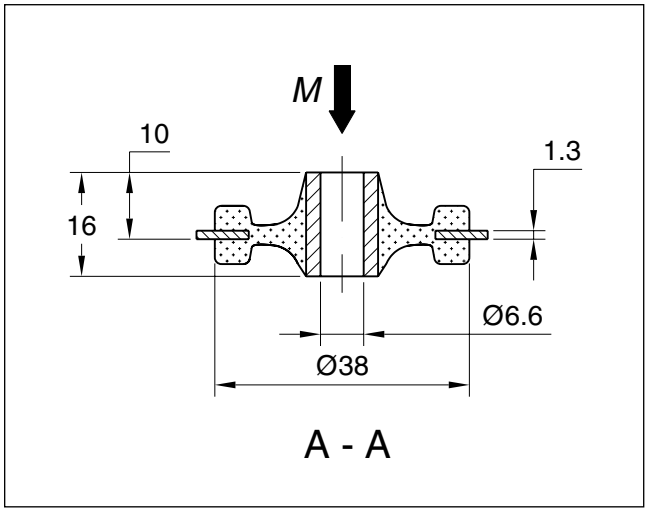


Type	Part no. 50° IRH	Dimensions in mm D	D1	d	H	t	Weight (kg)	*M*-Max (kg) 50° IRH
SE 75	20-00612-01	55	18	8	15	3	0.069	150
SE 250	20-00631-01	75	25	10	17	4	0.172	400
SE 750	20-00632-01	115	40	14	24	4	0.456	1100

Features
- Fail-safe when fitted with overload and rebound washers of the same diameter as the rubber section.
- Load range from 2.7 to 5.4 kg.
- Static deflection up to 3 mm.
- Easy to fit as part of a cabinet enclosure.
- Can be used in both vertical directions.

Metalastik® type Flanged Instrumountings
These mountings are suitable for both mobile and static applications, for the protection of sensitive equipment from external vibration or for vibration isolation of small fan sets, transformers and similar equipment. Flanged Instrumountings can be fail-safe if fitted with a washer to the top and bottom of the rubber section.



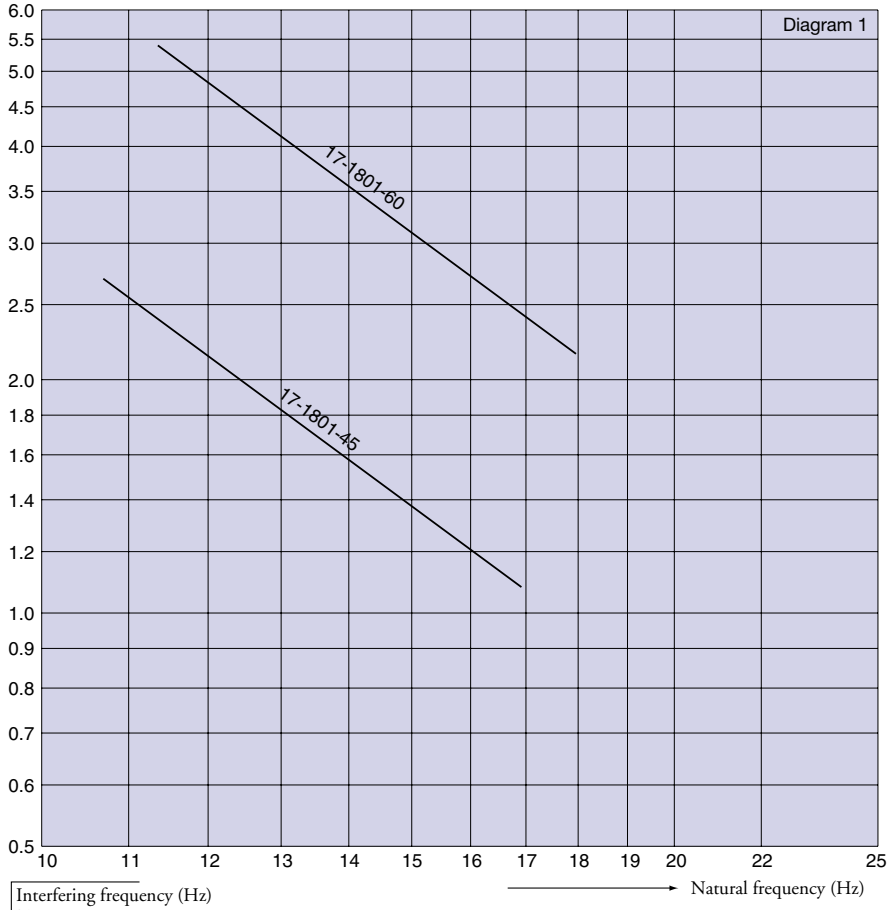


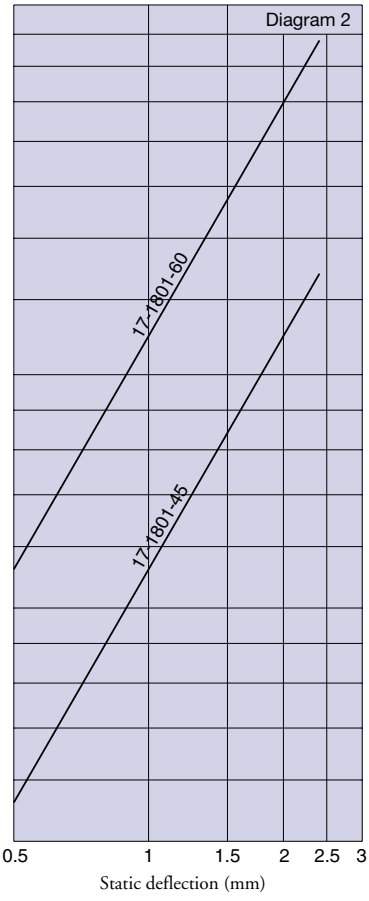
	Part no.	*M*-Max (kg)	Weight (kg)
17-1801-45	10-00583-01	2.7	0.03
17-1801-60	10-00584-01	5.4	0.03

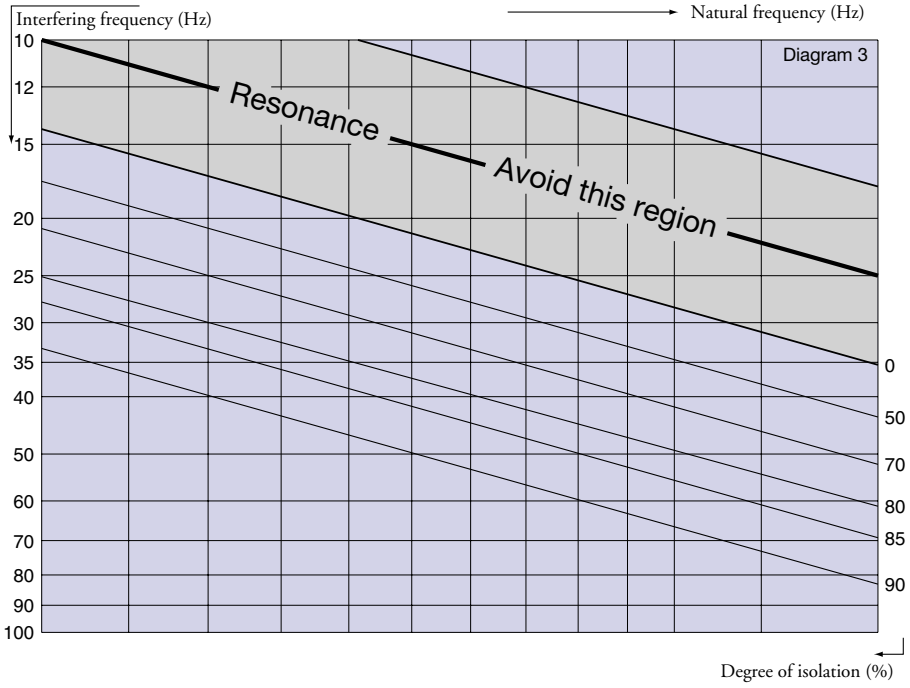
Flanged Instrumountings

Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

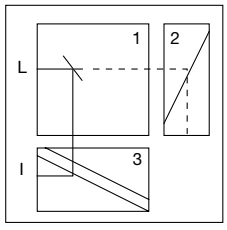
Load
per mounting (kg)

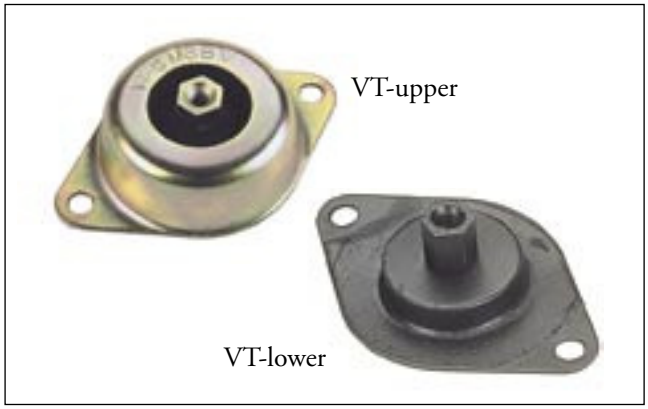






To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.





Novibra® type VT

Novibra® type VT protects wall-mounted instrument cabinets from vibrations and shocks generated by nearby engines, workshop machinery, etc. It is also suitable to isolate light wall-mounted machines, fans, refrigerating units, etc.

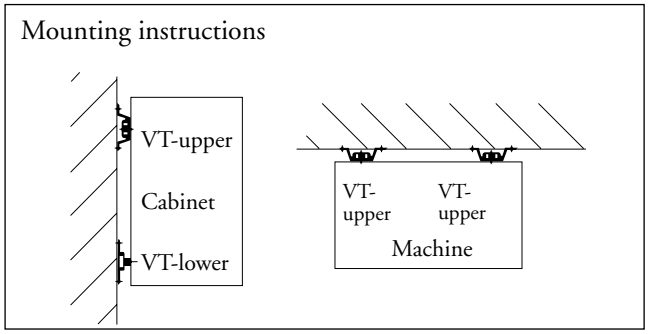
Mounting type VT-upper could be used for ceiling suspension e.g. fittings, fans, music speakers, etc.

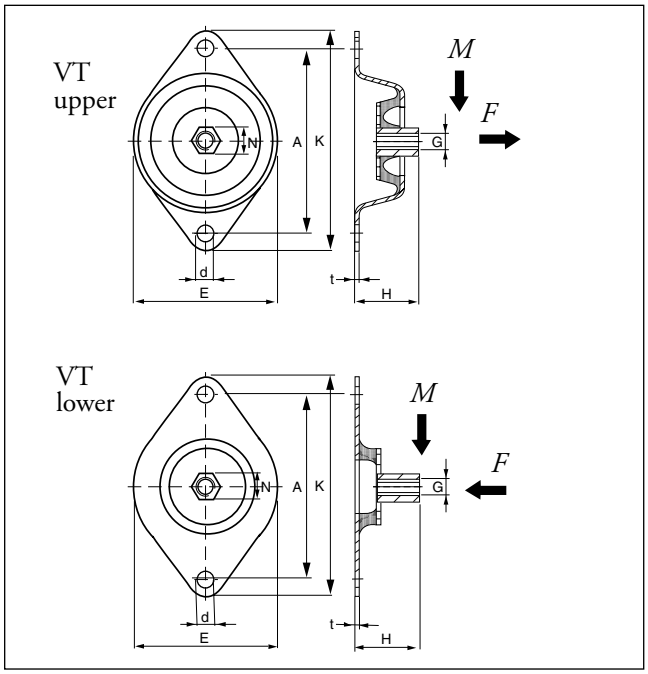
Features

Type VT has been designed so that upon installation the rubber section is subjected to shear loads, thus providing high deflection even at low loads.

Two different parts are available. The VT-upper provides for protection against tension preventing the isolated unit from falling down if overloading occurs.

VT-lower is designed to accept horizontal compression loads and allow shear deflection vertically.

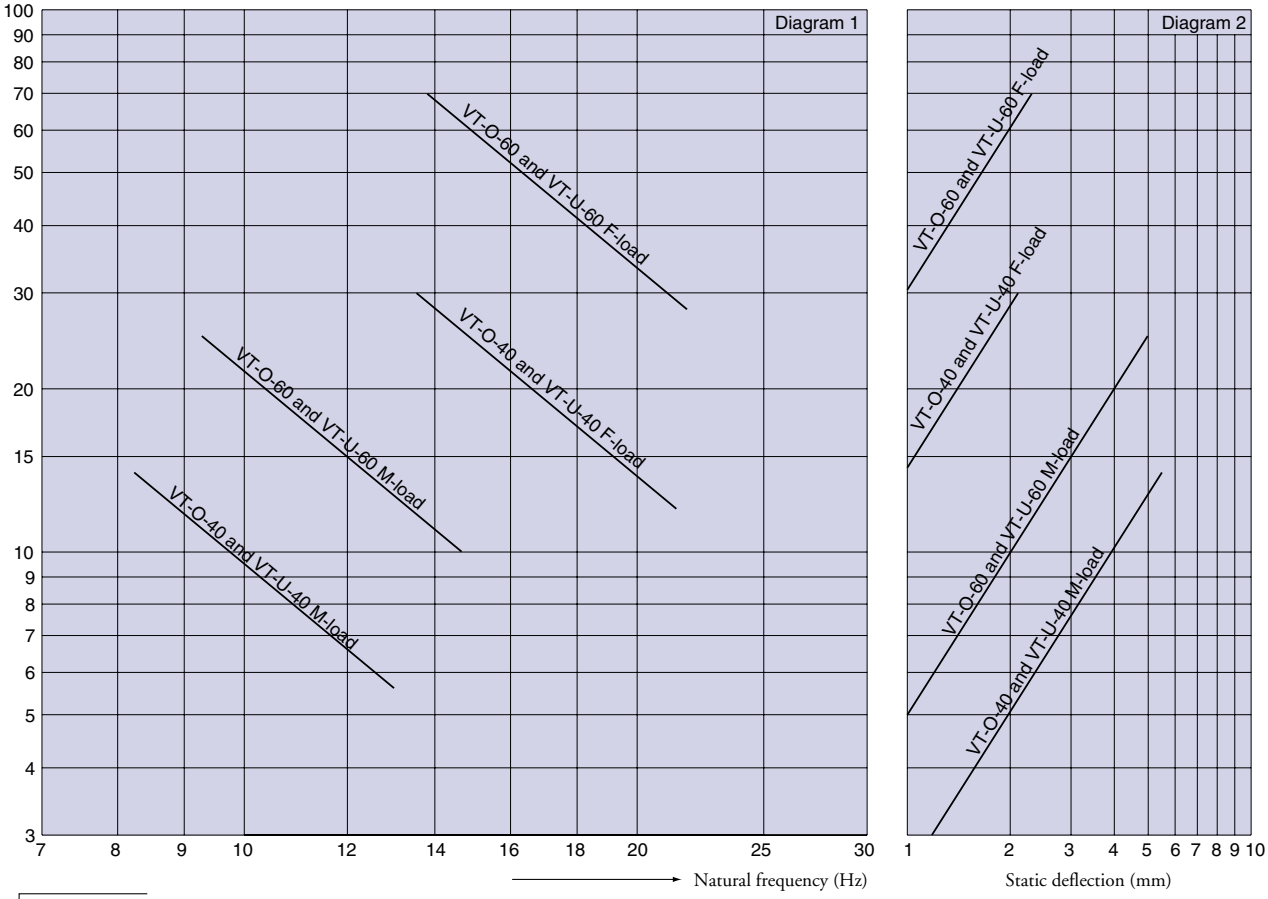


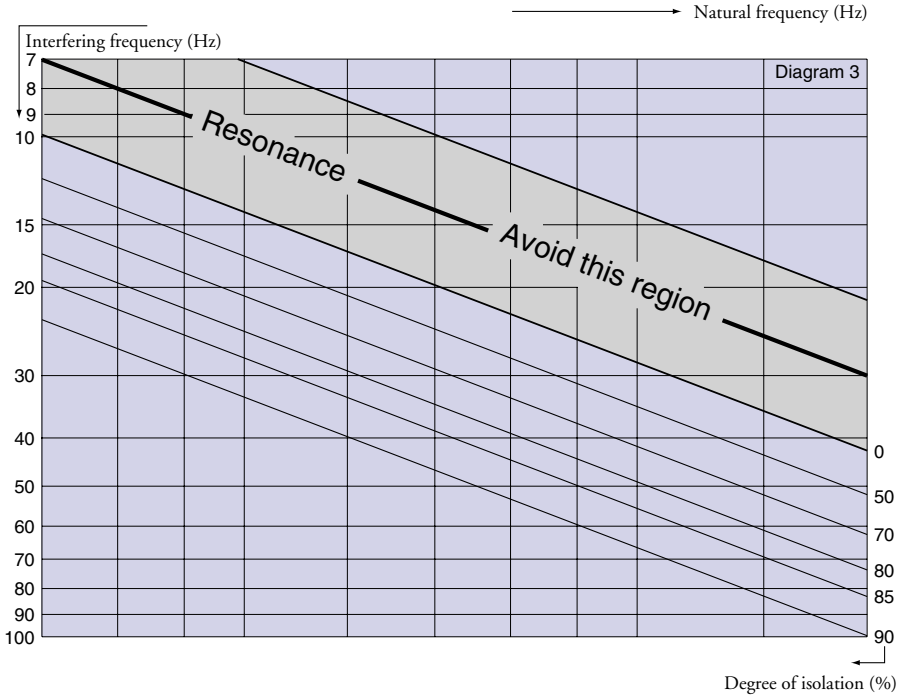


Type	Part no. 40° IRH	Part no. 60° IRH	Dimensions in mm E	K	A	H	d	N	t	G	Weight (kg)	*M*-Max(kg) 40°IRH	60°IRH	*F*-Max(kg) 40°IRH	60°IRH
VT-upper	10-01369-01	10-01370-01	75	114	96	33	9	15	1.5	M8	0.149	14	25	30	70
VT-lower	10-01373-01	10-00015-01	75	114	96	33	9	15	1.5	M8	0.104	14	25	30	70

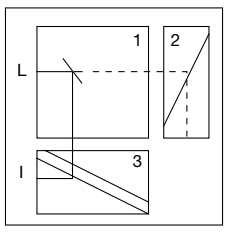
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Features

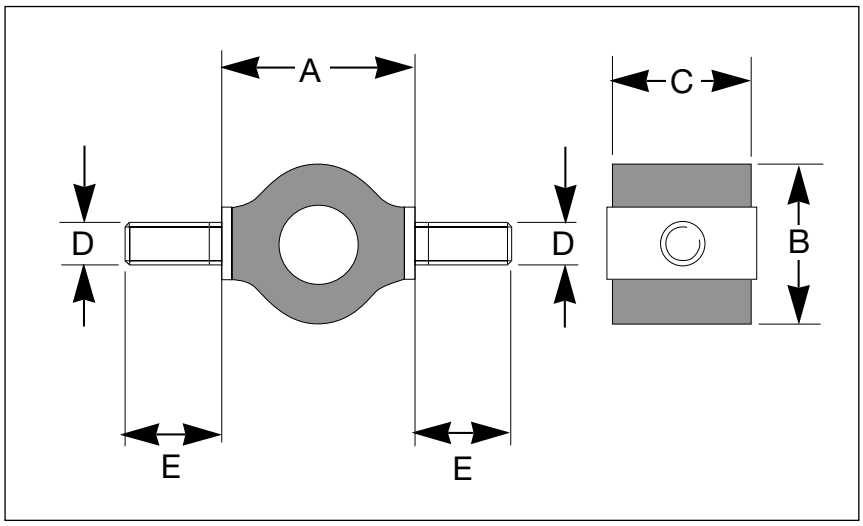
These antivibratin mountings are designed to give large deflection for small loads and are used to protect instruments etc against vibration and impact, and also to isolate light vibrating apertures from surroundings.

Low Frequency Mountings are available in three sizes and two grades of rubber hardness.

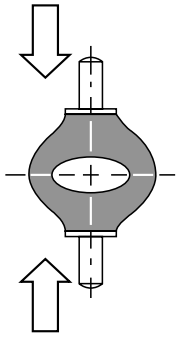
Novibra® type Low Frequency

Novibra® type Low Frequency are designed for shear as well as compressive loads.
Continual tensile load should be avoided.

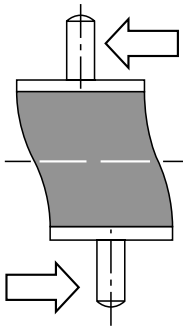
Ideal for applications as
- Light fans and compressors
- Computer and electronic units
- Light instruments
- Shock mounting for light applications



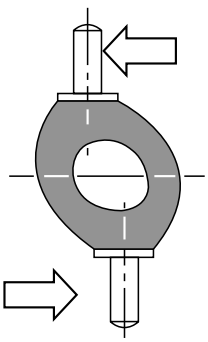
Radial load



Axial load



Tangential load

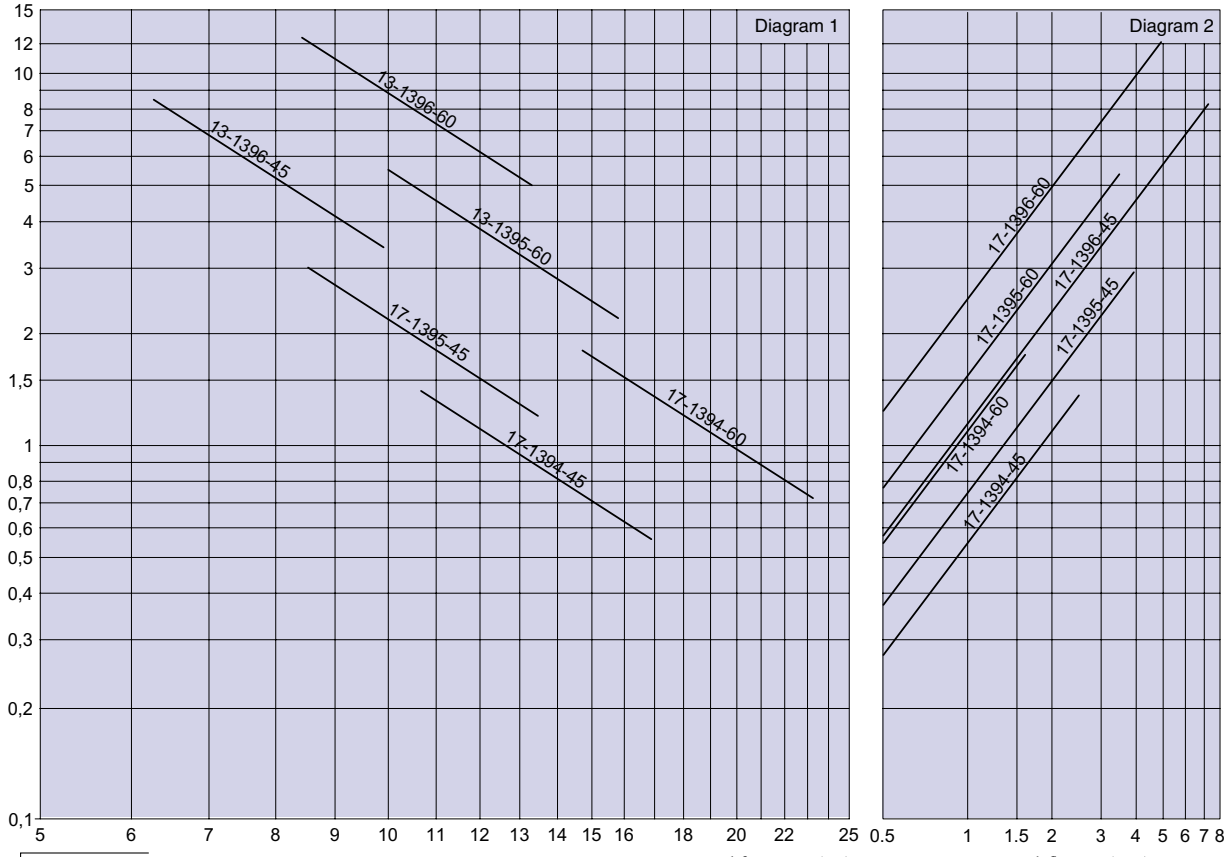


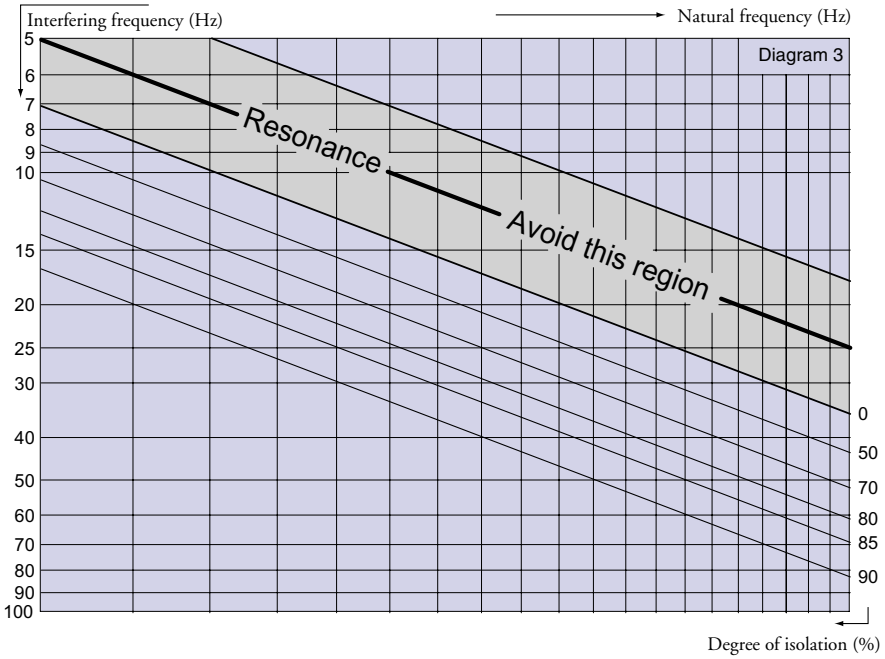
Type	Part no. 45° IRH	Part no. 60° IRH	Dimensions in mm A	B	C	D	E	45° IRH Max load Radial(N)	Axial(N)	Tangential(N)	60° IRH Max load Radial(N)	Axial(N)	Tangential(N)
17/1394	20-00017-01	20-00018-01	17	14	13	M4	10	14	4	2.5	18	5	3.5
17/1395	20-00020-01	20-00021-01	30	25	19	M5	14	30	10	8	55	15	15
17/1396	20-00022-01	20-00023-01	38	35	25	M6	15	85	30	25	125	45	35

Low Frequency Mountings

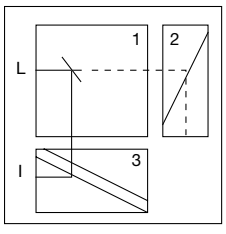
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

Load
per mounting (kg)





To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Metalastik® type Two Bolt Instrumountings

Two Bolt Instrumountings provide a convenient and effective means of isolating vibration generated by lightweight machinery. Also used to protect instruments and light equipment from vibration and shock. They may be loaded in compression or shear depending on application requirements.

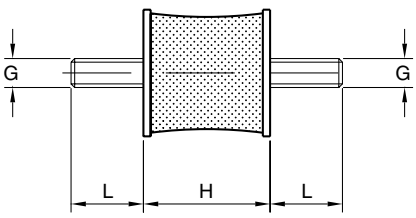
Typical applications:
- Instrument panels
- Lightweight laboratory machines
- Electronic equipment

Features

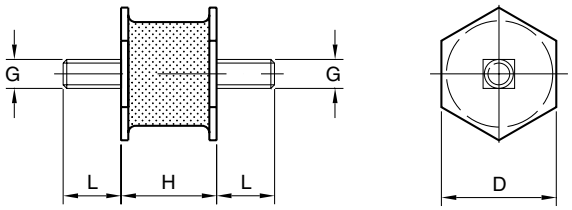
These mountings are high quality products capable of protecting light equipment from vibration and shock. Two Bolt Instrumountings are available in either 45° or 60° IRH natural rubber compound. Similar to Rectangular SAW Mountings and Circular SAW Mountings, Two Bolt Instrumountings can be assembled in a 'Vee' arrangement for good stability and improved vibration isolation.

- Circular or hexagonal end plates for simple fitting
- Can take up to 3 times rated load under shock conditions.
- Takes load in either shear or compression, or a combination.
- Fixing bolts threaded to within 2 pitches of the end plate.
- Up to 12 mm deflection in shear for a very soft suspension.
- Top quality bond strength for reliability and safety.

17-1061, 17-1379
17-1380



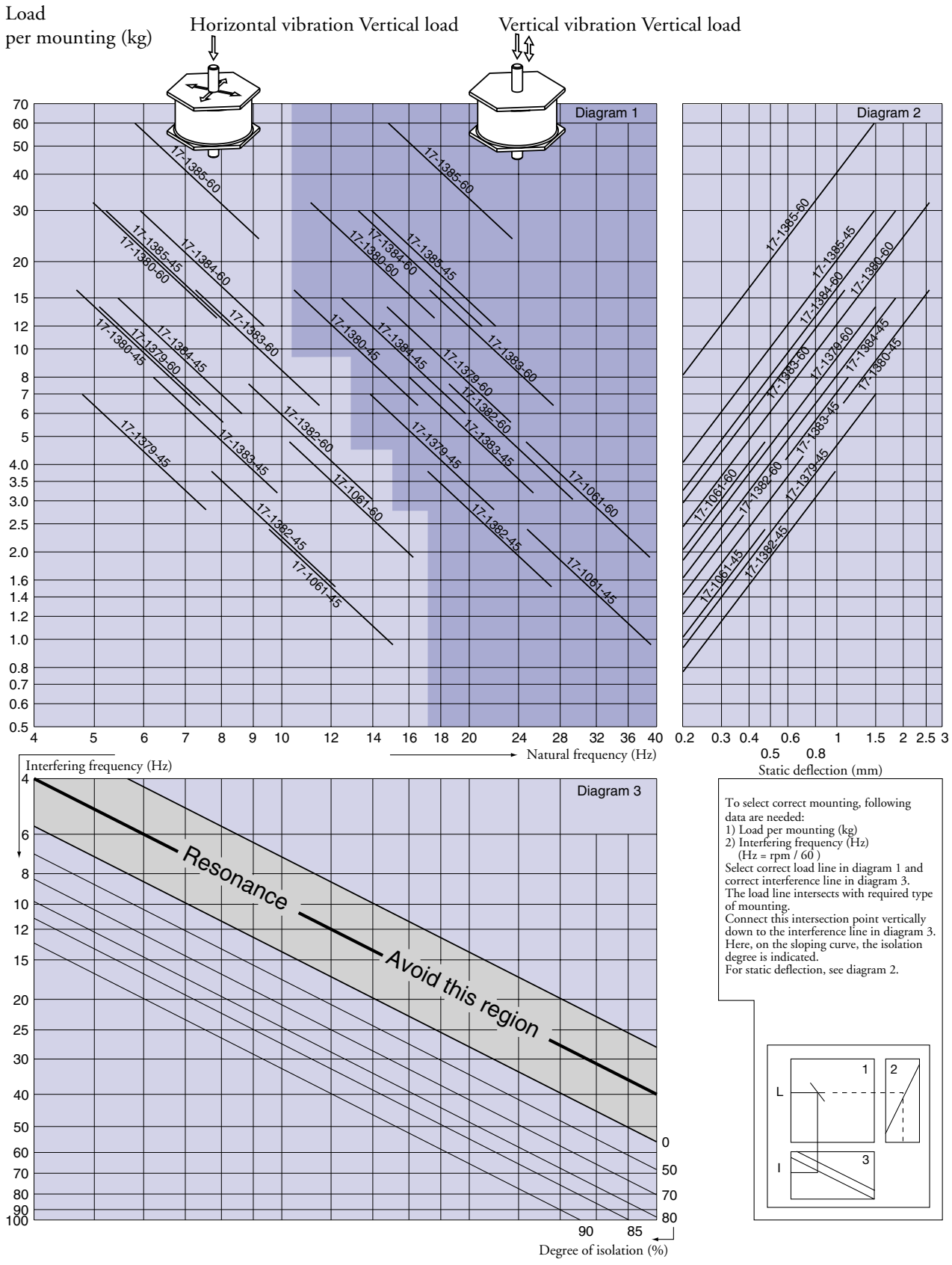
17-1382, 17-1383
17-1384, 17-1385



Two bolt instrumountings		Dimensions in mm				Max load in	Max load in	Weight
Type	Part no.	D	H	G	L	compression (kg)	shear (kg)	(kg)
17-1061-45	10-00443-01	11	11	M4	10	2.4	2.3	0.005
17-1061-60	10-00444-01	11	11	M4	10	4.8	2.5	0.005
17-1379-45	10-00470-01	21	22	M6	15	7.0	5	0.02
17-1379-60	10-00471-01	21	22	M6	15	14	5	0.02
17-1380-45	10-00472-01	35	34	M8	20	16	15	0.07
17-1380-60	10-00473-01	35	34	M8	20	32	15	0.07
17-1382-45	10-00476-01	15	16	M6	15	3.8	3	0.013
17-1382-60	10-00477-01	15	16	M6	15	7.6	3	0.013
17-1383-45	10-00478-01	21	19	M8	20	8.0	6	0.03
17-1383-60	10-00479-01	21	19	M8	20	16	6	0.03
17-1384-45	10-00480-01	32	26	M8	16	15	10	0.06
17-1384-60	10-00481-01	32	26	M8	16	30	10	0.06
17-1385-45	10-00482-01	33	22	M10	25	30	14	0.11
17-1385-60	10-00483-01	33	22	M10	25	60	14	0.11

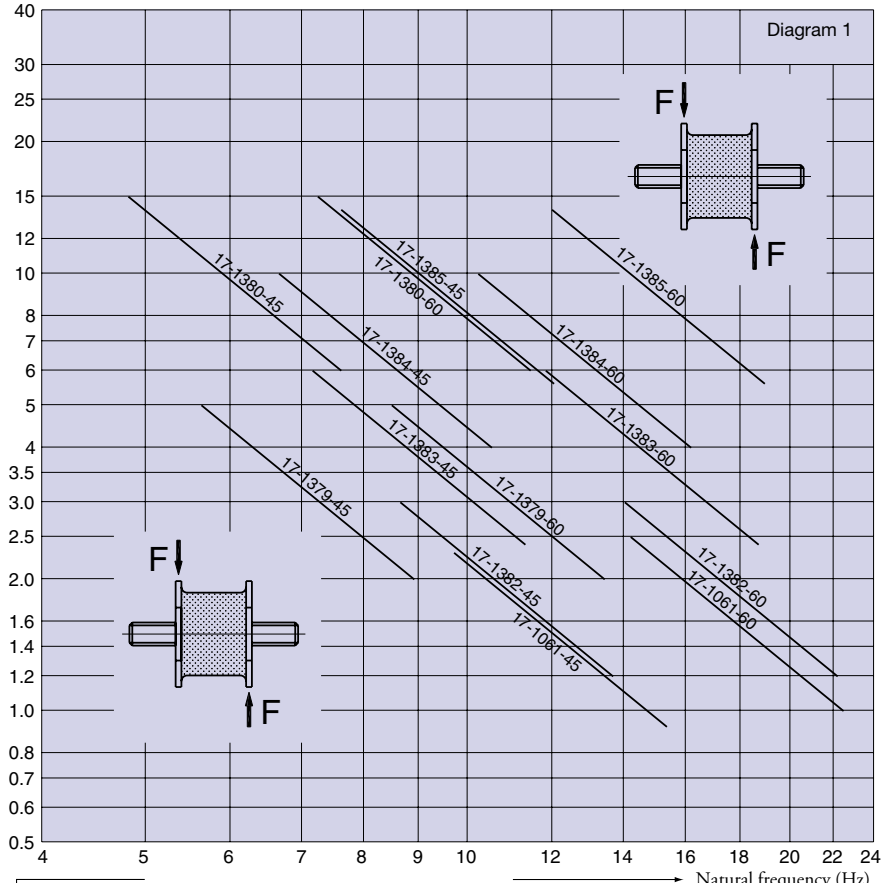
Two Bolt Instrumountings

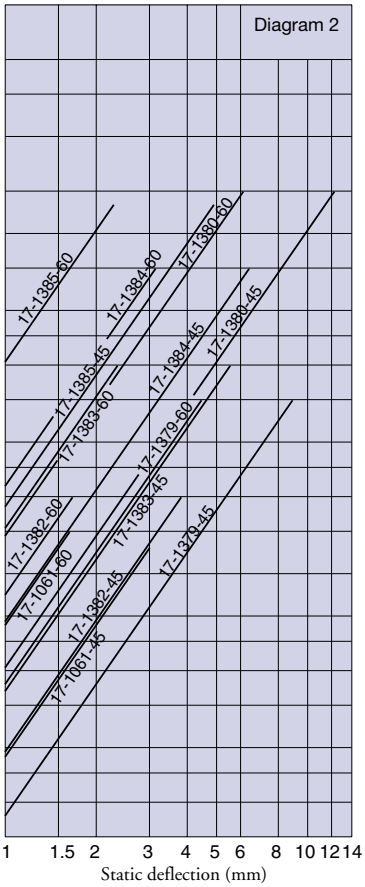
Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

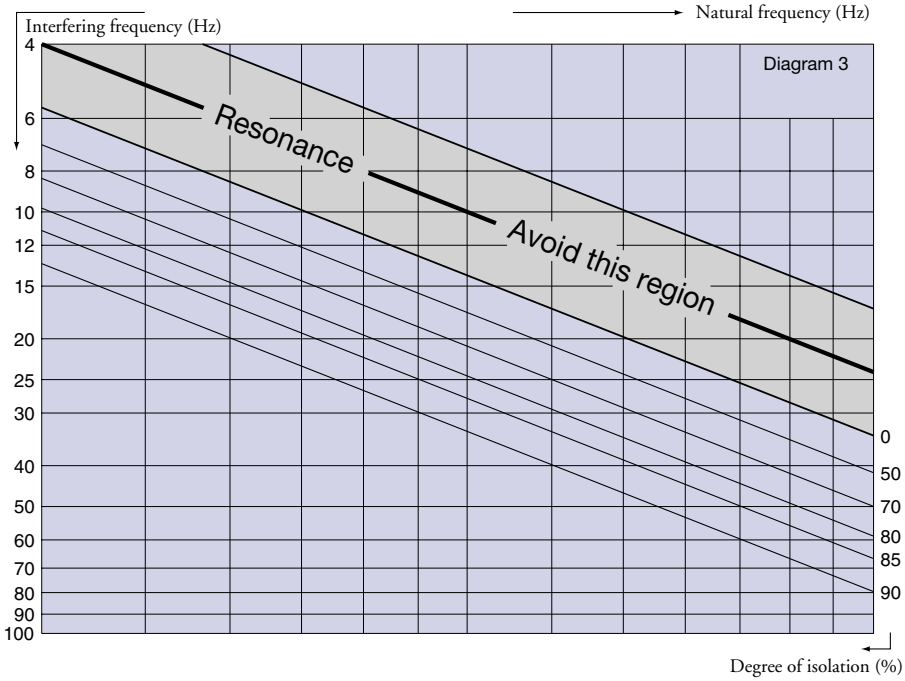


Note: The natural frequencies and degrees of isolation are based on dynamic characteristics of the mountings.

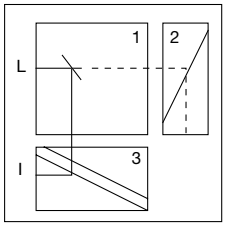
Load
per mounting (kg)







To select correct mounting, following data are needed:
1) Load per mounting (kg)
2) Interfering frequency (Hz)
(Hz = rpm / 60)
Select correct load line in diagram 1 and correct interference line in diagram 3.
The load line intersects with required type of mounting.
Connect this intersection point vertically down to the interference line in diagram 3.
Here, on the sloping curve, the isolation degree is indicated.
For static deflection, see diagram 2.



Bobbins

Trelleborg Industrial AVS - Bobbins

A supplementary range of cylindrical mountings for a wide range of applications. They can be loaded either in compression or shear taking into consideration individual demands for actual applications.

Manufactured in natural rubber hardness 40° IRH or 60° IRH.

Type A

Type B

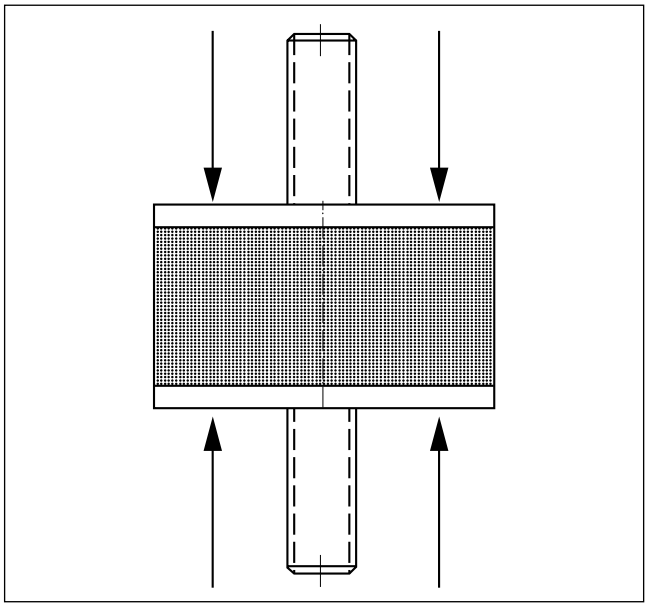
Type C

Type D

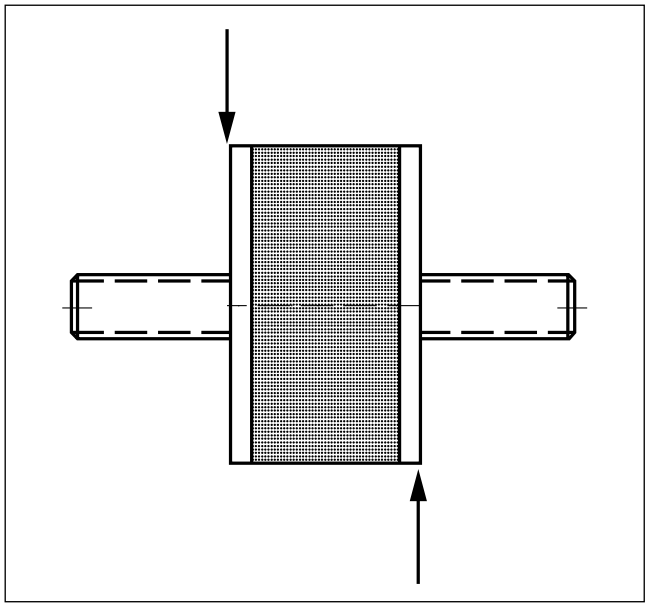
Type KD

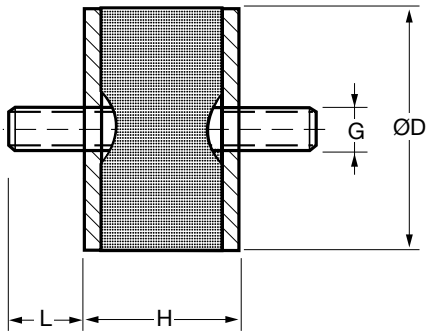
Type E

Compression load



Shear load

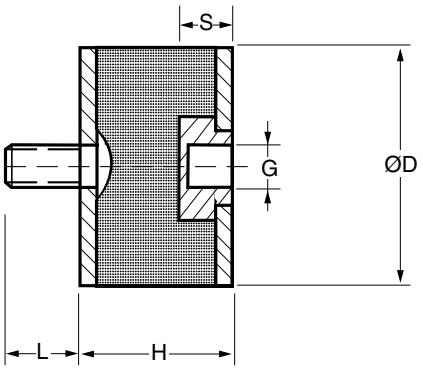




Cylindrical mountings type A

Type	D/H	GxL	Part no. 40° IRH	Part no. 60° IRH	40° IRH Compression load		40° IRH Shear load		60° IRH Compression load		60° IRH Shear load	
					k_{comp} (N/mm)	F_{max} (N)	k_{shear} (N/mm)	F_{max} (N)	k_{comp} (N/mm)	F_{max} (N)	k_{shear} (N/mm)	F_{max} (N)
A	10/10	M4x10		20-00553-01					55	75	10	30
A	10/15	M4x10		20-01066-01					30	55	6	25
A	15/10	M4x10		20-01067-01					135	150	22	50
A	15/15	M4x10		20-01068-01					75	135	13	50
A	20/10	M6x15	20-00418-01	20-00419-01	162	170	19	42	310	325	40	90
A	20/15	M6x15	20-00670-01	20-00555-01	70	123	11	42	145	255	25	90
A	20/20	M6x15	20-00659-01	20-00541-01	45	110	8	42	95	235	20	90
A	20/25	M6x15	20-00420-01	20-00556-01	33	105	6	42	70	225	15	90
A	20/30	M6x15	20-00421-01	20-00422-01	27	102	5	42	60	220	10	90
A	25/10	M6x15	20-00423-01	20-00424-01	314	330	29	66	575	600	65	145
A	25/15	M6x15	20-00425-01	20-00426-01	123	215	18	66	245	430	40	145
A	25/20	M6x15	20-00427-01	20-00428-01	75	184	13	66	155	385	25	145
A	25/25	M6x15	20-00429-01	20-00430-01	54	171	10	66	115	365	20	145
A	25/30	M6x15	20-00431-01	20-00432-01	43	164	8	66	95	355	15	145
A	30/15	M8x20	20-00433-01	20-00561-01	237	378	28	95	455	725	60	210
A	30/20	M8x20	20-00434-01	20-00543-01	129	295	19	95	260	600	40	210
A	30/25	M8x20	20-00435-01	20-00436-01	88	263	15	95	185	550	30	210
A	30/30	M8x20	20-00611-01	20-00562-01	67	248	12	95	145	530	25	210
A	30/40	M8x20	20-00437-01	20-00438-01	46	233	9	95	100	510	20	210
A	40/20	M8x20	20-01069-01	20-01070-01	275	632	34	170	535	1225	75	370
A	40/30	M8x20	20-00439-01	20-00440-01	130	481	21	170	270	1000	45	370
A	40/40	M8x20	20-00441-01	20-00442-01	86	437	16	170	185	935	35	370
A	50/20	M10x25	20-00443-01	20-00444-01	564	1248	56	265	1040	2305	120	580
A	50/25	M10x25	20-00445-01	20-00446-01	335	976	42	265	650	1900	95	580
A	50/30	M10x25	20-00635-01	20-00565-01	234	846	34	265	470	1705	75	580
A	50/35	M10x25	20-01071-01	20-01072-01	180	774	29	265	370	1600	60	580
A	50/40	M10x25	20-00447-01	20-00545-01	146	730	25	265	305	1535	55	580
A	50/45	M10x25	20-00448-01	20-00566-01	123	701	22	265	260	1490	45	580
A	50/50	M10x25	20-00449-01	20-00546-01	106	681	19	265	230	1460	40	580
A	75/40	M12x35	20-00450-01	20-00451-01	417	2032	57	596	825	4030	125	1300
A	75/50	M12x35	20-00452-01	20-00453-01	282	1766	44	596	580	3630	95	1300
A	75/55	M12x35	20-00454-01	20-00455-01	242	1689	40	596	505	3515	85	1300
A	100/40	M16x45	20-00456-01	20-00457-01	932	4541	102	1060	1755	8550	220	2310
A	100/55	M16x45	20-00458-01	20-00459-01	496	3455	71	1060	995	6930	155	2310

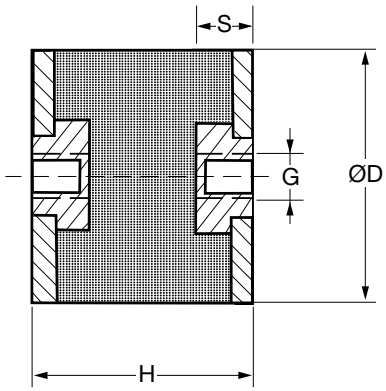
Bobbins



Cylindrical mountings type B

Type	D/H	GxL (S)	Part no. 60° IRH	60° IRH Compression load k_{comp} (N/mm)	60° IRH Compression load F_{max} (N)	60° IRH Shear load k_{shear} (N/mm)	60° IRH Shear load F_{max} (N)
B	10/10	M4x10(4)	20-00569-01	60	55	10	25
B	10/15	M4x10(4)	20-01063-01	35	50	5	25
B	15/15	M4x10(4)	20-01073-01	80	125	15	50
B	20/15	M6x15(6)	20-00570-01	160	240	25	90
B	20/20	M6x15(6)	20-00571-01	105	220	20	90
B	20/25	M6x15(6)	20-00460-01	80	215	15	90
B	25/15	M6x15(6)	20-00572-01	270	405	40	145
B	25/20	M6x15(6)	20-00461-01	170	360	25	145
B	25/25	M6x15 (6)	20-00462-01	125	340	20	145
B	25/30	M6x15(6)	20-00463-01	100	335	15	145
B	30/15	M8x20(8)	20-01074-01	495	675	60	210
B	30/20	M8x20 (8)	20-00574-01	285	560	40	210
B	30/25	M8x20(8)	20-00464-01	200	515	30	210
B	30/30	M8x20 (8)	20-00575-01	155	495	25	210
B	30/40	M8x20(8)	20-00465-01	110	475	20	210
B	40/30	M8x20(8)	20-00466-01	295	935	45	370
B	40/40	M8x20(8)	20-00467-01	200	875	35	370
B	50/30	M10x25(10)	20-00468-01	515	1595	75	580
B	50/40	M10x25 (10)	20-00469-01	335	1435	55	580
B	50/50	M10x25 (10)	20-00579-01	250	1365	40	580
B	75/50	M12x35(12)	20-00470-01	630	3400	95	1300
B	75/55	M12x35 (12)	20-00471-01	550	3290	85	1300
B	100/40	M16x45 (16)	20-00472-01	1915	7995	220	2310
B	100/55	M16x45(16)	20-00473-01	1085	6480	155	2310

S = internal thread length

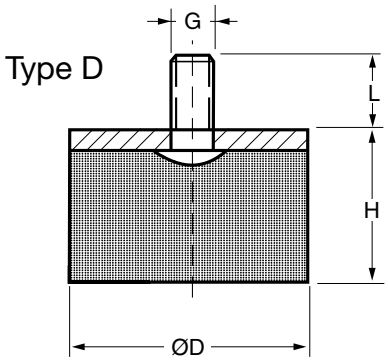


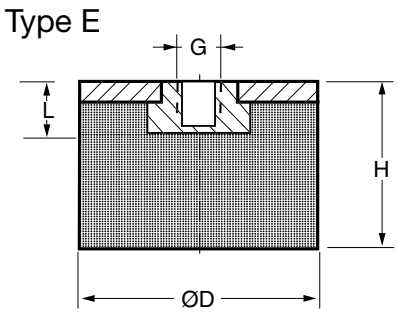
Cylindrical mountings type C

Type D/H	G(S)	Part no. 60° IRH	60° IRH Compression load		60° IRH Shear load	
			k_{comp} (N/mm)	F_{max} (N)	k_{shear} (N/mm)	F_{max} (N)
C 15/15	M4(4)	20-00583-01	85	110	15	50
C 20/20	M6(4)	20-00361-01	115	200	18	90
C 20/25	M6(6)	20-00584-01	85	195	15	90
C 20/30	M6(6)	20-00363-01	70	190	10	90
C 25/20	M6(6)	20-00585-01	185	325	25	145
C 25/25	M6(6)	20-00474-01	135	310	20	145
C 30/25	M8(8)	20-00475-01	220	465	30	210
C 30/30	M8(8)	20-00550-01	170	445	25	210
C 30/35	M8(8)	20-01075-01	140	435	22	210
C 30/40	M8(8)	20-00476-01	120	430	19	210
C 40/30	M 8(8)	20-00551-01	320	845	45	370
C 40/40	M 8(8)	20-00587-01	215	790	35	370
C 50/30	M10(10)	20-00588-01	560	1440	75	575
C 50/35	M10(10)	20-00669-01	440	1350	60	575
C 50/40	M10(10)	20-00589-01	360	1295	55	575
C 50/45	M10(10)	20-00590-01	310	1255	45	575
C 50/50	M10(10)	20-00591-01	270	1230	40	575
C 75/36	M12(12)	20-00371-01	1180	3635	140	1300
C 75/40	M12(12)	20-00477-01	975	3400	125	1300
C 75/45	M12(12)	20-00478-01	805	3200	110	1300
C 75/50	M12(12)	20-00682-01	685	3065	95	1300
C 75/55	M12(12)	20-00552-01	595	2970	85	1300
C 100/40	M16(16)	20-00479-01	2075	7215	220	2310
C 100/45	M16(16)	20-00480-01	1655	6585	195	2310
C 100/50	M16(16)	20-00481-01	1375	6155	170	2310
C 100/55	M16(16)	20-00482-01	1175	5850	155	2310

S = internal thread length

Bobbins





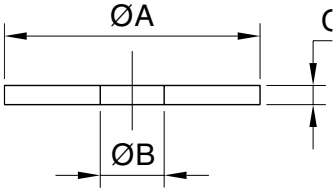
Cylindrical mountings type D/E/KD

Type D/H	GxL	Part no. 40° IRH	Part no. 60° IRH	Compression load 40° IRH F_{max} (N)	60° IRH F_{max} (N)
D 10/10	M4x10		20-01077-01		60
D 15/15	M4x10		20-01078-01		130
D 20/10	M6x15		20-00483-01		295
D 20/15	M6x15		20-00484-01		250
D 20/20	M6x15		20-00485-01		235
D 20/25	M6x15		20-00486-01		225
D 25/10	M6x15		20-00487-01		530
D 25/15	M6x15		20-00488-01		415
D 25/20	M615		20-00489-01		380
D 30/15	M8x20		20-00490-01		665
D 30/20	M8x20		20-00491-01		580
D 30/25	M8x20		20-00604-01		540
D 30/30	M8x20		20-00492-01		525
D 40/25	M8x20		20-00493-01		1045
D 40/30	M8x20		20-00494-01		985
D 40/40	M8x20		20-00495-01		930
D 50/20	M10x25		20-00496-01		2095
D 50/30	M10x25		20-00497-01		1655
D 50/40	M10x25		20-00498-01		1510
D 50/45	M10x25		20-00499-01		1475
D 75/40	M12x35		20-00500-01		3900
	G(S)				
E 30/17	M8(8)	20-00594-01	20-00613-01	225	500
E 50/20	M10(10)		20-00501-01		1700
E 50/36	M10(10)	20-00607-01	20-00502-01	550	1100
E 50/45	M10(10)		20-00606-01		1000
KD 25/12	M6x16		10-00087-01		300
KD 25/17	M6x18		20-00598-01		250
KD 50/17	M10x28		20-00595-01		1400

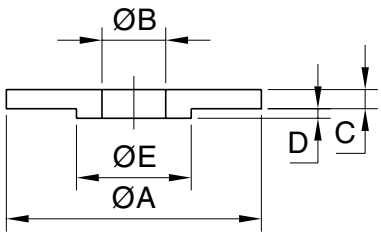
S = internal thread length

Top and bottom washers
Overload and rebound washers (top and bottom) are necessary to limit maximum movement in the event of shock loading.

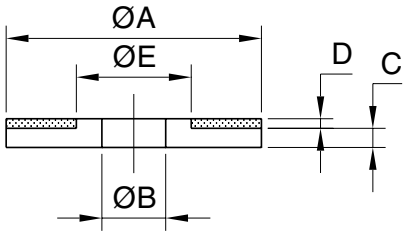
Type A
Steel Washer



Type B
Top Stepped Steel Washer



Type C
Rebound Washer with Rubber



Washer

Designation	Part no.	Type	Dimensions in mm				
			A	B	C	D	E
Washer 50x12C	10-03666-01	C	50	12	3	3	28.5
Washer 95x24C	20-00525-01	C	95	24	8	6	38
Washer 67.5x20C	10-03707-01	C	67.5	20	5	5	30
Washer 116x24B	20-00527-01	B	116	24	8	4	47
Washer 80x20B	20-00528-01	B	80	20	6	3	34.5
Washer 55x12B	20-00529-01	B	55	12	5	2.5	25
Washer 80x16B	20-00773-01	B	80	16	6.5	3	31.5
Washer 50x10A	20-00531-01	A	50	10	4		
Washer 80x16A	20-00532-01	A	80	16	5		
Washer 100x20A	20-00533-01	A	100	20	6		
Washer 139x24A	20-00534-01	A	139	24	10		
Washer 55x12A	20-00535-01	A	55	12	5		
Washer 51x16A	20-00536-01	A	51	16	4		
Washer 57x12A	20-01103-01	B	57	16	3	1.5	22
Washer 52x12A	20-00416-01	A	52	16	3		
Washer 110x20B	20-00643-01	B	110	20	5	3	52.5
Washer 55x20A	20-00644-01	A	55	20	5		

Recommended tightening torque for center fixing bolts	
Thread size	Torque (Nm)
M10	25
M12	40
M16	60
M20	120
M24	200

Metacone™ and HK on page 40

Type	Cone mount	Top washer Part no.	Bottom washer Part no.
Metacone™	17-0189	20-00529-01	10-03666-01
	17-0241	20-00529-01	10-03666-01
	17-0248	20-00529-01	10-03666-01
	17-0277	20-00773-01	20-00532-01
	17-0379	20-00531-01	20-00531-01
	17-0341	20-00773-01	20-00532-01
	17-0311	20-00773-01	20-00532-01
	17-1691	20-00535-01	20-00536-01
HK	HK 60	20-01103-01	20-00416-01

Metacone™ and HK on page 42

Type	Cone mount	Top washer Part no.	Bottom washer Part no.
Metacone™	11-1009	20-00532-01	20-00532-01
	17-0391	20-00532-01	20-00532-01
	17-0566	20-00532-01	20-00532-01
	17-1227	20-00528-01	20-00526-01
	17-1550	20-00534-01	20-00534-01
	17-1843	20-00533-01	20-00533-01
	17-1865	20-00532-01	20-00532-01
	17-0146	20-00527-01	20-00525-01
HK	HK 600	20-00643-01	20-00644-01

HA

Trelleborg Industrial AVS - Height Adjusters

Type HA is available in various sizes to suit the small and medium range of Trelleborg Industrial AVS-mountings, as listed in the table below. It allows mountings to be retrofitted to existing installations where original spares are unobtainable.

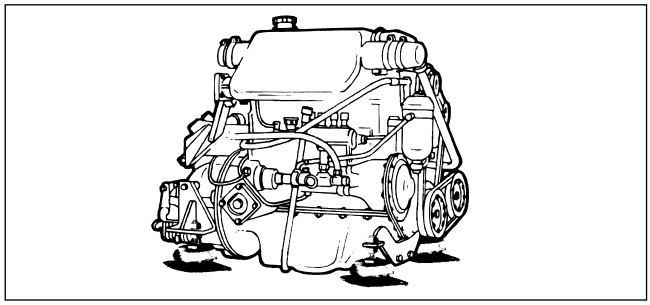
Notes:

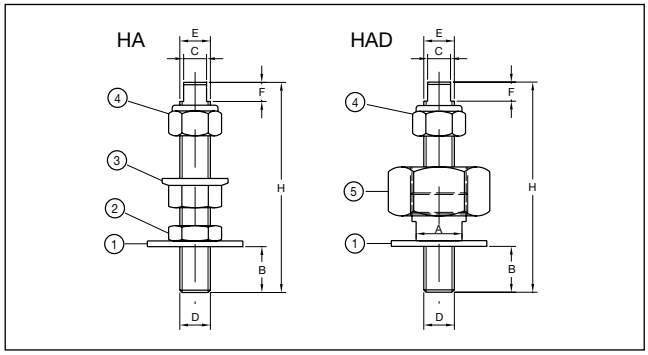
- For optimum solutions where close coupling tolerances are required, allow the mountings to settle for 48 hours before final alignment of the engine installation.
- For securing the bolt into the mounting, it is recommended to apply Loctite.
- The height adjuster HA can be used together with Novibra type M-mount. See description of M-mount.

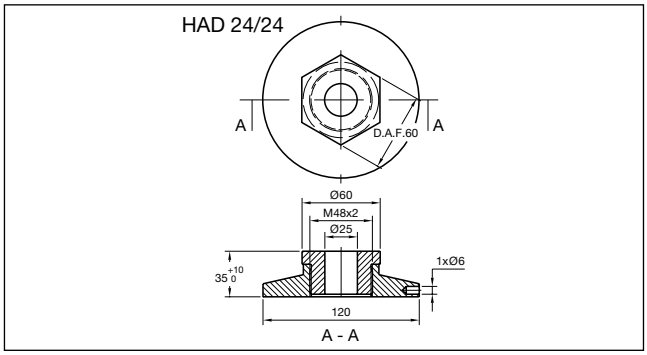
Height Adjusters	can be used together with
HA 12/12	RAB, RA 100 M 12, RA 200 M 12, RAEM
HA 12/16	60, RAEM 125 M 12, RAEM 350 M 12, 17-
HAD 12/16	1463, Cushyfloat 17-1600, SIM 100
HA 16/16	RA 350 M 16, RA 500, RA 800,
HAD 16/16	RAEM M 16, RAEM 800,
HA 16/20	Cushyfloat 17-1609, SIM 200
HAD 16/20	Cushyfoot 17-0213, 17-0290, 17-0346
HA 20/20	Cushyfloat 17-1657, SIM 300
HAD 20/20	
HAD 24/24	Cushyfloat 17-1841

Features

Type HA is a height adjuster made in corrosion protected grade 8 steel. The steel is zinc plated and chromated according to DIN 50691/ISO 2081. The height adjuster is supplied complete with washer and nut for fastening to the mounting and two nuts and a lock washer for the engine foot fastening. The HA height adjustment facilitates precise coupling alignment for engine installations and boat building tolerances.







Type	Part no.	Dimensions H	D	E	A	B	C	F	1 Washer	2 Hexagon low nut	3 Hexagon flange nut	4 Lock nut plastic insert	5 Fine thread adjusting unit
HA 12/12	20-00508-01	95	M12	M12		20	D.A.F. 8	8	37x12x3	M12	M12	M12	
HA 12/16	20-00509-01	105	M12	M16		20	D.A.F. 12	10	44x15x3	M16	M16	M16	
HA 16/16	20-00510-01	110	M16	M16		24	D.A.F. 12	10	50x15x3	M16	M16	M16	
HA 16/20	20-00511-01	130	M16	M20		24	D.A.F. 12	10	56x20x4	M20	M20	M20	
HA 20/20	20-00512-01	135	M20	M20		30	D.A.F. 12	10	60x21x4	M20	M20	M20	
HAD 12/16	20-00513-01	105	M12	M16	D.A.F. 24	20	D.A.F. 12	10	44x15x3			M16	M30x1.5
HAD 16/16	20-00514-01	110	M16	M16	D.A.F. 24	24	D.A.F. 12	10	50x15x3			M16	M30x1.5
HAD 16/20	20-00515-01	130	M16	M20	D.A.F. 27	24	D.A.F. 12	10	56x20x4			M20	M36x2
HAD 20/20	20-00516-01	135	M20	M20	D.A.F. 27	30	D.A.F. 12	10	60x21x4			M20	M36x2
HAD 24/24	20-00517-01				See drawing								

Trelleborg Industrial AVS Questionnaire

Customer	Date
Contact	
Phone	Fax

TECHNICAL DATA FOR THE APPLICATION

- Type of equipment _____
- Environment for the application _____

❑ Industrial ❑ Residential

❍ Stationary (e.g. living area, hospital, hotel, office)

❍ Mobile

Shock loads ❑ Yes ❑ No

If yes, direction and magnitude _____

- Total supported weight: _____
- Number of mounting points: _____
- Position centre of gravity, along a horizontal axis: ❑ Centered
  ❑ Offset, please present outline drawing and indicate eventual fix mounting points.
- Position of centre of gravity, vertically: _____ Above mountings (mm): _____
- Disturbing frequency range (e.g. rpm, Hz, strokes/min): _____
- Direction of vibrations: ❑ Vertical ❑ Horizontal ❑ Rotating
- Is a combustion engine installed in the machinery? ❑ Yes ❑ No
  If yes, number of cylinders: _____ ❑ Four-stroke ❑ Two-stroke

Additional comments: _____

_____

Trelleborg Industrial AVS recommendation:

Date:	Sign:

Mounting type :	
Number of mountings :	
Degree of isolation :	%

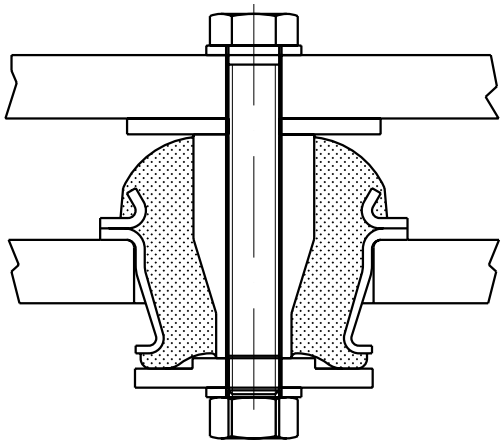
Please copy and fax questionnaire to nearest Trelleborg Industrial AVS office.

You can e-mail this page from "www.trelleborg.com/industrialavs" under the headlines, Products – Industrial

Installation guidelines

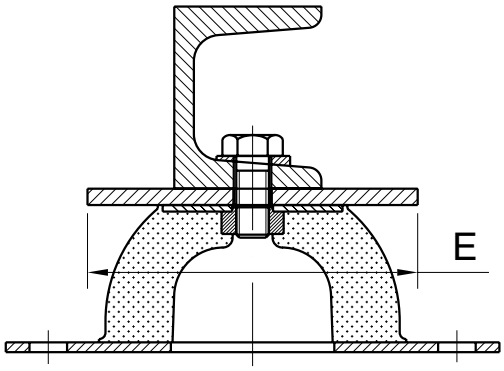
Metacone™ and HK

Always use appropriate washers when installing conical mountings! This recommendation refers also to mountings type Cab Mountings, UH and EH.



M Mountings

The underside surface of the suspended unit which rests on type M mountings should have an area of at least the diameter shown in the diagram and table. Otherwise a thick washer of diameter E should be fitted.



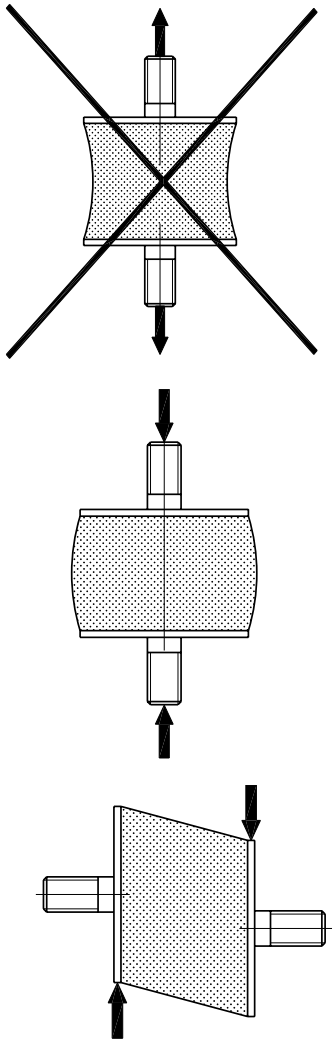
M mounting	E (mm)
M7	43
M25	56
M50	76
M100	96
M200	101
M400	125
M600	165
M1500	260

Loading directions

Do not install antivibration mountings in a way that causes the rubber to work in tension.

Compression and shear are the correct loading directions!

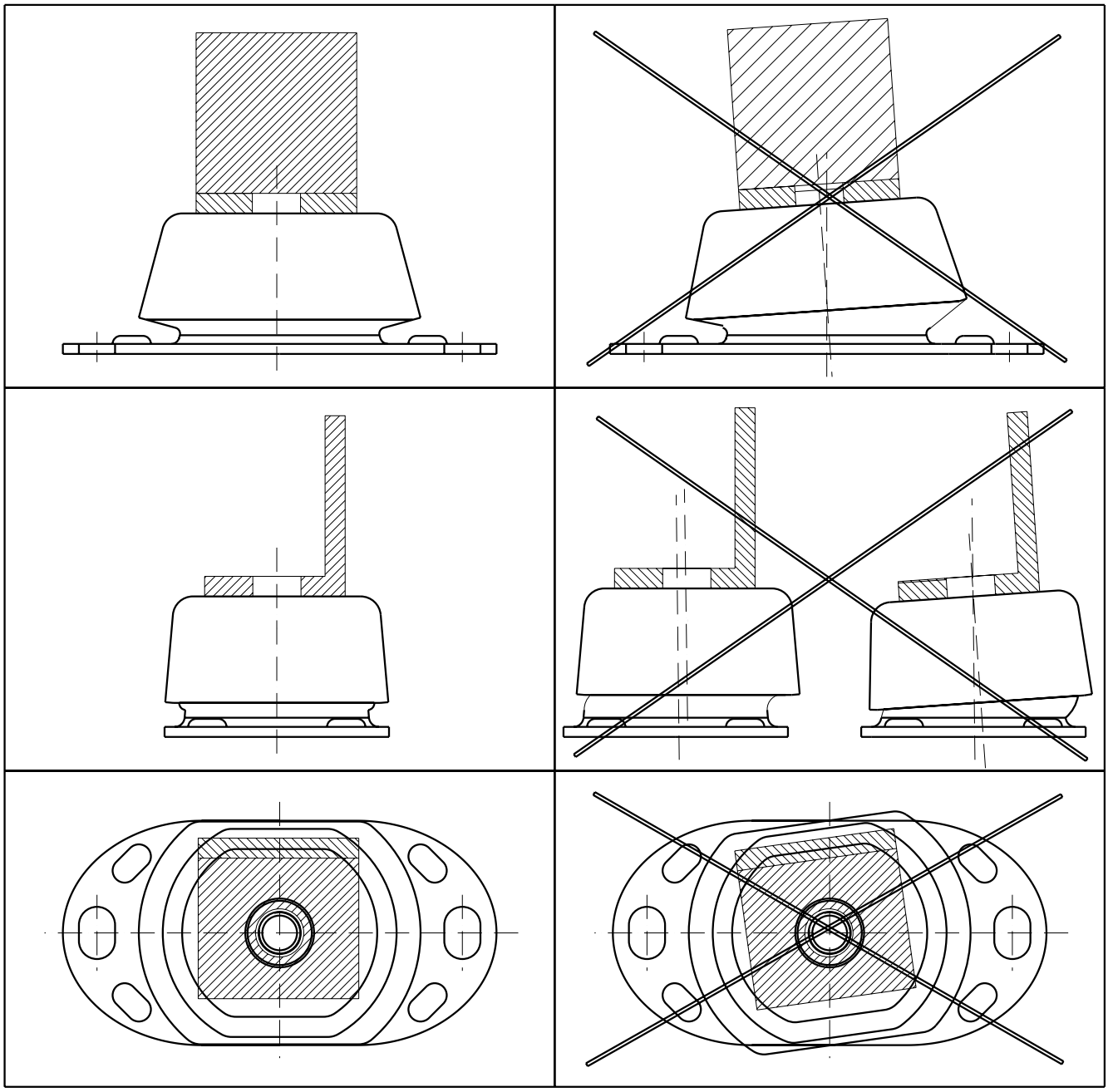
Take this into consideration for mounting types:
Bobbins, M, Two Bolt Instrumountings, Equi-Frequency, type SAW, Rectangular SAW and Circular SAW.



Alignment

In order to ensure maximum performance of all Metalastik® and Novibra® antivibration mountings fitted with top caps, all form of misalignment should be avoided.

Actual mounting types are: RA, RAEM, Cushyfloat™, SIM™, Cushyfoot™ and RAB.



Notes

Notes

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= Technical center

= Production

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Reg no. 21-00089-01 0308