

Comfort

Safety



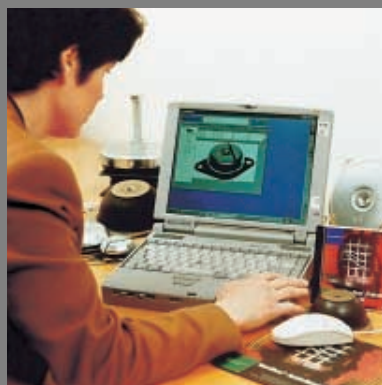
Novibra®  
Product catalogue

Environ-  
ment



TRELLEBORG

T R E L L E B O R G   N O V I B R A



*Trelleborg Novibra is a world-leading brand name and a part of the Trelleborg Group. 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. In a creative dialogue with you as customer we can today take care of virtually all types of problems caused by vibrations.*

Novibra operates a policy of continuous improvement and development.

We reserve the right to change design and specification of our products without prior notification or alteration of literature.

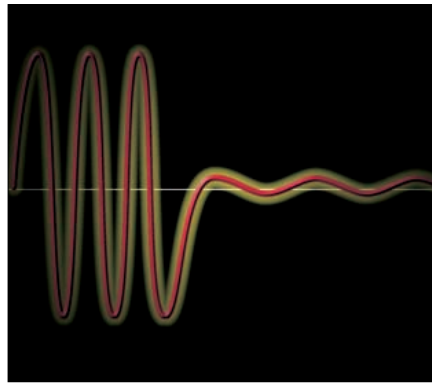
# We solve all types of vibration problems!

All machines vibrate and cause noise and structure-borne sound. At Trelleborg Novibra 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. Two vibration problems are never alike. We always analyse the situation 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 vibrations solutions.



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

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## Novibra® - product description

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**RA**



Universal mounting for industrial, marine and other mobile installations, i.e. generating sets, combustion engines, compressors and pumps.

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**RAEM**



As RA, but specifically recommended for installations where a high degree of isolation is required.

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**RAB**



Effective damping on small 1, 2 and 3 cylinder engines or other installations with excessive movements.

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**M**



An extremely soft mounting providing a high degree of isolation and shock protection on fans, electric motors, computers etc.

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**BA**



Suitable for the isolation of low speed machines - light fans, instruments and gauging equipment.

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**HK/MK**



Designed to permit high compression under vertical load but in the same time stable in the horizontal direction. Suitable for off road installations for instance to engine installations and cabin suspension





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**EH**



Vibration isolation on engines, operator cabins and other ancillary, mainly for mobile applications.

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<b>UH</b>		Suitable for the suspension of cabins on industrial and agricultural vehicles, like tractors, combine-harvester, street sweepers, fork-lift trucks, etc.
<b>SAW</b>		Dual stiffness mounting for crushers, mills, grinders and similar large, heavy equipment.
<b>GK</b>		A heavy duty mounting for large machines, such as refiners, defibrators, industrial fans, mixers, roll-mills and all types of inertia blocks. Also for supporting floating floors and control rooms.
<b>Novibra plate</b>		For vibration-isolation of limited requirements on e.g. printing machines, pillar drills, transformers, lathes.
<b>TF/TFE</b>		General workshop mounting with height adjustment, also suitable for punches, presses, etc.
<b>U</b>		As TF for installation of presses, punches, weaving machines, printing machines and other heavy high-speed machines.
<b>SE</b>		A simple mounting for office apparatus, sewing machines, electric motors, etc.
<b>VT/TK</b>		For the protection of instruments and apparatus on walls and ceilings. Particularly suitable for installation on board ships.
<b>ANB</b>		A shock absorbing mounting for the isolation of shocks on mobile installations e.g. off-road and rail vehicles, cranes and overhead cranes.
<b>VP</b>		For solving bearing problems in vibrating and oscillating constructions.
<b>Bobbins</b>		A supplementary range of cylindrical mountings.
<b>HA</b>		Height adjuster for precise coupling alignment of engine installations and boat building tolerances (for use with RA, RAEM, RAB and M).

## Novibra® – Questionnaire

# Novibra® – Provides a healthier environment

Novibra's antivibration mountings primary task/function is to eliminate harmful vibrations and to effectively reduce structure born sound.

## Experience and knowledge

Novibra is a well recognised supplier of antivibration mountings. With decades of experience of vibration problems all over the world, Novibra today covers a wide spectrum of applications. Here you will find satisfied manufacturers of fans, compressors, separators, marine engines, generators, pumps, wind mills, cabin mounts, fork lifts, buildings and bridges.

## Complete solution of the vibration problem

Novibra offers more than just a complete solution. We perform computer managed calculations to achieve the perfect technical solution, we educate and train in vibration technique to increase the understanding and knowledge of the vibration problems.

We can make FFT measurements to analyse the vibration problems at site.

Delivery of Novibra antivibration mountings is effectuated directly from the warehouse stock to the customer in order to minimise lead time.

## From R&D to finished product

Being part of the Trelleborg Group puts Novibra in a position with 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 measurement of raw materials and finished products. In our laboratories we continuously measure and control specifications of the raw material and finished products. Novibra has a R&D department, a production line and follows the product all the way to the customer. The total control, according to ISO 9001, of this process results in the quality product required by the customer.

## Environmental policy – ISO 14000

Novibra 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 glue to eliminate hazardous discharge.

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



Fig 1. Reaping-machine. Good environment in the cabin with Novibra type HK



Fig 2. ISO 9001 and DNV certificate



Fig 3. Silent windpower with Novibra type RA.



Fig 4. Novibra production.

# Novibra® – A safe choice

## Technical solutions

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

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.

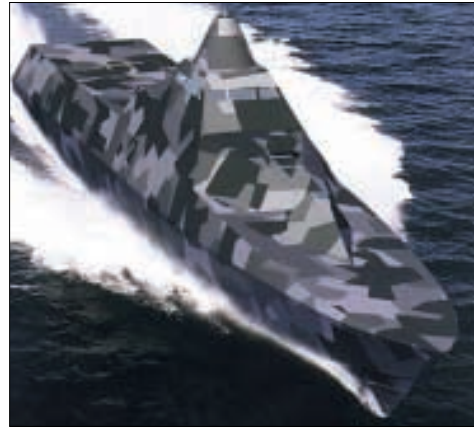


Fig 5. Marine Corvette Visby (YS 2000)

## Training and test

Novibra 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 Novibra solutions, we conduct training and education courses for our customers and distributors.

The new Technical Centre with advanced testing facilities gives Novibra excellent opportunities for product testing and product development.



Fig 6. Technical Centre

## Satisfied customers

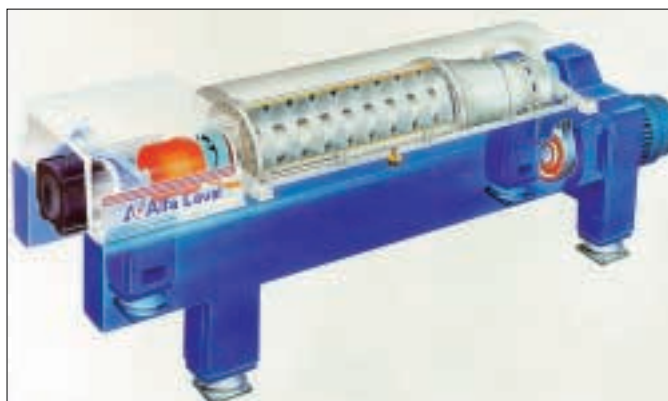
Over the 30 years that Novibra has been acting on the world market as a supplier of solutions to vibration applications the number of customers have increased dramatically.

Novibra customers come back year after year which has resulted in excellent cooperation and proved to be beneficial to both Novibra, who constantly optimises solutions, and the customers, who increase their ability to compete.

Our customers are pleased to communicate their experience of our products – we hope you will be one of them. Do contact us, we will always be at your service.



Fig 7. Satisfied customer



# Novibra® – 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 in the immediate surroundings where the machine is installed.

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

The human body, too, can easily 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 movements cause, for example, 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 the machine vibrations from being transmitted to surrounding areas.
3. Vibration-isolating the machine to prevent it from being affected by outside interference.
4. Sound-insulating the machine with suitable sound insulation and absorbing material to combat air-borne noise.

## Novibra 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, Novibra antivibration mountings can be cost effective because they will reduce 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 uniform stiffness. The types of spring material which are used most often are rubber and steel. Another alternative is air springs.

Cork was formerly used as a "spring" material and its elastic properties were based on compression and expansion of the air locked inside the cork. However, the locked-in air is eventually pressed out, thus impairing the isolation result and causing it to have no effect at all after a period of use. Cork does not permit a large spring travel, which is why it is no longer used in more demanding applications. The same applies to felt, which has more or less the same kind of properties.

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. Because of this, excessive movement occurs when running the machine through the resonance range, and more often than not special devices have to be installed in order to limit the deflections.

In order to allow the properties to be utilised in a satisfactory way, Novibra rubber mountings are available in various hardness grades according to designation as below.

- A = 40° IRH, Natural rubber
- B = 60° IRH, Natural rubber
- C = 70° IRH, Natural rubber
- E = 60° IRH, Butyl rubber
- N = 60° IRH, Nitrile rubber
- S = 60° IRH, Styrene rubber
- R = 50° IRH, Natural rubber



Fig 2. Chemicals

## 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 rather 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 module 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 any 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 with in 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 soft rubber is about 100 000 times softer than steel.

### Damping capacity

Damping capacity is another important feature of compounded rubber. This is of particular importance when operating a machine that is supported on springs through the resonance range. 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 figure 3. 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. But 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 lead to the rubber element being destroyed. See fig. 4. In the case of simple impact, the vibrations sequence will be as shown in fig. 5. The left-hand curve represents a steel spring, while the right-hand curve represents a rubber spring. These two curves clearly show just 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.

### High chemical resistance

High chemical resistance is yet another valuable feature when using rubber. Steel, on the other hand, can rust easily when exposed to air and acids leading to fatigue problems. Rubber is fully resistant to moisture and common acids, and at normal temperature, does not give rise to ageing problems. The highest temperature to which natural rubber should be continuously exposed is about +75°C. At extremely low temperatures, -30°-40°C, rubber stiffens and becomes rigid. At even lower temperatures it becomes hard, brittle and non-elastic though it is reversible. Rubber mountings may sometimes have to be installed at places where they can be exposed to the risk of coming into contact with oil. The harmful effects of all can often be avoided through the design of the mounting or by fitting a mechanical shield.

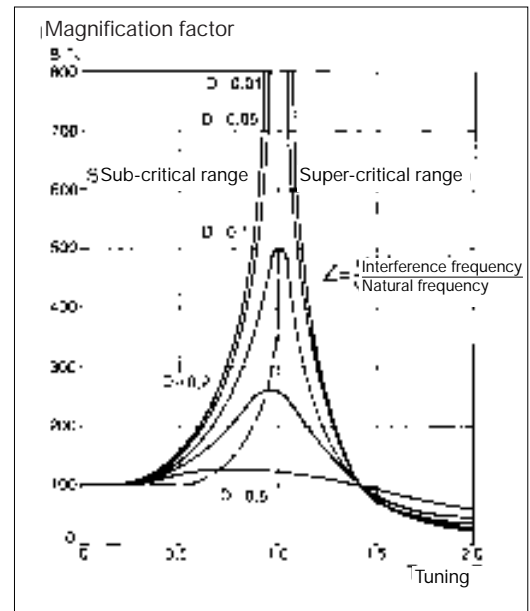


Fig 3. Resonance curve for spring material with different internal damping.

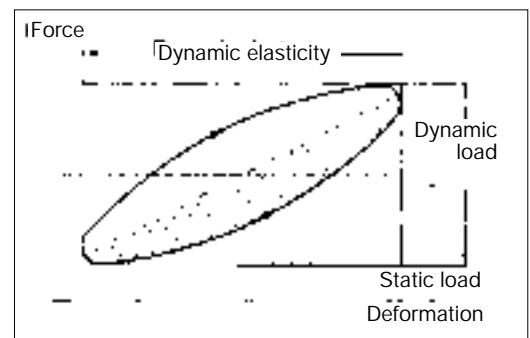


Fig 4. Schematic representation of the internal damping properties of rubber. The elliptical area indicates the loss of energy.

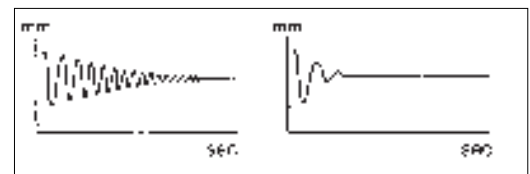


Fig 5. Vibrations sequence with single impact for steel and rubber springs.

## Spring coefficients

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

The static spring coefficient is used to calculate the deflection for the machine and the dynamic springs coefficient is used for calculating the natural frequency for the machine. It is the relationship between the natural frequency and the disturbing frequency from the machine that decide the isolation degree. Softer springs gives higher isolation degree.

The explanation for the difference between static and dynamic spring constants is that a rubber spring consists of a large elastic deformation part and a small visco elastic deformation part. A steel spring can be seen as totally elastic with 100 % return after loading and with no damping.

The internal damping for the rubber spring is of big advantage at resonance. In fig. 6 is the difference between a rubber spring with the visco elastic damping part and a steel spring schematically shown.

The dynamic spring constant is dependent on frequency and amplitude. The effect of frequency, however, is small up to 400 Hz.

The effect of amplitude is such that rubber will be stiffer the lower the amplitude. Most mountings in this catalogue have been dynamically tested with an amplitude of 0.05 mm.

The dynamic spring coefficient is always higher than the static spring coefficient. The ratio between dynamic and static stiffness is dependent on the material and the geometrical shape of the rubber body in the mounting.

The ratio for the mountings included in this catalogue is between 1.2 and 1.9.

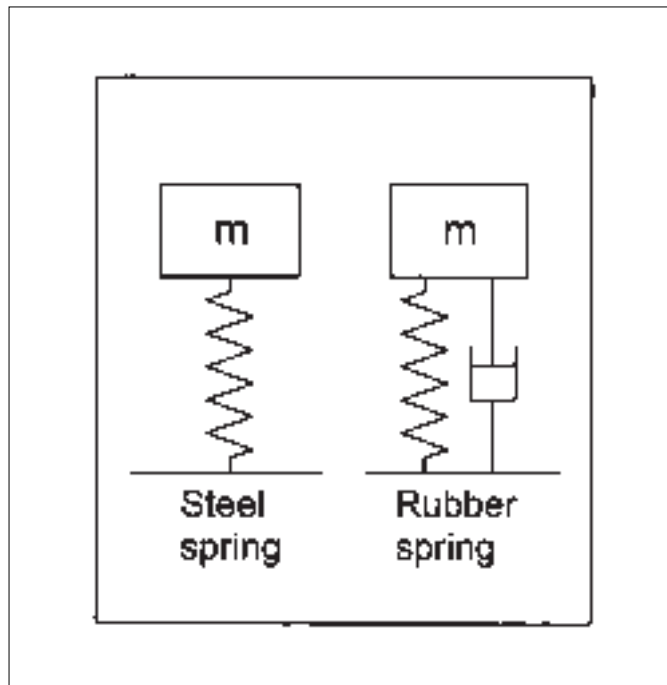


Fig 6. Schematic difference between rubber spring and steel spring.

## Stresses

One important question is how large a continuous stress can rubber be subjected to. When it comes to shear, normally 0.25 MPa is considered to be a normal stress factor, but in some instances it can go as high as 0.5 MPa without problems. Higher shear stresses are not suitable as they change to tensile stress. Experience has shown that tensile loads are detrimental to rubber bonded designs. If subjected to high shear stresses, rubber should be precompressed.

When it comes to compression 1 MPa is a normal stress for rubber bonded to metal with the restriction that the deformation  $\delta$  will not exceed 25 % of the rubber thickness. With hard rubber, one can expect the stress to increase slightly. The fact that the element is made of rubber and bonded to metal does not represent any restriction in the use of the rubber's strength properties; quite reverse, in fact. The bond between the rubber and the metal is stronger than the rubber material itself.

If the area under load is large in relation to the free area (high shape factor) the modulus of elasticity will be large and the deformation small. Higher compression stresses can then be utilised. Examples of applications are bearings for bridges and elements for vibration-isolation of buildings. The surface pressure here may be as high as 15-20 MPa.

One of the reasons why the afore-mentioned relatively low stresses for normal rubber mountings must be taken into consideration is that the rubber element will be permanently deformed if it is subjected to a too high load. This is called "compression set". The most important factor for reducing compression set is that the rubber is of a high quality and correctly vulcanised. Moreover, it is essential that the rubber spring is not exposed to high temperatures.

## 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 calculation 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. 7 illustrates the relationship between rubber hardness and shear modulus, and fig. 8 shows 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.

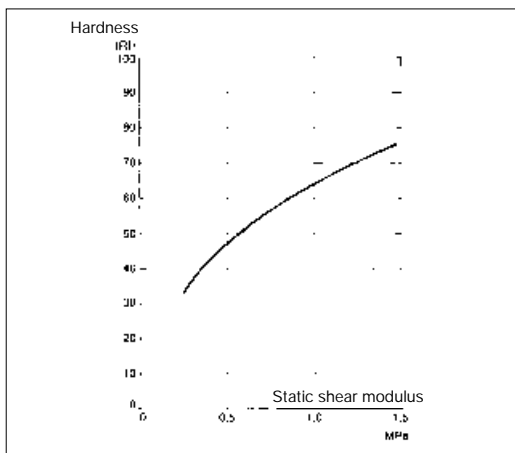


Fig 7. Relationship between rubber hardness and shear modulus

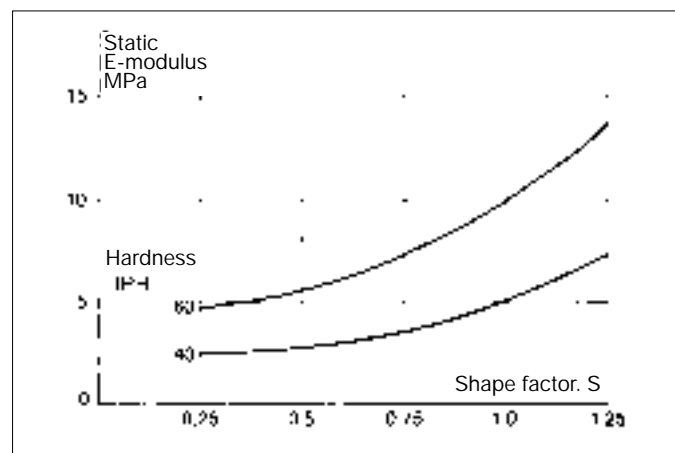


Fig 8. The dependence of the compression modulus upon the shape factor

## Calculation of antivibration mounts

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 calculated very accurately, otherwise the result could be impaired performance. In favourable cases, the force can be reduced to only 2 or 3% of the force of a rigidly mounted machine. In such cases, you could say that the vibrations are practically eliminated.

### Some vibration definitions

Amplitude	A	(m)	The magnitude of the displacement of a vibration deflection from the mean position. The total vibration is thus twice the amplitude
Interference frequency	f	(Hz)	Is mostly the same as the frequency of the rotational speed of the machine's.
Frequency	$f_0$	(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	$K_{stat}$	(N/m)	The force required in Newtons to compress the mounting 1 m.
Dynamic spring stiffness	$K_{dyn}$	(N/m)	The force required in Newtons to compress the mounting 1 m in dynamical relations.
Tuning	Z	(-)	The ratio between interference frequency f and natural frequency $f_0$ .
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	I	(-)	The part of the impulse force which is eliminated by the vibration isolation, (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	$\delta_{stat}$	(mm)	The deflection for a machine.

## Calculation of deflection

When calculating the deflection for a machine the following formula shall be used.

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

## Calculation of isolation degree

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

The natural frequency:  $f_0 = \frac{1}{2\pi} \sqrt{\frac{K_{\text{dyn}}}{m}}$

Tuning:  $Z = f/f_0$

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 distinct 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. 3 on page 10.

Isolation degree  $I=(1-B)$  or as percentage,  $I=(1-B) \times 100$

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

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. 9, 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.

As a rule, the operating speed of a machine (interference frequency) is given. If the system's natural vibration coefficient can be altered in any way, and thereby influence Z, then it is possible to change the force transmitted. This is exactly what happens when vibration isolation is achieved i.e. by means of springs. The low elasticity and shear moduli of rubber are used to achieve a low natural frequency.

To sum up, 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 can increase considerably and may amount to several hundred per cent.
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 many different ways. The resonance points can be determined, but the methods of calculation are often very difficult. Experience has shown that all resonance velocities that can arise do not need to be clarified. It is usually quite sufficient to calculate the most significant ones which can be determined easily. The desired level of isolation and the interference frequency determine where the resonance frequency shall be.

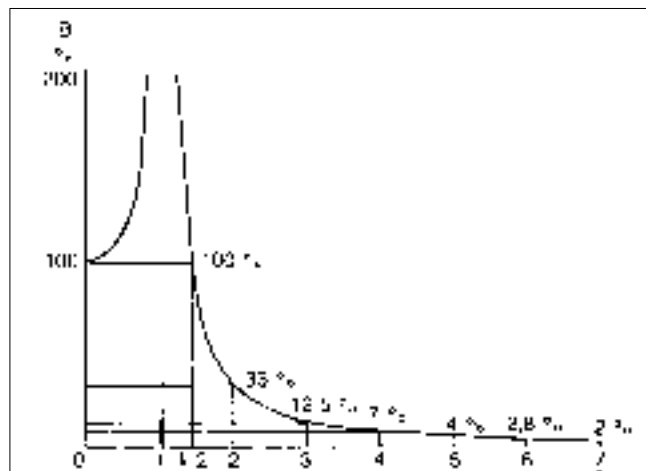


Fig 9. Resonance curve

## Shock isolation

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

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

The basic principle for achieving good shock isolation is to mount the machine which is to be protected 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  $\tau$  seconds, and the natural frequency of the set up is  $f_0$  Hz, then the product must be  $\tau f_0 < \text{approx. } 0.25$  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.

## 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 <sup>2</sup>	0.3048	meters/second <sup>2</sup>
inches/second <sup>2</sup>	0.0254	meters/second <sup>2</sup>

## 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 Novibra 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 earthing for removing static electricity.
5. Pipe supports to prevent structural noise and damage occurring around fixtures and pipes.

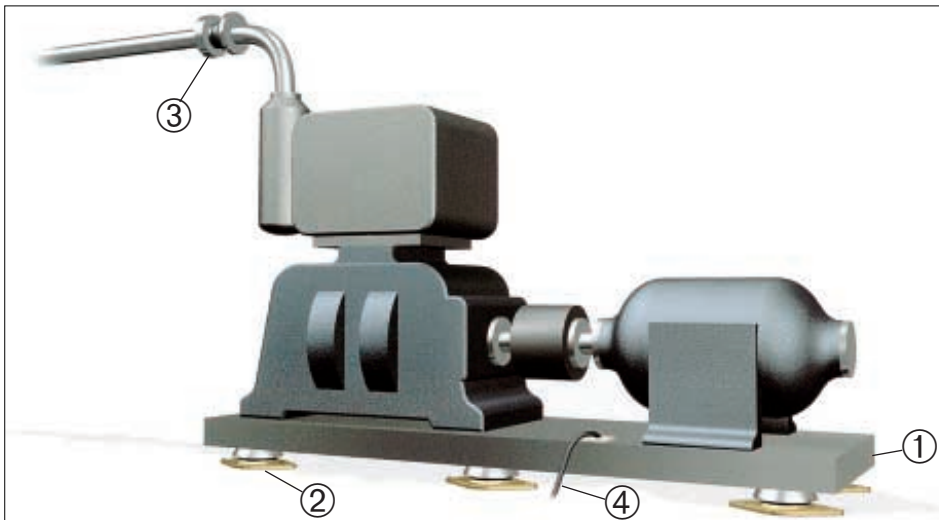

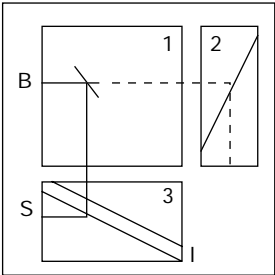
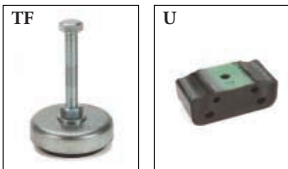
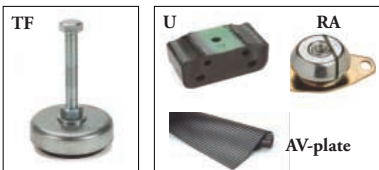


Fig 10. General set up.

## Assistance when choosing antivibration mounting

Type of machine	Type of mount	How to choose																																			
<p><b>1. Rotating machines</b></p> <p>Combustion engines, compressors</p> <p>Crushers, mixer and rolling mills</p> <p>Fans and pumps</p> <p>Electrical motors</p> <p>Sensitive electronic equipment</p> <p>Cabin suspension</p> <p>Building and construction</p> <p>Shock absorbing</p>		<p><b>Important information</b></p> <ul style="list-style-type: none"> <li>• Weight</li> <li>• Number of mounts</li> <li>• Speed</li> <li>• Environment</li> </ul> <p><b>See corresponding product data sheet:</b></p> <p>To select correct mounting, following data are needed:</p> <ol style="list-style-type: none"> <li>1. Load per mounting (kg)</li> <li>2. Interfering frequency (Hz) (Hz = rpm/60)</li> </ol> <p>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.</p> 																																			
<p><b>2. Punching machines</b></p> <p>Presses, punching machines, steel shears</p>		<p><b>Important information</b> <i>Loading range per mounting (kg)</i></p> <ul style="list-style-type: none"> <li>• Weight</li> <li>• Number of mounting points</li> <li>• Number of strokes</li> </ul> <table border="1"> <thead> <tr> <th rowspan="2">Type of machine</th> <th colspan="3">Presses and punches</th> </tr> <tr> <th colspan="3">Numer of strokes per minute</th> </tr> <tr> <th>Type of mounting</th> <th>1-125</th> <th>126-175</th> <th>176-225</th> </tr> </thead> <tbody> <tr> <td>TF 250</td> <td>25-125</td> <td>20-100</td> <td>15-85</td> </tr> <tr> <td>TF 600</td> <td>126-300</td> <td>101-240</td> <td>86-200</td> </tr> <tr> <td>TF 1200</td> <td>301-600</td> <td>241-480</td> <td>201-400</td> </tr> <tr> <td>TF 3000</td> <td>601-2400</td> <td>481-1600</td> <td>401-1000</td> </tr> <tr> <td>TF 4000</td> <td>2401-3200</td> <td>1601-2100</td> <td>1001-1300</td> </tr> <tr> <td>TF 6000</td> <td>3201-4800</td> <td>2101-3200</td> <td>1301-2000</td> </tr> </tbody> </table>	Type of machine	Presses and punches			Numer of strokes per minute			Type of mounting	1-125	126-175	176-225	TF 250	25-125	20-100	15-85	TF 600	126-300	101-240	86-200	TF 1200	301-600	241-480	201-400	TF 3000	601-2400	481-1600	401-1000	TF 4000	2401-3200	1601-2100	1001-1300	TF 6000	3201-4800	2101-3200	1301-2000
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<p><b>3. General workshop machines</b></p> <p>Turning lathes, cutters, planers, joinery machines, etc</p>		<p><b>Important information</b></p> <ul style="list-style-type: none"> <li>• Weight</li> <li>• Number of mounting points</li> </ul> <table border="1"> <thead> <tr> <th>Type of mounting</th> <th>Load/mount (kg)</th> </tr> </thead> <tbody> <tr> <td>TF 250</td> <td>-250</td> </tr> <tr> <td>TF 600</td> <td>251-600</td> </tr> <tr> <td>TF 1200</td> <td>301-600</td> </tr> <tr> <td>TF 3000</td> <td>601-2400</td> </tr> <tr> <td>TF 4000</td> <td>2401-3200</td> </tr> <tr> <td>TF 6000</td> <td>3201-4800</td> </tr> </tbody> </table>	Type of mounting	Load/mount (kg)	TF 250	-250	TF 600	251-600	TF 1200	301-600	TF 3000	601-2400	TF 4000	2401-3200	TF 6000	3201-4800																					
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# Novibra type RA



## FEATURES

RA 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 type provides a degree of isolation of 75-85%. For even better isolation, the alternative RAEM or M can be chosen.

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

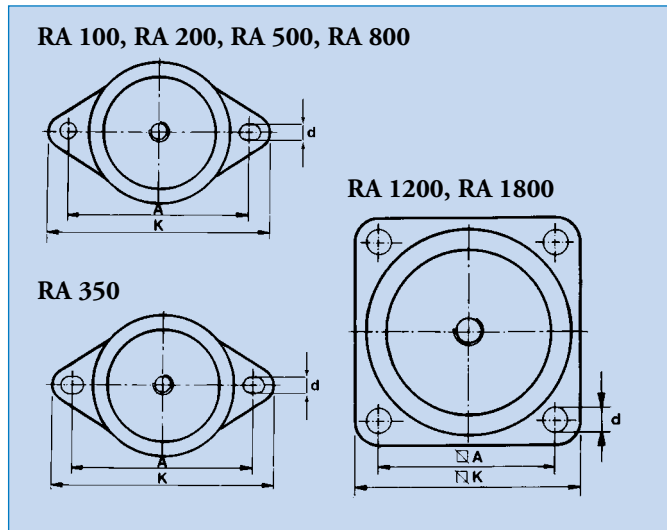
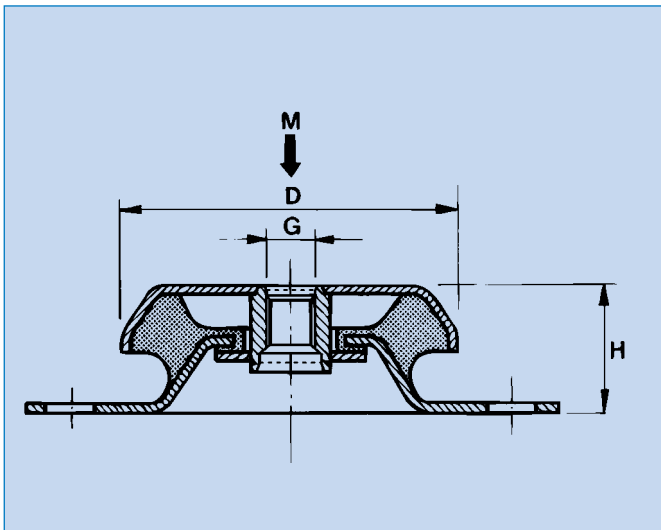
- Rubber features are utilised effectively combining compression and shear.
- Tight tolerances on dynamic stiffness rate for accurate vibration calculations.
- Wide load rating options, 40-2100 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn 8C as per ISO 2081).
- Stronger base metal withstands high shock loads without deformation.
- Fitted as standard with a shock-proof device with resilient stop, making RA ideal for use on mobile or marine applications. The RA-mounts can manage occasional shock loads up to 5 g referred to the weight in hardness B. The mount can 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.

## APPLICATION

For the effective isolation of vibration and noise on different machines with rotating movements, like:

- compressors
- combustion engines
- generators
- converters
- pumps
- industrial and marine gen-sets
- fans

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

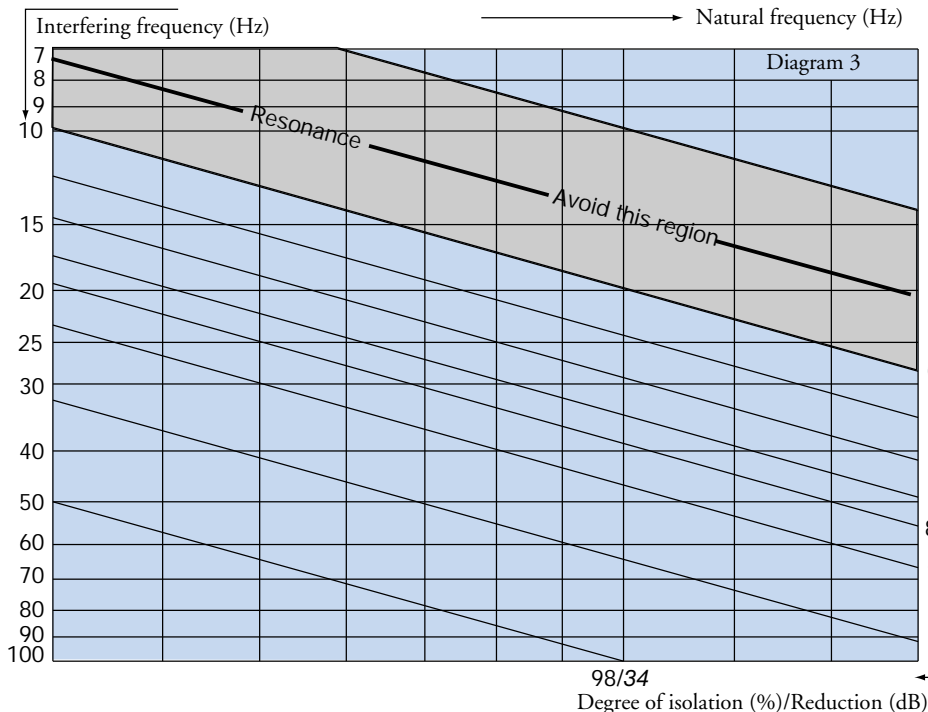
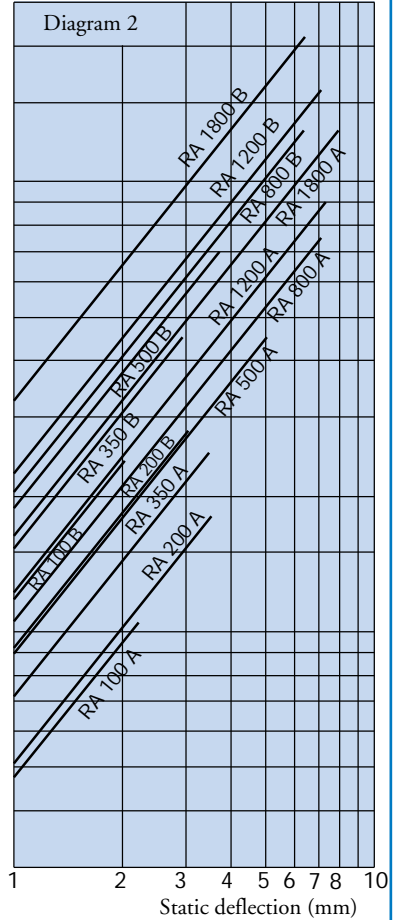
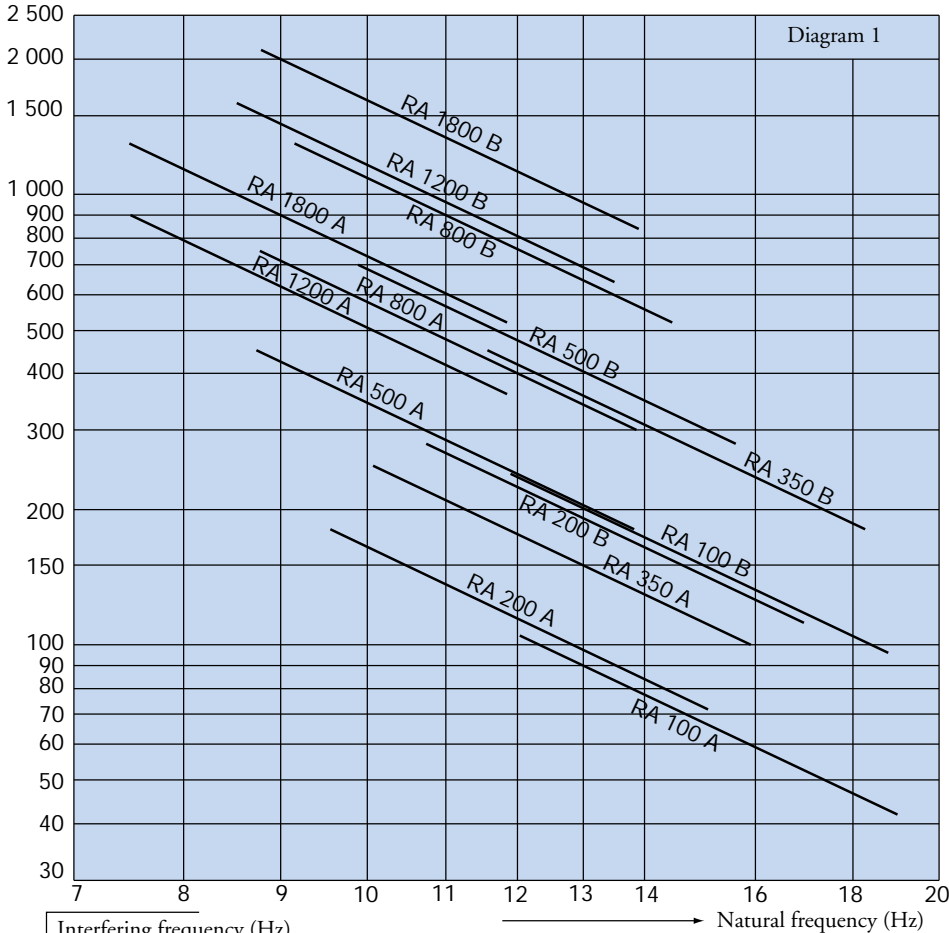


Type	Art.No.	Art.No.	Dimensions in mm						Weight (kg)	M-Max(kg)	
	Hardness A (40° IRH)	Hardness B (60° IRH)	D	A	H	K	d	G		A (40° IRH)	B (60° IRH)
RA 100/M10	1861700	1861710	79	110	30	130	9	M10	0.330	105	240
RA 100/M12	2256120	2256130	79	110	30	130	9	M12	0.330	105	240
RA 200/M10	1861740	1861750	94	124	35	150	10	M10	0.470	180	280
RA 200/M12	2255720	1860350	94	124	35	150	10	M12	0.470	180	280
RA 350/M12	2256370	2256380	101	140-148	38	175	14	M12	0.737	250	450
RA 350/M16	1861760	1861770	101	140-148	38	175	14	M16	0.737	250	450
RA 500	1861800	1861810	123	158	42	192	14	M16	1.020	450	700
RA 800	1861820	1861830	144	182	48	216	14	M16	1.589	750	1300
RA 1200	2255360	2255370	161	140	58	170	14	M20	2.188	900	1600
RA 1800	2255380	2255390	181	160	66.5	190	14	M20	2.325	1300	2100

# Novibra type RA

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.**

Load per mounting (kg)



To select correct mounting, following data are needed:

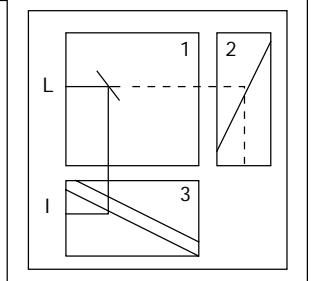
- 1) Load per mounting (kg)
- 2) Interfering frequency (Hz)

(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 RAEM



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 a good isolation even 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.
- Tight tolerances on dynamic stiffness rate for accurate vibration calculations.
- Wide load rating options, 10-3400 kg.
- Corrosion protected to cope with arduous environments on land or marine applications (Fe/Zn 8C as per ISO 2081).
- Stronger base metal withstands high shock loads without deformation.
- Fitted as standard with a shock-proof device with resilient stop, making RAEM ideal for use on mobile or marine applications. The RAEM-mounts can manage occasional shock loads up to 5 g referred to the weight in hardness B.

The mount can 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.

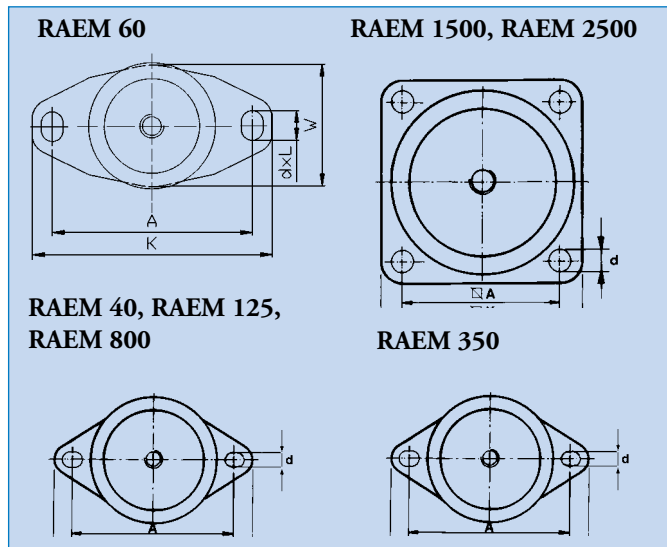
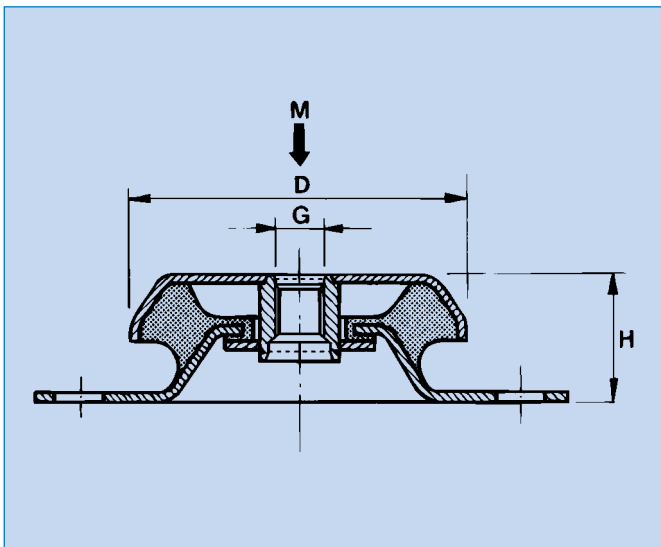
## APPLICATION

For the effective isolation of vibration and noise on different machines with rotating movements, like:

- 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,



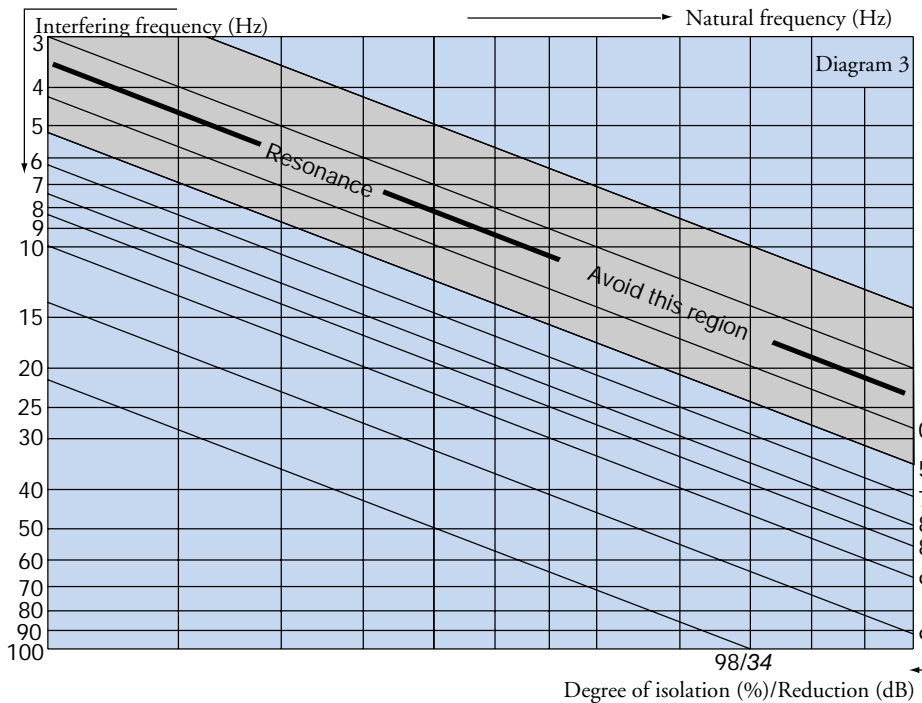
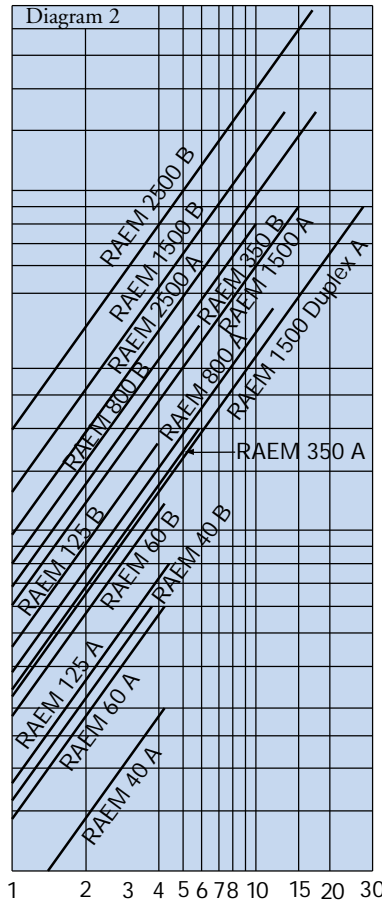
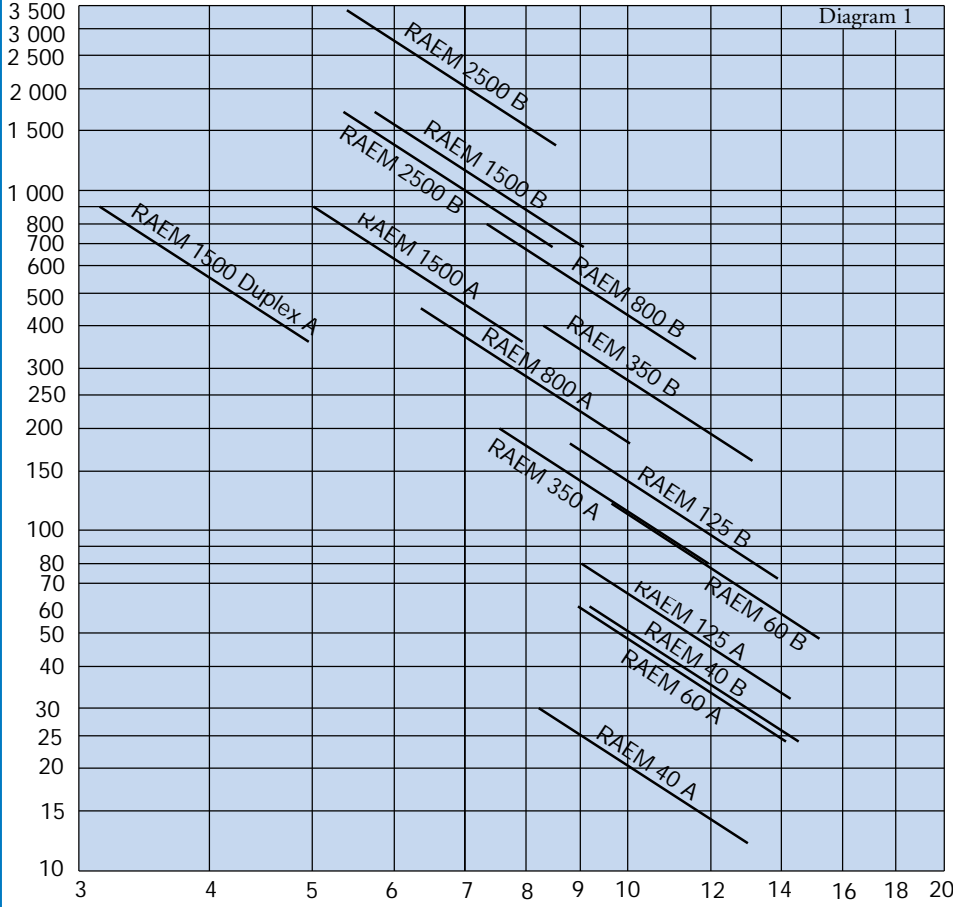
Type	Art.No.	Art.No.	Hardness		Dimensions in mm					Weight (kg)	M-Max(kg)	
			A (40° IRH)	B (60° IRH)	D	A	H	K	d		G	A (40° IRH)
RAEM 40	1861860	1861870	64	88	35.5	110	9	M10	0.255	30	60	
RAEM 60	2256760	2256770	63	100	35.5	120	11	M12	0.295	60	120	
RAEM 125 M10	1861720	1861730	84	110	35.5	135	11	M10	0.372	80	180	
RAEM 125 M12	2256140	2256150	84	110	35.5	135	11	M12	0.372	80	180	
RAEM 350 M12	2256440	2256450	110	140-148	42	175	14	M12	0.800	200	400	
RAEM 350 M16	1861780	1861790	110	140-148	42	175	14	M16	0.800	200	400	
RAEM 800	1861840	1861850	155	182	54	216	14	M16	1.784	450	800	
RAEM 1500	2255400	2255410	182	146	85	180	14	M20	3.000	900	1700	
RAEM 2500	2255420	2255430	224	180	105.5	220	17.5	M24	4.620	1700	3400	
RAEM 1500 Duplex(*)	1011105		248	146	115	180	14.5	M20		900		

(\*) No stop device

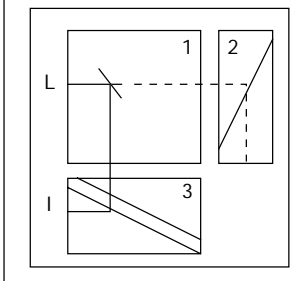
# Novibra type RAEM

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured 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 RAB



## 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 whilst eliminating much of the excessive movement normally associated with 1–3 cylinder engines.

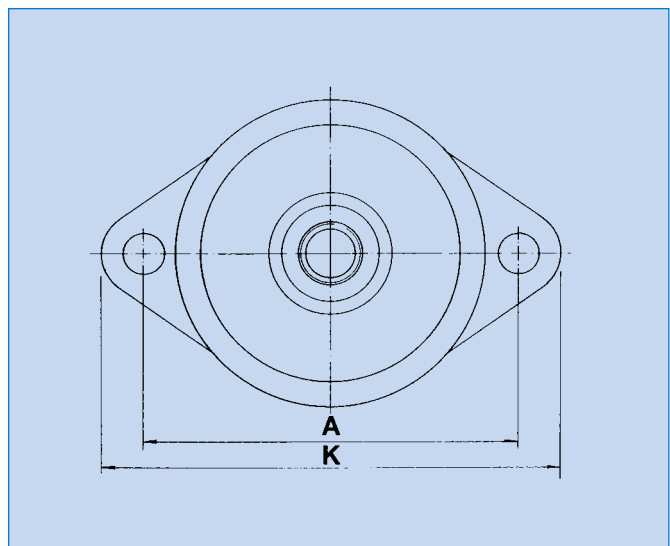
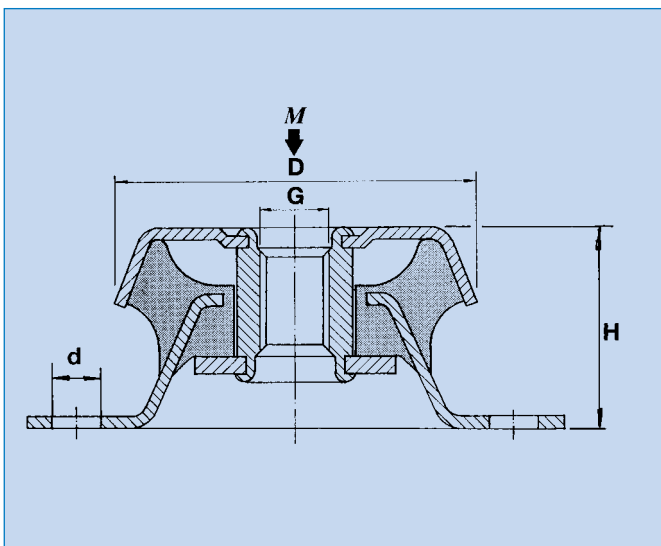
Its unique construction and the latest production methods make Novibra type RAB a high performance mounting having a number of advantages:

## APPLICATION

For the effective isolation of vibration and noise on different machines with rotating movements, like:

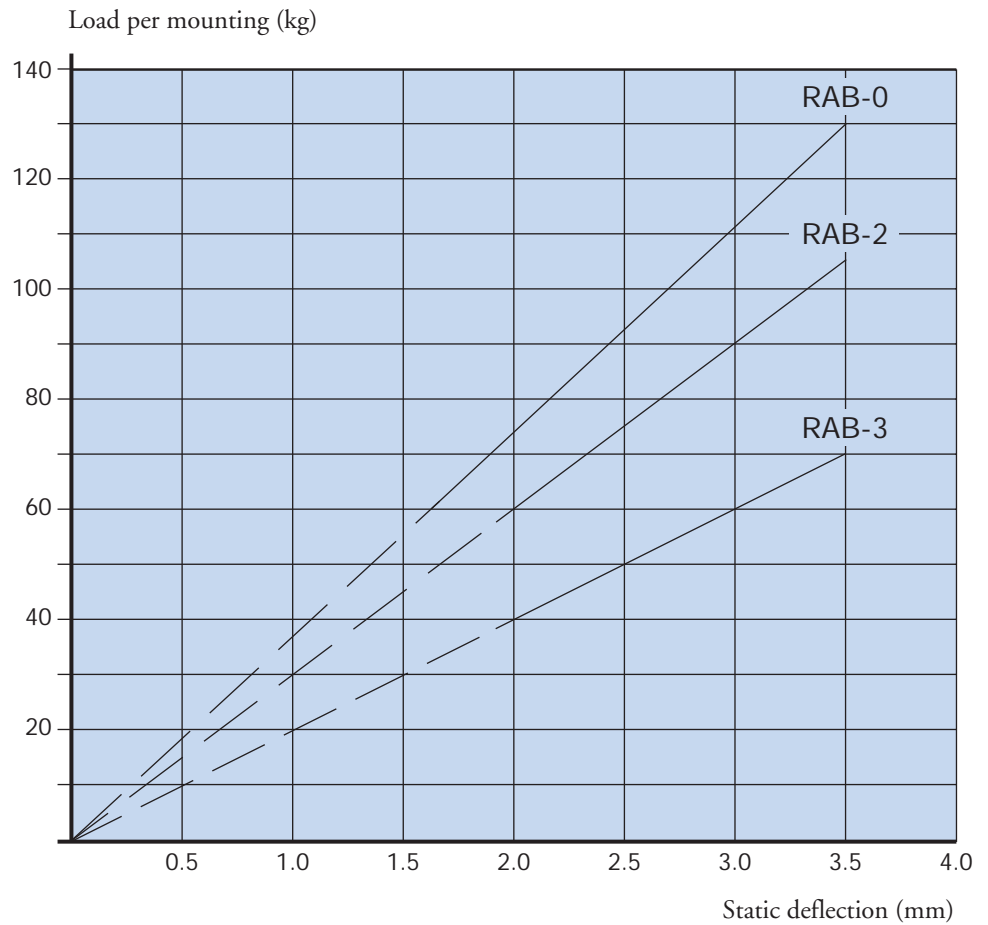
- diesel engines
- combustion engines
- emergency power packs
- pumps
- industrial gensets
- marine gensets

- 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/Zn 8C as per ISO 2081).
- Stronger base metal withstands high shock loads without deformation.
- Fitted as standard with a shock-proof device with resilient stop, ideal for mobile or marine use. The RAB-mounts can manage occasional shock loads up to 5 g referred to the weight.  
The mount can 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	Art.No. (55° IRH)	Dimensions mm						Weight	
		D	A	H	K	d	G	Kg	M-Max (kg)
RAB- 0	2256600	63	76	35	93,5	8,5	M12	0,22	130
RAB -2	2256610	63	76	35	93,5	8,5	M12	0,22	105
RAB -3	2256620	63	76	35	93,5	8,5	M12	0,22	70

# Novibra type RAB



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.

# Novibra type M



## FEATURES

Novibra type M is specifically designed to give high resilience at low loads. Although the mount design allows high deflection, they 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/Zn 8C3 as per ISO 2081).
- Clear and durable product marking so that mountings can be identified even after several years in operation.

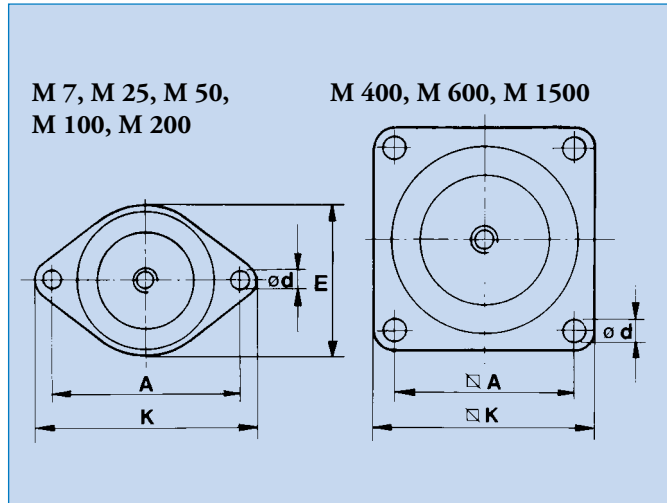
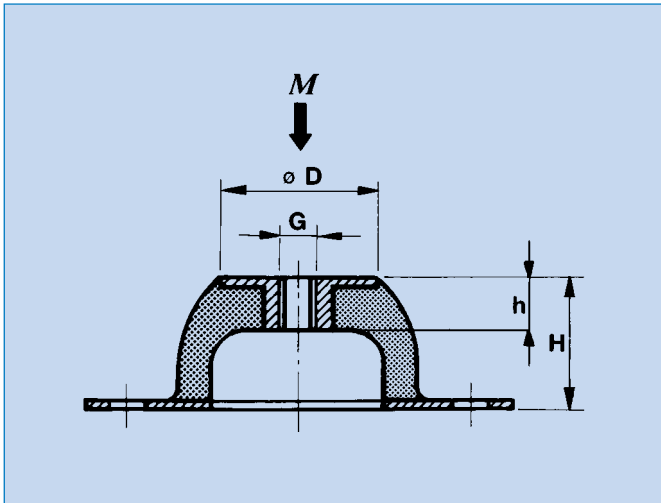
When using M mount together with the height adjuster HA it is necessary to use a washer. The diameter of the washer must be 20% larger than the diameter of the upper plate (D).

## APPLICATION

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 give large deflections whilst providing passive vibration on electronic instruments, measuring equipment, 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

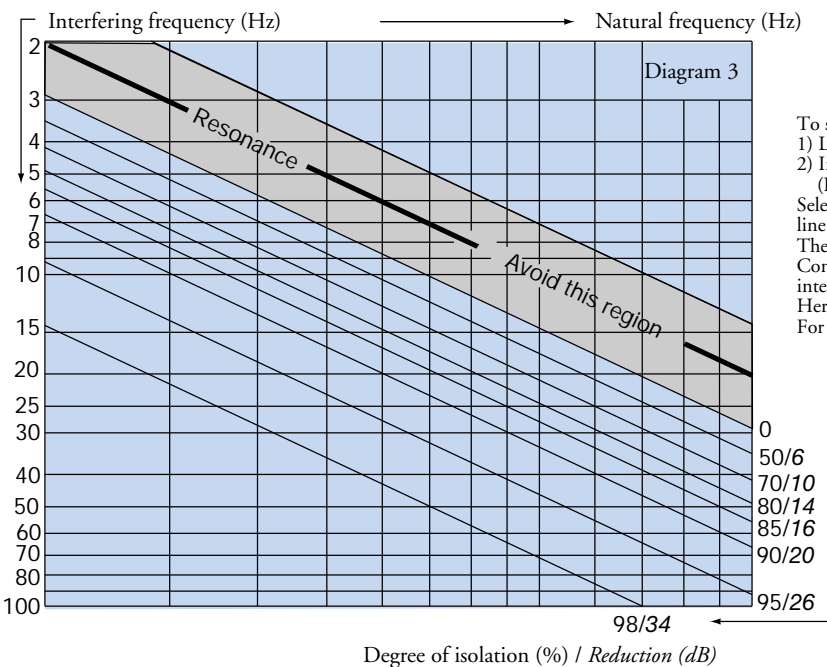
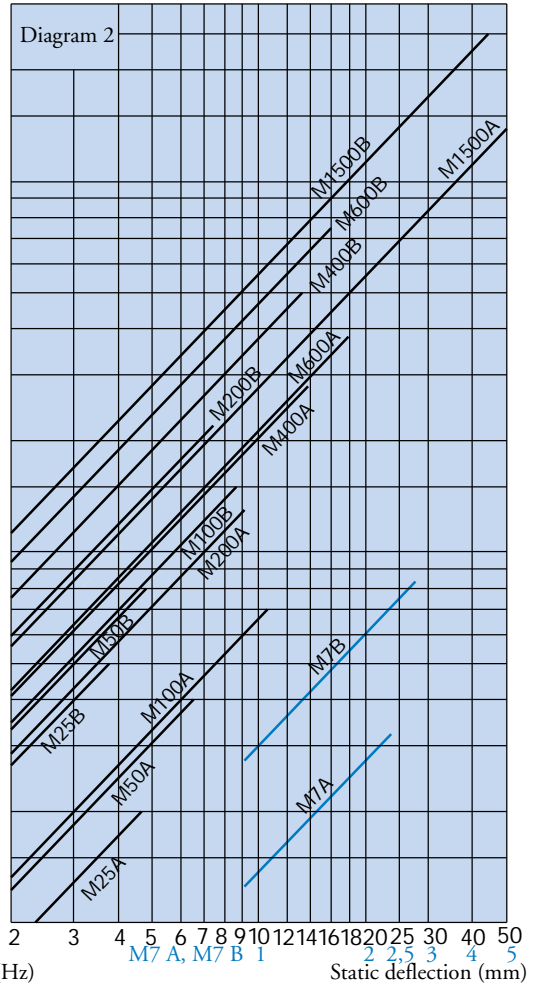
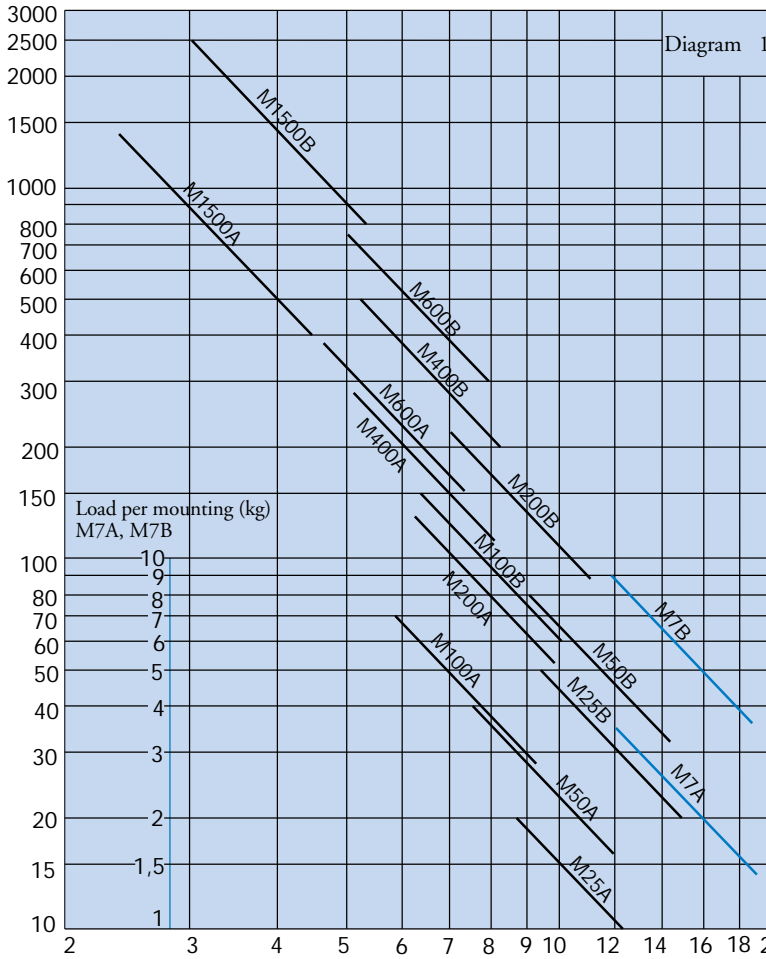


Type	M	Art.No.	Art.No.	Dimensions in mm							Weight Kg	M-Max(kg)	
				Hardness A (40° IRH)	Hardness B (60° IRH)	D	E	A	K	H		h	d
M 7	2255110	2255120	18	43	50	64	20	7	7	M 6	0,02	3,5	9
M 25	1861220	1861230	33	56	66	85	25	11	8	M 8	0,07	20	50
M 50	1861240	1861250	45	76	92	114	35	14	10	M 10	0,16	40	80
M 100	1861620	1861610	53	96	110	136	40	15	11,5	M 10	0,26	70	150
M 200	1861660	1861670	58	101	124	151	45	13	11,5	M 10	0,42	130	220
M 400	1861680	1861690	78		120	150	63	18	14,5	M 12	1,06	280	500
M 600	1533710	1533720	100		160	200	85	25	14,5	M 16	2,35	380	750
M 1500	1533730	1533740	186		250	310	160	43	18	M 24	9,43	1400	2500

# Novibra type M

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.**

Load per mounting (kg)  
M25 – M1500



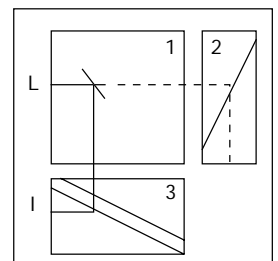
To select correct mounting, following data are needed:

- 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.



# Novibra type BA



## FEATURES

Novibra type BA utilises bonded rubber in shear to permit relatively high deflections to occur, thus providing excellent isolation of low frequencies. (Type BA 20/2 is a halfsection suitable for very light loads).

On revolving equipment applications the soft axis should be at right angles to the shaft, whilst in mobile applications the stiff axis should be aligned in the direction of travel.

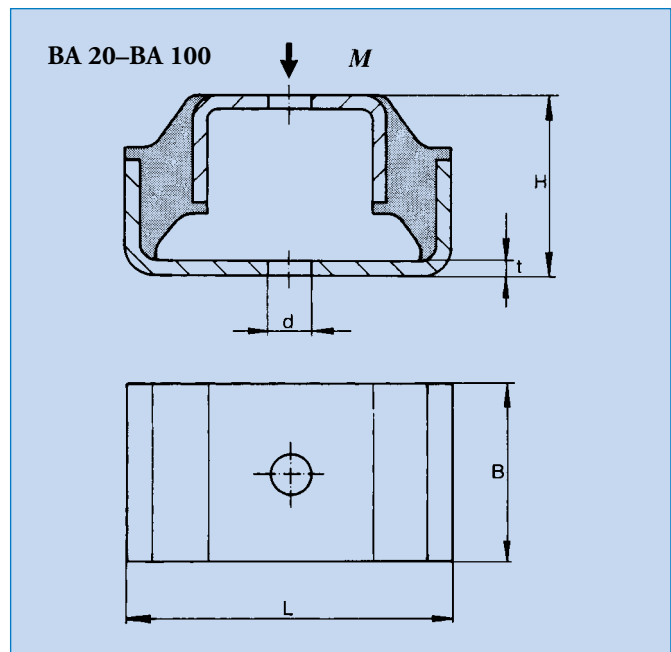
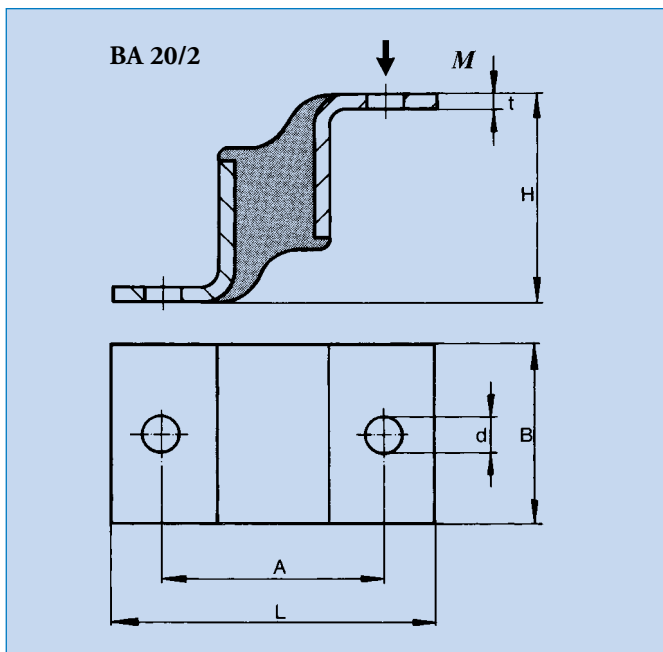
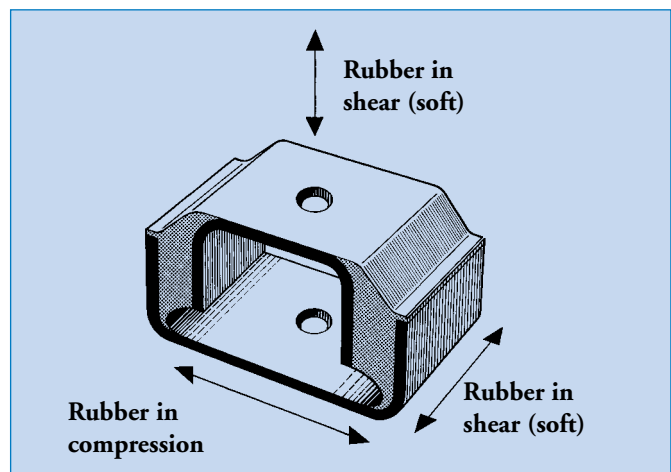
For transit case applications the mountings need to be arranged so that the horizontal stiffness is the same in all directions.

## APPLICATION

Novibra type BA is equally suitable for isolating vibrations from low speed machines and equipment whilst also protecting sensitive and lightweight units from external shocks and vibrations.

Type BA is very easy to install and ideal for applications like:

- light fans and compressors
- portable gensets and pumps
- computers and electronic units
- transit cases
- measuring and test instruments
- gauging equipment

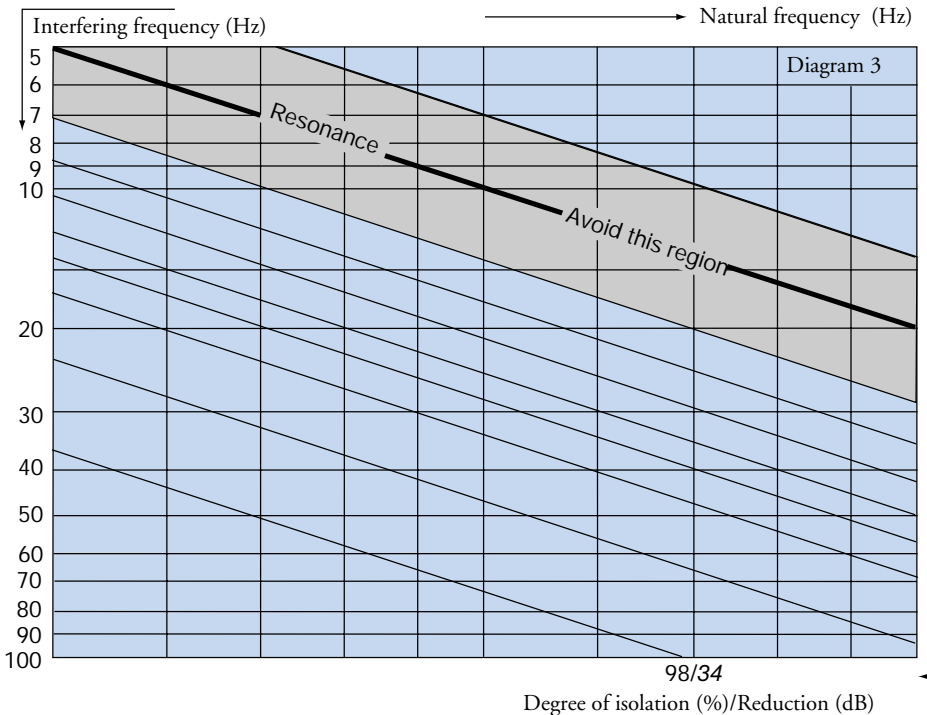
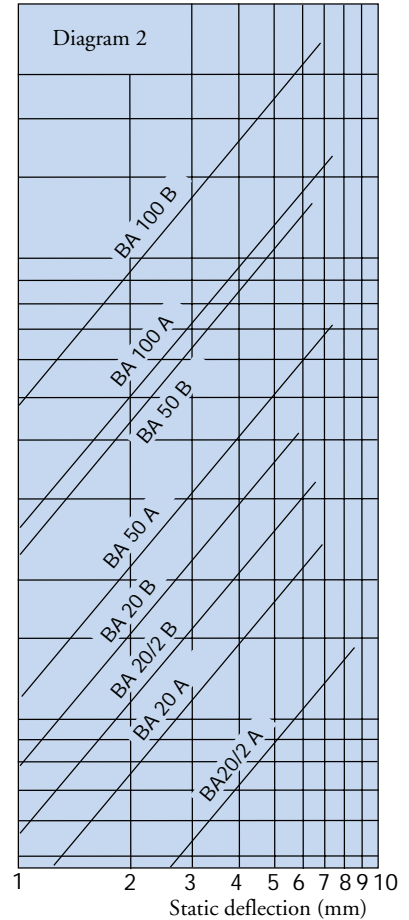
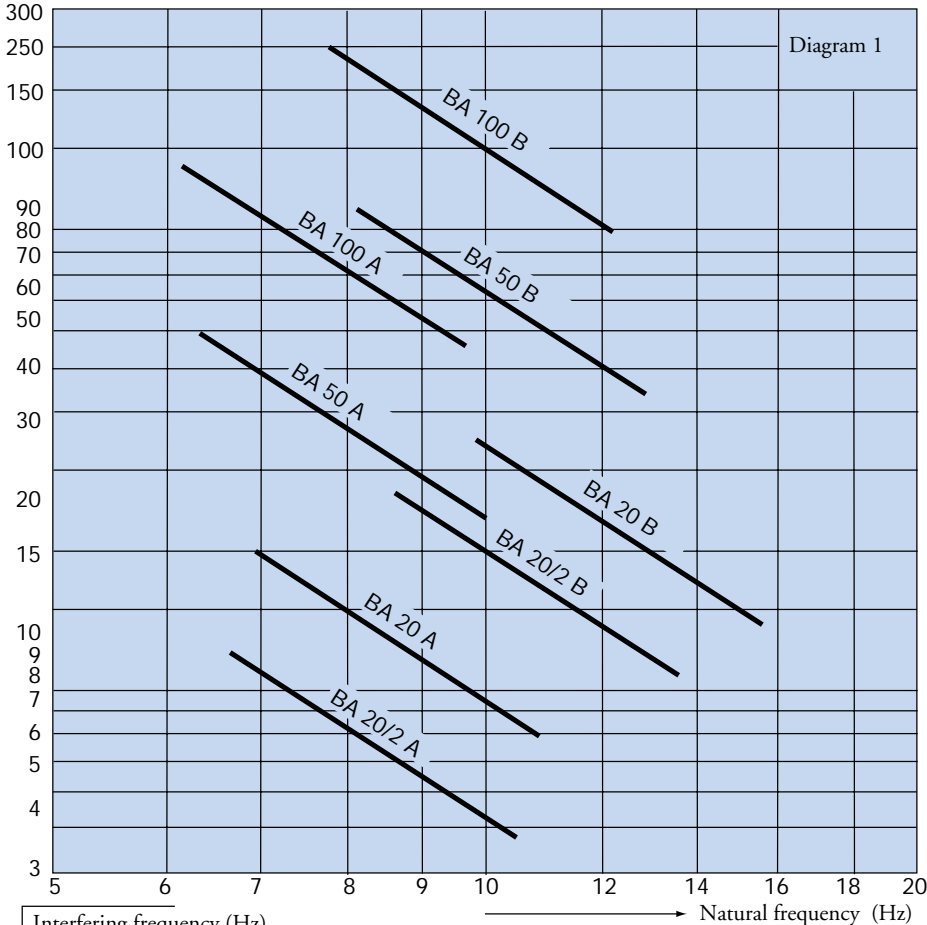


Type	Art.No.	Art.No.	Dimensions in mm						Weight (kg)	M-Max(kg)	
	Hardness A (40° IRH)	Hardness B (60° IRH)	B	L	H	A	d	t		A (40° IRH)	B (60° IRH)
BA 20/2	67868	67876	20	90	58	62	8	4	0.09	12	27
BA 20	2255230	2255240	20	90	50		10	4	0.16	20	35
BA 50	2255250	2255260	50	90	50		12	4	0.42	60	110
BA 100	2255270	2255280	100	90	50		15	4	0.83	130	250

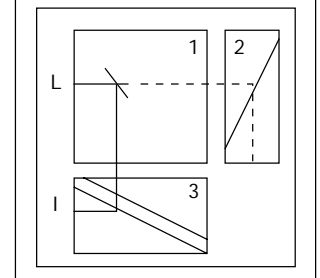
# Novibra type BA

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured 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 HK/MK



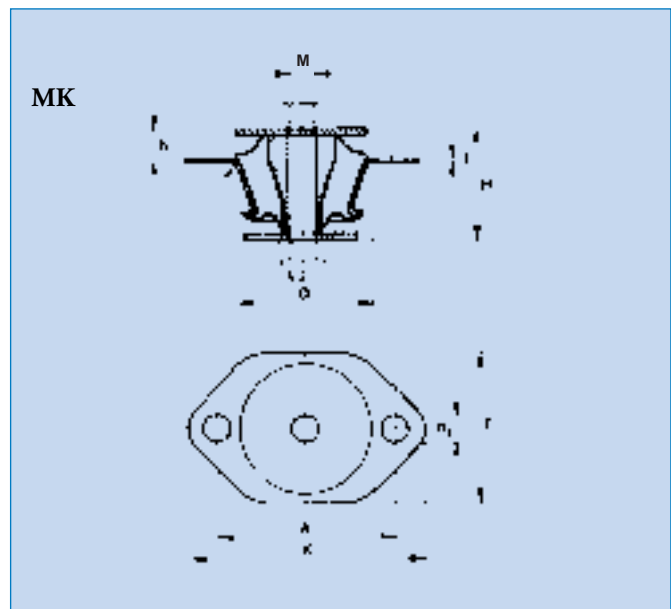
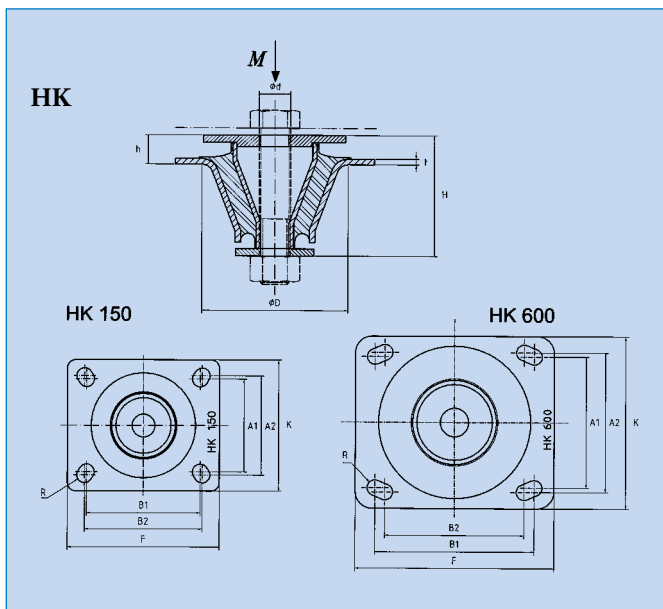
## APPLICATION

Novibra type HK/MK has a special resilient nature and impact resistance which make it suitable for isolating combustion engines in mobile applications as in ships, heavy construction vehicles and tractors. HK is also suitable for isolation of cabs on the same type of machines.

The MK is supplied with shock absorbing washers, whilst washers for the HK 150 and HK 600 should be ordered separately.

## FEATURES

Novibra Antivibration mounting type HK/MK is designed to permit high compression under vertical load but is at the same time stable in the horizontal direction. The conical shape makes the rubber work in both shear and compression stresses in a favourable way.



Type	Art.No.	Dimensions in mm										Weight			
		A <sub>1</sub>	B <sub>1</sub>	A <sub>2</sub>	B <sub>2</sub>	K	F	D	d	R	t	H	h	(kg)	M-Max (kg)
HK 150 A	2256920	65	80	69.4	82.7	92	107	74	16H11	5.5	4	64	19	0.65	225
HK 150 B	2256930	65	80	69.4	82.7	92	107	74	16H11	5.5	4	64	19	0.65	545
HK 600 A	2256940	92	112	98	98	121	140	103	20H11	5.5	4	85	20	1.0	940
HK 600 B	2256950	92	112	98	98	121	140	103	20H11	5.5	4	85	20	1.0	1700

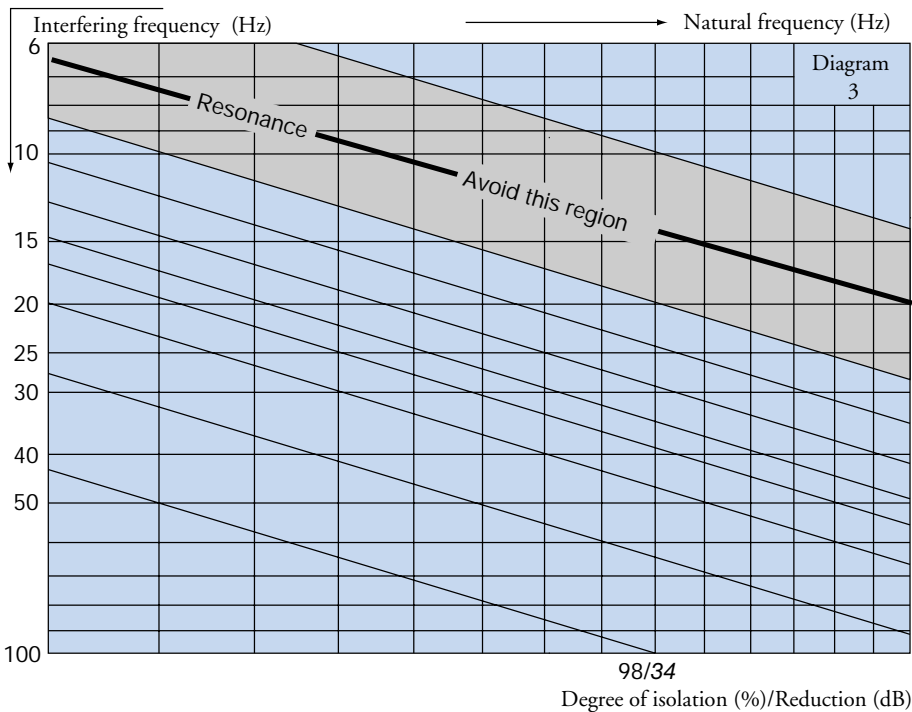
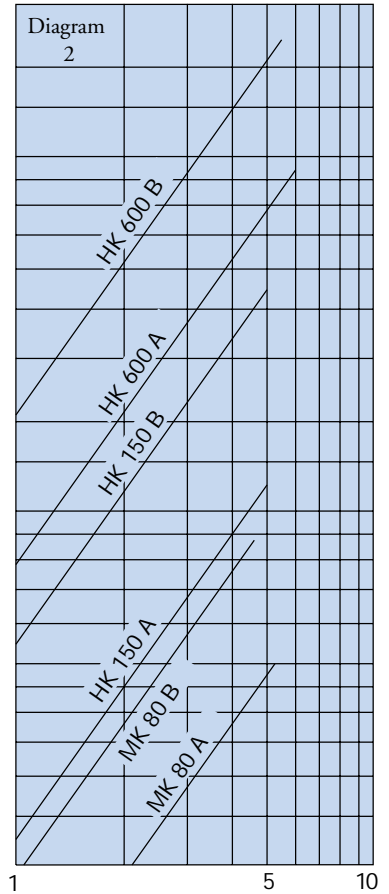
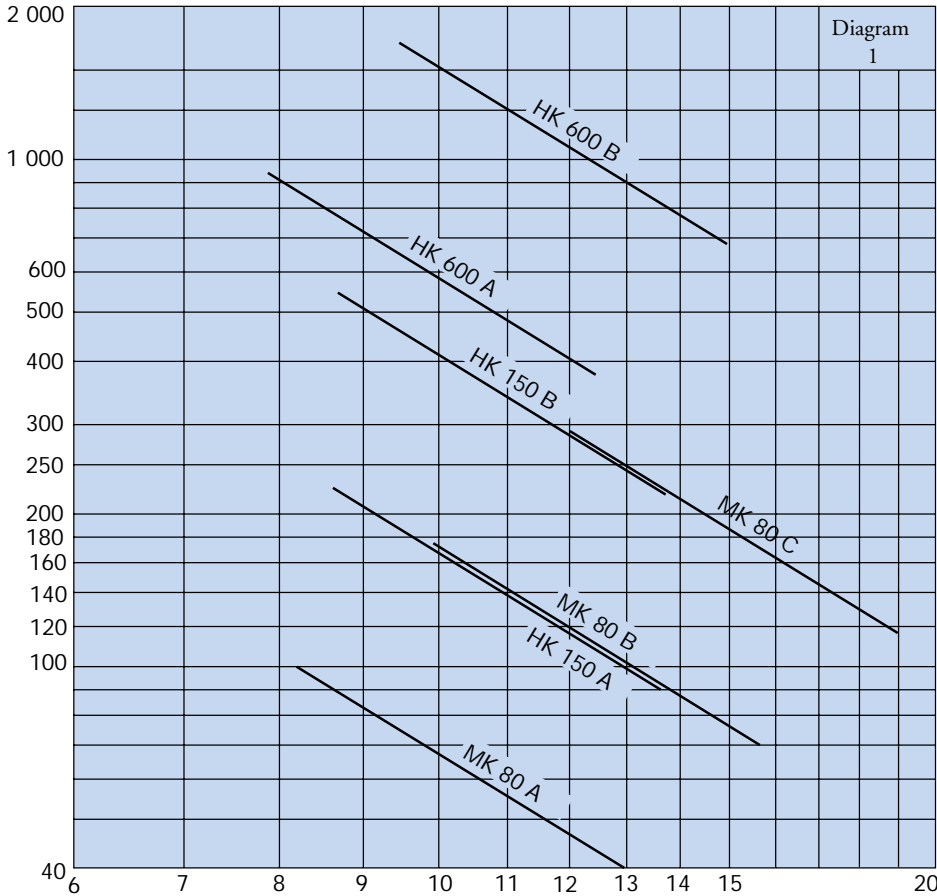
Type	Art.No.	OD (mm)	ID (mm)	Thickness (mm)	
Washer upper	HK 150	2230390	75	16H11	4
Washer lower	HK 150	2230400	55	16H11	5
Washer upper	HK 600	2230560	55	20H11	5
Washer lower	HK 600	2230570	110	20H11	5

Type	Art.No.	Dimensions in mm										Weight	
		A	K	F	H	h	D	d	d <sub>i</sub>	t	(kg)	M-Max (kg)	
MK 80 A	2256030	80	107	70	51	16.5	62	12	11	2.5	0.37	100	
MK 80 B	2256040	80	107	70	51	16.5	62	12	11	2.5	0.37	175	
MK 80 C	2256050	80	107	70	51	16.5	62	12	11	2.5	0.37	285	

# Novibra type HK/MK

**Note:** The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.

Load per mounting (kg)



To select correct mounting, following data are needed:

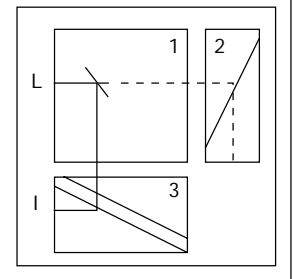
- 1) Load per mounting (kg)
- 2) Interfering frequency (Hz)

(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 EH



## FEATURES

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

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

Racking and twisting stress of brackets are accommodated 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 structural borne noise
- Accommodation of misalignment and distortion
- Simple design – easy to install
- Fail-safe installation
- Wide load range, 80 to 450 kg

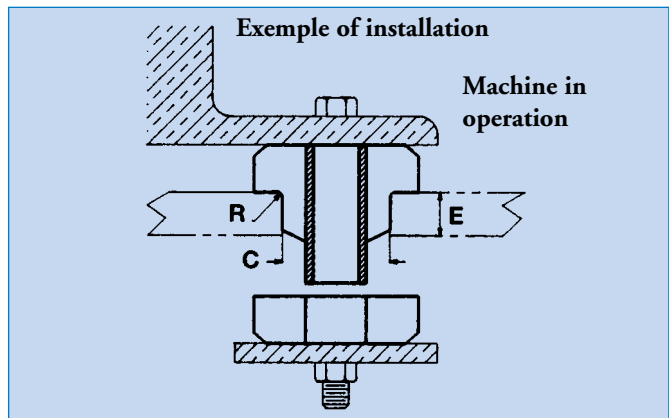
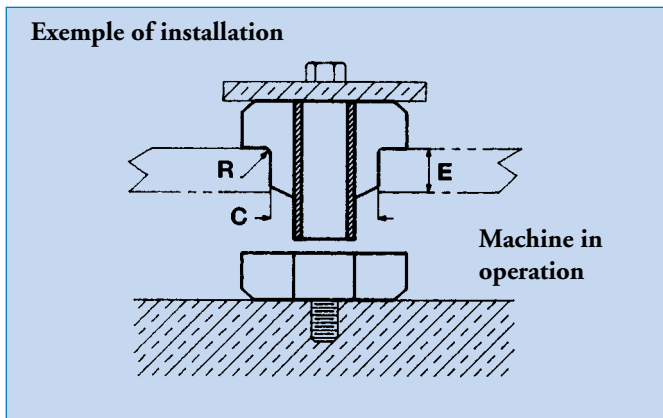
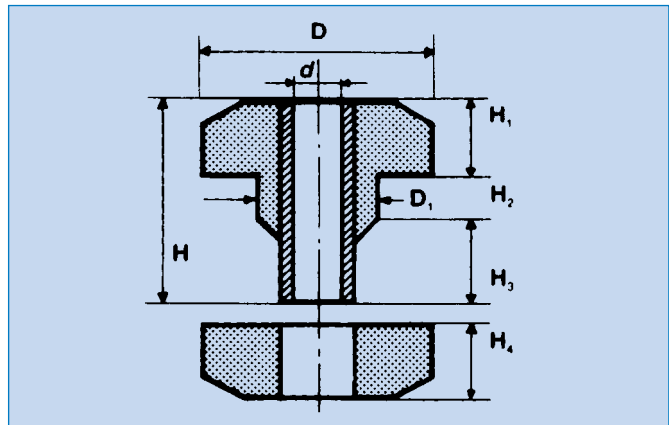
## APPLICATION

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



## Table of measures for installation

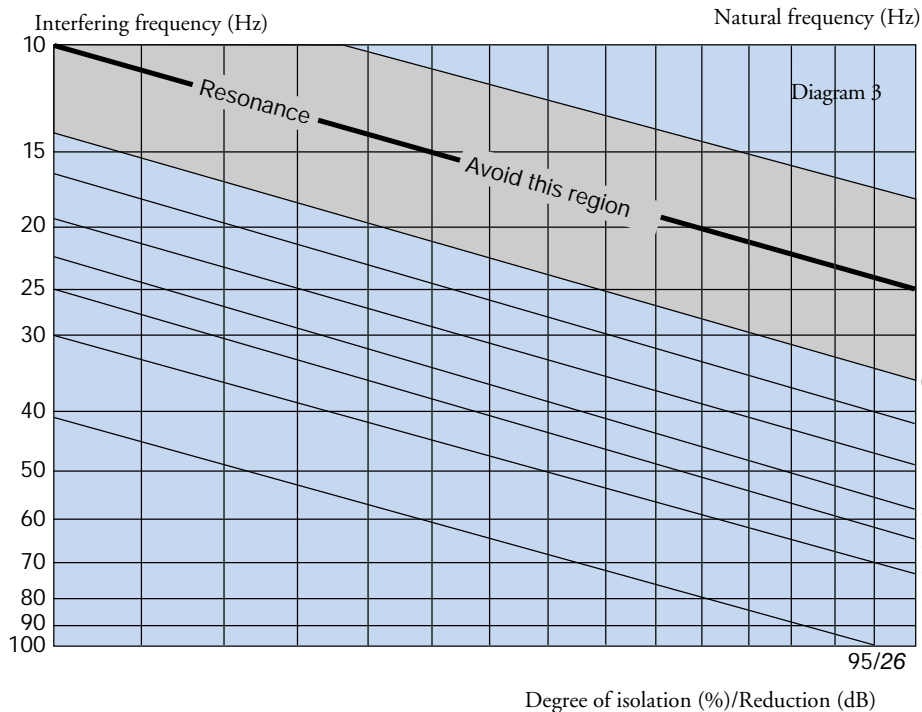
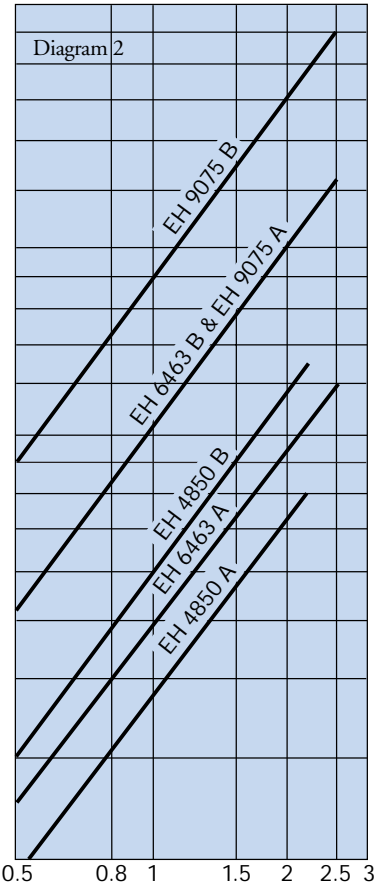
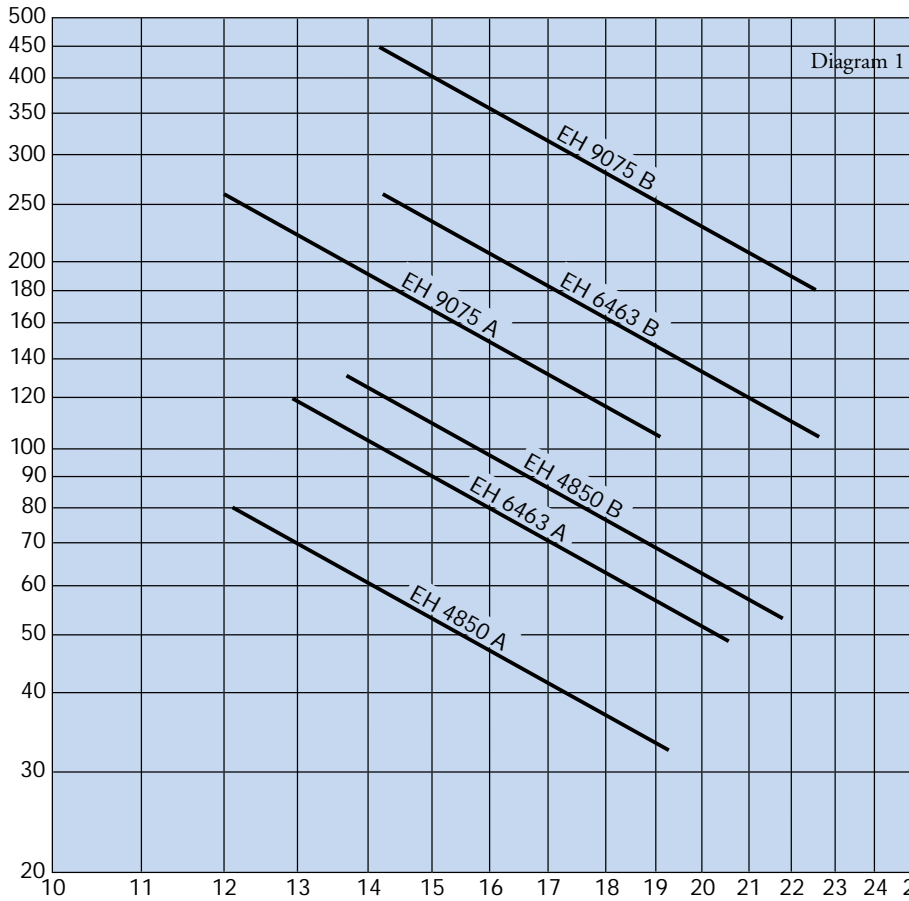
Type	Dimensions in mm		
	C	E	R
EH 4850	31.0	15.0	1.5
EH 6463	39.0	22.0	2.3
EH 9075	56.5	28.0	3.0

Type	Art.No. Hardness A	Art.No. Hardness B	Dimensions in mm								Max load (kg)	
			d	D	D <sub>1</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	A	B
EH 4850	1860570	1860560	13.0	50	32	50	20	10	20	20	60	120
EH 6463	1860550	1860540	17.0	64	40	62	23	14	25	23	100	190
EH 9075	1860530	1860520	23.0	89	58	73	25	19	29	25	260	420

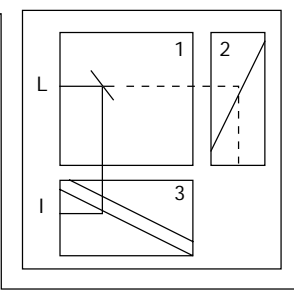
# Novibra type EH

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured 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 UH



## FEATURES

Novibra 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 an extra dome-shaped washer on the top rubber-section, which will provide impact resistance against deflection beyond the permissible limit.

Installation of the mounting can be done in an easy way and reduces necessary build tolerances.

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

## APPLICATION

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

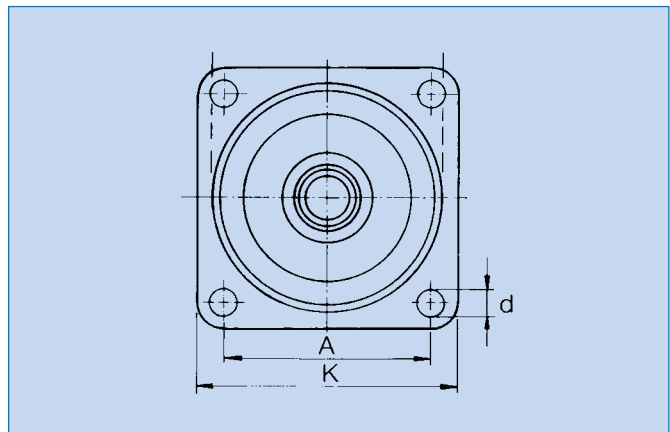
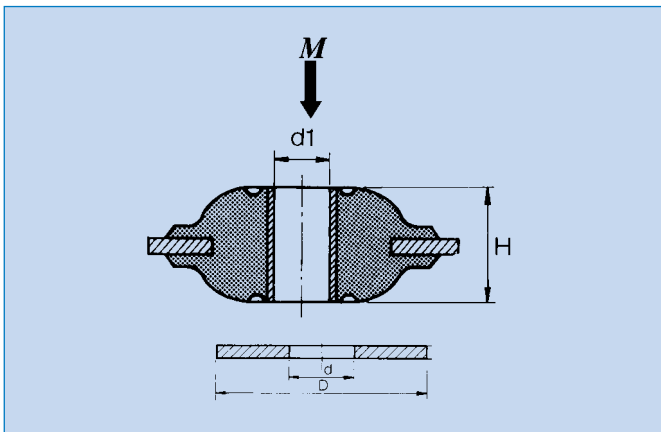
Whilst vibration and noise is effectively isolated the UH-mounting also protects tanks and ancillary equipment against metal fatigue caused by chassis distortion.

Specific applications can be found on :

- tractors
- combine harvester
- wheel-mounted loaders
- street sweepers
- compactors
- lifting cranes
- construction vehicles
- forestry vehicles
- off-the-road equipment
- fork-lift trucks
- excavators

Note: Maximum tightening torque of bolts:

- UH 50 80 Nm
- UH 70 120 Nm

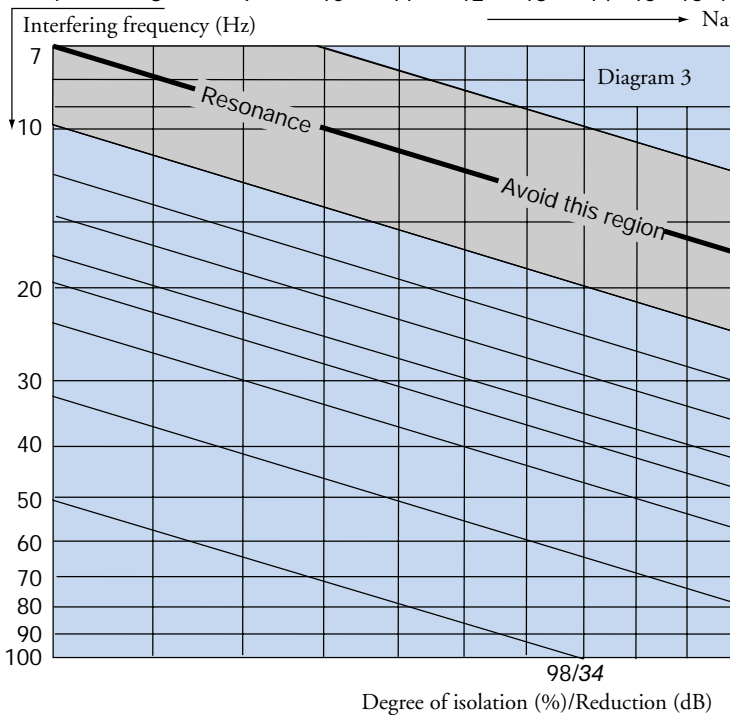
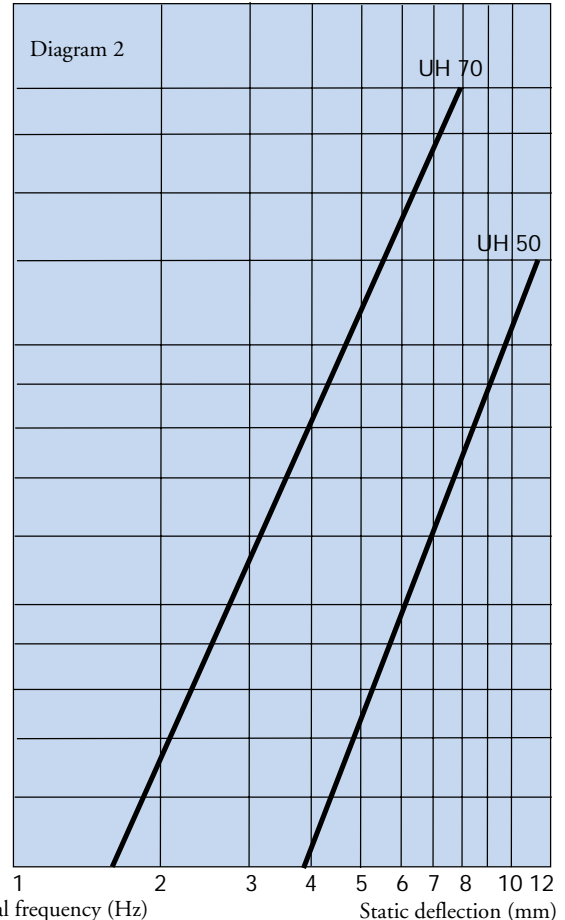
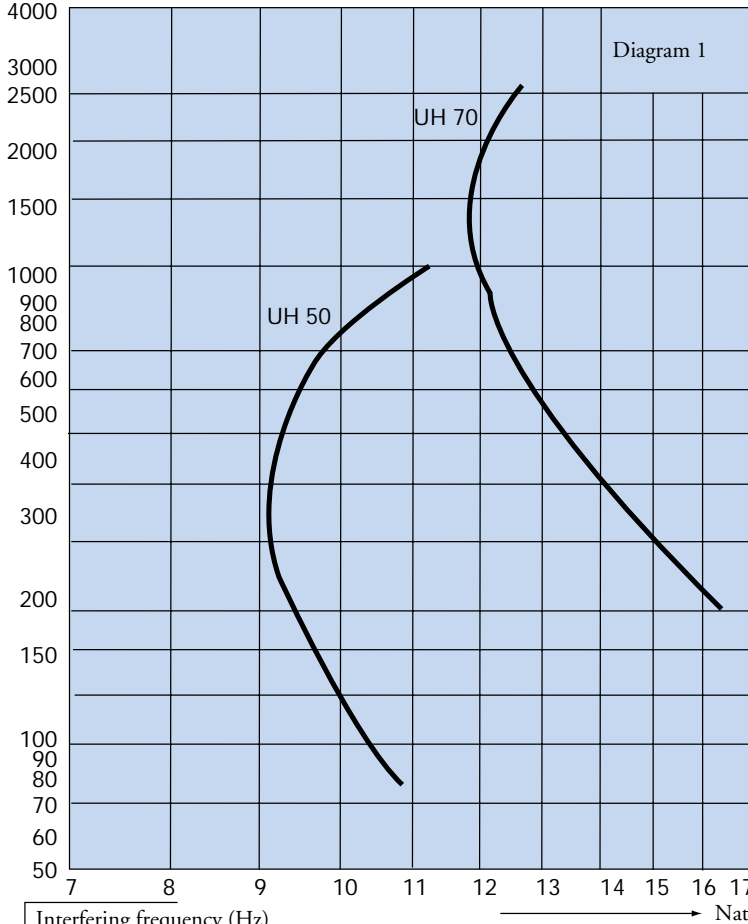


Tipo	Art.No.	Dimensioni in mm						Peso (kg)	M-Max (kg)
		K	A	H	C	d	d <sub>1</sub>		
UH 50	1534120	100.5	80.4	37	91	10.5	15	0.41	250
UH 70	1660850	100.5	80.4	37	91	10.5	17	0.41	400
		d	D	t					
UH Washer	1660420	17	75	6					

# Novibra type UH

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.**

Load per mounting (kg)



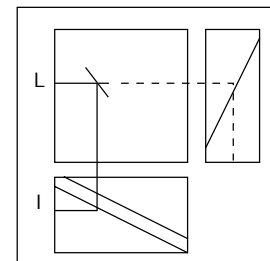
To select correct mounting, following data are needed:

- 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 SAW



## FEATURES

Novibra type SAW mountings consists of a cylindrical shaped rubber section with integrally bonded interleaf metal plates which is bonded to two square heavy duty outer metal fixing plates. It has been designed for large compressive thrust forces with minimum deformation, whilst 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. Installation is easy due to only 4 clearance holes in each fixing plate.

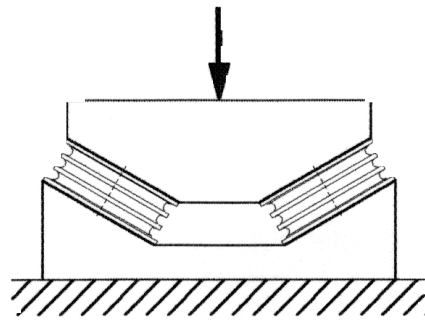
By connecting 2 SAW-elements in series i.e. one on top of another, an increased isolation efficiency is achieved in both shear and compression planes to isolate very low frequencies. Where large deflections are required in the vertical plane Novibra type SAW mountings can be mounted at a calculated angle configuration to provide the optimum spring rate between shear and compression stiffness.

## APPLICATION

Novibra elements type SAW are heavy duty mountings for high vertical static and shock loads in compression, whilst at the same time providing high isolation values in the horizontal shear direction.

Typical fields of application are:

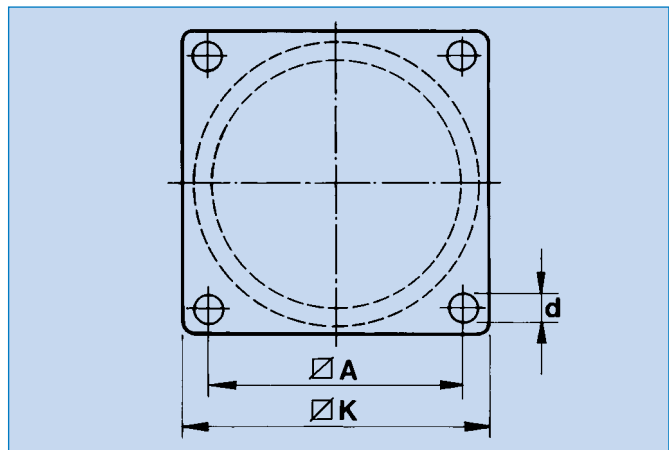
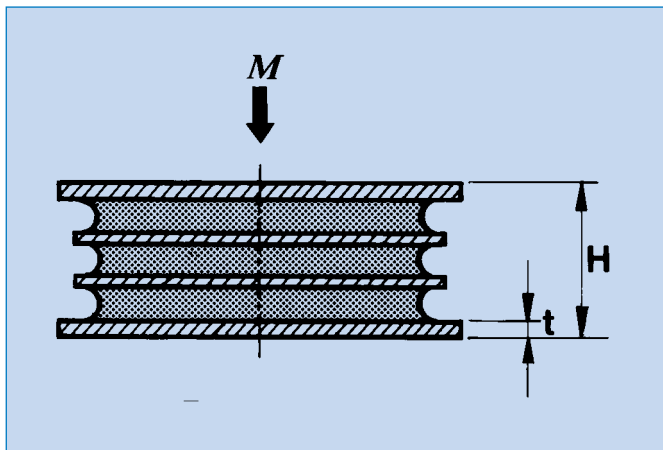
- crushers
- edge runners
- mills
- grinders
- hoppers and feeders
- vibratory rollers
- screens
- other very heavy machines and equipment



Shear loads only.



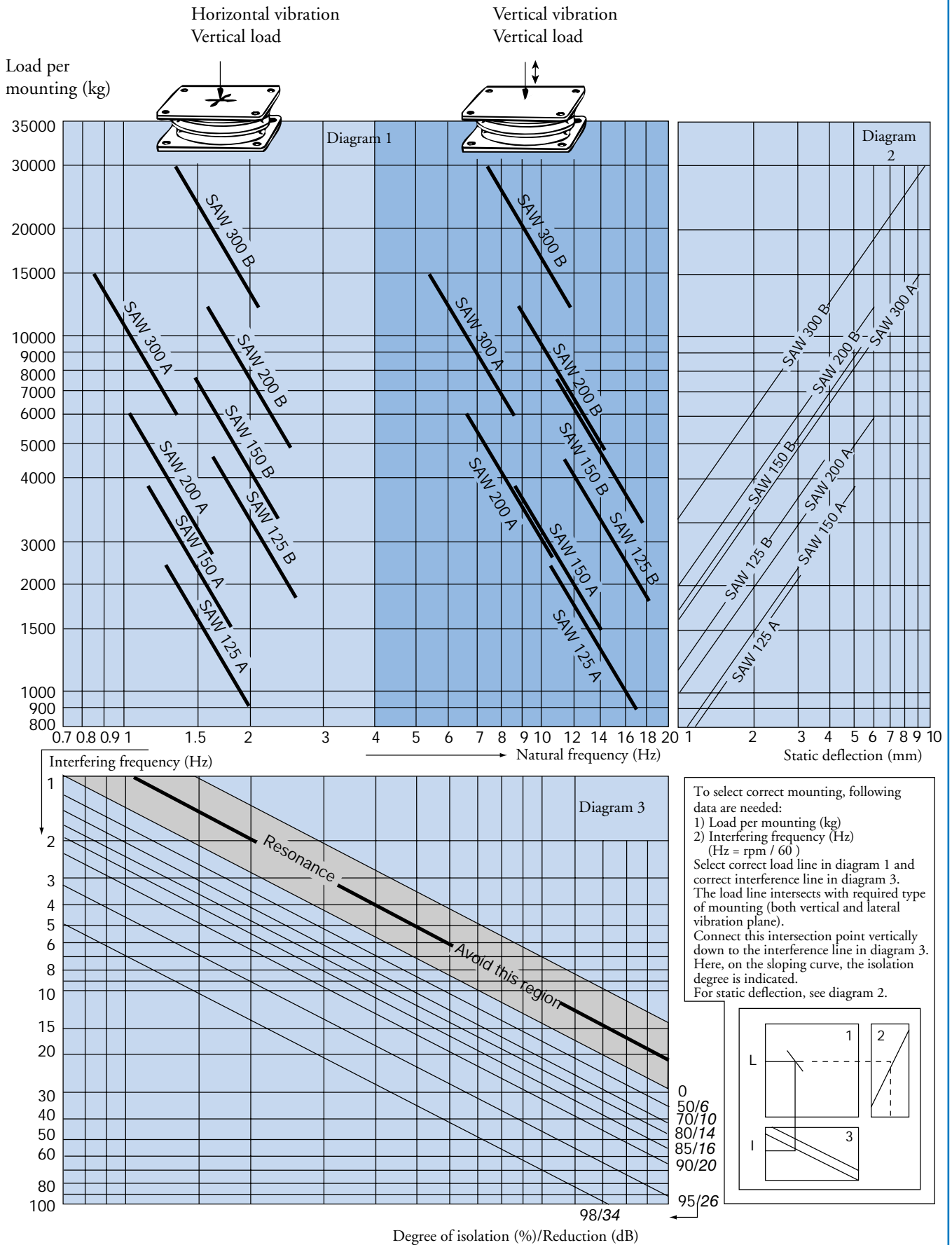
See separate diagram for shear load.



Type	Art.No. Hardness A (40° IRH)	Art.No. Hardness B (60° IRH)	Dimensions in mm					Weight (kg)	<i>M</i> -Max(kg)	
			A	K	H	d	t		A (40° IRH)	B (60° IRH)
SAW 125	2255130	2255140	118	148	52	13.5	5	2.6	2250	4500
SAW 150	2255150	2255160	136	166	63	13.5	6	4.1	3750	7500
SAW 200	814467	814475	184	220	82	17	8	9.2	6000	12000
SAW 300	814483	814491	270	310	120	22	10	27.0	15000	30000

# Novibra type SAW

**Note:** The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.



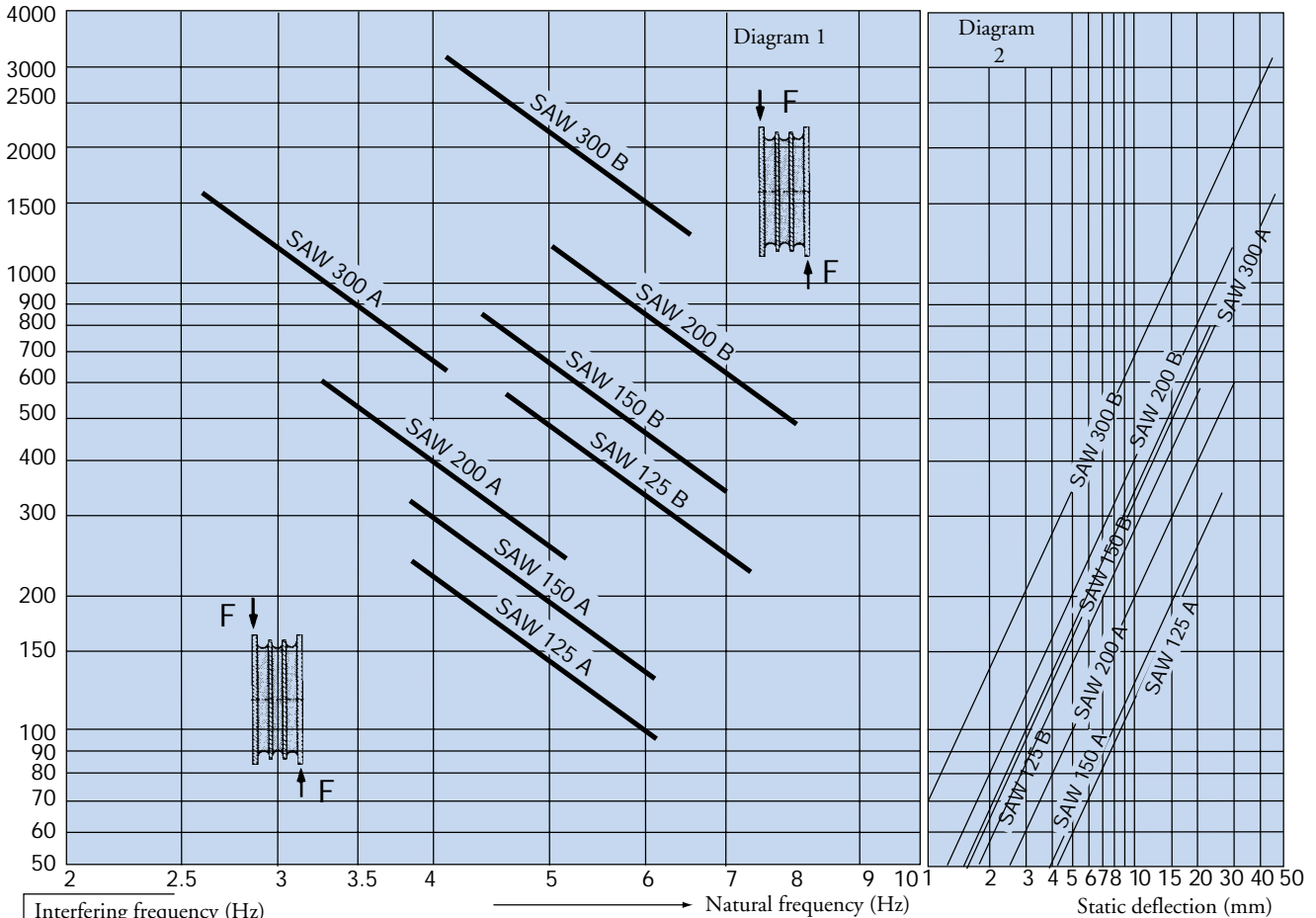
# Novibra type SAW = Shear loads

Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.

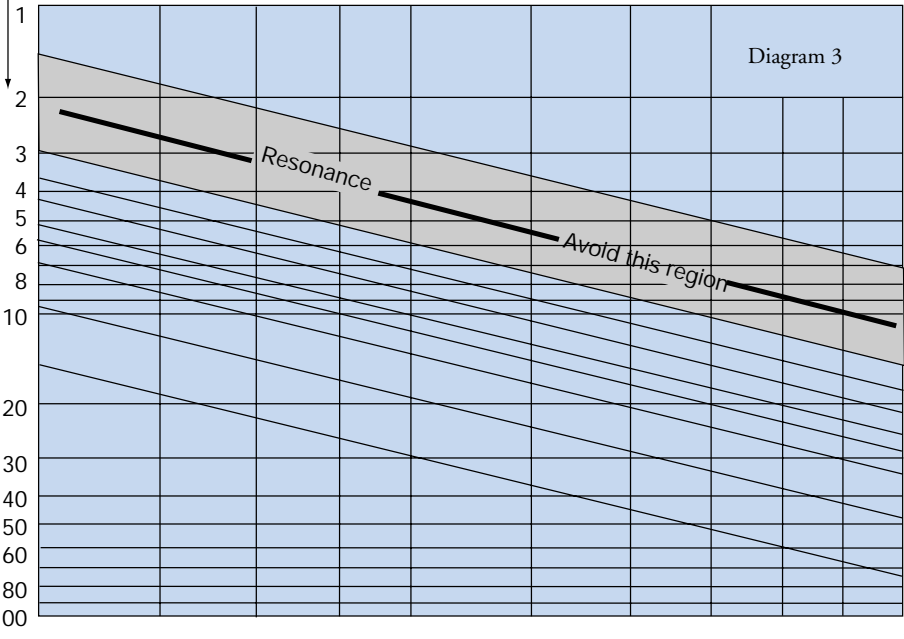
F max (kg)	Hardness A	Hardness B
SAW 125	240	570
SAW 150	330	850
SAW 200	600	1200
SAW 300	1575	3150

This page refers to shear load characteristics only!

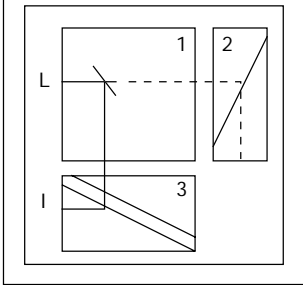
Load per mounting (kg)



Interfering frequency (Hz) → Natural frequency (Hz)



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.



# Novibra type GK



## FEATURES

Type GK is a heavy duty mounting with excellent flexible characteristics in both vertical and lateral planes. Deflection up to 30 mm can be obtained which makes Novibra type GK suitable for installations with low disturbing frequencies.

Installation is simple with no need for traditional means of attachment to machinery or support structure.

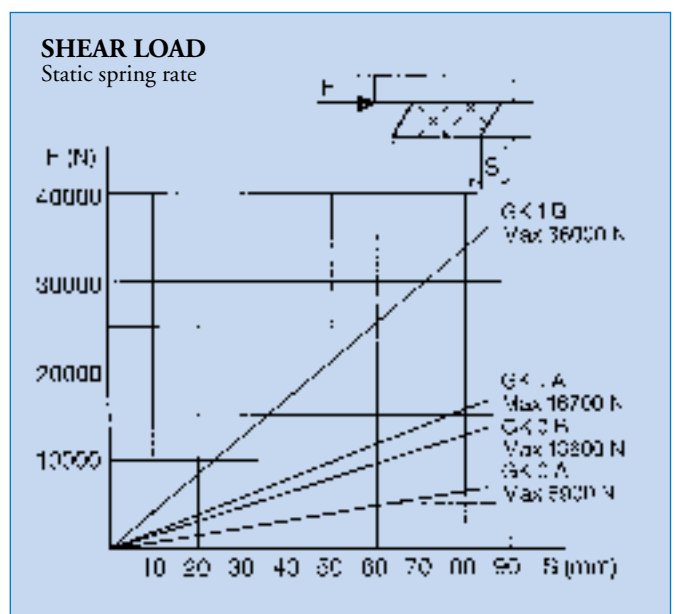
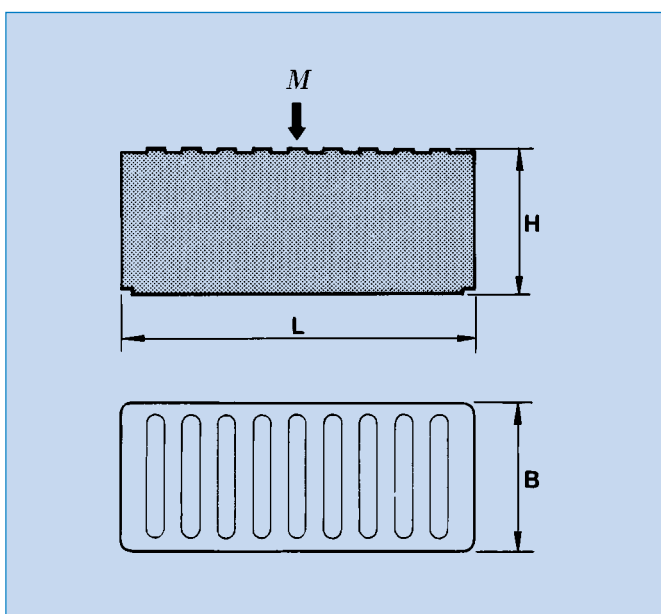
## APPLICATION

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

The long narrow section makes type GK also suitable for composite installations on common structural framework.

Typical fields of application are:

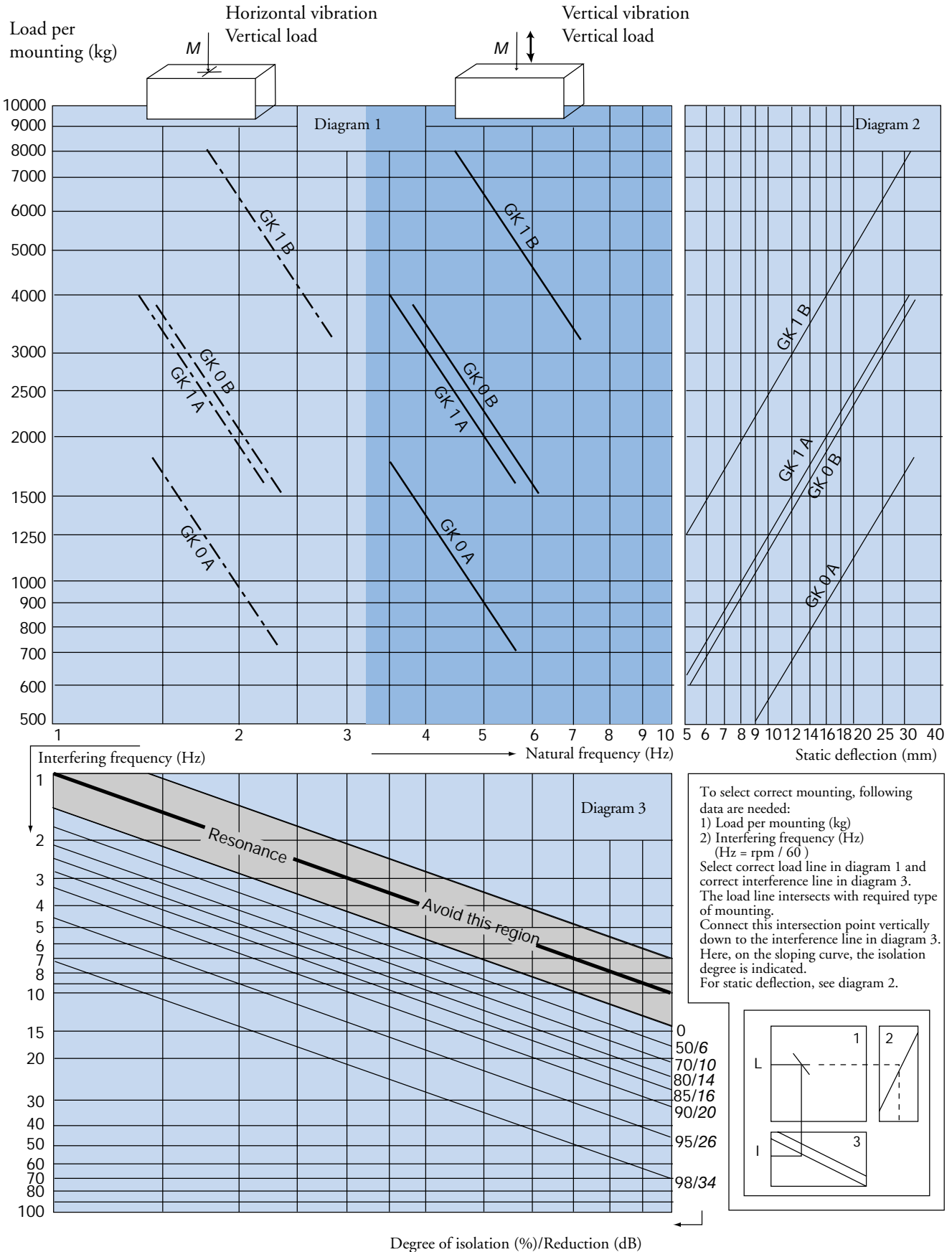
- rolling mills
- mixers
- gear wheels
- industrial fans
- paper mills
- converters
- sound enclosures
- floating structures



Type	Art.No.	Dimensions in mm			Weight (kg)	M-Max(kg)
		L	B	H		
GK 0 A	1534080	195	175	150	5.2	1800
GK 0 B	1861630	195	175	150	5.7	3800
GK 1 A	67959	400	175	150	10.7	4000
GK 1 B	67967	400	175	150	11.8	8000

# Novibra type GK

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured dynamic characteristics of the mountings.**



# Novibra Anti-vibration Plate



Suitable applications are:

- pillar drills
- transformers
- large pumps
- printing presses
- industrial fans
- horizontal drill presses
- textile machinery
- large forging presses

## FEATURES

The Novibra Anti-vibration 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 in a 90 degree angle to each other.

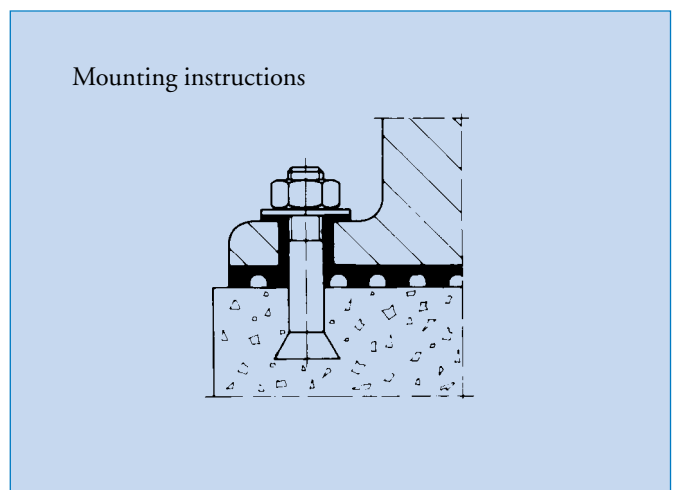
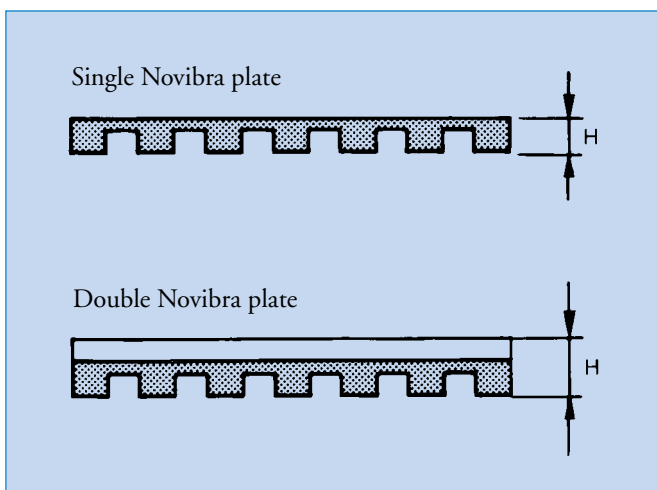
Good performance is also obtained when using the Novibra plate in the building and construction industry as support pads between flooring and joists. This application provides for cushioning of loads and isolation of high frequency vibrations within the building.

## APPLICATION

The Novibra Anti-Vibration Plate is intended, primarily, for applications with low demands on vibration isolation. Typical installations would be machinery generating vibrations in the high frequency range, and also for tall unstable installations, which require secure attachments to the foundation.

If insufficient deflection is achieved by a single layer, multiple layers can be used by separating each layer with a steel plate for the purpose of weight distribution.

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 "Mountings instructions" on this page.

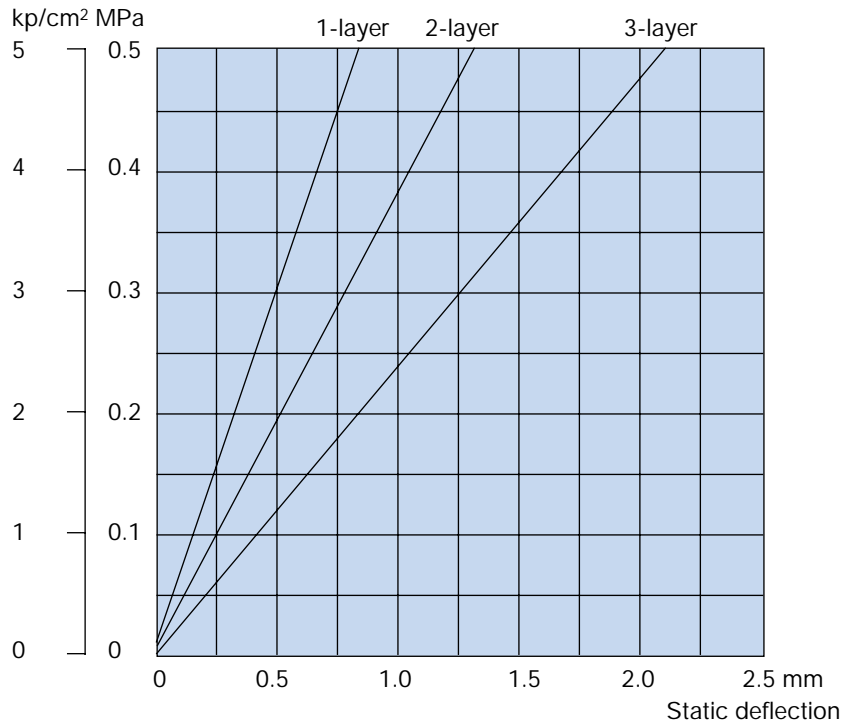


Type	Art.No.	Dimensions in mm		Weight (kg)	M-max load kg/cm <sup>2</sup>
		LxB	H		
Single plate	70136	500x600	4.5	1.210	5
Double plate	70151	500x600	8	1.815	5

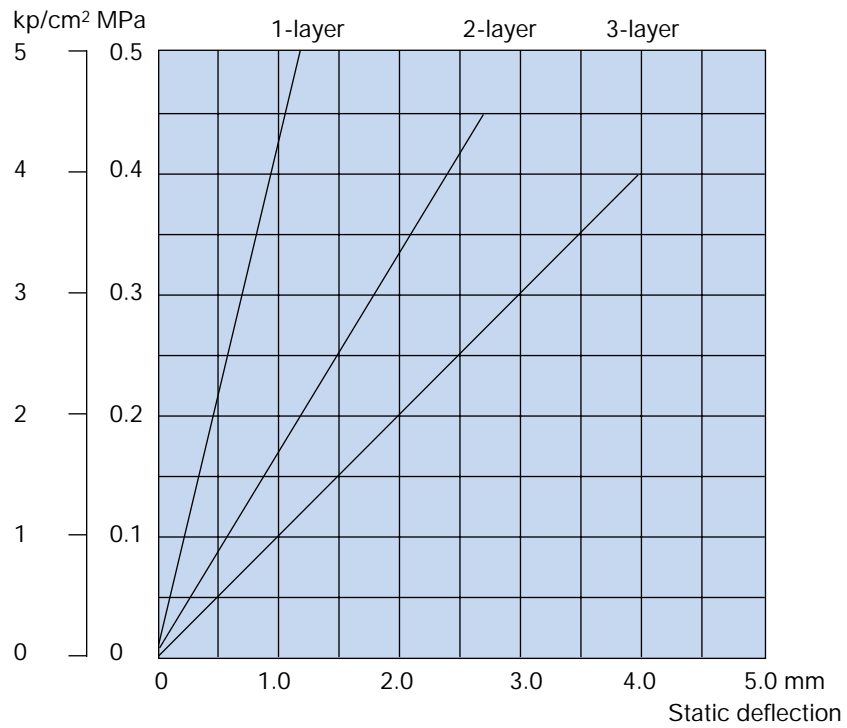
# Novibra Anti-vibration Plate

## Load

### Single Novibra plate



### Double Novibra plate



# Novibra type TF



## FEATURES

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

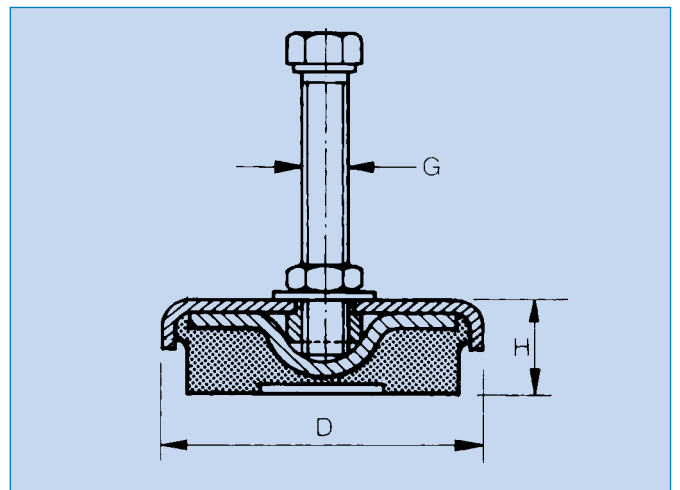
The rubber element of the TF mounting is oil and chemical resistant whilst all metal parts are zincplated and chromated for protection against corrosion.

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

## APPLICATION

Novibra type TF with level adjuster is a modern machine mounting suitable for a wide range of free standing workshop machines, like:

- lathes
- milling machines
- grinding machines
- multiple operation machinery
- presses
- plate shears
- nibbling machines
- punches and cutters
- carpentry machines
- plastic moulding machinery



Type	Art.No.	Dimensions in mm			Overall bolt length	Thread G	Weight (kg)	Max load (kg)
		D	H min	H max				
TF 250	1860740	69	23	<sup>1)</sup>	100	M 12	0.355	250
TF 600	1860780	81	25	<sup>1)</sup>	100	M 12	0.486	600
TF 1200	1860790	108	29	<sup>1)</sup>	100	M 16	0.990	1200
TF 3000	1860800	151	35	<sup>1)</sup>	120	M 20	2.223	3000
TF 4000	1860810	170	39	<sup>1)</sup>	120	M 20	2.925	4000
TF 6000	1860820	205	44	<sup>1)</sup>	150	M 24	4.813	6000

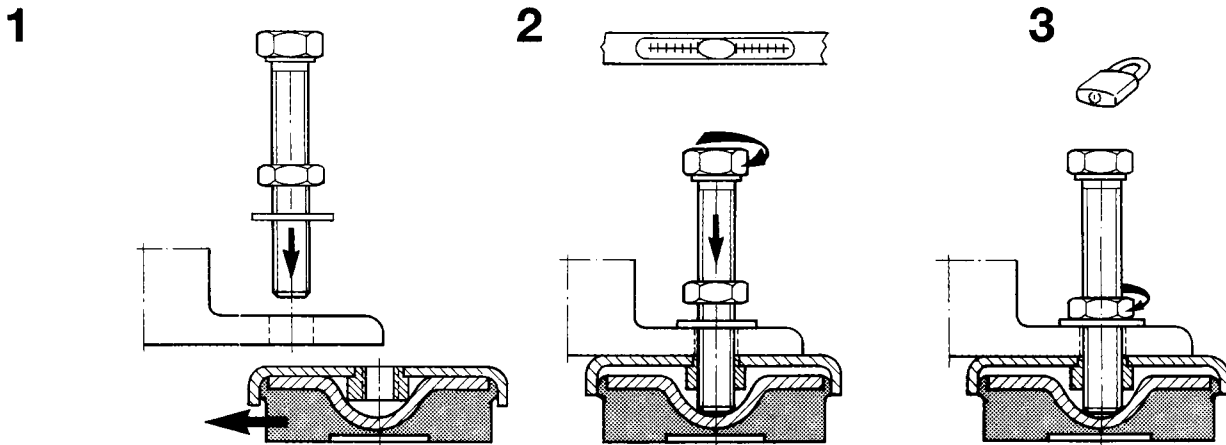
1) Levelling of the bolt up to its total length.

# Novibra type TF

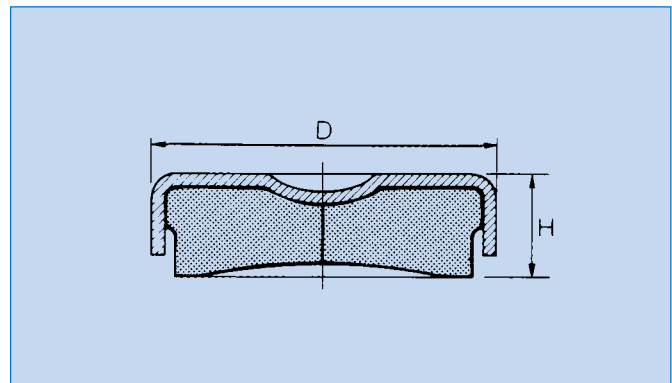
## Loading range per mounting (kg)

Type of machine Type of mounting 226-	General work- shop machines Max load (kg) 275	Presses and punches Number of strokes per minute			
			1- 125	126- 175	176- 225
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

## Mounting instructions



# Novibra type 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 function 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	Art.No.	Dimensions in mm		Weight (kg)	Max load (kg)
		D	H		
TFE 601	1861050	80	25	0.375	800
TFE 1201	1861060	109	29	0.925	1600

# Novibra type U



## FEATURES

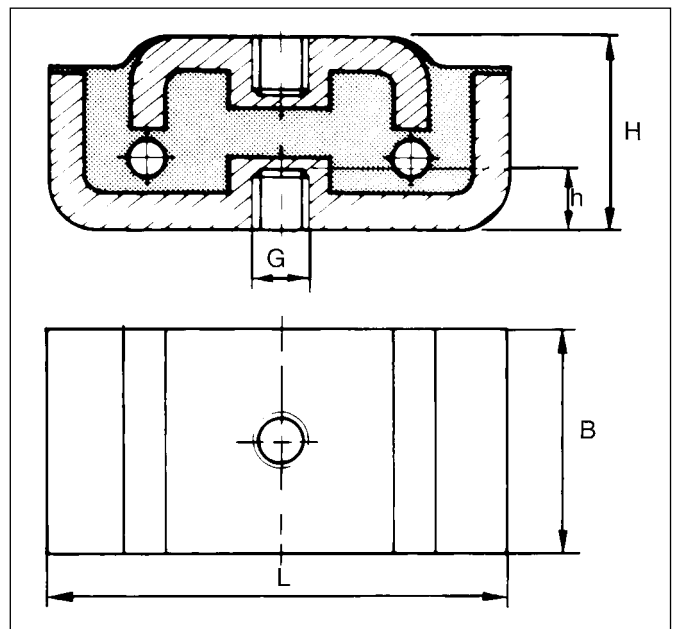
Novibra type U is a robust element consisting of 2 solid U-shaped steel parts securely bonded with rubber. To achieve higher resilience two holes in the rubber have been provided under the innershanks. The upper steel plate is to be mounted under the machine foot or base-plate by means of a bolt whereas the bottom plate should be secured to the floor by e.g. an expansion bolt. For certain applications a dowel pin may be adequate.

## APPLICATION

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

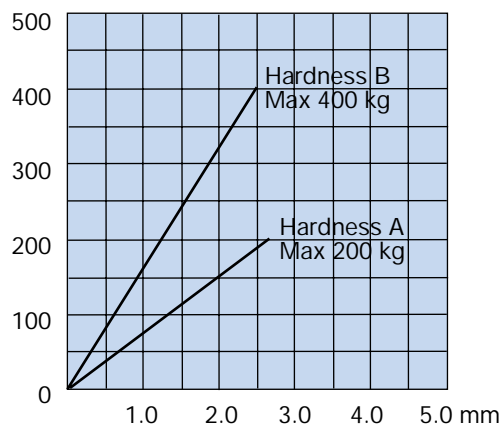
Typical applications can be found on :

- presses
- punches
- weaving machines
- carpentry machines
- church bells
- transformers
- printing machinery
- other heavy high speed machines



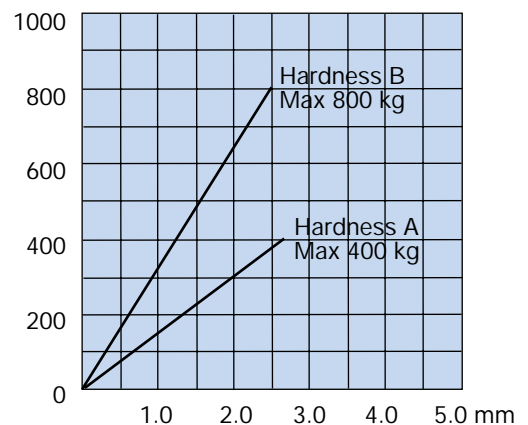
### U 100

Load per mounting (kg)



### U 130

Load per mounting (kg)



Type	Art.No.		Dimensions in mm					Weight (kg)	M-Max(kg)	
	Hardness A (40° IRH)	Hardness B (60° IRH)	B	L	H	h	G		A (40° IRH)	B (60° IRH)
U 100	67363	67371	50	100	42	12	M12	0.650	200	400
U 130	67421	67439	70	130	54	12	M12	1.318	400	800

# Novibra type 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.

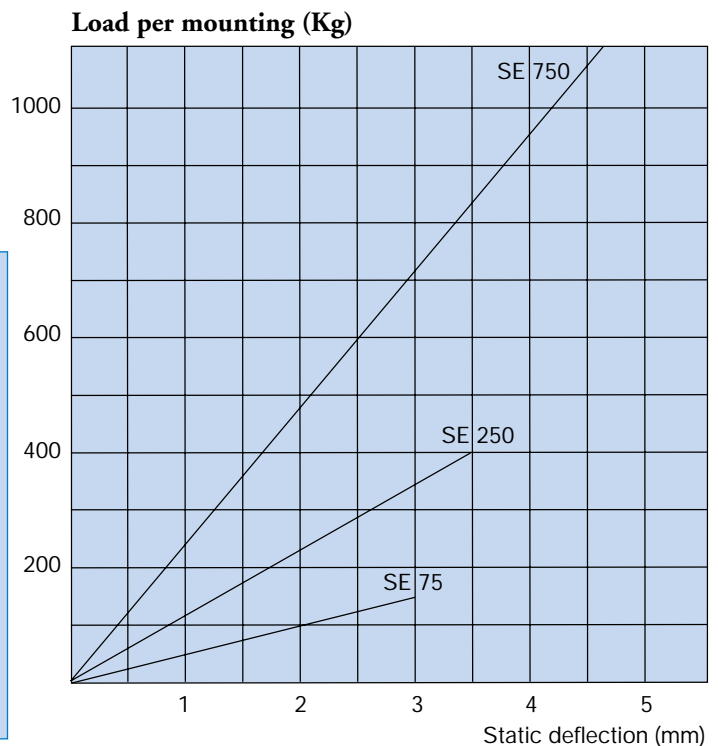
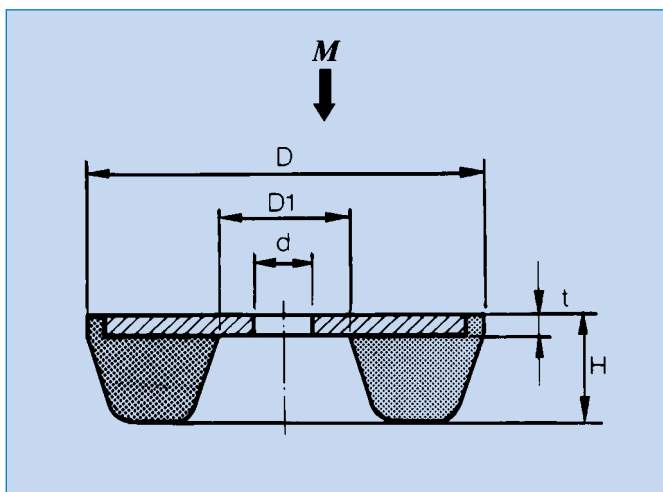
Since the rubber component is in direct contact with the surface, friction is sufficient to prevent the equipment from "travelling".

## APPLICATION

Novibra type SE is most suitable for the isolation of high frequency disturbances and also provides reduction of structure borne noise.

Specific applications are:

- office equipment
- textile machinery
- domestic appliances
- electric motors
- weighing equipment



Type	Art.No. Hardness R (50° IRH)	Dimensions in mm					Weight (kg)	M-Max (kg) R (50° IRH)
		D	D <sub>1</sub>	d	H	t		
SE 75	1661010	55	18	8	15	3	0.069	150
SE 250	1861110	75	25	10	17	4	0.172	400
SE 750	1861120	115	40	14	24	4	0.456	1100

# Novibra type VT and TK

VT-over



VT-under



TK



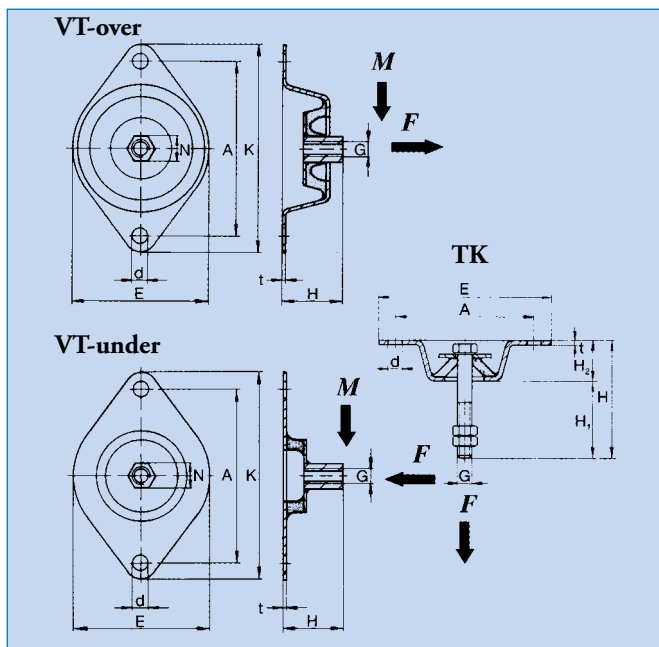
## FEATURES

Novibra type VT has been designed in such a way that upon installation the rubber section is subjected to shear loads, thus providing high deflection even at low loads. Two different parts are available, of which the "over part" provides for protection against tension preventing the isolated unit from falling down if overloading occurs. VT-under is designed to accept compression loads and permits shear deflection mainly. The design of Novibra mounting type TK makes it specifically suitable for ceiling installation. Its function is basically identical to VT-over, but is intended for lighter load applications.

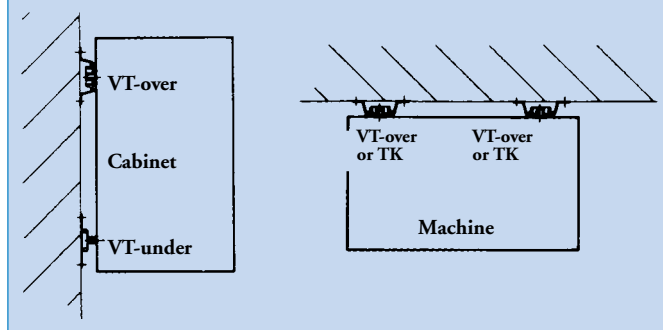
## APPLICATION

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.

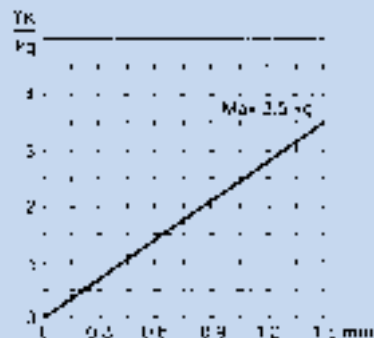
Mounting type VT-over can also be used for ceiling suspension e.g. fittings, fans, music speakers, etc.



## Mounting instructions



## Static deflection (mm) for TK

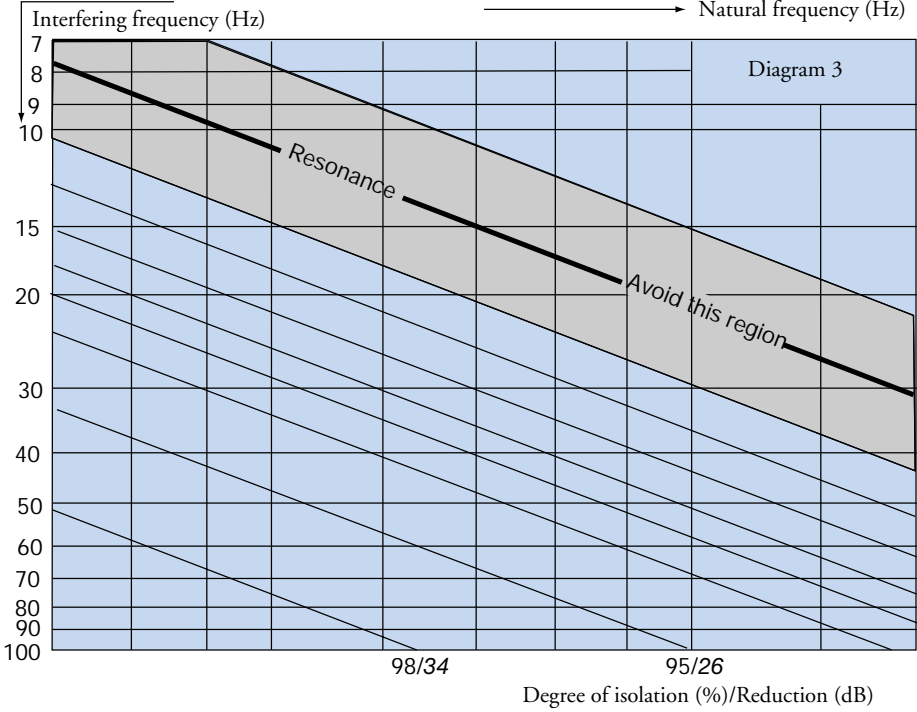
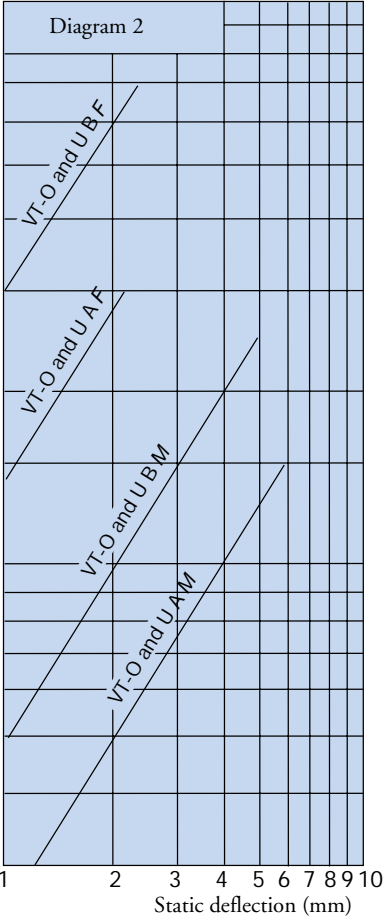
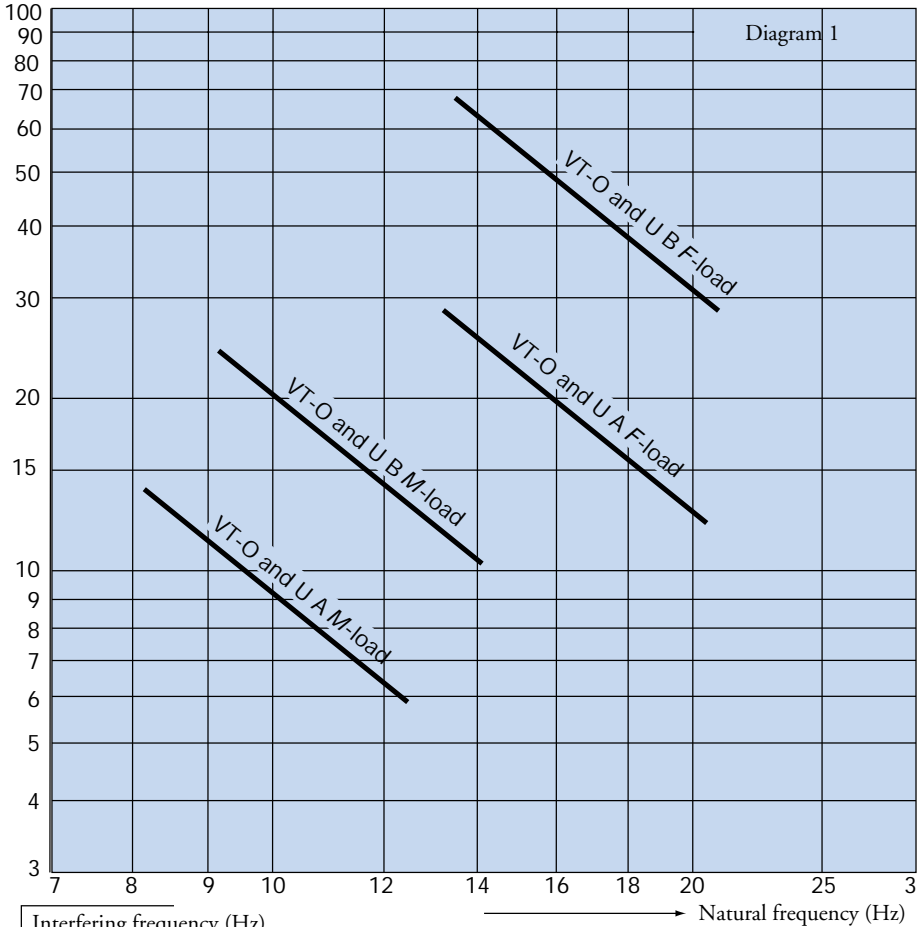


Type	Art.No.	Art.No.	Dimensions in mm							Weight/M-Max(kg)			F-Max(kg)		
	Hardness A (40° IRH)	Hardness B (60° IRH)	E	K	A	H	d	N	t	G	(kg)	A(40°IRH)	B(60°IRH)	A(40°IRH)	B(60°IRH)
VT-over	69526	69534	75	114	96	33	9	15	1.5	M8	0.149	14	25	30	70
VT-under	69567	69575	75	114	96	33	9	15	1.5	M8	0.104	14	25	30	70
TK	Hardness R (50°IRH)		Dimensions in mm							Weight		F-Max(kg)			
	Art.No.		E	A	H	H1	H2	d	t	G	(kg)	R(50°IRH)			
	1861410		58	46	39.5	26	13.5	7	1	M5	0.036		3.5		

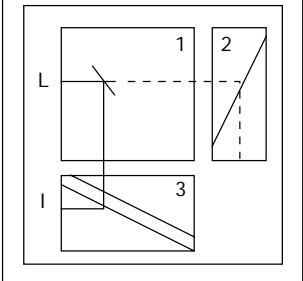
# Novibra type VT

**Note: The natural frequencies, degrees of isolation and dB-reductions are based on the measured 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 shockbuffer type ANB



## FEATURES

Novibra 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 so that the volume of the rubber is used at an optimum efficiency.

It permits that for new machine developments simpler designs and lighter calculated forces can be considered which means lower costs.

## APPLICATIONS

The Novibra shockbuffer type ANB is used to effectively damp movements of machines or machine components which need to be slowed down or stopped.

Typical field applications would be:

- wagons
- cabinets
- traverse cranes
- forestry vehicles
- lifting cranes
- off-road material handling equipment
- working beams
- falling goods

Through the excellent resilience of the rubber a high degree of energy absorption can be achieved. The rubber is stiffer for rapid dynamic processes than for slow static applications. With the same deformation this means that more energy is absorbed in fast processes than in slow ones. Diagram 1 shows the impact of the energy factor.

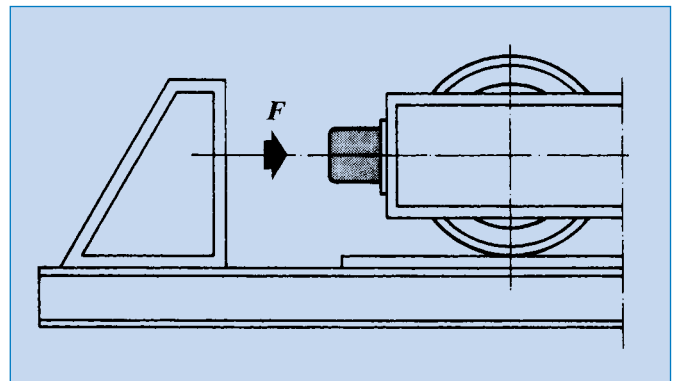


Fig 1. Traverse crane with shock buffer ANB.

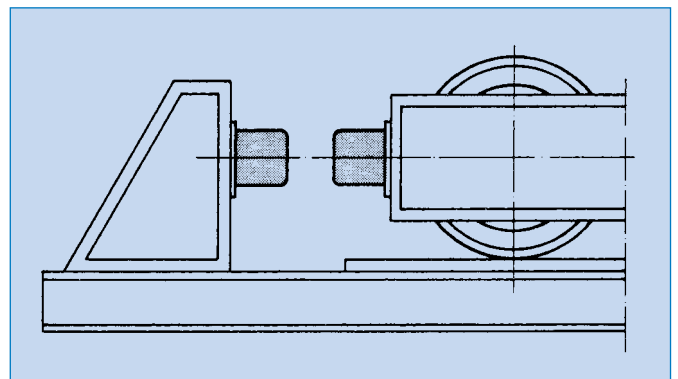


Fig 2. Traverse crane with 2 ANB buffers connected in series.

Type	Art.No.	K	A	Dimensions in mm				Weight (kg)	F-Max (N)
				D	d	H	t		
ANB 50	2255290	70	50	50	7	43	3	0.2	8000
ANB 75	2255300	100	75	75	9	63	3	0.5	20000
ANB 100	2255310	130	100	100	11	84	4	1.2	41000
ANB 200	68569	185	150	150	13.5	126	6	3.9	90000
ANB 200	68577	240	200	200	13.5	168	8	9.1	180000

# Novibra shockbuffer type ANB

For calculation purposes the following equations can be used:

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

$$E = F \cdot s \quad (2)$$

$$F = m \cdot a \quad (3)$$

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

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

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

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

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<sup>2</sup>

t = time in s

g = acceleration due to gravity 9.81 m/s<sup>2</sup>

h = height in m

δ = spring travel in m

Equation (4)- (7) at start velocity = 0

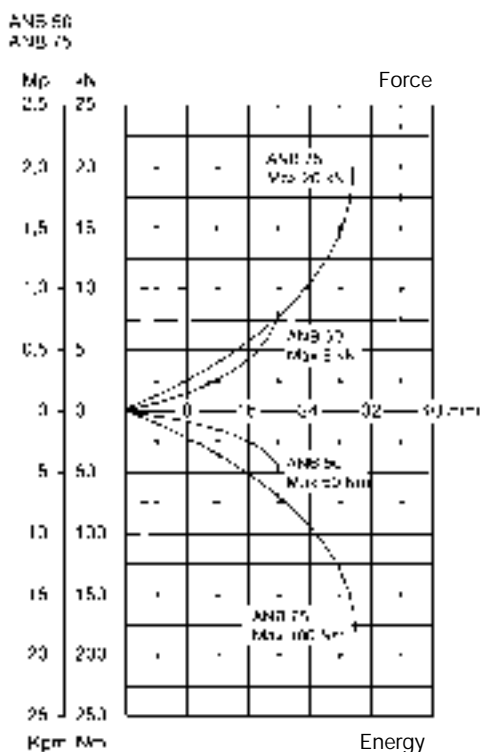


Diagram 1

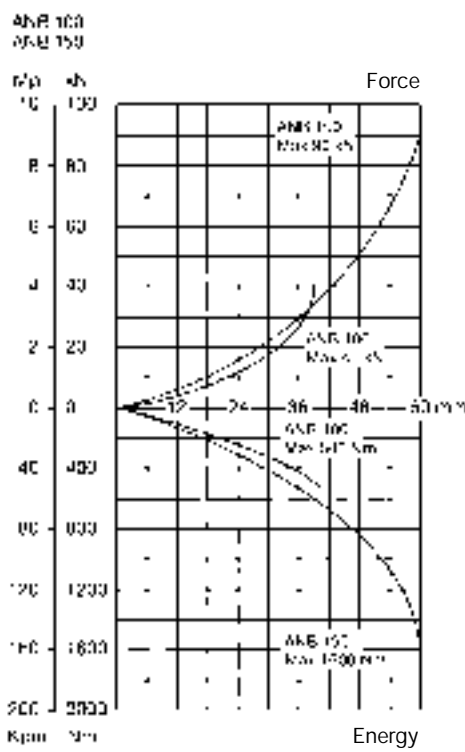


Diagram 2

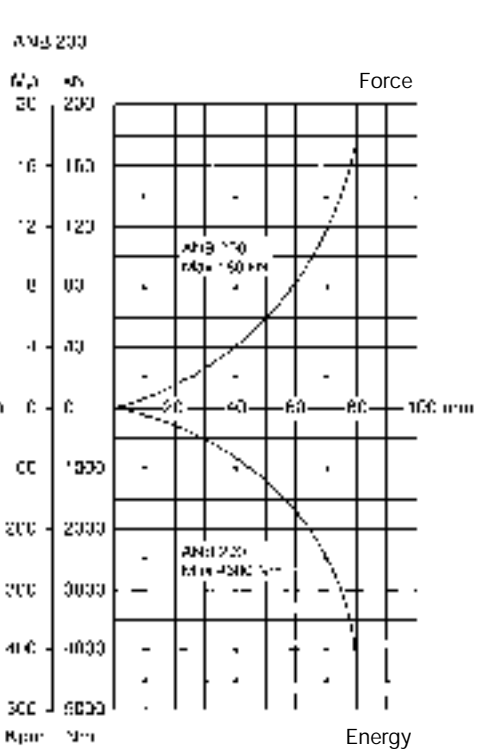
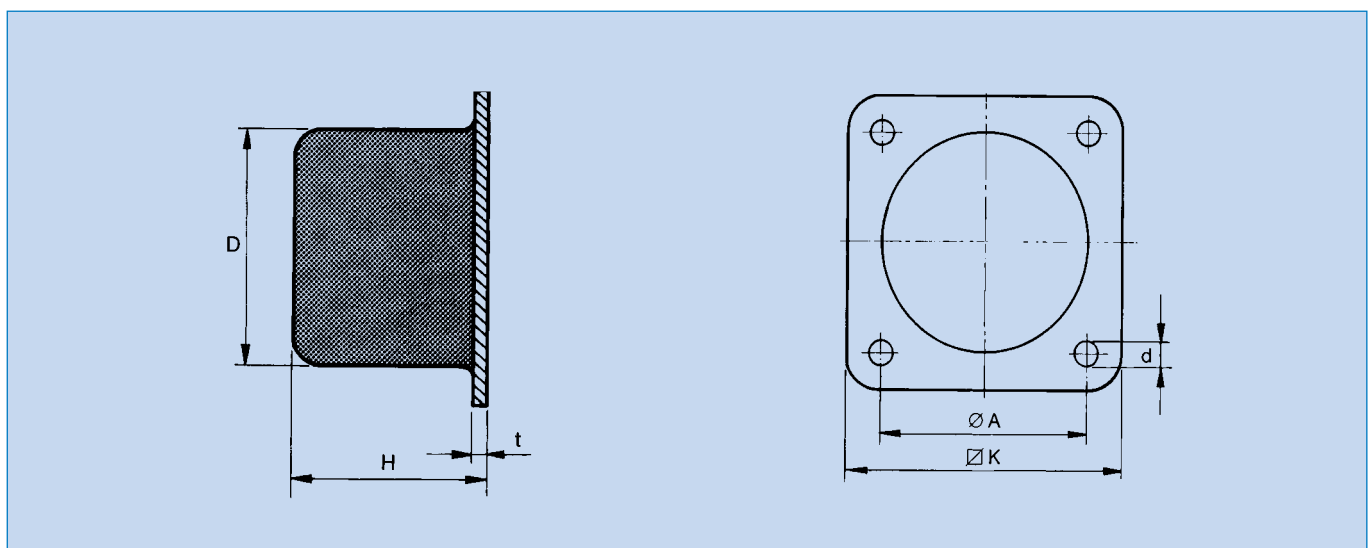


Diagram 3



# Novibra shockbuffer type ANB

## 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?

$$\text{Energy } E = F \cdot S \text{ (2)} = 1.83 \cdot 1850 \cdot 9.81 = 33212 \text{ Nm}$$

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

### 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  $33212 \cdot 0.4 = 13285$  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.

$$\begin{aligned} \text{Force at impact surface} \\ &= \text{force at 76 mm deflection} / 0.4 \\ &= 150 / 0.4 = 375 \text{ kN per buffer} \\ &= 1500 \text{ kN for 4 buffers} \end{aligned}$$

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?

$$\begin{aligned} \text{The dynamic or kinetic energy } E = \\ \frac{1}{2} = m \cdot v^2 = \frac{2000 \cdot 1.6^2}{2} = 2560 \text{ Nm (1)} \end{aligned}$$

### 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  $2560 \cdot 0.75 = 1920$  Nm. Then for 2 buffers the static energy is 960 Nm per buffer.

### REFER TO FORCE-ENERGY DIAGRAM

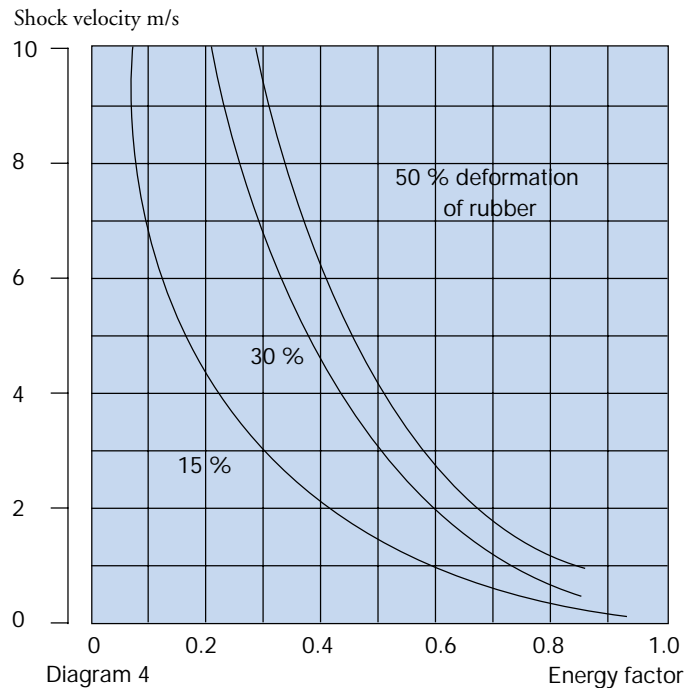
ANB 150 buffers can be chosen with a deflection at 960 Nm of 49 mm, which is only 41% of a free height of 120 mm, whereas 50% had been assumed. With the energy factor reduced to 0.72 (for 41% deflection at 1.6 m/s) the static energy is:

$$2560/2 \times 0.72 = 922 \text{ Nm}$$

### 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  $2560 \cdot 0.68 = 1740$  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:

$$26 / 0.68 = 38 \text{ kN}$$

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.

# Novibra sleeves type VP



## FEATURES

Novibra type VP consists of two concentric sleeves with rubber securely bonded between them. Designed to take up torsional movements and axial and radial loads. The rubber is prestressed to give maximum dynamic strength and durability.

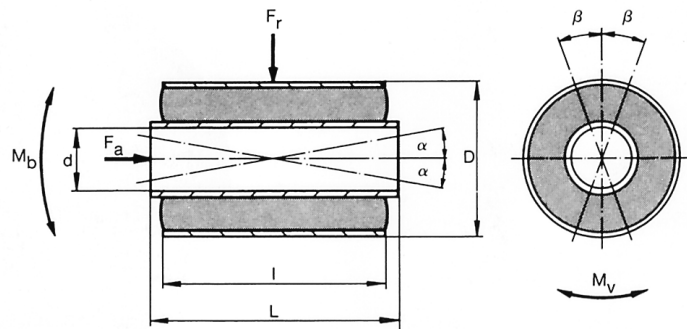
The bonded rubber takes up the full movement. Lubrication or other bearing maintenance is not required. The sleeves also have excellent sound and vibration isolation capacity, which makes structures fitted with Novibra type VP sleeves both silent and vibrationfree.

## APPLICATION

Novibra type VP sleeves are used to solve bearing problems in vibrating and oscillating constructions.

Suitable applications are linkage systems in:

- Cars
- Railway carriages
- Tractors
- Trucks
- Agricultural machinery
- Bulldozers
- Vibratory screens



## Tolerances

d	10-25±0,1 30-50±0,2
D	+0,25 +0,05 with chamfer at one end
l	±0,5
L	±0,25

Designation	Dimensions in mm				Torque			Bending			Axial load		Radial load		Aprox. weight (kg)
	d	D	L	l	Max Mv Nm/ degr.	Max β degr.	Spring const. Nm/ degr.	Max Mb Nm	Max α degr.	Spring const. Nm/ degr.	Max Fa N	Spring const. N/mm	Max Fr N	Spring const. N/mm	
VP 10/2525	10	25	25	20	5.0	15	0.3	6.0	8	0.7	750	170	2300	2000	0.035
VP 10/2540	10	25	40	35	6.0	15	0.4	38.0	8	4.8	1500	380	3800	2350	0.057
VP 15/3530	15	35	30	25	9.0	15	0.6	12.0	8	1.5	1500	220	3500	3000	0.076
VP 15/3550	15	35	50	45	15.0	15	1.0	120.0	8	15.0	2500	520	6000	6500	0.120
VP 20/4540	20	45	40	35	24.0	15	1.6	45.0	8	5.6	2600	330	6800	4000	0.160
VP 20/4575	20	45	75	70	48.0	15	3.2	365.0	8	46.0	5500	820	13500	8000	0.315
VP 25/5045	25	50	45	40	46.0	14	3.3	96.0	8	12.0	3800	450	9000	4500	0.211
VP 25/5085	25	50	85	80	69.0	14	4.9	730.0	8	92.0	7500	960	18000	10500	0.416
VP 30/6055	30	60	55	45	78.0	14	5.6	135.0	8	17.0	5100	530	12000	5000	0.335
VP 30/60100	30	60	100	90	135.0	14	9.7	1200.0	8	150.0	10500	1150	25000	20000	0.630
VP 35/6560	35	65	60	50	93.0	12	7.7	180.0	6	23.0	6600	720	16000	8500	0.434
VP 35/65110	35	65	110	100	200.0	11	17.0	1560.0	6	260.0	13000	1550	31500	29400	0.810
VP 40/7065	40	70	65	55	138.0	12	11.5	290.0	7	41.0	8300	870	20500	17000	0.555
VP 40/70120	40	70	120	110	240.0	11	22.0	2520.0	6	420.0	18000	1750	40000	37750	1.090
VP 45/7570	45	75	70	60	240.0	12	20.0	320.0	7	45.0	10000	1100	24000	20000	0.673
VP 45/75130	45	75	130	120	340.0	10	34.0	5040.0	6	840.0	20000	2150	40000	42350	1.280
VP 50/8075	50	80	75	65	275.0	11	25.0	700.0	7	100.0	12000	1350	28500	30000	0.767
VP 50/80140	50	80	140	130	450.0	10	45.0	5160.0	6	860.0	23500	2650	49000	43700	1.484

# Novibra Bobbins

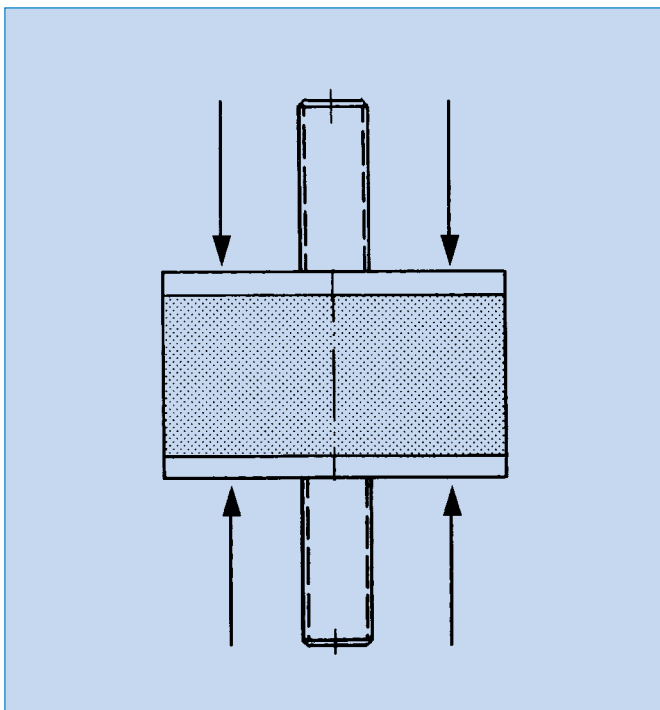
## APPLICATIONS AND FEATURES

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.

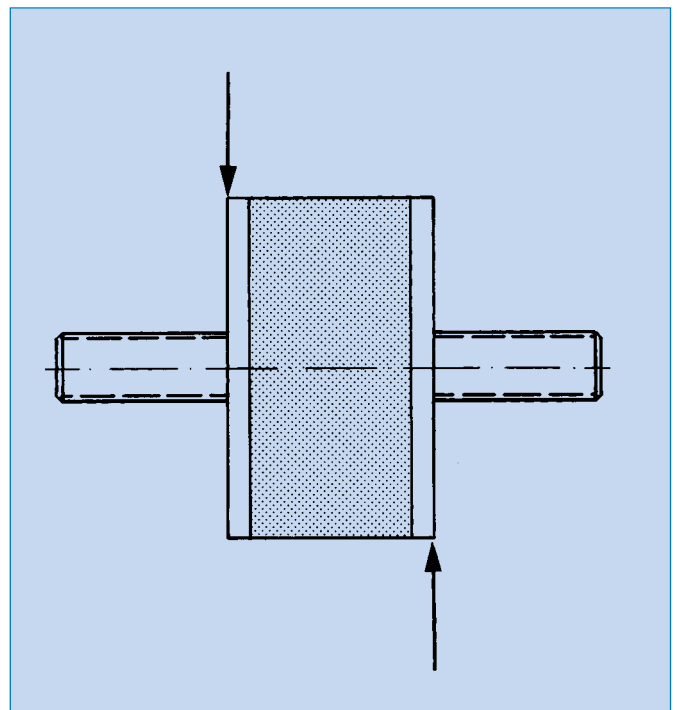
Made of natural rubber in hardness A (40-45 ° IRH) or hardness B (55-60 ° IRH).



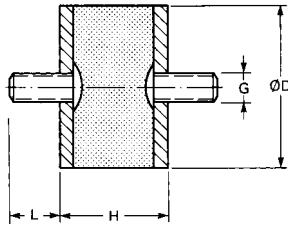
Compression load



Shear load

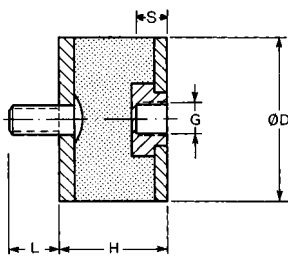


# Novibra Bobbins



Cylindrical mountings type A

Type D/H	GxL	Art.No. Hardn. B	Hardness B			
			Compression load $k_{comp}$ (N/mm)	$F_{max}$ (N)	Shear load $k_{shear}$ (N/mm)	$F_{max}$ (N)
A 10/10	M 4x10	1255720	53	77	10	31
A 15/15	M 4x13	1255740	73	170	13	69
A 20/15	M 6x15	1255770	145	327	25	123
A 20/20	M 6x15	1255300	96	303	18	123
A 20/25	M 6x15	1255780	72	292	14	123
A 25/10	M 6x18	1255790	574	755	64	192
A 25/15	M 6x18	1255800	247	556	38	192
A 25/20	M 6x18	1255810	157	495	27	192
A 25/25	M 6x18	1255310	116	471	21	192
A 25/30	M 6x18	1255820	93	458	17	192
A 30/15	M 8x20	1255830	453	930	61	277
A 30/20	M 8x20	1255320	261	771	42	277
A 30/30	M 8x20	1255840	143	680	26	277
A 40/30	M 8x23	1255330	271	1288	47	493
A 40/40	M 8x23	1255850	184	1202	34	493
A 50/25	M 10x28	1255860	652	2442	93	770
A 50/30	M 10x25	1255870	472	2193	75	770
A 50/40	M 10x25	1255340	306	1970	54	770
A 50/45	M 10x25	1255880	261	1915	47	770
A 50/50	M 10x25	1255350	228	1877	42	770
A 75/40	M 12x37	1255360	827	5181	124	1732
A 75/50	M 12x37	1255900	579	4670	97	1732
A 100/55	M 16x41	1255910	994	8908	155	3079

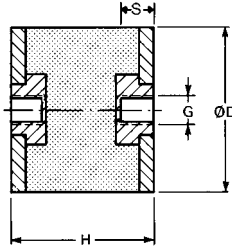


Cylindrical mountings type B

Type D/H	GxL (S)	Art.No. Hardn. B	Hardness B			
			Compression load $k_{comp}$ (N/mm)	$F_{max}$ (N)	Shear load $k_{shear}$ (N/mm)	$F_{max}$ (N)
B 20/15	M 6x15 (6)	1255960	159	298	25	123
B 20/20	M 6x15 (6)	1255970	105	275	18	123
B 25/25	M 6x18 (6)	1256010	127	428	21	192
B 30/20	M 8x20 (8)	1256040	285	701	42	277
B 30/30	M 8x20 (8)	1256060	156	618	26	277
B 50/30	M10x28 (10)	1256090	515	1994	75	770
B 50/40	M10x28 (10)	1256100	334	1791	54	770
B 50/50	M10x25 (10)	1256120	248	1706	42	770
B 75/55	M12x37 (12)	1256160	550	4111	87	1732
B 100/40	M16x41 (16)	1256170	1914	9992	221	3079

S = internal thread length

# Novibra Bobbins



Cylindrical mountings type C

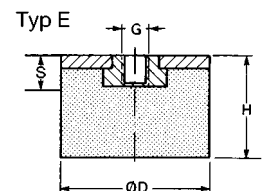
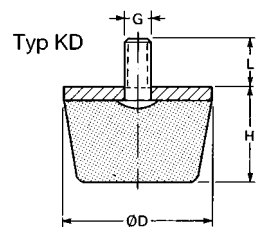
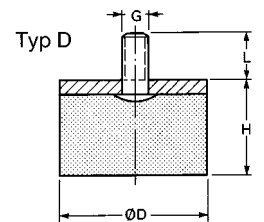
Type D/H	GxS	Art.No.	Art.No.	Hardness A				Hardness B			
				Hardn. A	Hardn. B	Compression load	Shear load	Compression load	Shear load		
				$k_{comp}$	$F_{max}$	$k_{shear}$	$F_{max}$	$k_{comp}$	$F_{max}$	$k_{shear}$	$F_{max}$
				(N/mm)	(N)	(N/mm)	(N)	(N/mm)	(N)	(N/mm)	(N)
C 10/10	M 4x4		1256200					63	61	10	31
C 15/15	M 4x4		1256210					86	134	13	69
C 20/20	M 6x6	66514	66522	53	112	8	57	114	238	18	123
C 20/25	M 6x6		1256220					85	230	14	123
C 20/30	M 6x6	66530	66548	31	104	5	57	69	226	11	123
C 25/20	M 6x6		1256230					186	390	27	192
C 30/28	M 8x8	66449	66456	87	256	13	127	186	544	28	277
C 30/30	M 8x8		1255410					169	536	26	277
C 30/36	M 8x8	66498	66506	62	241	10	127	134	521	21	277
C 40/30	M 8x8		1255420					320	1015	47	493
C 40/40	M 8x8		1256260					217	947	34	493
C 50/36	M10x10	66589	66597	203	774	28	353	420	1603	61	770
C 50/40	M10x10		1256280					361	1552	54	770
C 50/42	M10x10	66639	66647	160	726	23	353	338	1533	51	770
C 50x48	M10x10	66688	66696	133	697	20	353	283	1490	44	770
C 75/36	M12x12	66738	66746	608	2247	65	795	1180	4363	141	1732
C 75/42	M12x12	66787	66795	450	1987	54	795	900	3975	118	1732
C 75/48	M12x12	66837	66845	356	1828	46	795	728	3738	101	1732
C 75/55	M12x12		1255430					596	3562	87	1732
C100/42	M16x16	66886	66894	848	4750	96	1414	1884	8321	209	3079
C100/48	M16x16	66936	66944	652	3750	83	1414	1474	7573	180	3079
C100/54	M16/16	66985	66993	500	3250	72	1414	1210	7083	158	3079
C140/42	M20x20	67124	67132	2070	12000	192	2771	5139	22201	419	6034
C140/48	M20x20	67173	67181	1724	10000	165	2771	3799	19146	359	6034
C140/60	M20x20	67223	67231	1070	7500	128	2771	2439	15804	279	6034

S = internal thread length

Cylindrical mountings type D/KD/E

Type D/H	GxL	Art.No.	Art.No.	Compression load	
				Hardness A	Hardness B
				$F_{max}$	$F_{max}$
				(N)	(N)
D 30/17	M 8x20		1533350		600
D 30/25	M 8x25		1534880		450
D 30/30	M 8x25		1257030		425
D 50/20	M 10x28		1534460		1900
D 50/30	M 10x28		1534390		1600
D 50/42	M 10x15		1534220		1400
KD25/12	M 6x16		1534150		300
KD25/17	M 6x18		1533450		250
KD50/18	M 10x28		1256940		1400
GxS					
E 30/17	M 8x8	1256930	1661280	225	550
E 50/36	M 10x10	1659990		550	
E 50/45	M 10x10		1659870		1100

S = internal thread length



# Novibra type HA



## FEATURES

Novibra type HA is a height adjuster made in corrosion protected steel. The steel is zink plated and chromated according to DIN 50691/ISO 2081.

The height adjuster is supplied complete with washer and nut for the fastening to the mounting and two nuts and a lock washer for the engine foot fastening.

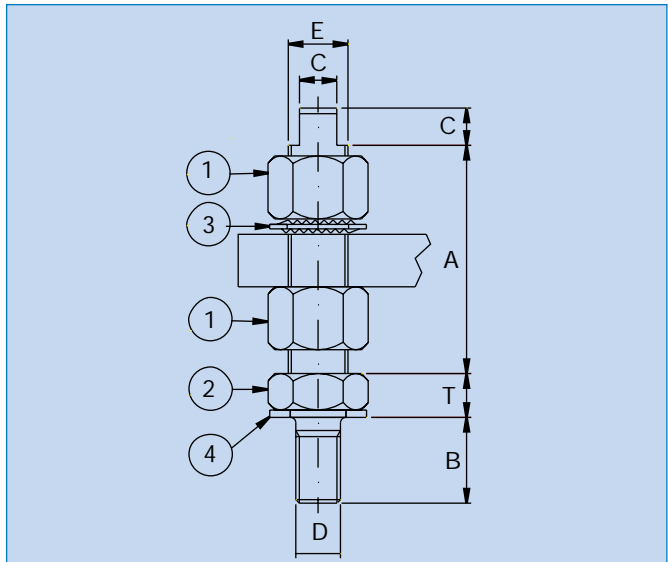
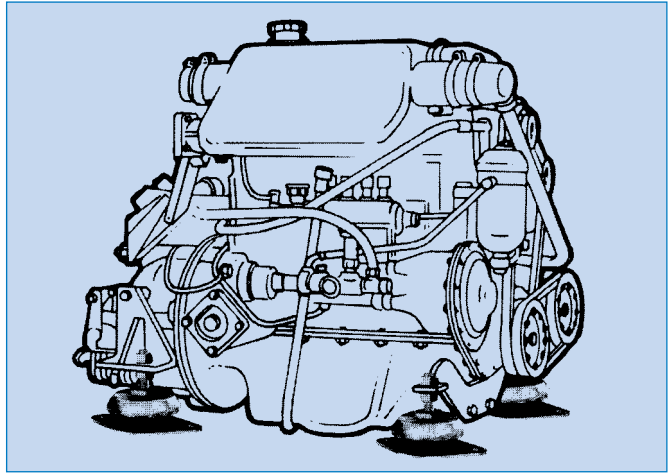
The HA height adjustment facilities precise coupling alignment for engine installations and boat building tolerances.

## APPLICATION

Novibra type HA is available in 4 versions to suit the small and medium range of Novibra AV-mountings, as listed on table below. It also allows Novibra mountings to be retrofitted to existing installations where original spares are unobtainable.

Notes :

- For optimum solutions where close coupling tolerances are required, leave the mountings to settle for 24 hours before final alignment of the engine installation.
- For securing the bolt into the mounting, it is recommended to apply Loctite.
- For the dimensions HA 16/16 and 16/20 it is necessary to use a larger washer than nr 4 in the sketch, approx 30% of the diameter of the upper part of the cover.
- For mobile applications it is recommended to use a washer (see part 4 in table below) that has the same size as the diameter of the upper part of the cover for the corresponding RA, RAB and RAEM mount.
- The heightadjuster HA can be used together with Novibra type M-mount. See description of M-mount.



Type	Art.no.	Dimensions in mm				Thread		1 Nut	2 Low nut	3 Serrated lock washer	4 Plain washer	For mounting sizes
		A	B	C	T	D	E					
HA 12/12	2230630	65	20	8	8	M12	M12x1.25	M12x1.25	M12x1.25	12.5x20.5	13x24x2	RAB-RA 100 M12-RA 200 M12-RA 350 M12-RAEM 60 RA 125 EM M12-RAEM 350 M12
HA 12/16	2230640	65	23	10	10	M12	M16x1.5	M16x1.5	M16x1.5	16.5x26	15x26x2	RAB-RA 100 M12-RA 200 M12-RA 350 M12-RAEM 60 RA 125 EM M12-RA 350 EM M12
HA 16/16	2230650	65	24	10	11	M16	M16x1.5	M16x1.5	M16x1.5	16.5x26	17x30x3	RA 350 M16-RA 500-RA 800-RAEM 350 M16-RAEM 800
HA 16/20	2230660	80	26	12	13	M16	M20x2	M20x2	M20x2	21x33	20x36x3	RA 350 M16-RA 500-RA 800-RAEM 350 M16-RAEM 800

# Novibra Questionnaire

Customer	Date
Contactperson	
Phone	Fax

## TECHNICAL DATA FOR THE APPLICATION

- Type of equipment \_\_\_\_\_
- Model and manufacturer \_\_\_\_\_
- Environment for the application \_\_\_\_\_

Industrial  
 Stationary  
 Mobile

Residential  
 (e.g. hospital, hotel,  
office)

Marine  
 Commercial vessel  
 sea going: Yes  No   
 Pleasure craft  
 High speed craft

**For propulsion engines, see next page**

- Total supported weight: \_\_\_\_\_
- Number of mounting points: \_\_\_\_\_
- Position centre of gravity
  - Centred
  - Offset, please present outline drawing
- Disturbing frequency range (e.g. rpm, Hz, strokes/min): \_\_\_\_\_
- Is a combustion engine installed in the machinery? Yes  No   
 If yes, number of cylinders: \_\_\_\_\_  Four-stroke  Two-stroke
- Position of mountings:
  - under the frame
  - under the engine

Additional comments: \_\_\_\_\_

\_\_\_\_\_

**Novibra recommendation:**

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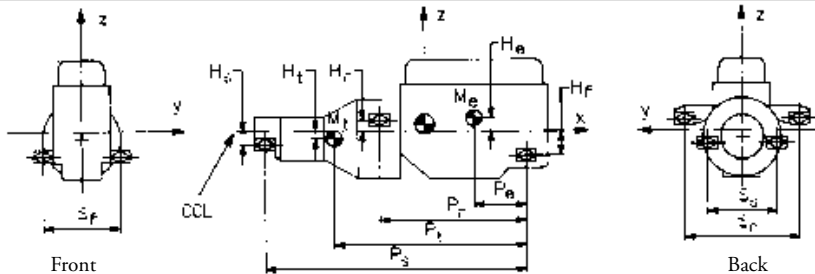
Mounting type	:	
Number of mountings	:	
Degree of isolation	:	%

**Please copy and fax questionnaire to nearest Novibra office.**

# Novibra Questionnaire

## Data required for engine analysis

Customer	Date
Contact	
Phone	Fax



- |  |      |       |                  |
|--|------|-------|------------------|
| 1. Engine model & manufacturer.....  |      |       |                  |
| 2. Transmission model & manufacturer .....   |      |       |                  |
| 3. Engine weight (wet, including accessories) .....  | Me=  | _____ | kg               |
| 4. Transmission weight (wet) .....   | Mt=  | _____ | kg               |
| 5. Engine C. G. height above/below CCL. ....   | He=  | _____ | mm               |
| 6. Transmission C. G. height above/below CCL .....   | Ht=  | _____ | mm               |
| 7. Front mounting position above/below CCL.....  | Hf=  | _____ | mm               |
| 8. Rear mounting position above/below CCL. ....  | Hr=  | _____ | mm               |
| 9. Engine C. G. position behind front mounting.....  | Pe=  | _____ | mm               |
| 10. Rear mounting position behind front mounting .....   | Pr=  | _____ | mm               |
| 11. Transmission C. G. position behind front mounting.....   | Pt=  | _____ | mm               |
| 12. Rear mounting spread .....   | Sr=  | _____ | mm               |
| 13. Front mounting spread .....  | Sf=  | _____ | mm               |
| 14. Engine speed   |      |       |                  |
| -idle .....  | ni=  | _____ | rpm              |
| -operating .....   | no=  | _____ | rpm              |
| 15. Number of cylinders and arrangement (1-6, 90°V-8, etc) .....   |      |       |                  |
| 16. Two or four stroke.....  |      |       |                  |
| 17. Tail mounting position above/below CCL (if applicable).....  | Hs=  | _____ | mm               |
| 18. Tail support position behind front mounting (if applicable) .....  | Ps=  | _____ | mm               |
| 19. Tail mounting spread (if applicable) .....   | Ss=  | _____ | mm               |
| 20. Moments of inertia of total system or for all components (engine, transmission, etc) (If these are not available, a drawing of the engine/transmission system is required) | lxx= | _____ | kgm <sup>2</sup> |
|  | lyv= | _____ | kgm <sup>2</sup> |
|  | lzz= | _____ | kgm <sup>2</sup> |
| 21. Output torque (including highest gear reduction).....  | To=  | _____ | Nm               |

Is there a thrust bearing?      Yes <input type="checkbox"/> No <input type="checkbox"/>	Model & manufacturer of elastic coupling:
If no, what is the propeller thrust.....N	Dynamic stiffness of the coupling: axial .....N/mm    radial.....N/mm

### Novibra recommendation:

Date:

Sign:

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

# Novibra® - A safe choice - All over the world

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Novibra has a well developed library of information material. This material consists of catalogues, product leaflet, CAD symbol library and CD calculation program.

You can also find our information material on the Internet.

Our adress is [www@trelleborg.com/novibra](http://www.trelleborg.com/novibra).



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