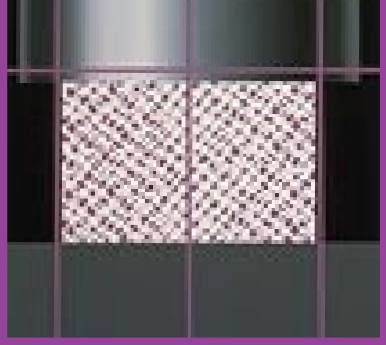


METAL MOUNTINGS

VIBRACHOC RANGE

PAULSTRA

METAL MOUNTINGS VIBRACHOC RANGE

CONTENTS

I - STEEL MOUNTINGS

VIBRACHOC have a range of all steel mountings whose essential element is the "**steel cushion**" made from woven stainless steel wire and compressed.

Steel mountings have considerable mechanical strength as well as high damping characteristics in the order of 10 to 20%, depending on the application.

ADVANTAGES

Stability. Steel mountings provide stable characteristics and the height under load remains constant with time.

Unaffected by corrosion. Steel dampers are unaffected by oil, grease, solvents, adverse weather and corrosive products.

Unaffected by temperature. Steel dampers withstand temperatures from - 70°C to 300°C without changing characteristics.

Low natural frequency. Steel mountings with springs can have natural frequencies as low as 3 Hz, which can provide up to 98% attenuation for low speed rotating machinery.

II - GENERAL INFORMATION ON VIBRATIONS AND SHOCK

PURPOSE OF AN ELASTIC SUSPENSION

An appropriate elastic mounting placed between the support and the equipment usually fulfils two functions :

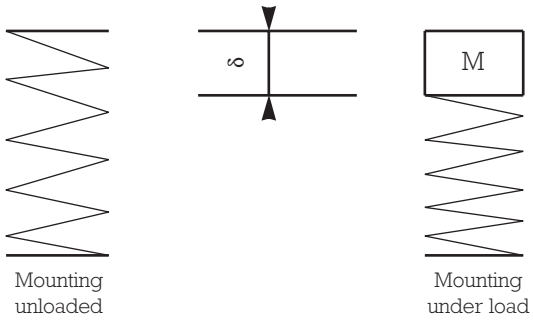
- It has an important static role : it provides better load distribution by absorbing certain manufacturing tolerances, thus allowing more reliable, cheaper installation.

- It has a dynamic role : it provides protection against vibration and shock, considerably reducing the surrounding vibration and increasing the life time of the equipment isolated.

THEORY

Natural frequency

An elastic mounting is characterised by its load-deflection curve. The load produced by a mass M causes a static deflection δ (difference between the unloaded height and the height under load) and a subtangent Δ.



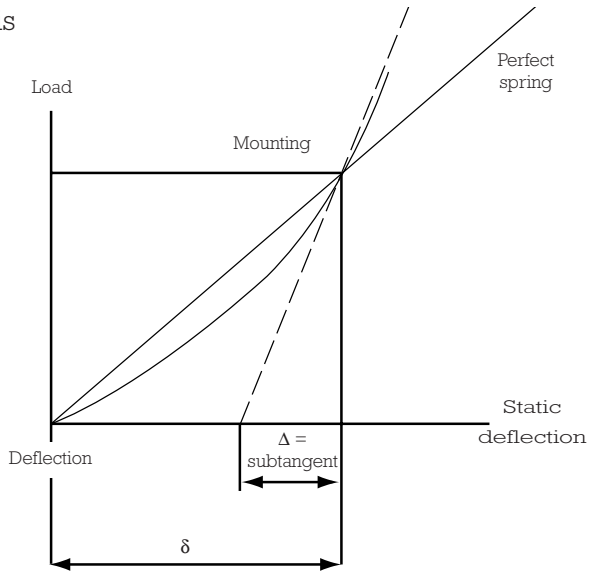
The Natural frequency of the suspended mass is given by the formulae

$$f \text{ in Hz } f = \frac{1}{2\pi}\sqrt{\frac{K}{M}}$$

K = stiffness of the mounting in N/m

$$M \text{ in kg } f = \frac{15.8}{\sqrt{\delta}}$$

Δ = dynamic deflection in mm



The load-deflection curve is linear for a theoretical spring but is not necessarily linear for a mounting. The form of the curve is highly variable and depends on the design and materials of the mountings.

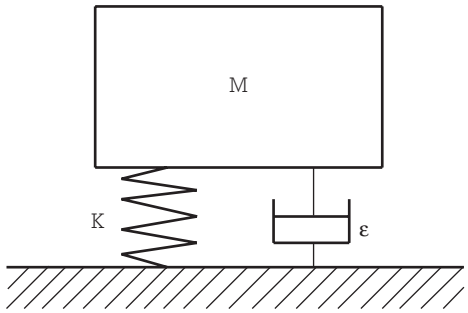
Natural frequency

The purpose of a mounting is to reduce the transmission of excitation forces between the suspended mass and the foundation. The degree of attenuation obtained depends firstly on the natural frequency of the mounting or, more exactly, on the ratio of fe (excitation frequency) to fn (natural frequency).

In the simplest case, that of a single degree of freedom (vertical translation), the natural frequency of the mass + isolator without damping and is written :

$$fn = \frac{1}{2\pi}\sqrt{\frac{K}{M}}$$

fn = Hz
K = Stiffness of isolator in N.m
M = Kg

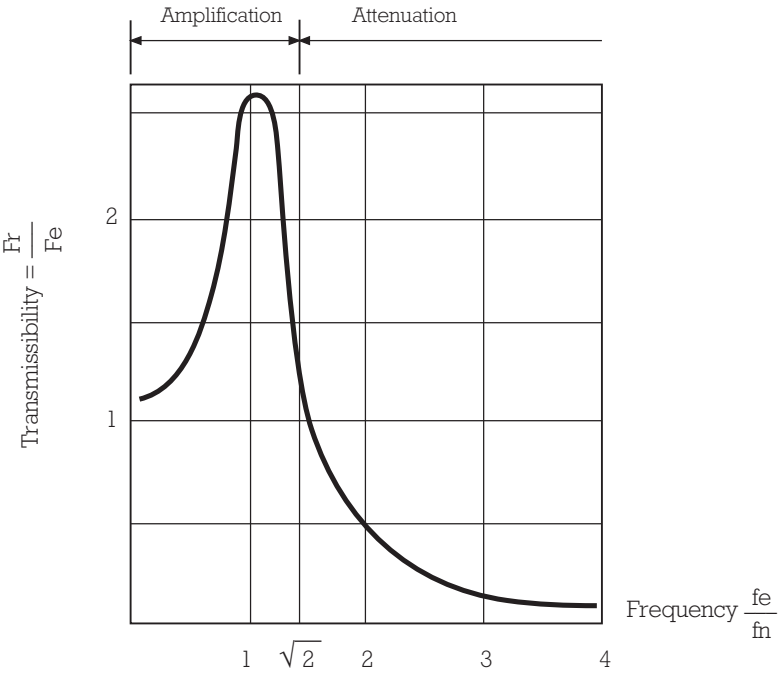


Model of an elastic mount
K = stiffness
ε = damping

Transmissibility is the ratio of the transmitted force fr to the excitation force fe. Examination of the curve opposite shows that :

- for fe/fn > $\sqrt{2}$ and in particular when the natural frequency of the mounting is greater than the excitation frequency, there is amplification of vibration rather than attenuation.
This illustrates the fact that the selection of unsuitable resilient mounting makes the problem worse rather than solving it.

- for fe/fn > $\sqrt{2}$, the excitation is attenuated.
This shows the advantages of using a mounting with a natural frequency (fn) as low as possible in relation to the excitation frequency (fe). The greater the difference, the higher the degree of attenuation.



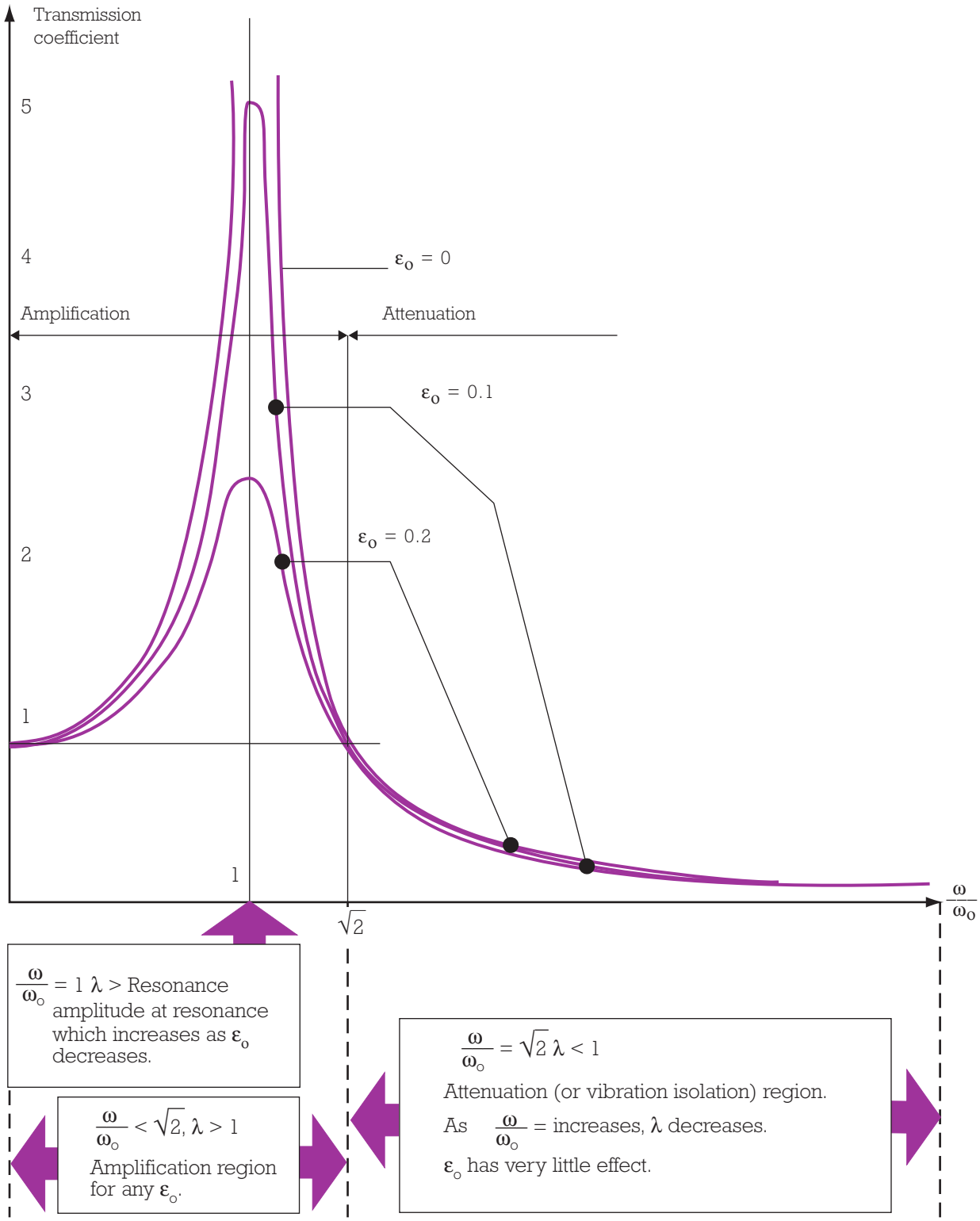
Damping

Damping dissipates vibrational energy by dry or viscous friction and acts as a brake, preventing displacement of the suspended assembly.

It can be seen that :
- for fe/fn < $\sqrt{2}$, the amplification decreases with higher damping, particulary when close to resonance.

- for fe/fn > $\sqrt{2}$, attenuation improves with lower damping.

To limit amplification at resonance while achieving good attenuation, it is necessary to find a good compromise when choosing a damper.



For an efficient mounting system use :

a high value of $\frac{\omega}{\omega_0}$ → low value of ω_0 → low value of λ

a high value of ε_0 → - limited amplification in the resonant region
- minor effect in the attenuation region

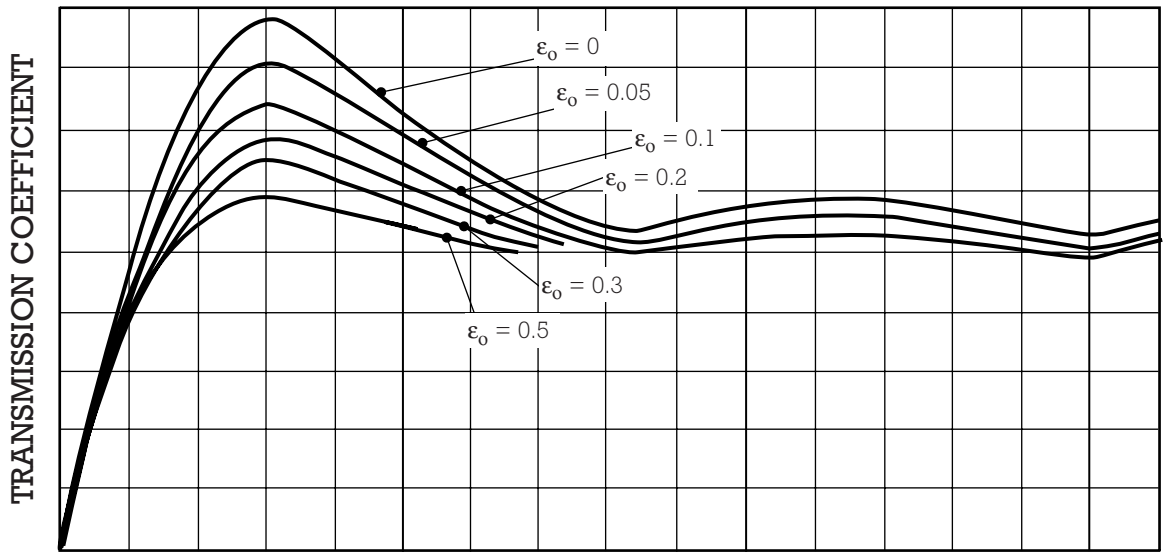
Shocks

For impact machines like presses, forging hammers, etc, excitation is generated in the form of individual very short-time based shocks. In the same way as for vibration, where the importance of the relationship of fe to fn is paramount in determining the attenuation provided, here it is the fn/fs relationship (fn : natural frequency of the mounting - fs : shock frequency) which as to be considered.

We can deduce from these curves that :

- to obtain attenuation of a ½ sine shock (T < 1) the fn/fs ratio must be approximately less than 0.30. Beyond this limit the excitation force is amplified. Thus for a shock lasting 0.02 second, the resonant frequency of the isolators chosen must be as low as possible and in any case must be lower tahn 7.5 Hz ;
- the presence of damping between 0 and 0.5 of critical contributes to the attenuation of a shock, but this improvement is slight for fn/fs < 0.3.

The influence of the damping effect will be all the greater in the case of multi-frequency excitation where it is not always possible to select a natural frequency well away from the excitation frequencies. This is also true when searching for a compromise between shock attenuation (force transmission) and the limitation of displacement.



NATURAL FREQUENCY, fn X DURATION OF SHOCK, T (secs) - FOR ½ SINE SHOCK

III - VIBRACHOC RANGE APPLICATION SECTORS

AERONAUTICS

- Protection of electronic equipment
- Frequency adapters for helicopters, etc.
- On board avionics mountings.

MILITARY :

- Protection of on board electronics (tanks, shelters, vehicles, ships, submarines, etc.).
- Protection of inertial and other guidance systems.
- Protection of missiles and equipment on missiles.

MARINE AND NAVY :

- Suspension of engines and gun turrets.
- Protection of electronic racks.
- Noise reduction.

INDUSTRY :

- Vibration isolation of rotating machinery.
- Vibration isolation of machine tools.
- Seismic protection for civil engineering constructions.

IV - INDUSTRIAL APPLICATIONS OF THE VIBRACHOC RANGE

IV.1 MACHINE TOOLS AND IMPACT MACHINERY

Lathes, horizontal and vertical mills, tapping machines, drills, etc.
Hydraulic and mechanical presses, shears, etc.
High speed presses, power hammers, etc.
Printing machinery, textile machinery, etc.

Suspension of machine tools

For example, lathes, drills, mills, planes, mortise cutters, saws, grinders, nibblers, gear cutter, borers, tapping machines, etc. The machinery is isolated actively (attenuation of the vibration generated by the machine) and passively (the machine is protected from floor vibrations).

- Vertical natural frequency between 20 and 25 Hz, provides excellent attenuation of the vibration spectrum, very effective for this type of machinery ;

- Various assembly possibilities : integral levelling, non-slip base, fitting under machinery that does not have any mounting holes, etc.

Suspension of machinery for forming materials

For example : shears, folding machines, presses for punching, stamping, pressing and embossing, machinery for making nuts, hydraulic and mechanical presses, etc.

This type of machinery operates mainly by delivering blows and the shocks generated, which are sometimes significant, have to be absorbed by dampers with both a considerable capacity and high mechanical strength. The noise propagated to the structure is also noticeably reduced.

Suspension of high speed presses

The suspension has to avoid transmitting shock to the floor while maintening the stability of the machine, particulary for automatic feed.

The dampers must be selected to avoid resonance with the machine speed :

- the machine speed may vary from 0 to 600 cycles/min ;

- if the speed is greater than 250 cycles/min, highly efficient isolation is obtained by using very low frequency mountings. An integrated damping system is usually necessary (metal pad, fluid dampers, etc.).

IV.2 ROTATING AND VIBRATING MACHINERY

Engines, generators sets, compressors, fans, crushers, centrifuges, dryers, pumps, etc.
Sieves, riddles, engine test benches, pipework, etc.

Suspension of well balanced rotating machines

This category includes most rotating machines, which develop free forces during operation which are quite low in comparison with their mass, such as : generator sets, air conditioning plants, most engines, fans (in clean air), compressors, pumps, etc.

The choice of mounting depends mainly on the speed of rotation of the machine and the degree of attenuation required. The natural frequency of the mounting must be low for slow rotational speed and high attenuation.

The antivibration mounting protect the machine without using an inertia mass. However, the engine should be mounted on the same chassis as the driven equipment if they are not already mounted in this way, to avoid excessive stress on the couplings.

Suspension of rotating machines with high dynamic forces

Grinders, centrifuges, dryers, certain types of reciprocating compressors, pumps, engines (with 2 or 3 cylinders), etc. may generate very high forces (such as eccentric loads, unbalanced forces or torque, start-up and short-circuit torque, etc.) during operation which may affect their stability and the various connectors and hoses. It is essential to limit the displacement of the suspended equipment by ensuring that the anti-vibration system is properly designed :

- the mountings should include dampers such as metal pads, damping fluids, etc. ;
- an inertial mass may be incorporated, but only if the damping obtained is insufficient to stabilise the equipment.

The design of the mounting system must cover all aspects and be carried out from the start of the equipment installation design to define the supporting structures accurately at a sufficiently early stage.

Consult us for particular solutions.

Passive suspension of rotating machines

Certain types of compressors are perfectly balanced and do not generate any significant vibration. However, their operation and setting are so sensitive to vibration or shock (nearby workshops, handling, etc.) that they need passive protection.

The machine should be mounted on an inertial mass suspended on mountings with springs and metal pads.

Suspension of on-board rotating machines

On board lorries, trailers, trains, road and rail vehicles, boats, etc.

In addition to active protection, the machine needs to be protected against shocks and vibrations generated by the vehicle.

''Captive'' mountings are usually used. They have travel limiting stops in all directions to ensure absolute safety while the vehicle is moving.

Suspension of vibrating machinery

Suspending sieves, vibrating riddles, etc... is more complex because these machines already have elastic couplings (e.g. springs) which assist operation.

If the machine is suspended on vibration mountings, it becomes a two-stage vibration system. When designing these systems the natural frequency of the elastic couplings within the machines as well as any flexibility in the chassis have to be taken into account.

Suspending engine test benches

This type of equipment poses a special vibration problem :

- the forces generated may be very high and sudden.
- the equipment must be able to be used with engines that vary considerable in size, weight and power.

An effective solution is to use an inertia mass suspended on very low frequency mountings with adequate integral damping.

IV.3 VEHICLES

Civil engineering plants
Handling equipment
Lorries
Trailers
Road vehicles
Railway engines

Particular attention must be paid to elastic mountings for equipment on Civil Engineering plant and vehicles in general. **The relative elasticity of the structures must often be taken into account as they can generate low or very low frequency vibration as a result of shocks arising from the work or movement.**

To be effective - the elastic mounting - must, therefore, be carefully designed.

The following examples, in particular for cabs, seats and equipment, are given for illustration only. The right solution may vary considerably from one machine to another.

Suspension of propulsion systems

The problem here is to minimise the vibration and noise generated by the engine through the structure of the vehicle (structure borne).

The disturbing frequencies vary from 10 to 100 Hz (and harmonics) for engines and 120 to 400 Hz for gear boxes.

The damping system should usually have :

- a low (isometric) resonant frequency (if possible 6-8 Hz) ;
- a limited displacement under extreme forces (system with very progressive siffness) ;
- considerable low frequency damping and as low as possible above 100 Hz.

IV.4 MARINE-OFFSHORE

The vibration and noise on board ships is generated by :

- the system of propulsion: the alternating hydro-dynamic forces generated by the propellors pass through the hull, usually creating low frequency vibration
- the main engines and auxiliary engines which transmit vibrations to the hull via the structure : the spectrum is usually in the 15-50 Hz region
- the exhausts : spectrum 16-8000 Hz
- the effects of the sea: swell, heavy seas, wind
- accidental shocks against the quays

Regulations have been drawn up to protect the crews, passengers and equipment from discomfort caused by shocks and noise.

The VIBRACHOC range provides a comprehensive selection of means for complying with the standards and regulations for vibration and noise on ships.
Ask us for details.

Suspension of main engines and auxiliary engines

The main engines and auxiliary engines transmit vibrations to the structure of the ship. They also emit noise :

- directly into the air ;
- indirectly, as the structures linked rigidly to the engine themselves become sources of transmitted noise.

Mountings (dampers) at strategic places between the engine and the structure **significantly reduce the structure borne vibration and noise**.

Many parameters are required for calculating the suspension required for marine engines: the rotation speed of the engine, the number of cylinders, the number of blades on the propeller, the natural frequency of the hull, the elastic coupling characteristics, the roll, the pitch and the maximum permitted forces. The technical service of Paulstra, Vibrachoc and Stop-Choc has several computer calculation programmes to define the most suitable suspension.

An extensive range of all metal or elastomer based dampers is available for mounting all kinds of engines :

- **diesel engines** of all sizes for merchant ships, war ships or pleasure boats ;
- **auxiliary engines**, generators, pumps, compressors, windlasses, etc.

Suspending exhaust pipes

The turbulent gases circulating in exhaust pipes are a source of vibration and noise.
Using elastic mountings to anchor exhaust pipes from diesel engines has the advantages of :

- reducing the vibrations transmitted to the structure of the ship ;
- attenuating the global noise in areas near the funnels, by between 5 and 20 dB (A) ;
- eliminating expansion compensators, as the mounting allows free expansion of the ducts ;
- eliminating the deformation of the pipes caused by rigid mountings. The suspension of an exhaust pipe usually requires supports and stabilisers.

Suspension of on board equipment

Elastic suspension of sensitive on-board equipment (radio, navigation, electric or electronic enclosures, control panels, etc) provides protection against vibration coming from the structure. On board warships, high deflection mountings also provide protection against shocks from mines, etc. Stabilisers have to be added to supporting dampers for tall enclosures or racks.

IV.5 BUILDINGS

The problem of preventing vibration caused by air conditioning, ventilation, compressor or pumping systems, etc, in housing (flats, hotels, etc) offices or factories is now becoming more common for two reasons :

1) There is a general tendency to reduce the vibration and noise levels to comply with new noise regulations

2) There is also a general tendency to build lighter constructions with greater spans, implying greater floor flexibility.

Active damping of machinery by preventing vibration being transmitted through the structure of buildings is often a way of complying with these regulations. The mechanical vibration filtered by VIBRACHOC mountings is transmitted at a level that is too low to excite structures that could create noise.

Suspension of foundations of lifts, hoists, etc

The vibration generated by the winch while operating a lift has to be damped but it is especially important to absorb the shock generated when the machine starts or brakes. This often requires the use of elastic systems with good damping.

Suspension of fans, air conditioning, compressors, pumps, etc

An elastic suspension provides good protection against vibration, **while, in most cases, avoiding the need for concrete masses, a costly solution** which prevents the equipment being moved easily.

The vibration and noise generated by a machine are more of a nuisance to the environment if they are positioned at a structurally weak point (roofs, terraces, floors, etc) and near offices or flats.

The rigidity of the floor is a factor that has to be taken into consideration when deciding which type of suspension to use.

Suspension of floating slabs

An economical solution is not to mount each machine separately but to group all the equipment likely to cause vibration on one slab, said to be floating because it is linked to the structure of the building by very low frequency mountings.

This system considerably increases the inertia of the suspended part and thus significantly reduces the displacement of the slab.

Suspension of pipework and conduits

Pipes and conduits generate two types of vibration :

- low frequency vibration due to turbulent flow (8-15 Hz),
- high frequency vibration due to the vibration of the pipes themselves (above 25 Hz)

The suspension usually also has to withstand quite high temperatures and allow the pipes to expand freely, which means that elastic all metal and/or telescopic systems have to be used.

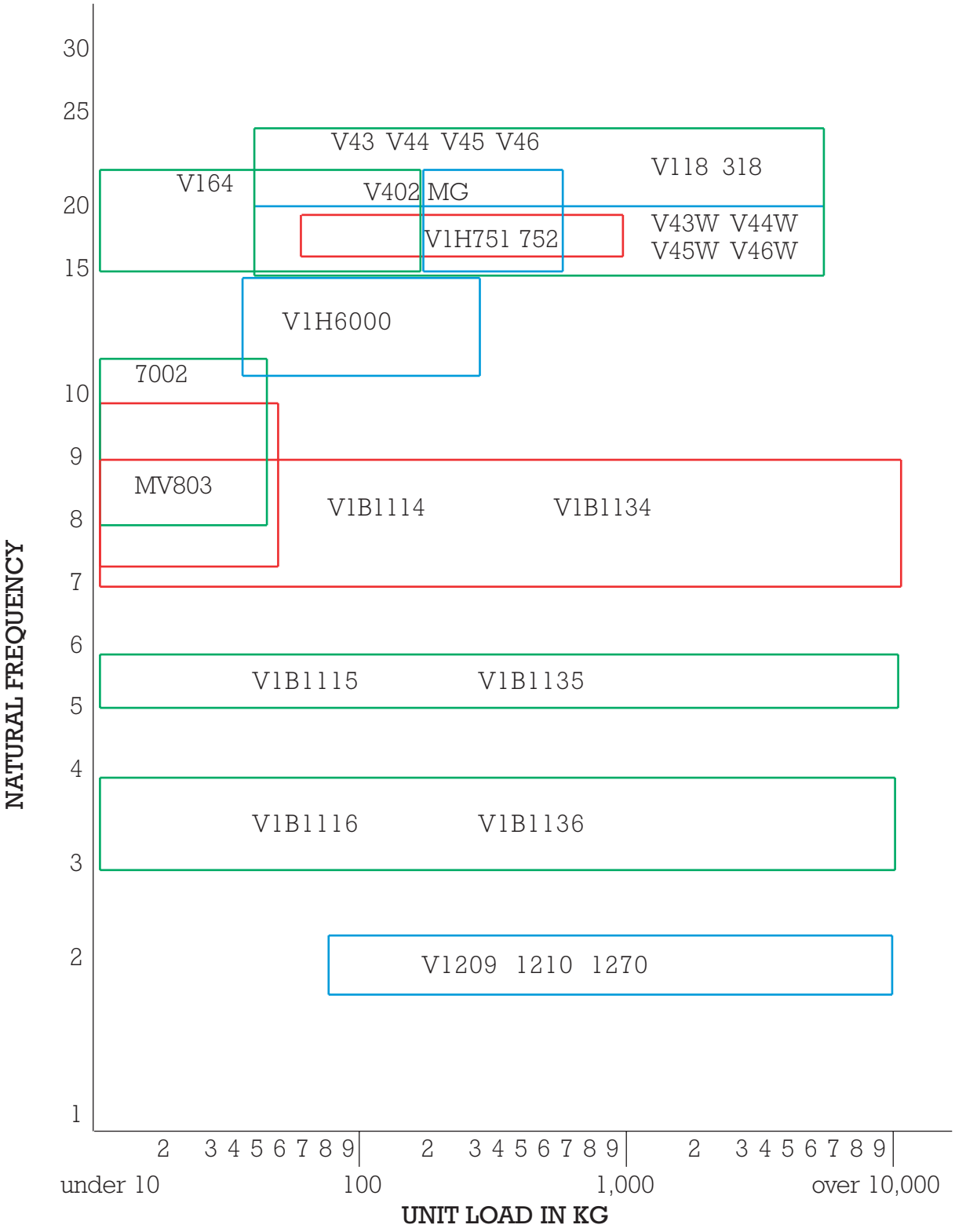
APPLICATIONS GUIDE TO VIBRACHOC METAL RANGE

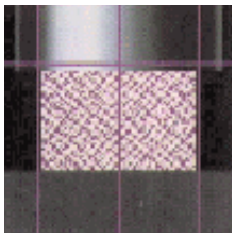
APPLICATIONS	MOUNT REFERENCE	PAGE
Measuring equipment	7002 - V1B1114 - 1115 - 1116	39-37
	VIBCABLE	43
Electric or	V1B1134 - 1135 - 1136 (fixed equipment)	36
electronic enclosure	V1H6000 - VIBCABLE (on board equipment)	34-43
Lift (foundations)	V1B1134 - 1135 - 1136	37
Balance	7002 - V1B1114 - 1115 - 1116	39-37
Weighbridge	V1B1134 - 1135 - 1136	37
Engine test bench	V1B1134 - 1135 - 1136 V1209 - 1210	37-46-47
	V164G - V1H751 - 752	28-34
Crusher	V402 MG - V118 MG - V318 - V1B1134 - 1135 - 1136	30-26-37
Machining center	V43 - V44 - V45 - V46	23
Centrifuge	V402 MG - V318 - V1H6000	30-26-34
Anechoic chamber	V1B1134 - 1135 - 1136 - V1209 - 1210	37-46-47
Boiler	V43 - V44 - V45 - V46	23
Shears	V43W - V44W - V45W - V46W	23
Air conditioning	V1B1134 - 1135 - 1136 - V164G	37-28
Exhaust pipe	VI700 - VI786A06 - V1N303 - 304 - 305	21-20-46
	V1B1134 - 1135 - 1136 - V164G - V1H751 - 752	37-28-32
Compressor	V1B1134 - 1135 - 1136	37
Vibrating riddle	V1B1134 - 1135 - 1136 - V1H5023 - 5025	37-48
Floating slab	V1B1134 - 1135 - 1136 - V1209 - 1210 -1270	37-46-47
Diesel	V1B1134 - 1135 - 1136	37
Doser	V1B1134 - 1135 - 1136	37
Packing machine	V43 - V44 - V45 - V46 - V164G	23-28
Work-bench	V43W - V44W - V45W - V46W	23
Plane	V43 - V44 - V45 - V46	23
Mill	V43 - V44 - V45 - V46	23
Nibbler	V43 - V44 - V45 - V46	23
Generator set	V1B1134 - 1135 - 1136	37
Printing press	V43W - V44W - V45W - V46W - V164G	23-28
Concrete-mixer	V1B1134 - 1135 - 1136	37
Power hammer	V1B1134 - 1135 - 1136 - V118MG - V138	37-26
Tilt hammer	V43W - V44W - V45W - V46W	23
Mixer	V1B1134 - 1135 - 1136 - V1H6000 - V402MG	37 - 34 - 30
	V118MG - V318 - V1H5023 - 5025 - V164G	26 - 48 - 28

APPLICATIONS GUIDE TO VIBRACHOC METAL RANGE

APPLICATIONS	MOUNT REFERENCE	PAGE
Microscope	7002 - V1B1114 - 1115 - 1116	39 - 37
Housing unit	V120 - 125	49
Mortise cutter	V43 - 44 - 45 - 46	23
Engine	V1B1134 - 1135 - 1136 - V1H6000	37-34
	V1H751 - 752	32
Litho	V43W - 44W - 45W - 46W - V164G	23 - 28
	V1H751 - 752	32
Drill	V43 - 44 - 45 - 46	23
Folding machine	V43W - 44W - 45W - 46W - V118MG - V318	23 - 26
Polisher	V43 - 44 - 45 - 46	23
Pump	V1B1134 - 1135 - 1136 - V164G - V1H6000	37 - 28 - 34
Press	V43W - 44W - 45W - 46W - V1B1134 - 1135 - 1136	23 - 37
	specific mountings	
Swing press	V1H5023 - 5025	48
High speed press	V118MG - V318 - V1B1134 - 1135 - 1136	26-37
Friction press	V1H5023 - 5025	48
Injection press	V43 - 44 - 45 - 46	23
Inclinable press	V402MG - V118MG - V318	30 - 26
Horizontal mill	V43 - 44 - 45 - 46	23
Plane	V43 - 44 - 45 - 46	23
Saw	V43 - 44 - 45 - 46	23
Measurement room	V1B1134 - 1135 - 1136 - V1209 - 1210 - 1270	37 - 46 - 47
Sieve	V1B1134 - 1135 - 1136 - V1H5023 - 5025	37-48
Tapping machine	V43 - 44 - 45 - 46	23
Lathe	V43 - 44 - 45 - 46	23
(up to 1.5 m p/p)		
Lathe (other types)	ask us	
Rolling mill line	V120 - 125 - V402MG - V118MG - V318	49-30-26
Former	V120 - 125 - V1B1134 - 1135 - 1136	49-37
Turbine	V1B1134 - 1135 - 1136	37
Pipework	VI700 - VI786A06 - V1N303 to 308	21-20-46
	V1H751 - 752	32
Machining centre	V43 - 44 - 45 - 46 - V1B1134 - 1135 - 1136	23-37
Fan	V1B1134 - 1135 - 1136 - V164G	37 - 28

Metal mounting selection guide depending on frequency and load





METALLIC CUSHIONS

DESCRIPTION

Metallic cushions are made from drawn, woven stainless steel wire that is compressed into a geometric shape.

The Vibrachoc range has more than 1,000 standard metallic cushions of various sizes and characteristics.

As metallic cushions are easy to create, custom shapes and characteristics can be developed and produced on request.

APPLICATIONS

Standard or custom metallic cushions can be used for many industrial applications because they are naturally resistant to grease, oil, water, etc and withstand temperatures from -70°C to +300°C.

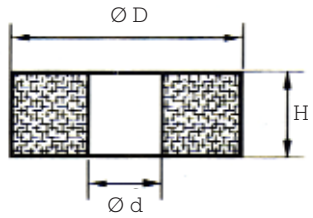
The static stiffness of the metallic cushion ensures progressive stiffening and maintains a constant natural frequency for a very wide range of loads within a small space.

Their natural frequency of between 10 and 25 Hz and damping of 15 to 20% make them suitable for mounting rotating machines with a rotation speed over 2,000 rpm.

CYLINDRICAL CUSHIONS

DIMENSIONS

CYLINDRICAL



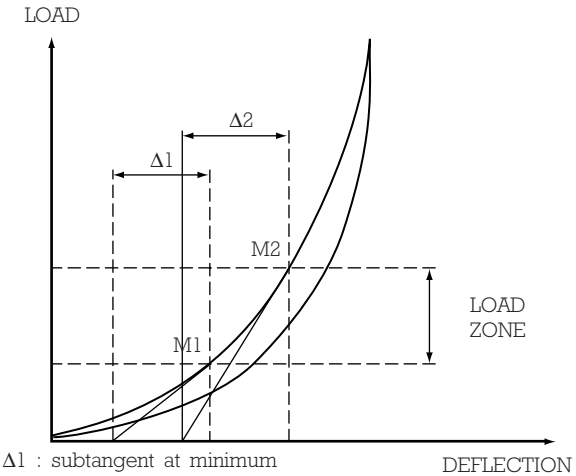
CYLINDRICAL

Reference	Ø Ext. D mm	Ø Int. D mm	Height H mm	Load range daN	Dynam. force daN	Natural frequency daN
VI 168-B	53	16.5	14	20 to 250	1250	15 to 22
V3 CNVI653-A02	33	14	19	75 to 300	900	15 to 22
CH440-A02	72	50	21	50 to 350	1000	15 to 20
VI771-A02	40	15	20	150 to 550	1700	15 to 20
MC345-A02	72	34	21	300 to 1300	5000	15 to 20
CH281-A02	119	34	21.5	700 to 2700	12500	15 to 20
CH283-A02	159	70	21.5	250 to 7000	22500	15 to 20
VI 996-A02	203	121	21	250 to 7000	22500	15 to 20
CH438-A02	72	51	10	50 to 350	1000	20 to 25
CH505-A02	50	19	11.5	100 to 500	2000	15 to 25
CH265-A02	70	34	10.5	300 to 1300	5000	20 to 25
CH264-A02	116	36	11	700 to 2700	8000	20 to 25
VI771-B02	40	15	11.5	750 to 3000	9000	20 to 25
CH472-A02	156	72	10.5	2000 to 7000	21000	20 to 25

For other sizes or shapes, consult us.

OPERATING CHARACTERISTICS

TYPICAL STIFFNESS CURVE
FOR A METALLIC CUSHION



Δ1 : subtangent at minimum load M1.
Δ1 : subtangent at maximum load M2.
Δ1 = Δ2

Natural frequency of the mounting remains constant in the load zone.

The elastic limit of the metallic cushion under compression is 3 to 5 times greater than the maximum static load shown in the data sheets.

1) - Excellent resistance to oil, grease, solvents, water, dust, chemical agents.

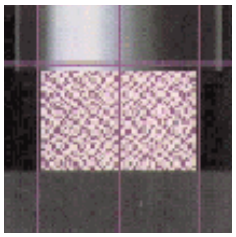
2) - Whistands temperatures from - 70°C to 300°C and in certain applications -150° to + 400°C.

3) - Highly resistant to ageing : characteristics are stable.

4) - High damping from 15 to 20%, i.e. tan. δ from 0.3 to 0.4 corresponding to an amplification factor at resonance <4.

5) - Loading up to 150 kg/cm² under compression and 500 kg/cm² for isolating shocks.

6) - Natural frequency between 15 and 25 Hz.



VI 786-A06
VI 700-A06
VI 700-B06

DESCRIPTION

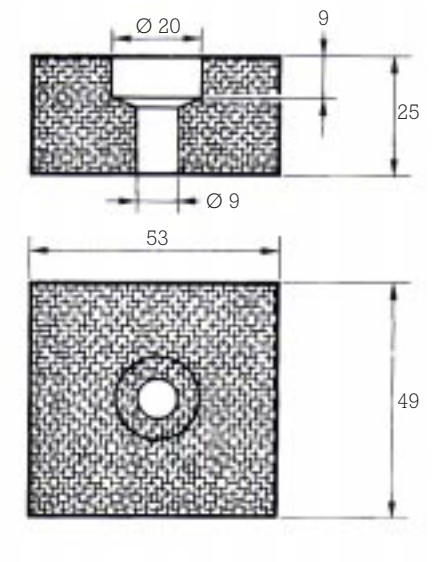
This suspension system consists of rectangular cushions made of woven compressed stainless steel wire. The VI 786 have a Ø 9 bored screw hole, so that they can be mounted in collars with the diameters required by the user.

APPLICATIONS

This suspension system is particularly suitable for mounting exhaust pipes from generator sets on board ship or permanently mounted in buildings. They are unaffected by aggressive chemicals, oil, grease and corrosion and withstand extreme temperatures from - 70°C to + 300°C.

The natural frequency of between 15 and 20 Hz enables the pipes to be mounted independently of the support and thus reduces noise levels and allows the pipes to expand freely.

DIMENSIONS



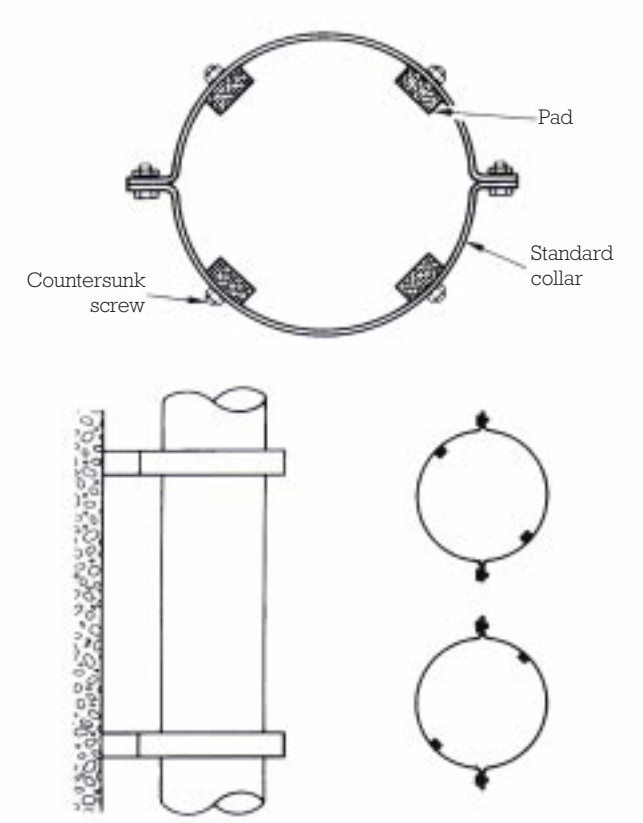
Assembly :

Countersunk screws can be used to mount the cushions inside the collar which must be designed for a cushion is 25 mm thick.

The number of cushions used should be a multiple of 4, depending on the diameter of the pipework : see table below.

However, for small diameter pipes, 2 collars can be used edge to edge, each having 2 pads at opposite diagonals.

OPERATING CHARACTERISTICS

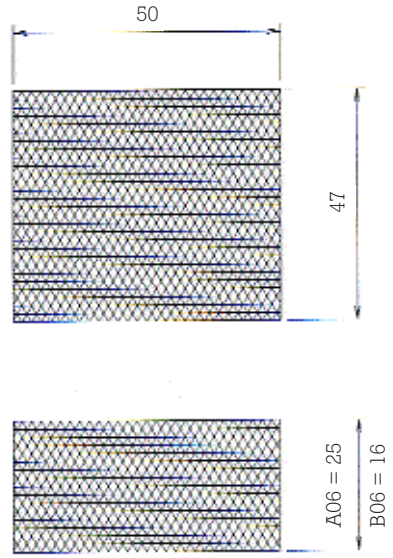


Ø of the pipe	Number of cushions
75 - 175	4
175 - 425	8
425 - 550	12
550 - 700	16
700 - 850	20
850 - 1000	24
1000 - 1150	32
1150 - 1300	36
1300 - 1450	40
1450 - 1600	44
1600 - 1750	48

Maximum permitted force : 1,000 daN

VI 700 A06 - VI 700 B06

DIMENSIONS



Assembly:

Our wide range of mountings can meet many requirements. These mountings should be used as shown in the following diagram (two half collars, in which the cushions are placed side by side, are connected to the structure).

NB : the cushions may be mounted in two orientations: the height H is shown on the table. Refer to the drawing to ensure that the height H is correct when mounting.

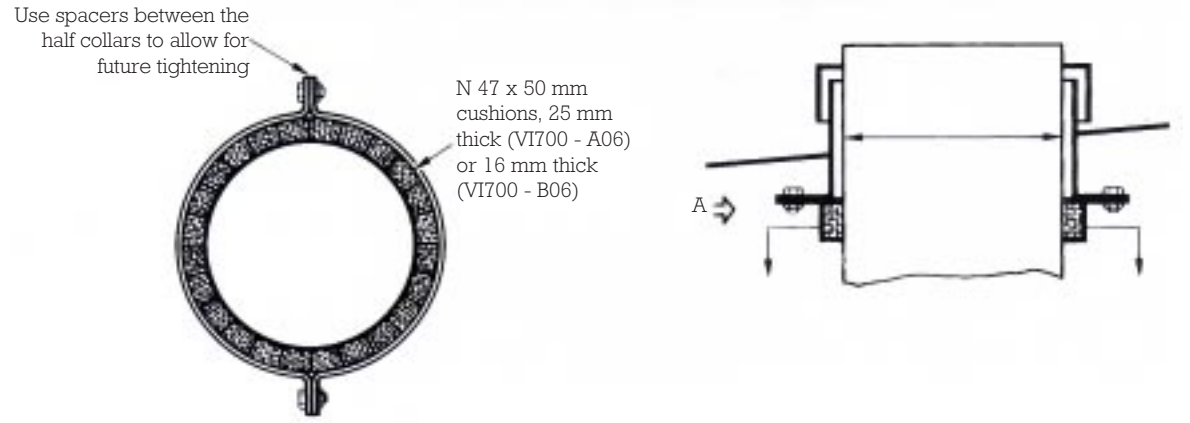
Choice:

The cushions are 16 mm or 26 mm thick. We advise using VI700 B06 pads (16 mm thick) for Ø D pipes < 270 and VI 700 A06 (25 mm thick) for Ø D pipes > 270.

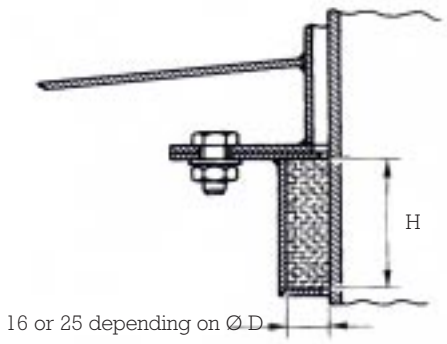
For example :

- for Ø D ext 140 pipe : use 9 VI700-B06 cushions
- for Ø D ext 1,000 pipe : use 61 VI700-A06 cushions.

OPERATING CHARACTERISTICS



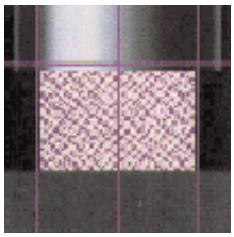
DETAIL A



Pipe Ø D	H	N cushions
75 to 85	50	5
80 to 90	47	5
90 to 100	50	6
95 to 105	47	6
105 to 120	50	7
120 to 135	50	8
135 to 150	50	9
150 to 170	50	10
165 to 185	50	11
180 to 200	50	12
195 to 220	50	13
210 to 240	50	14
240 to 270	47	15
270 to 305	47	17
300 to 340	50	20

Pipe Ø D	H	N cushions
335 to 380	47	21
360 to 410	50	24
400 to 450	50	27
445 to 500	47	28
500 to 560	47	31
560 to 630	47	35
620 to 700	47	39
700 to 790	47	44
780 to 880	47	49
875 to 985	47	55
975 to 1100	47	61
1100 to 1240	47	69
1230 to 1385	47	77
1370 to 1550	47	86
1530 to 1725	47	96

Maximum permitted force : A 06 = 1,000 daN
B 06 = 3,000 daN



V43 V44
V45 V46

See also PAULSTRA elastomer range: Nivofix - Minifix

DESCRIPTION

Standard V43, V44, V45 and V46 mountings have a cast steel base and a resilient element made from a stainless steel wire cushion.

A cover and jack shaft for levelling may be supplied as options for version H.

Version W differs from the standard version as it has a thicker cushion for greater flexibility.

APPLICATIONS

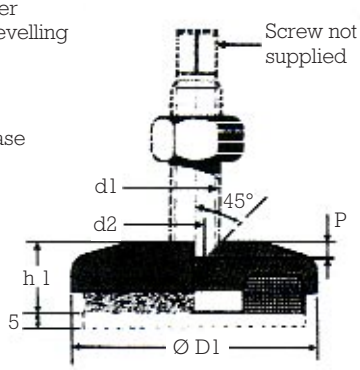
This range of all metal mounting with a natural frequency of 20 to 25 Hz for a displacement of ±0.4mm can be used for mounting machine tools in harsh industrial environments. They are unaffected by oil, temperature and fatigue and their life time is often the same as that of the machine.

The thicker metallic cushion of the version W, can be used for mounting forming tools (presses, shears, folding machines) with a natural frequency of 15-20 Hz.

DIMENSIONS

Without suffix :
To be fitted under machines with levelling jacks

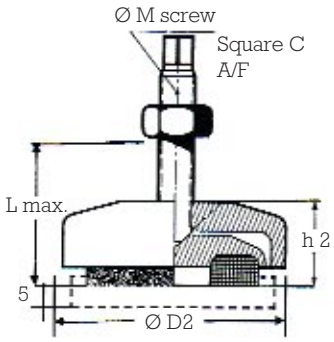
Suffix G :
With non-slip base



Non-slip base : approx. 5 mm

Suffix H :
With integral levelling jack

Suffix HG :
With levelling system and non-slip metal base



Adjustment : ± 2.5 mm about height h2

OPERATING CHARACTERISTICS

Ref.	Static loads kg	Max. dynamic compression forces (daN)	Dimensions (mm)									
			Ref. : V4( ) , V4( ) G, W et WG					Ref. : V4( ) H, HG, WH et WHG				
			D1	h1	d1	d2	p	D2	h2	M	L	C
V43	50 to 350	1000	81	20	17	12	3	96	35	12	83	7
V43-W	50 to 350	1000	81	31	17	12	3	96	46	12	94	7
V44	300 to 1300	5000	81	20	17	12	3	96	35	16	114	9
V44-W	300 to 1300	5000	81	31	17	12	3	96	46	16	125	9
V45	700 to 2700	8000	128	26	33	18	3	152	45	20	136	12
V45-W	700 to 2700	8000	128	36.5	33	18	3	152	56	20	147	12
V46	2000 to 7000	21000	170	34.5	44	28	4	190	60	27	130	16
V46-W	2000 to 7000	21000	170	43.5	44	28	4	190	71	27	141	16

Weight of dampers (in kg)

	V43	V43-W	V44	V44-W	V45	V45-W	V46	V46-W
Without suffix	0.35	0.4	0.42	0.48	1.3	1.43	3.35	3.75
Suffix H	1.0	1.05	1.1	1.16	2.85	3.0	7.6	8.0

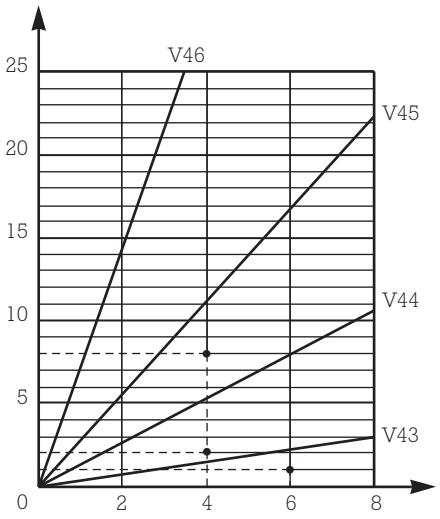
SERIES : V43 V44 V45 V46 (Natural frequency 20-25 Hz)
V43-W V44-W V45-W V46-W (Natural frequency 15-20 Hz)

SELECTION FOR VARIOUS APPLICATIONS

MACHINE TOOLS	FORMING MACHINES	SUNDRY MACHINES
Grinders Borers Shapers Mills Nibblers Gear cutting machines Slotters Drills Polishers Rebaters Planes Saws Lathes	Shearers Spinning machines Rolling machines Stamping presses Presses Eccentric presses Hydraulic presses Folding presses Riveters Guillotines Offset machines	Broaching machines Conveyors Wood working machines Packing machines Welding machines Injection moulding presses Etc.
BASIC TYPES	BASIC TYPES	BASIC TYPES
V43 V44 V45 V46	V43-W V44-W V45-W V46-W	V43 V44 V45 V46

SELECTION DEPENDING ON STATIC LOAD AND NUMBER OF MOUNTING POINTS.

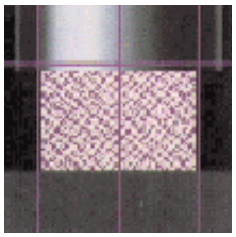
Total weight of machine
(Tonnes)



Number of mounting points

Examples :

1) Mill :
Weight 2 t. on 4 mounting points : **4/V44 or 4/V44-H**
2) Lathe :
Weight 1 t. on 6 mounting points : **6/V43 or 6/V43-H**
3) Shears :
Weight 8 t. on 4 mounting points : **4/V45-W or 4/V45-WH**



V 118-MG
V 318

DESCRIPTION

V 118-MG and V 318 mountings have cast iron cover and base with 4 mountings holes in the base and a central tapped hole in the cover.

Each mounting has two conical stainless steel cushions to provide an equifrequent characteristics capable of high tensile loads.

APPLICATIONS

This series of mountings have a natural frequency between 18 and 25 Hz and can be used for mounting :

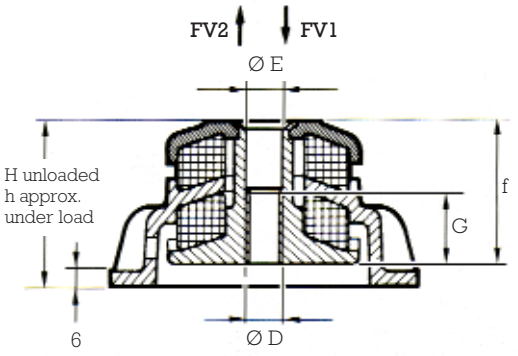
- **heavy machinery** (grinders, crushers, inclined presses, eccentric presses, printing presses, textile machines)
- **rotating machines** (motors, generator sets, pumps, etc, which rotate at more than 2,500 rpm
- **gantry cranes** (structure, cabs, equipment)

The isometric stiffness characteristics and anti-rebound metal cushions of the V 118-MG and V 318 series makes them suitable for suspending engines on ships, vehicles, etc.

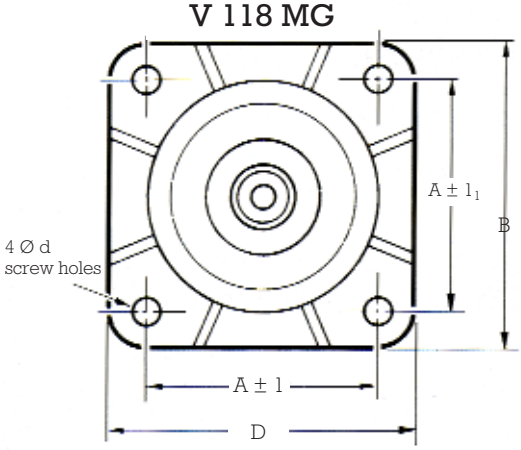
As they can withstand temperatures between -70°C and +300°C, they can also be used for mounting exhaust pipes.

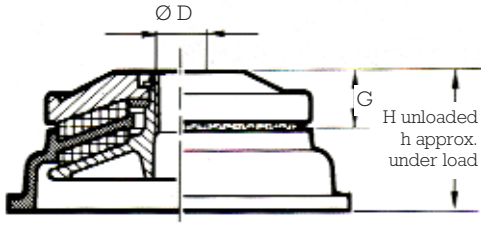
V 118-MG - V 318

DIMENSIONS



V 118 MG





V 318

Reference	A	B	D	E	G	H	d	f	hV1	hV2
V 118-MG	100	130	M16	16.5	31	73	12	63	68	77
V 318	170	220	M27	-	88	97	17	-	93	100

NB : Versions V 118 DG and V 318 D have an extra cushion for greater flexibility.

OPERATING CHARACTERISTICS

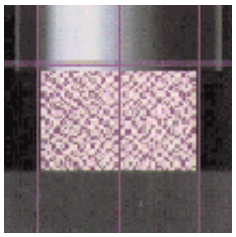
Natural frequency :

- axial
- radial

} 18 to 25 Hz

- Maximum permitted excitation at natural frequency of suspension : ±0.3 mm
- Amplification factor at resonance : < 4
- Operating temperature : - 70°C to + 300°C
- Structural strength : see table
- Weight V 118-MG : 2 kg
  V 318 : 10 kg.

Reference	Static loads in kg	Maximum dynamic forces in daN	
		Compression	Traction
V 118-MG	50 to 900	4500	1500
V318	250 to 7000	22500	9000



V164

DESCRIPTION

The V164 mount has aluminium metalwork with four holes in the base and a central tapped hole in the cover.

The mounting has two stainless steel cushions.

APPLICATIONS

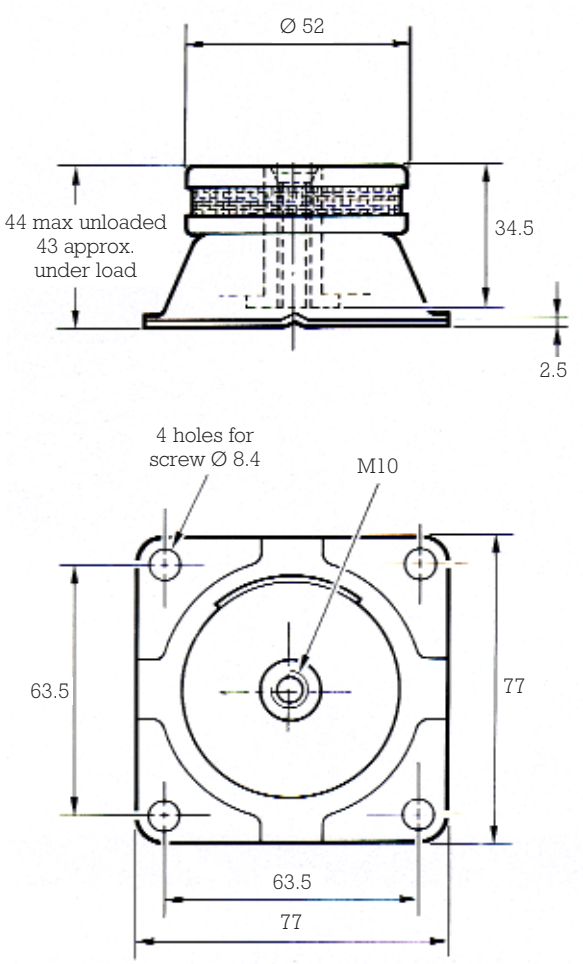
The load range of between 5 and 120 kg makes it suitable for isolating light machine tools from motors with rotational speeds of over 2,500 rpm.

It has an isometric natural frequency of 15 to 22 Hz and a lower cushion to withstand accidental traction forces (for example, shock rebound).

This damper is not affected by aggressive chemicals and can be used, for example, for mounting petro-chemical pumps.

V164F - V164G

DIMENSIONS



OPERATING CHARACTERISTICS

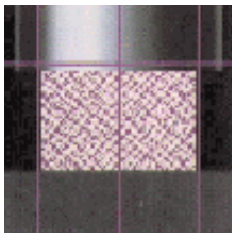
Natural frequency :

- axial
- radial

} 15 to 22 Hz

- Maximum permitted excitation at natural frequency of suspension : ± 0.3 mm
- Amplification factor at resonance : < 4
- Operating temperature : - 70°C to + 300°C
- Weight 180 g approx.

Reference	Static loads in kg	Maximum dynamic forces in daN	
		Compression	Traction
V164-F	5 - 30	150	150
V164-G	20 - 120	1250	600



V402 MG

DESCRIPTION

The V402 MG damper has a cast iron upper cover and mounting plate and a high strength aluminium alloy shaft.

The resilient element is a woven stainless steel cushion.

The cast iron parts are painted.

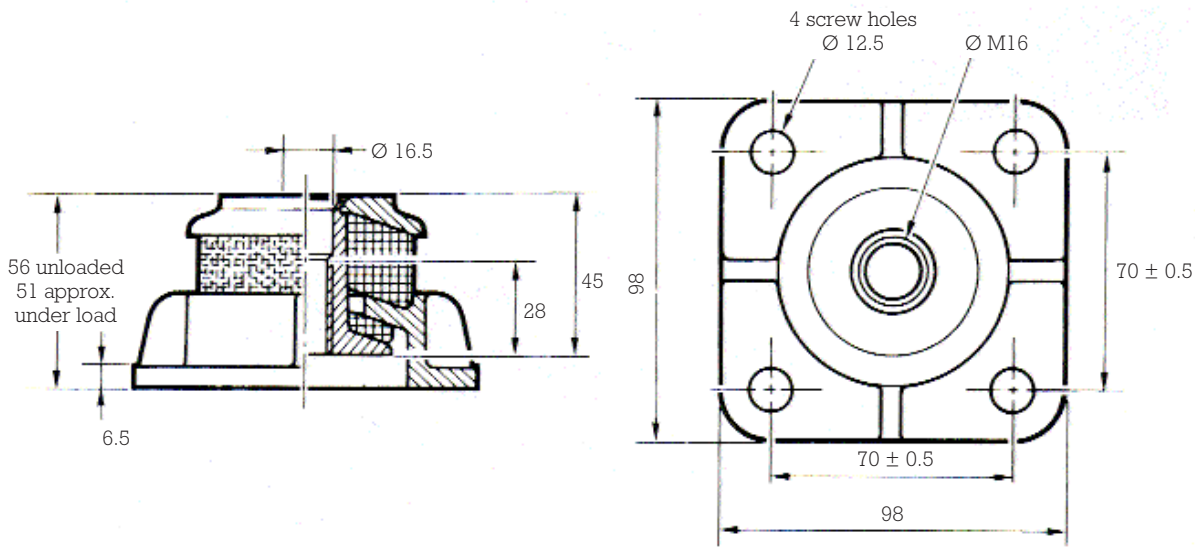
APPLICATIONS

This all metal damper has a natural frequency between 15 and 20 Hz and is isometric within the defined load ranges. It is designed for compression loads but its retaining cushion makes it able to withstand high tensile forces.

The conical cushions provide resilience in all directions. It can be used to suspend fixed or on board machine tools and rotating machines (pumps, engines, generator sets rotating at speeds over 2,500 rpm).

V402 MG

DIMENSIONS



OPERATING CHARACTERISTICS

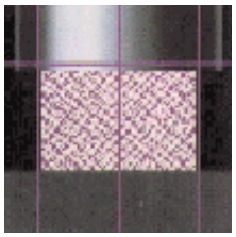
Natural frequency :

- axial
- radial

} 15 to 20 Hz

- Maximum permitted excitation at natural frequency of suspension : ±0.3 mm
- Amplification factor at resonance : < 4
- Operating temperature : - 70°C to + 300°C
- Weight 0.8 Kg approx.

Reference	Static loads in daN	Maximum dynamic forces in daN (compression or traction)
V402 MG	30 to 700	3400



V1H 751
V1H 752

DESCRIPTION

The V1H 751 and 752 range has a pressed steel casing and mounting plate and light alloy shaft. The resilient element is a stainless steel cushion.

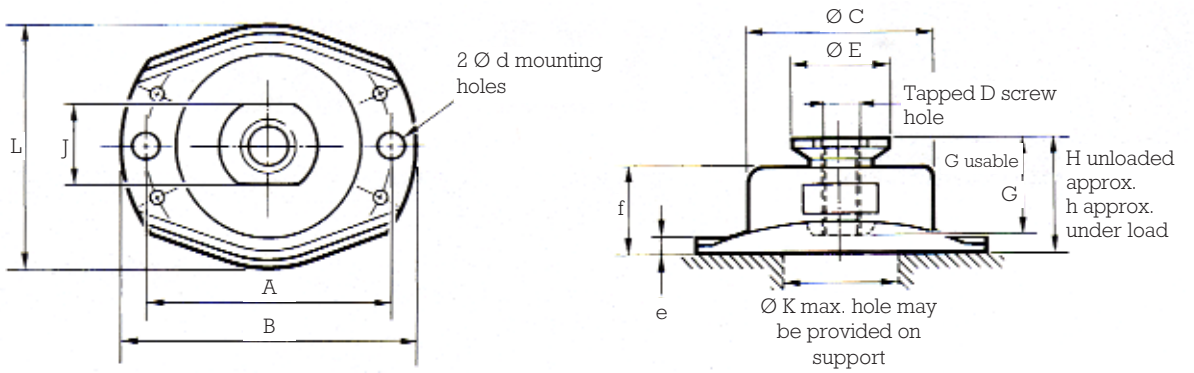
The steel parts are painted.

APPLICATIONS

The V1H 751 and 752 have a natural frequency beteween 15 and 25 Hz for static loads under compression.

The -11 and -12 versions are reinforced by radial cushions and can absorb considerable horizontal dynamic forces, which makes it possible to use them for mounting on board equipment in ships, rail, road transport, civil engineering plant (engines, pumps, generator sets, pipework) or fixed machines that have to be floor mounted.

DIMENSIONS



Reference	A	B	C	D	E	G	H	J	K	L	d	e	f	h
V1H 751	92*	110	69	M12	32	47	54	27	40	90	11*	5.5	40.5	50
V1H 752	126	152	96	M20	41	51	60	36	60	124	15	7	45	56

* Elongated holes, 13 mm long.

OPERATING CHARACTERISTICS

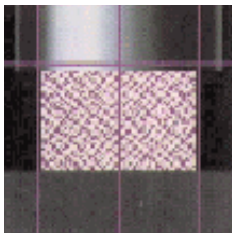
Natural frequency :

- axial
- radial

} 15 to 25 Hz

- Maximum permitted excitation at natural frequency of suspension : ±0.4 mm
- Amplification factor at resonance : < 4
- Structural strength corresponding to continuous acceleration under compression of 5 g for the 751 and 10 g for the 752 with maximum load
- Operating temperature : - 70°C to + 300°C
- Weight V 1H 751 : 0.75 kg
  V 1H 752 : 1.6 kg.

Reference	Static axial loads in daN	Maximum dynamic forces in daN			Upper mounting screws		
		Compression	Traction	Radial	Take up length mm		Torque in N.m
					mini	maxi	
V1H 751-01	70 - 250	900	900	300	25	45	18
V1H 751-11	70 - 250	900	900	800			40
V1H 751-02	150 - 500	2000	1800	650			18
V1H 751-12	150 - 500	2000	1800	1600			40
V1H 752-01	300 - 1000	4000	3000	1000	35	50	50
V1H 752-11	300 - 1000	4000	3000	3000			140



V1H 6000

DESCRIPTION

The V1H 6000 mounting steel has a mounting plate, cover and swaged steel shaft.

The steel parts are zinc plated.

The resilient parts are stainless steel wire cushions.

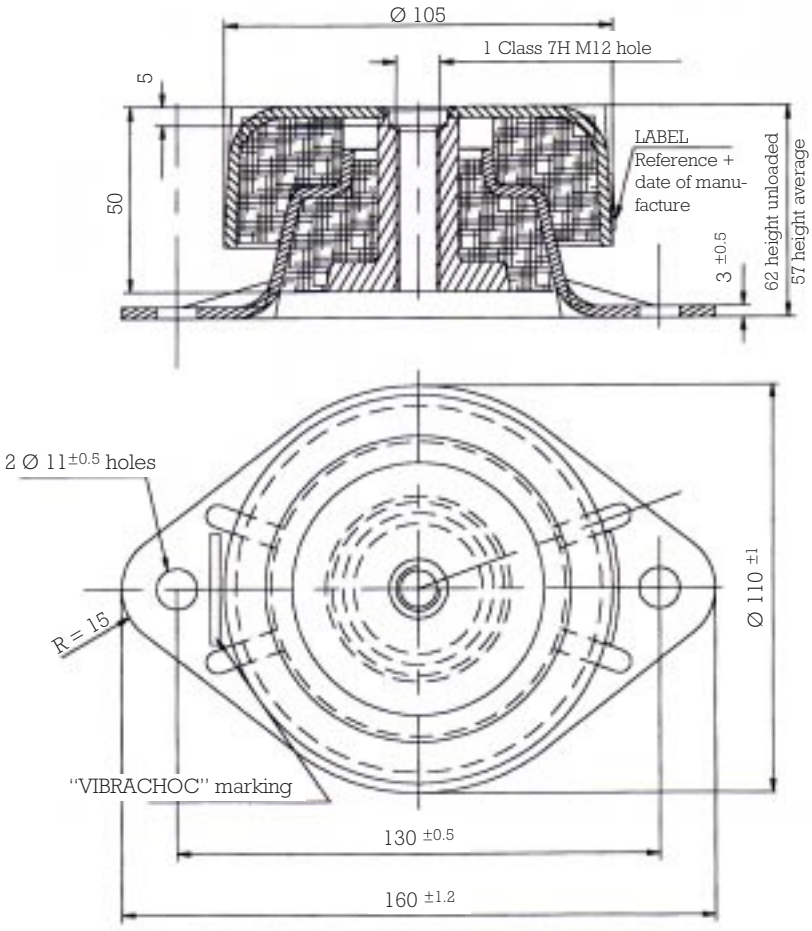
There are two 11 mm diameter mounting holes in the base and 1 tapped M12 hole in the cover.

APPLICATIONS

The V1H 6000 mounting has a natural frequency of between 12 and 18 Hz and is designed for suspending marine or static combustion engines, generator sets, etc. Its all metal construction means that its characteristics do not deteriorate with time and it maintains its height under load, even in the most severe ambient conditions and temperatures.

The shape of the armature and upper cushion provide high radial performance and a structural strength of 3 g, making it suitable for mounting on board equipment on ships and military ground vehicles (auxiliary engines, pipework, electronic racks, air conditioners, etc).

DIMENSIONS



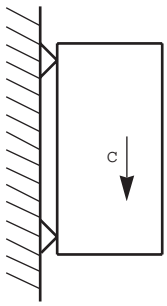
OPERATING CHARACTERISTICS

Natural frequency :

- axial
- radial

} 12 to 18 Hz depending on the load

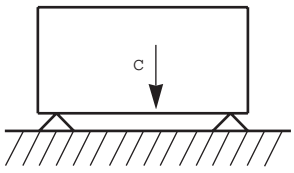
- Structural strength : 3 g
- Complies with GAMT13-MIL.STD. 167-1
- Amplification factor at resonance < 4
- Operating temperature : - 70°C to + 300°C
- Weight : 1.6 Kg approx.



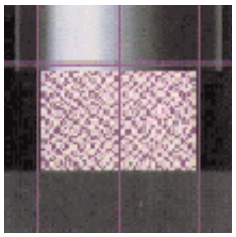
Mountings with radial load

(CONSULT US)

Reference	Load range in daN
V1H 6000-21	30 to 75
V1H 6000-01	50 to 150
V1H 6000-02	100 to 300
V1H 6000-03	200 à 500



Mountings with axial load



V1B 1114 V1B 1134
V1B 1115 V1B 1135
V1B 1116 V1B 1136

DESCRIPTION

This range of mountings has one or two steel mounting plates depending on the model, one or several high strength steel springs, 2 light alloy rings and a stainless steel wire cushion in each spring.

All steel parts are painted.

APPLICATIONS

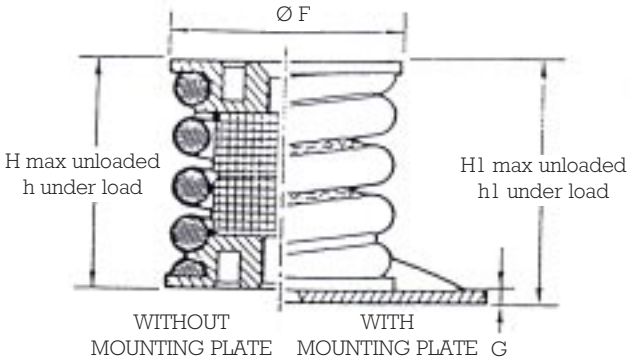
These very low frequency isolators (down to 3 Hz) can be used to mount machine rotating at speeds over 450 rpm, vibrators and impact machines, achieving an attenuation of about 95%.

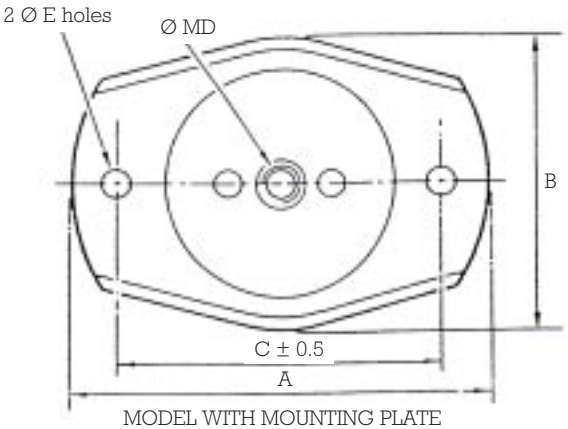
They are all metal and can be used outdoors or in the harshest conditions.

As they do not creep, their life time may be the same as that of the machine they are used to mount.

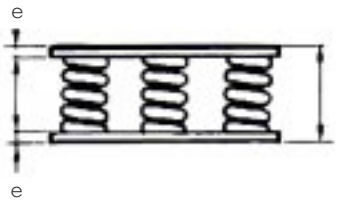
A metal cushion inside each spring increases the damping factor and limits the amplification at the natural frequency.

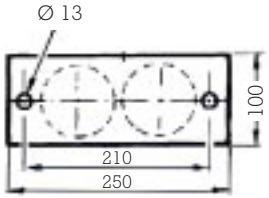
DIMENSIONS



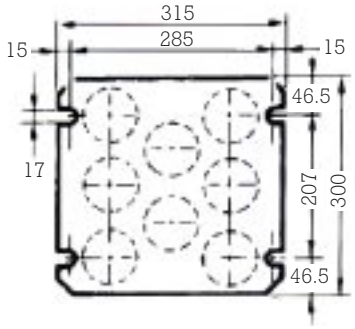


MODEL WITH MOUNTING PLATE
(VERSION A)

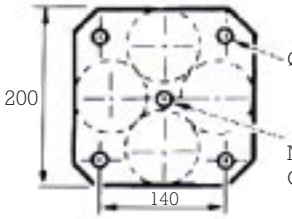




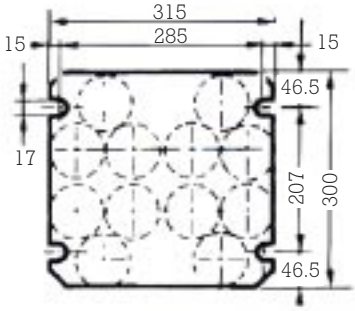
V1B 1134-25 or 26
V1B 1135-25 or 26
V1B 1136-25 or 26



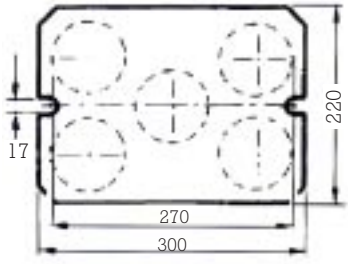
V1B 1134-86
V1B 1135-86
V1B 1136-86



V1B 1134-45 or 46
V1B 1135-45 or 46
V1B 1136-45 or 46

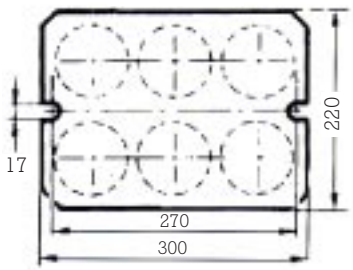


V1B 1134-125 or 126
V1B 1135-125 or 126
V1B 1136-125 or 126

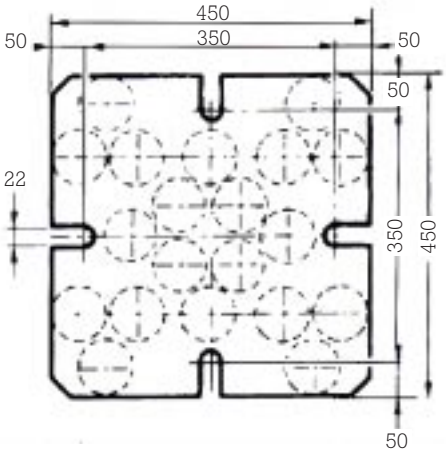


V1B 1134-56
V1B 1135-56
V1B 1136-56

V1B 1135-56



V1B 1134-66
V1B 1135-66
V1B 1136-66



V1B 1134-205 or 206
V1B 1135-205 or 206
V1B 1136-205 or 206

SERIES : V1B 1114 V1B 1115 VIB 1116
V1B 1134 V1B 1135 VIB 1136

OPERATING CHARACTERISTICS

Natural frequency :
- axial
- radial

} see table below

- Maximum permitted excitation at natural frequency of suspension : ± 1 mm
- Amplification factor at resonance : Q, see table
- Maximum permitted static forces under compression and lateral stress, with respect to the maximum load :

Mounting machines rotating at :

SERIES	Compression	Lateral	Q
1,000 rpm V1B 1114 - V1B 1134	4 g	1.2 g	≤ 5
650 rpm V1B 1115 - V1B 1135	2 g	1.2 g	≤ 10
450 rpm V1B 1116 - V1B 1135	2 g	0.5 g	≤ 10

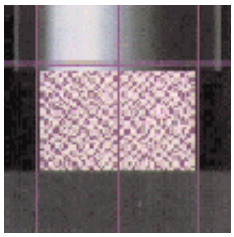
Reference	A	B	C	D	E	F	G	H	h	H1	h1	Axial natural frequency = fz	Radial natural frequency = fz
V1B 1114	90	60	69,6	8	6	47	2.5	59	47.5	61.5	50 ± 2	7 to 9 Hz	fr = fz
V1B 1115	90	60	69,6	8	6	47	2.5	59	47.5	61.5	50 ± 3	5 to 6 Hz	fr = fz
V1B 1116	90	60	69,6	8	6	47	2.5	90	68	92.5	70.5 ± 5	3 to 4 Hz	fr = 0.7 fz
V1B 1134	140	100	110	12	10	78	4	90	78	94	82 ± 2	7 to 9 Hz	fr = fz
V1B 1135	140	100	110	12	10	78	4	90	78	94	82 ± 3	5 to 6 Hz	fr = fz
V1B 1136	140	100	110	12	10	78	4	142	120	146	124 ± 5	3 to 4 Hz	fr = 0.7 fz

LOAD RANGE

References		Static loads
without mount. plate	with mounting plate	in daN
V1B 1114-01	V1B 1114-01A	6 to 10.5
V1B 1114-02	V1B 1114-02A	7.5 to 13.5
V1B 1114-03	V1B 1114-03A	12 to 20
V1B 1114-04	V1B 1114-04A	18 to 30
V1B 1114-05	V1B 1114-05A	24 to 46
V1B 1114-06	V1B 1114-06A	40 to 75
V1B 1115-01	V1B 1115-01A	5 to 7
V1B 1115-02	V1B 1115-02A	6 to 9
V1B 1115-03	V1B 1115-03A	9 to 14
V1B 1115-04	V1B 1115-04A	14 to 20
V1B 1115-05	V1B 1115-05A	20 to 30
V1B 1115-06	V1B 1115-06A	30 to 50
V1B 1116-01	V1B 1116-01A	5 to 7
V1B 1116-02	V1B 1116-02A	6 to 9
V1B 1116-03	V1B 1116-03A	9 to 14
V1B 1116-04	V1B 1116-04A	14 to 20
V1B 1116-05	V1B 1116-05A	20 to 30
V1B 1116-06	V1B 1116-06A	30 to 50

References		Static loads
without mount. plate	with mounting plate	in daN
V1B 1134-01	V1B 1134-01A	40 to 85
V1B 1134-02	V1B 1134-02A	65 to 125
V1B 1134-03	V1B 1134-03A	110 to 190
V1B 1134-04	V1B 1134-04A	175 to 270
V1B 1134-05	V1B 1134-05A	250 to 400
V1B 1134-06	V1B 1134-06A	360 to 560
V1B 1135-01	V1B 1135-01A	30 to 48
V1B 1135-02	V1B 1135-02A	48 to 80
V1B 1135-03	V1B 1135-03A	80 to 130
V1B 1135-04	V1B 1135-04A	130 to 200
V1B 1135-05	V1B 1135-05A	200 to 310
V1B 1135-06	V1B 1135-06A	310 to 400
V1B 1136-01	V1B 1136-01A	75 to 105
V1B 1136-02	V1B 1136-02A	95 to 130
V1B 1136-03	V1B 1136-03A	115 to 160
V1B 1136-04	V1B 1136-04A	160 to 230
V1B 1136-05	V1B 1136-05A	220 to 310
V1B 1136-06	V1B 1136-06A	300 to 415

Reference	Static loads in daN	Reference	Static loads in daN	H2 unloaded mm	h2 under load mm	e mm
V1B 1134-25	500 to 800	V1B 1135-25	390 to 620	96	86 ± 3	4
V1B 1134-26	720 to 1120	V1B 1135-26	620 to 840	96	86 ± 3	4
V1B 1134-45	1000 to 1600	V1B 1135-45	780 to 1240	104	94 ± 3	8
V1B 1134-46	1440 to 2240	V1B 1135-46	1240 to 1680	104	94 ± 3	8
V1B 1134-56	1800 to 2800	V1B 1135-56	1550 to 2100	108	98 ± 3	10
V1B 1134-66	2160 to 3360	V1B 1135-66	1860 to 2520	108	98 ± 3	10
V1B 1134-86	2880 to 4480	V1B 1135-86	2480 to 3360	108	98 ± 3	10
V1B 1134-125	3000 to 4800	V1B 1135-125	2340 to 3720	108	98 ± 3	10
V1B 1134-126	4300 to 6720	V1B 1135-126	3720 to 5040	108	98 ± 3	10
V1B 1134-205	5000 to 8000	V1B 1135-205	3900 to 6200	108	98 ± 3	10
V1B 1134-206	7200 to 11200	V1B 1135-206	6200 to 8400	108	98 ± 3	10
		V1B 1136-25	440 to 620	148	128 ± 5	4
		V1B 1136-26	600 to 830	148	128 ± 5	4
		V1B 1136-45	880 to 1280	156	136 ± 5	8
		V1B 1136-46	1200 to 1660	156	136 ± 5	8
		V1B 1136-56	1500 to 2075	160	140 ± 5	10
		V1B 1136-66	1800 to 2490	160	140 ± 5	10
		V1B 1136-86	2400 to 3320	160	140 ± 5	10
		V1B 1136-125	2640 to 3720	160	140 ± 5	10
		V1B 1136-126	3600 to 4980	160	140 ± 5	10
		V1B 1136-205	4400 to 6200	160	140 ± 5	10
		V1B 1136-206	6000 to 8300	160	140 ± 5	10



7002

DESCRIPTION

The 7002 damper has a satin finish treated AG3 casing and mounting plate, a stainless steel centre axis. A spring and stainless steel cushion provide the resilient elements. It has 4 Ø 5.2 mounting holes in the base and a tapped hole in the centre axis..

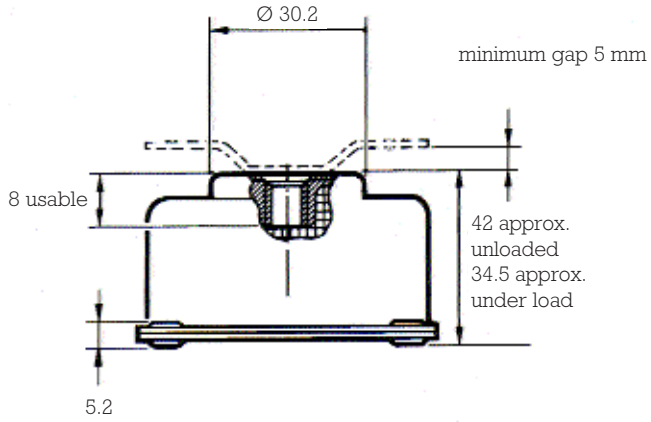
APPLICATIONS

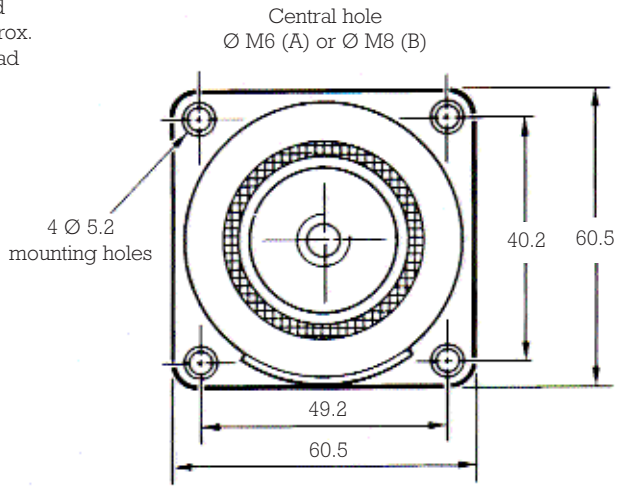
Its axial natural frequency of between 7 and 10 Hz and its integral travel limiter enable 7002 dampers to be used for mounting electronic or computer equipment, navigation equipment and on board measurement instruments.

They can also be used for static equipment for suspending control panels, etc.

Their all metal construction enable them to operate in the harshest of conditions.

DIMENSIONS





OPERATING CHARACTERISTICS

Natural frequencies :

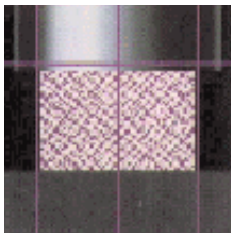
- axial : 7 to 10 Hz (depending on load)
- radial : 4.5 to 6 Hz (depending on load)

- Maximum permitted excitation at natural frequency of suspension : ± 0.75 mm
- Amplificator factor at resonance : < 4
- Operating temperature : - 70°C to + 300°C
- Structural strength corresponds to continuous acceleration of 10 g with maximum load
- Travel available under shock :

- axial : ± 6 mm
- radial : ± 5 mm

- Weight : 100 to 200 (depending on version).

Reference	Axial static loads in daN	Central hole
7002 GA 7002 HA 7002 JA 7002 KA 7002 LA 7002 UA 7002 MA 7002 PA	0.70 - 1.25 1.15 - 2.30 2.00 - 4.50 2.80 - 5.60 4.50 - 9.00 7.00 - 14.00 8.00 - 18.00 16.00 - 22.00	M 6
7002 RB 7002 SB 7002 TB	20.00 - 33.00 28.00 - 45.00 40.00 - 60.00	M 8



VE 101
VE 111
VE 112
VE 113

See also PAULSTRA elastomer range : Traxiflex

DESCRIPTION

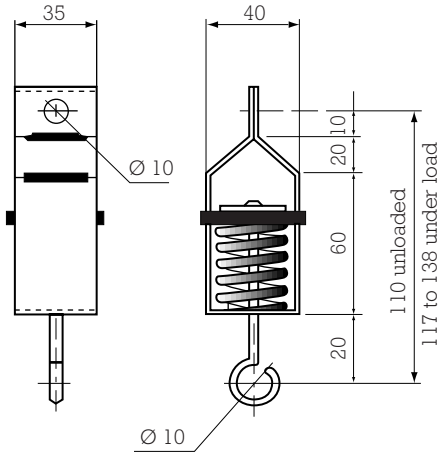
VE isolators have a cylindrical stainless steel spring, a galvanised body, an elastomer noise reduction guide and steel rings or studs depending on the model. The VE 112 series has a steel cushion inside the spring.

APPLICATIONS

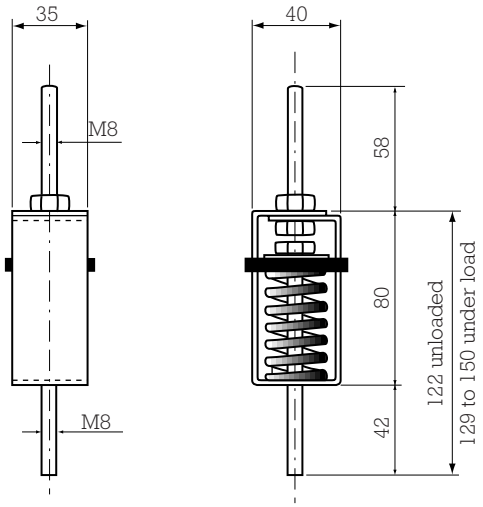
These isolators with a natural frequency of between 3 and 5 Hz are specially designed for suspending false ceilings, air conditioning equipment and pipework and significantly reduces noise in buildings.

DIMENSIONS

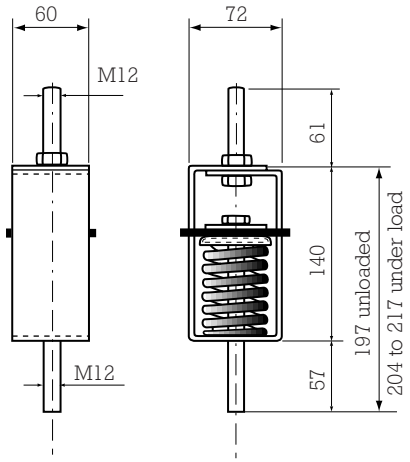
VE 101



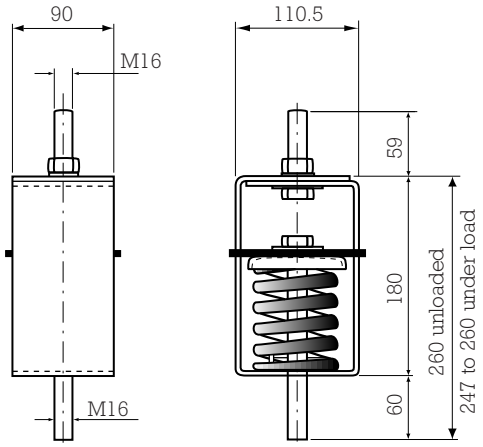
VE 111



VE 112



VE 113



OPERATING CHARACTERISTICS

Reference	Static loads in daN
VE 101 - 01	1 to 5
VE 101 - 02	4 to13
VE 101 - 03	7 to 20
VE 101 - 04	12 to 33
VE 101 - 05	19 to 43

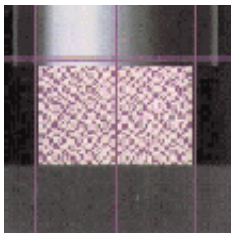
Reference	Static loads in daN
VE 111 - 01	1 to 5
VE 111 - 02	4 to 13
VE 111 - 03	7 to 20
VE 111 - 04	12 to 33
VE 111 - 05	19 to 43

Reference	Static loads in daN
VE 112 - 01	25 to 70
VE 112 - 02	45 to 130
VE 112 - 03	85 to 230

Reference	Static loads in daN
VE 113	150 to 420

Vibration characteristics :

- Natural frequency : 3.5 to 6 Hz



VIBCABLE

DESCRIPTION

This range of mountings has a stainless steel cable wound between light alloy bars. The 8010 to 8060 versions are assembled using stainless steel clips and the 8080 to 8140 models have galvanised steel screws.

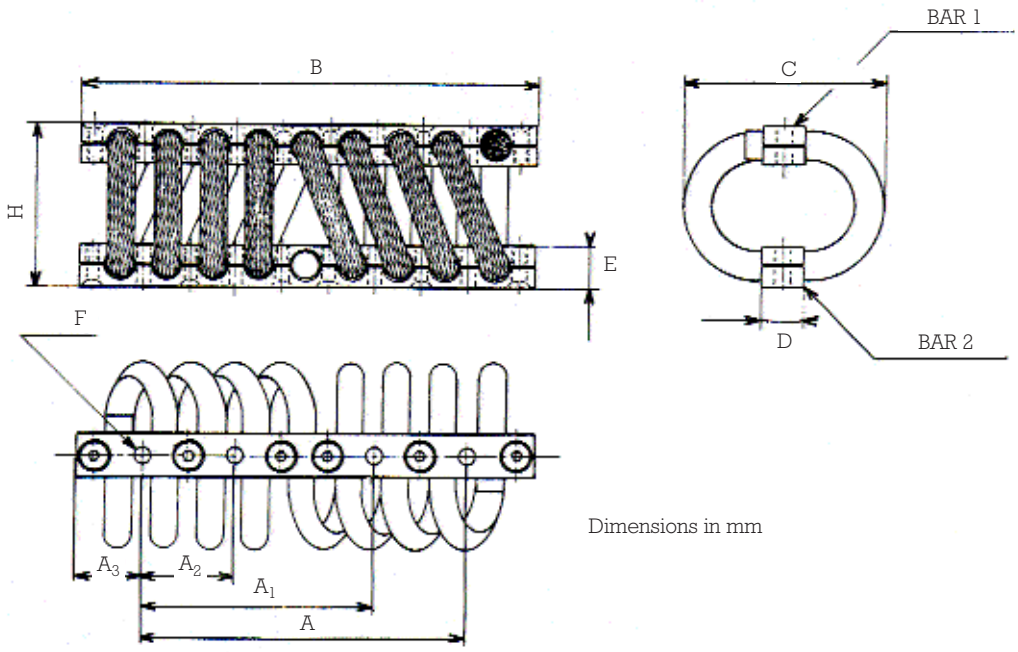
There are 4 mounting holes, smooth, counter sunk or tapped.

APPLICATIONS

With a natural frequency between 7 and 25 Hz, damping up to 40% and high deflection in all directions, these dampers can absorb accelerations to equipment subjected to shock or drop.

Protection of equipment in containers, protection of racks and any fragile on board equipment.

DIMENSIONS



Dimensions in mm

Reference	A (mm)	B (mm)	C (mm) depend. on version		D (mm)	E (mm)	F Ø (mm)	H (mm) depend. on version					
			min.	max.				01	02	03	04	05	06
V3 CA 8010-01 to -06	68	82	25	38	10	4	4.5	18	26	20	28	30	33
V3 CA 8020-01 to -06	100	112	29	43	12.5	6	5.5	21	31	35	25	28	38
V3 CA 8030-01 to -06	114	127	37	49	14	8	6.5	28	30	33	36	38	41
V3 CA 8040-01 to -03	114	127	37	44	14	8	6.5	28	33	38	-	-	-
V3 CA 8060-01 to -06	114	127	37	95	15	11	6.5	38	43	87	43	31	34
V3 CA 8080-01 to -06	131	145	57	102	16	13	6.5	48	54	60	64	80	90

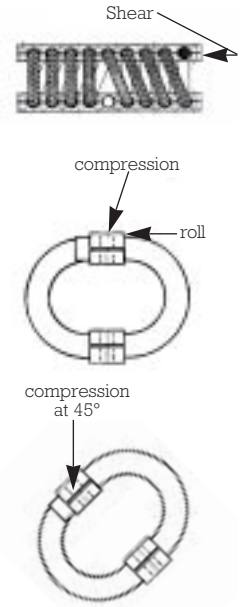
Reference	A (mm)	A_1 (mm)	A_2 (mm)	A_3 (mm)	B (mm)	C (mm) dep. version		D (mm)	E (mm)	F Ø (mm)	H (mm) depend. on version					
						mini	maxi				01	02	03	04	05	06
V3 CA 8090-01 to -06	156	111	44.5	30	216	80	135	25	16	9	70	74	89	110	68	77
V3 CA 8100-01 to -06	156	111	44.5	30	216	92	150	25	20	9	75	90	95	110	83	108
V3 CA 8110-01 to -06	191	136.5	54.5	38	267	102	170	25	25	11	90	95	100	100	110	150
V3 CA 8120-01 to -04	266.5	190.5	76	50.5	368	140	195	40	40	13	132	150	160	160	-	-
V3 CA 8130-01 to -03	378	270	108	71	520	216	260	50	50	20	178	216	235	-	-	-
V3 CA 8140-01 to -02	378	270	108	71	520	224	256	50	50	20	180	214	-	-	-	-

The bars can be supplied with smooth, tapped or countersunk holes.

References Ex : V3CA 8010-[ ] XX

Smooth holes L (1 bar) LL (2 bars)
Countersunk holes int. F (1 bar) FF (2 bars)
Tapped holes N (1 bar) NN (2 bars) : M4
Can be a combination on upper an lower bars.

OPERATING CHARACTERISTICS



Reference	Static load range daN																	
	Compression						Compression at 45°						Roll/Shear					
Version	01	02	03	04	05	06	01	02	03	04	05	06	01	02	03	04	05	06
V3 CA 8010-01 to -06	5	2.5	4	2	1.8	1.5	3.5	2	3	1.8	1.5	1.4	3	1	2.5	0.9	0.7	1
V3 CA 8020-01 to -06	10	5	5	10	10	6	10	5	4	8.5	7	4	7.5	2.5	3	6	5	3
V3 CA 8030-01 to -06	20	20	20	15	15	12	18	15	14	10	10	10	10	10	10	8	7	7
V3 CA 8040-01 to -03	20	20	15	-	-	-	20	15	10	-	-	-	10	10	7.5	-	-	-
V3 CA 8060-01 to -06	60	50	15	40	80	80	50	30	12	30	60	50	30	20	5	20	40	40
V3 CA 8080-01 to -06	75	75	50	40	25	25	50	50	35	30	15	14	25	25	20	15	12	10
V3 CA 8090-01 to -06	100	75	50	50	100	100	100	75	50	35	100	75	50	30	30	25	50	50
V3 CA 8100-01 to -06	200	150	100	50	200	70	200	150	100	50	150	50	120	75	70	40	100	40
V3 CA 8110-01 to -06	400	350	300	300	180	100	300	200	300	250	180	75	250	200	200	180	100	50
V3 CA 8120-01 to -04	600	500	400	400	-	-	600	500	400	400	-	-	500	500	400	400	-	-
V3 CA 8130-01 to -03	800	800	800	-	-	-	800	600	600	-	-	-	600	500	500	-	-	-
V3 CA 8140-01 to -02	1200	1200	-	-	-	-	1200	900	-	-	-	-	700	700	-	-	-	-

- Operating temperature :

- 180°C to + 300°C.

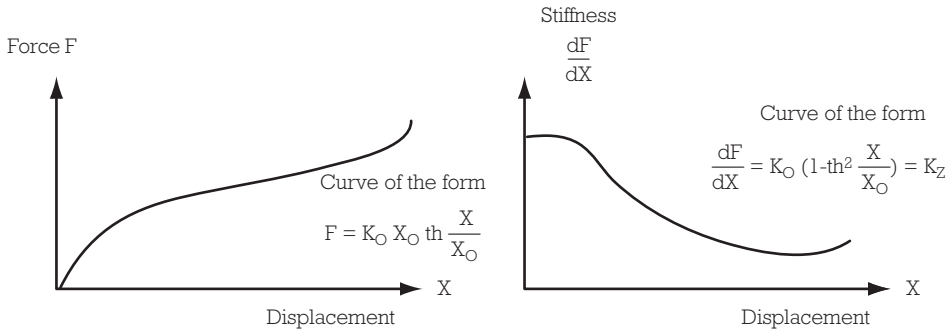
- Electrical resistance :

with conducting coating < 210° **Ω**.

- Environment :

The material used are unaffected by harsh environments.

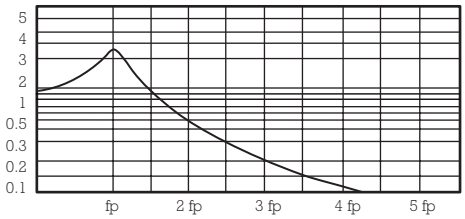
- Typical curves :

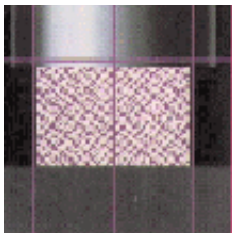


The damping increases from 20% (for low amplitudes) to approximately 40% (for high amplitudes).

- Vibration transmission coefficient curves :

For perfectly free system.





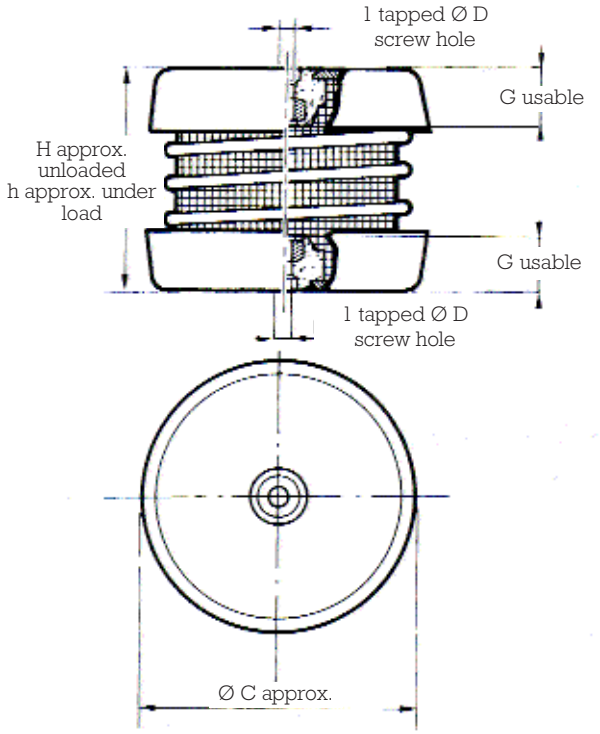
OTHER METAL SUSPENSIONS MV 801 MV 803

Natural frequency

- axial
- radial

} 5 to 10 Hz depending on load

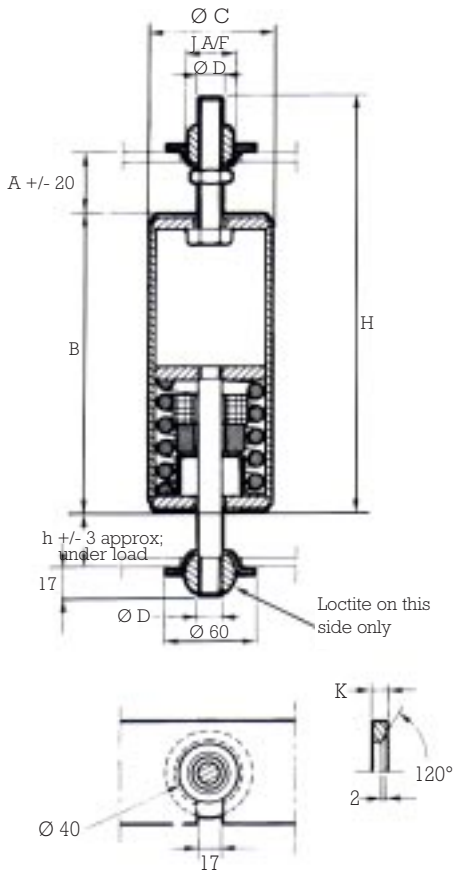
- Structural strength corresponds to continuous acceleration of 2 g with maximum load
- Operating temperature : - 70°C to + 300°C.



Reference	Static axial loads in daN
MV 801- 1CC	0.15 - 0.20
MV 801- 2CC	0.20 - 0.25
MV 801- 3CC	0.25 - 0.30
MV 801- 4CC	0.30 - 0.40
MV 801- 5CC	0.40 - 0.50
MV 801- 6CC	0.50 - 0.65
MV 801- 7CC	0.60 - 0.80
MV 801- 8CC	0.75 - 1.00
MV 801- 9CC	0.95 - 1.20
MV 801-10CC	1.20 - 1.65
MV 801-11CC	1.50 - 2.00
MV 801-12CC	1.80 - 2.50
MV 801-13CC	2.40 - 3.20
MV 803- 1CC	1.20 - 1.65
MV 803- 2CC	1.50 - 2.00
MV 803- 3CC	1.80 - 2.50
MV 803- 4CC	2.40 - 3.20
MV 803- 5CC	3.00 - 4.00
MV 803- 6CC	3.70 - 5.00
MV 803- 7CC	4.80 - 6.50
MV 803- 8CC	6.00 - 8.00
MV 803- 9CC	7.50 -10.00
MV 803-10CC	9.50 -13.00
MV 803-11CC	12.00-16.50
MV 803-12CC	15.00-20.00
MV 803-13CC	

Reference	H	C	D	G	h
MV 801	42	26	M4	6	25
MV 803	55	40.2	M5	8	34

V1N 303 V1N 304 V1N 305
V1N 306 V1N 308



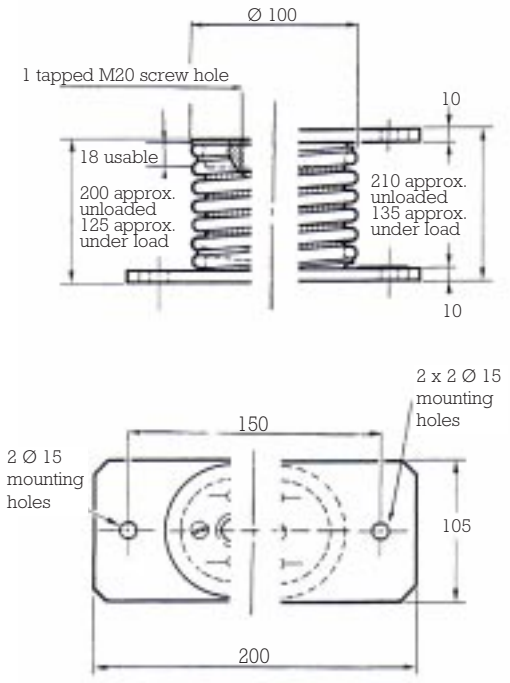
- Maximum permitted excitation at natural frequency of suspension : ± 1 mm ;
- Natural frequencies for this amplitude :
- axial : 3.5 to 5 Hz (depending on load)
- Structural strength corresponds to continuous acceleration of 3 g with maximum load
- Operating temperature : - 70°C to + 150°C ;
- Displacement in all directions : ± 40 mm ;
- Adjustment between attachment points : ± 20 mm.

Reference	Static loads in traction in daN	Ø of pipes 3 m long (for information only)
V1N 303	45 - 85	150 - 300
V1N 304	75 - 140	300 - 500
V1N 305	120 - 230	500 - 800
V1N 306	200 - 380	800 - 1000
V1N 308	270 - 500	1000 - 1200

Reference	A	B	C	D	H	J	K	h
V1N 303	40	135	63	M12	210	30	6	35
V1N 304	40	155	63	M12	230	30	6	35
V1N 305	45	175	82	M16	257	30	8	40
V1N 306	45	200	82	M16	282	30	8	40
V1N 308	45	220	82	M16	302	30	8	40

V 1209

TYPE A **TYPE B**



- Maximum permitted excitation at natural frequency of suspension : ± 3 mm ;
- Natural frequencies for this amplitude :
- axial
- radial

} 1.5 to 3.5 Hz depending on load

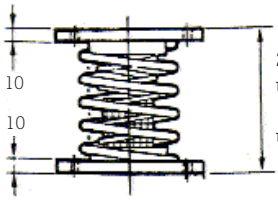
- Amplification factor at resonance : <5
- Structural strength corresponds to continuous acceleration of 2 g with maximum load
- Operating temperature : - 70°C to + 300° C.

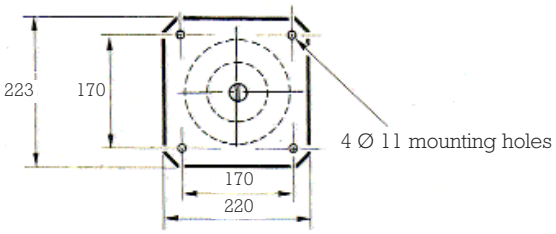
With lower mounting plate
V 1209-01A
V 1209-03A
V 1209-05A
V 1209-07A
V 1209-09A

With lower and upper mounting plate	Static axial loads in daN
V 1209-01B	60 - 95
V 1209-03B	95 - 150
V 1209-05B	150 - 230
V 1209-07B	210 - 330
V 1209-09B	300 - 460

V 1210 V 1270

TYPE V 1210

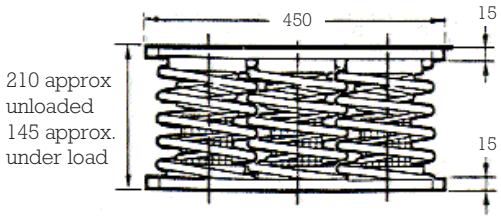


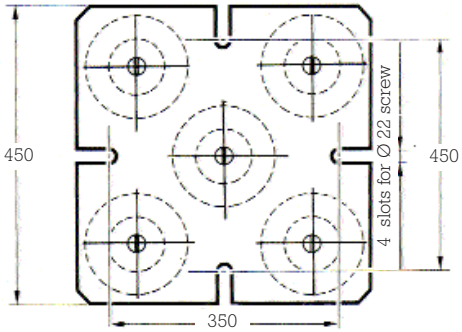


- Maximum permitted excitation at natural frequency of suspension : ± 3 mm ;
- Natural frequencies for this amplitude :
  - axial
  - radial

  } 1.5 to 3.5 Hz (depending on load)
- Amplification factor at resonance <5
- Structural strength corresponds to continuous acceleration of 2 g with maximum load
- Operating temperature : - 70°C to + 300° C.

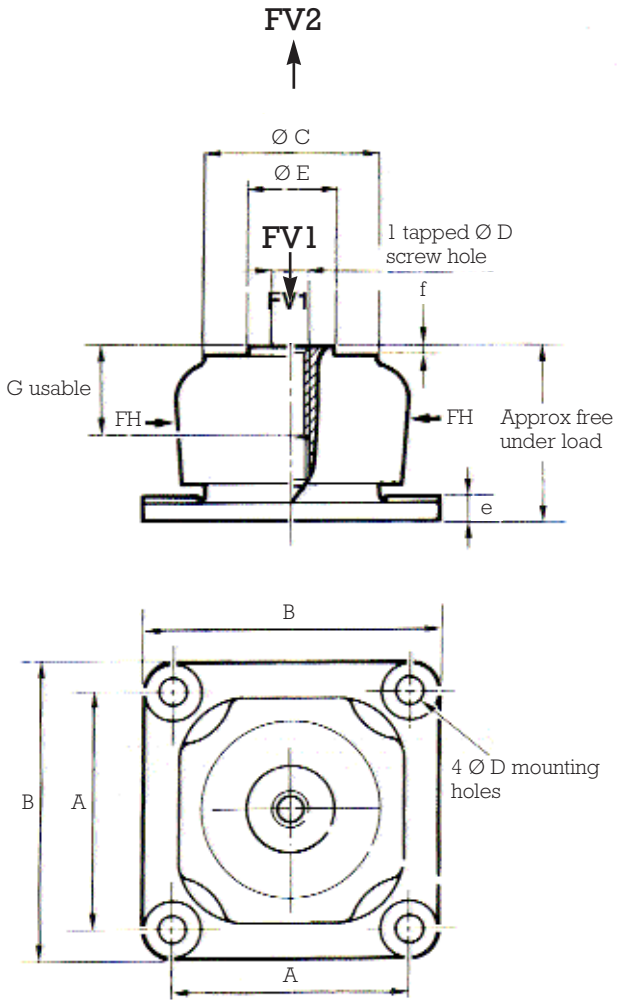
TYPE V 1270





Reference	Static axial loads in daN
V1210-51	460 - 740
V1210-52	550 - 870
V1210-53	700 - 1100
V1210-54	1000 - 1600
V1210-55	1300 - 1960
V1270-50	1840 - 2960
V1210-51	2300 - 3700
V1210-52	2750 - 4350
V1210-53	3500 - 5500
V1210-54	5000 - 8000
V1210-55	6200 - 9800

V1H 5023 - V1H 5025



- Maximum permitted excitation at natural frequency of suspension : ± 3 mm ;
- Natural frequencies for this amplitude :

• axial
• radial
} 15 to 25 Hz depending on load

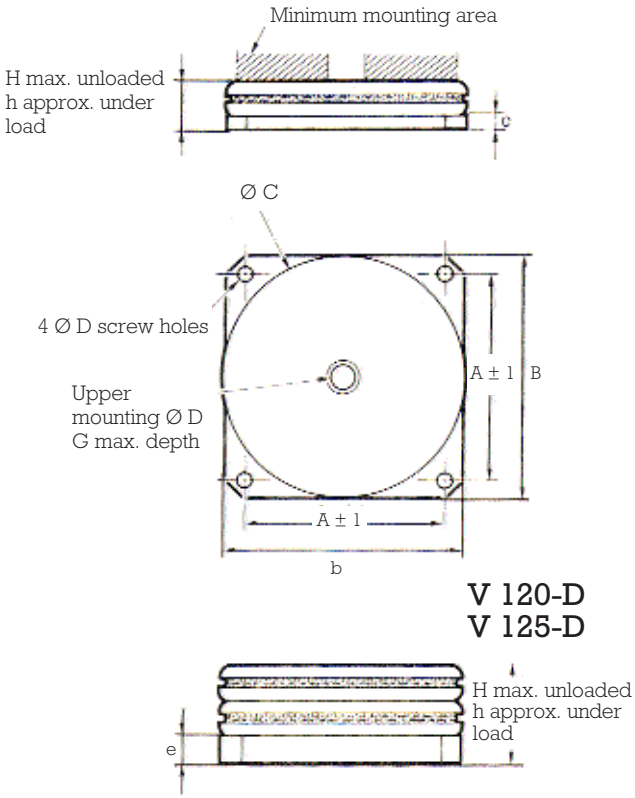
- Amplification factor at resonance : <5
- Structural strength : see table
- Operating temperature : - 70°C to + 300° C.

Reference	Static axial loads in daN
V1H 5025-01	350 - 900
V1H 5025-02	800 - 3000
V1H 5023-01	1000 - 2500
V1H 5023-02	2000 - 7000

Reference	Maximum dynamic forces in daN		
	FV1	FV2	FH
V1H 5025-01	4500	4500	4500
V1H 5025-02	15000	4500	4500
V1H 5023-01	12500	12500	12500
V1H 5023-02	35000	12500	12500

Reference	A	B	C	D	E	G	H	d	e	f	hV1	hV2
V1H 5025	138	172	100	M20	50	50	100	15	12	5	96	104
V1H 5023	215	260	140	M33	70	60	136	23	18	7	132	140

V 120 - V 125 - V 120-D - V 125-D



- Natural frequencies :
  - axial } V 120 - V 125 : 15 to 20 Hz
  - radial } V 120-D - V 125-D : 13 to 18 Hz
- Maximum permitted excitation amplitude :
V 120 - V 125 : ± 0.3 mm
V 120-D - V 125-D : ± 0.4 mm
- Amplification factor at resonance :
V 120 - V 125 : < 6
V 120-D - V 125-D : < 5
- Operating temperature : - 70°C to + 300°C
- Structural strength under compression : see table.

Reference	Static loads in daN	Max. dynamic compression forces in daN
V 120 V 125	120 - 2500 250 - 7000	12500 22500
V 120-D V 125-D	120 - 2500 250 - 7000	12500 22500

Reference	A	B	C	D	G	H	b	d	e	h
V 120	114	150	126	M16	28	36	140	11	8	32
V 125	138	165	165	M20	28	36	160	11	8	32
V 120-D	114	150	126	M16	50	72	140	11	16	66
V 125-D	138	165	165	M20	50	72	160	11	16	66