



We make it **possible**

# INDUSTRY CATALOG

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We make it **possible**

**Creator of solutions to ensure the vibration  
insulation, acoustic, dynamic sealing and power  
transmission functions.**





# SERVICES

## TECHNICAL RECOMMENDATIONS

The Hutchinson Paulstra's commercial team support you in the right choice of product for your project. Thanks to our technical recommendations software, our experts analyse your data and external context to extract a transmissibility curve.

## PAULSTRASOFT MOBILE APPLICATION

The Paulstrasoft Mobile application allows to measure the vibratory frequency of a machine in operation and to recommend a suitable antivibration support.

It is free to use and download on the App Store (iOS) and the Play Store (Android).



## VIBRO-ACOUSTIC ANALYSIS

Hutchinson Paulstra brings you its experience for the "in situ" measurement, in order to give a "vibroacoustic" diagnostic of your installation as well as in the implementation of solutions in your environment.

Our services :

- On-site displacement
- Vibratory and acoustic recording
- Analyzing of the results in our place
- A detailed report
- Proposing and supplying the antivibration and acoustic solutions



## PAULSTRASOFT

Paulstrasoft software allows to determine the appropriate antivibratory solution to meet your expectations. It is free to download and use.

This antivibratory mount preselection tool offers several functions :

- vibratories attenuations
- stops calculations
- shocks responses calculations
- products datasheets

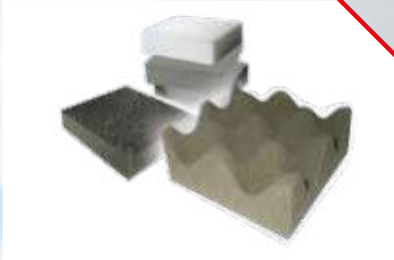






**ELASTOMER MOUNTS** **page 21**

A complete range bringing a technical solution to neutralize the noise transmission and vibrations, and ensure a protection against shocks.



**ACOUSTIC FOAMS** **page 169**

A complete range of complex insulations and acoustics foams to reduce the airborne noises (insulation, absorption and damping).



**METAL MOUNTS** **page 193**

Reduce considerably the float and the frictions, the bushes minimize wear on moving parts and noises.



**FLEXIBLE BUSHES** **page 269**

Power Transmission from 2,5 to 100 000 N.m allowing to absorb radial, axial and angular misalignment as well as couple irregularities.



**FLEXIBLE COUPLINGS** **page 293**

Power transmission from 2,5 to 100 000 N.m allowing to absorb radial, axial and angular misalignment as well as couple irregularities.



**DYNAMIC SEALINGS** **page 344**

Seals for rotating shafts. More than 2 000 references constantly evolving on materials and profiles, allowing to satisfy on industrial market requirements.





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We make it *possible*

# FLEXIBLE MOUNTS



# FLEXIBLE MOUNTS

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We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures and schemas of the products are supplied for information only.

# 1 - INTRODUCTION

The reduction of noise and vibration has become very important :

- the need to improve operating conditions makes it essential;
- the increasing mechanisation of industrial and domestic equipment and appliances make it necessary;
- the lightness and increasing complexity of equipment demand it.

The following pages are dedicated to protection against vibration and shock. They offer design engineers the means to resolve isolation problems using elastomer alone or elastomer bonded to metal supports.

The first few pages start, therefore, with a summary of definitions and an explanation of the terminology used as well as the principal formula on which suspension calculations are based. The design of a flexible mounting system is a major undertaking and is the subject of a special section which gives the principles used to select a mounting system according to its size, characteristics, type and applications.

**Warning :** solving flexible mounting system problems very often requires the services of a specialist and we advise, very strongly, that if a simple solution cannot be found, then our technical services should be consulted.



## 2 - DEFINITIONS

### 2.1 - Flexible mounts

#### 2.1.1 - Properties

Flexible mounts are components which exhibit both flexibility and damping, at the same time and to varying degrees.

- **Flexibility**

- Flexibility is the ability of the mount to deform and recover, with an amplitude approximately proportional to the load.

- **Damping**

Damping is a braking force the most important effect of which is the reduction of oscillations.

There are essentially two types of damping :

- constant friction (dry friction) which, for a given setting, provides a constant braking force independent of the movement. For there to be movement, it is, therefore, necessary to apply a force at least as great as the frictional force;

- viscous damping (such as that provided by hydraulic dampers) which provides a braking force proportional to the instantaneous velocity of the suspended part relative to the fixed part. Viscous damping is, therefore, essentially dynamic: it does not affect the position of static equilibrium.

#### 2.1.2 - Environmental conditions

Most of the standard mounts are made of natural rubber which has been chosen because of its good dynamic properties. Under normal operating conditions, these rubber compounds guarantee stability over long periods and, in particular, limited creep.

The following operating conditions are considered abnormal :

- temperatures greater than 70°C;
- prolonged contact with corrosive liquids;
- prolonged contact with acids or alkalis;
- aggressive environment (oils, fuels);
- corrosive gases (ozone, chlorine...).

Using a mount unintentionally under such conditions can lead to premature ageing, degradation or even destruction of the rubber. An abnormally aggressive environment can, in particular, increase the deformation of the mounting (creep).

**PAULSTRA flexible mounts may be made using various special compounds that are highly resistant and able to withstand the abnormal conditions described above.**

**Our technical services are at your disposal to reply to any queries about the properties of particular compounds.**

#### 2.1.3 - Elastomeric flexible mounts

Mounts using natural or synthetic elastomers always provide a combination of pure elasticity and viscous damping. Although commonly used, the term "shock absorbers" is completely incorrect. The two characteristics, flexibility and damping, are, in fact, essentially different : a rubber mounting may be compared to a car suspension where the two functions are provided by different components working in parallel :

- true elastic suspension provided by springs;
- damping provided by hydraulic damping (shock absorbers).

A flexible mounting using rubber = a spring + a damper.

### 2.1.4 - Characteristics of elastomeric flexible mounts

#### • Elastic properties

These are the parameters which define the ability of the mounting to be deformed in various directions.

- **The linear stiffness**  $K_x$ , along the axis  $G_x$  is the ratio of the force to the corresponding displacement along this axis. The linear stiffness is expressed by N/mm.

The linear stiffness ( $K_y, K_z$ ) for the other axes ( $G_y, G_z$ ) are defined in the same way.

- **The torsional stiffness** ( $C_x, C_y, C_z$ ) about the three axes ( $G_x, G_y, G_z$ ) is the ratio of the torque to the angular displacement about the axis.

The torsional stiffness is expressed in m.daN/rad.

These six parameters, which are not independent of each other for a given mount (the interdependence changes with the shape and structure of the mounting), are proportional to the Young's modulus of the elastomer used in the mounting.

Using these six values, it is possible to calculate the stiffness along or about any arbitrary axis.

#### • Damping properties

The most useful parameter is the "intrinsic damping factor" of the elastomer used. This will be defined for a suspension (§ 2.2.2). The intrinsic damping factor of a mount is the same as that of the suspension.

## 2.2 - Flexible mounting systems

A machine is suspended elastically by placing flexible mounts between the machine and its seatings (floor, slab, chassis, etc.). The type of mount, its number, distribution, positioning and individual characteristics, depend on the overall characteristics required by the suspension to give the desired result.

The most common problems are those where vibration determines the essential characteristics of the suspension. It is necessary, therefore, to start with a presentation of the terminology and a review of the most important definitions and principles.

### 2.2.1 - Vibration theory concepts

A machine, suspended elastically, vibrates when it is subject to periodic alternate influences which produce oscillations of greater or lesser amplitude.

There are two main modes of vibration :

- natural or free vibration, which is the vibration of the machine that occurs when it is released after having been displaced from its position of equilibrium;
- forced vibration, which is imposed on the machine, either by its own operation, or by influences from its surrounding.

#### • Degrees of freedom

The number of degrees of freedom is the number of independent parameters which determine the position of the machine at any given time. Degrees of freedom of movement :

- linear movement parallel to a given axis (the independent parameter is the displacement along the axis),
- rotation about a given axis (the independent parameter is the angle of rotation about the axis).

#### • Vibrations with only one degree of freedom

The following discussion applies to vibrations with only one degree of freedom : a linear vibration parallel to a fixed axis.

#### • Periodic vibration

- Frequency : number of complete cycles in a unit of time.

$N$  = number of cycles per minute.

$n$  = number of cycles per second (Hertz).

- Period : duration of one cycle.

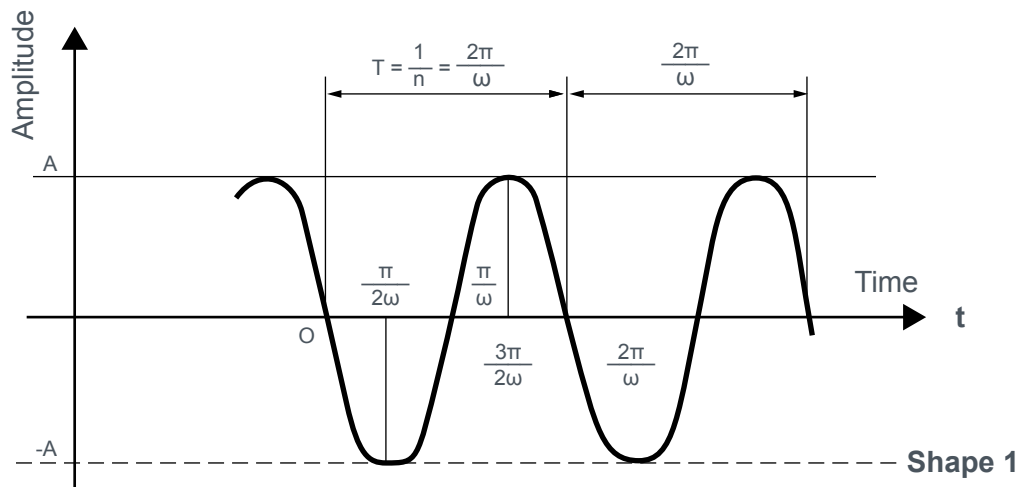
$$T = \frac{1}{n} \text{ in second.}$$

- Pulsation :  $\omega = 2\pi n = \frac{2\pi}{T}$  in radians per second



- Maximum amplitude : The maximum offset from the equilibrium position for each cycle. For a forced vibration under constant conditions, the amplitude remains constant.

- Sinusoidal vibration  $x = A \sin \omega t$  (shape 1)



- Frequency  $n = \frac{1}{T} = \frac{\omega}{2\pi}$

- Amplitude  $A$

- Maximum velocity  $V = A\omega$

- Maximum acceleration  $\Gamma = -A\omega^2$

- Instantaneous amplitude  $x = A \sin \omega t$

- Instantaneous velocity  $v = A\omega \cos \omega t$

- Instantaneous acceleration  $Y = -A\omega^2 \sin \omega t$

High frequency vibrations (high  $\omega$ ) may, therefore, produce very high accelerations even at low amplitudes.

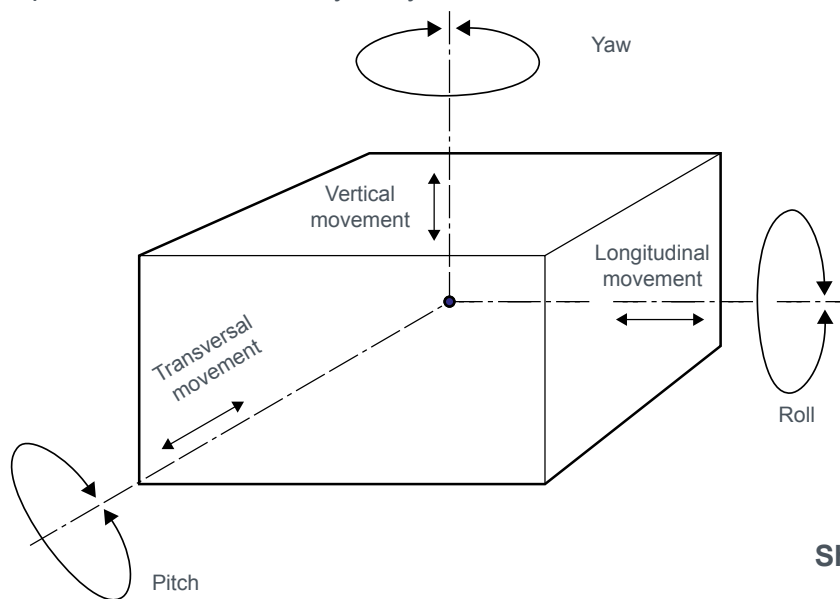
## 2.2.2 - Characteristics of flexible mounting systems

### • Elastic properties

These are the parameters which define the freedom of a machine to move with respect to its seating. The movements are, usually, referred to an axis system ( $G_x, G_y, G_z$ ).

In the example in shape 2 :

- the origin of the axis system is at the equilibrium position of the machine's centre of gravity;
- the axes are parallel to the axes of symmetry of the machine.



Shape 2

As for mounts, the stiffness of a suspension is defined for displacements with only one degree of freedom relative to a fixed set of axes.

### - Linear stiffness :

$K_x$  along  $G_x$  = longitudinal movement.

$K_y$  along  $G_y$  = transverse movement.

$K_z$  along  $G_z$  = vertical movement.

For each axis, the linear stiffness is the sum of the linear stiffness of all the mounts.

$$K_x = \sum K_x$$

$$K_y = \sum K_y$$

$$K_z = \sum K_z$$

### - Torsional stiffness :

$C_x$  about  $G_x$  = roll.

$C_y$  about  $G_y$  = pitch.

$C_z$  about  $G_z$  = yaw.

The torsional stiffness of the suspension depends on :

- the individual stiffness of the mounts;
- the position and orientation of the mounts with respect to the centre of gravity G of the machine.

### • Damping properties

Elastomers exhibit viscous damping, the braking force applied to an elastic suspension is  $R \times V$ , where : R is the resistance, V is the relative velocity of the suspended machine at time t.

If, starting with an undamped suspension, the damping is progressively increased (with all other factors remaining constant) the amplitude of the free oscillations, starting from a given initial offset, die away more and more quickly.

**The value of damping for which the return to the equilibrium position is asymptotic (without oscillation) is called the “critical damping” and is denoted by a resistance  $R_c$ .**

The damping factor  $\epsilon$  is defined for a resistance R :

$$\epsilon = \frac{R}{R_c} \quad (\epsilon = 1 \text{ for critical damping}).$$

When suspension is subjected to forced vibrations at a frequency  $\omega$ , it has been shown that, for natural elastomers, the product  $\epsilon\omega$  remains reasonably constant. This is equally true at the resonant frequency (see below).

$$\epsilon \omega = \epsilon_0 \omega_0 \text{ constant } (\omega_0 \text{ is the resonant frequency}).$$

$\epsilon_0$  being the damping factor at the resonance frequency.

It can be shown that  $\epsilon_0$  is an intrinsic property of the elastomer used.

$\epsilon_0$  = intrinsic damping factor.

$\epsilon_0$  of a suspension =  $\epsilon_0$  of each mounting (if all mountings use the same elastomer).

### • Electrical characteristics

Elastomers have an electrical resistance which varies according to their composition, hardness. As a guide, the following values have been measured for our standard elastomers.

Natural Rubber : hardness 45  $10^{13}$  Ohm x  $\text{cm}^2 / \text{cm}$   
hardness 60  $10^6$  Ohm x  $\text{cm}^2 / \text{cm}$   
hardness 75  $10^4$  Ohm x  $\text{cm}^2 / \text{cm}$

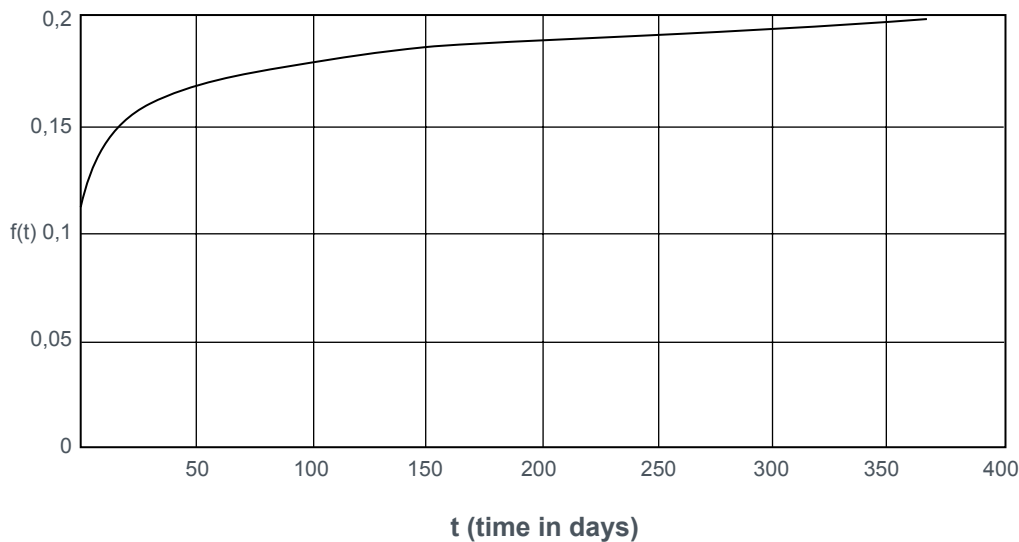
We have also developed special elastomers which can have a dielectric strength greater than 2,000 Volts for 1 minute.

- **Creep characteristics**

The following formula, which is derived from measurements on samples, gives an estimate of the creep for a load which compresses a Radiaflex mount by 10% of its height at a temperature of 30°C. The creep for an actual mounting also depends equally on its shape.

Static deflection at time t = initial static deflection x (1 + C<sub>m</sub> x f(t))  
 where f(t) is the value of the creep from the graph below:

**Creep f(t) in compression relative to the initial static deflection.**



and C<sub>m</sub> is a correction coefficient taken from the table below according to the sample material :

Material	Hardness 45	Hardness 60	Hardness 75
Standard natural rubber	1.0	1.6	1.7
Polychloroprene	1.1	1.6	1.6

**Note**

These values are given as a guide only. Consult us for use under other conditions (temperature, complex profiles or other elastomers).

**Mounting**

For applications where alignment is important, to overcome the problems of initial creep of the elastomer mounts, adjustment to align the axes of shafts should be made at least two days after the machine has been mounted.

# 3 - FUNCTION OF AFLEXIBLE MOUNTING SYSTEM

## 3.1 - Static function

**An elastic suspension allows the static load to be more evenly distributed.**

If a machine rests on more than three points using “rigid” mountings, it is impossible to predict the load on each mounting point and the machine could be unevenly stressed.

With elastic mounts having a known stiffness, it is possible to determine (by calculation, or direct measurement) the deflection in each mounting and thus deduce the loading and correct any imbalance.

**An elastic suspension accomodates minor differences in the distance between mounts.** However many mountings there are, in order to avoid excessive local stresses, a rigid assembly requires very close tolerances on the distance between mountings and of the mating surfaces of the machine and its seatings.

To avoid prohibitively close manufacturing tolerances, “play” is allowed in the mount which gives rise to the well known problems of wear and noise due to loose fixings.

Flexible mounts allow larger manufacturing tolerances without large variation in forces.

An elastic suspension can also absorb small movements due to, for example, the expansion or the deformation of chassis, bodysells, girders, etc.

## 3.2 - Dynamic function

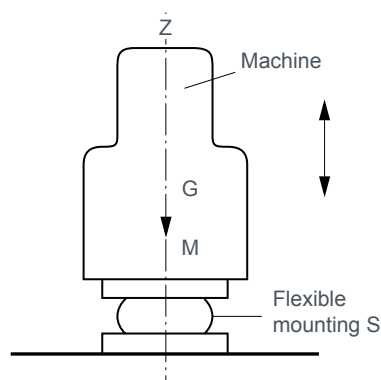
**This is the primary function of elastic suspensions where there is vibration or shock. The calculations presented here assume that the linear stiffness of the mounts remains constant. This is true for elastomeric mountings in normal conditions of use (mechanical vibration, normal temperature).**

### 3.2.1 - Vibrations with only one degree of freedom

The action of a flexible mounting system is very complex. To present the principles, we will study a simple idealised case (shape 3).

Taking the case of a machine of mass  $M$  constrained so that it can only move in a direction parallel to the vertical axis  $Gz$ .

It is attached to its seatings by a flexible mount  $S$  with a stiffness  $K$  along the axis  $Gz$ .



Shape 3

- **Free oscillation (natural frequency)**

- a) Undamped (entirely theoretical)**

The machine having been displaced from its position of equilibrium by a distance A oscillates sinusoidally.

The equation of motion is :  $z = A \sin \omega_0 t$

The natural pulsation is  $\omega_0 = \sqrt{\frac{K}{M}}$       Proper frequency  $F_0 = \frac{\omega_0}{2\pi}$

The oscillation continues indefinitely with an amplitude A (as shown in shape 1 with  $\omega$  replaced by  $\omega_0$ ).

- b) Damped**

In this case, the machine oscillates about its position of equilibrium with a damped sinusoidal motion (see shape 4). The equation of motion is :

$$z = A.e^{-\varepsilon'_0 \omega'_0 t} . \sin \omega'_0 t$$

The natural pulsation is :

$$\omega'_0 = \sqrt{\frac{K}{M} (1 - \varepsilon_0'^2)} = \omega_0 \sqrt{1 - \varepsilon_0'^2}$$

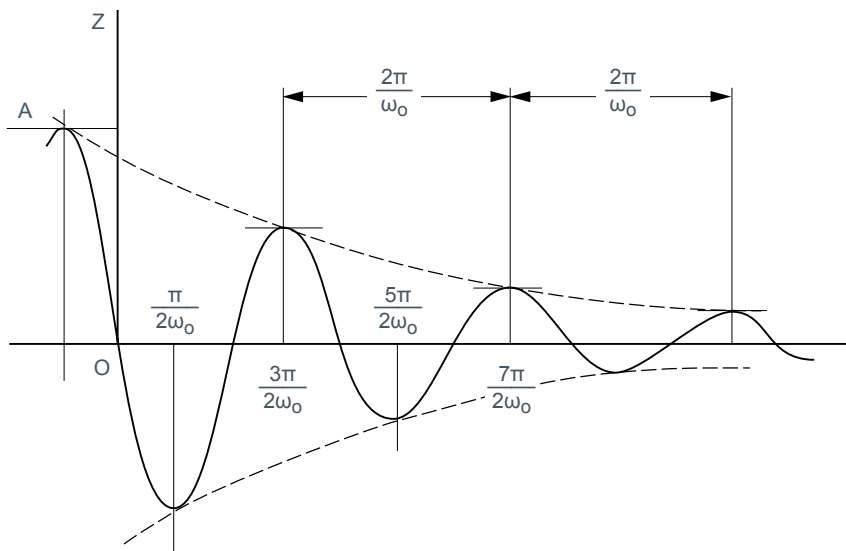
$\varepsilon'_0$  is the damping factor at the frequency  $\omega'_0$ .

As  $\varepsilon'_0$  is very close to  $\varepsilon_0$ , the natural frequency may, therefore, be written as :

$$\omega'_0 \approx \omega_0 \sqrt{1 - \varepsilon_0^2}$$

For natural rubber,  $\varepsilon_0$  is small by comparison with 1 (from 0.02 to 0.1).

$\omega'_0$  is, therefore, very close to  $\omega_0$ .



Shape 4

• **Forced vibration**

If the machine is now subject to forced vertical vibration induced by a sinusoidal force of frequency  $\omega$ .

The inducing force is  $F = F_M \sin \omega t$ .

- For a rigid suspension : the inducing force is transmitted directly to the structure the machine is mounted on.

- For an elastic suspension with a natural frequency  $\omega_0$  or proper frequency  $F_p = \frac{\omega_0}{2\pi}$  and damping factor  $\epsilon_0$  :

When the inducing force is applied, an oscillation is induced at the natural frequency  $\omega_0$  which dies away rapidly so that, after a short period, only the steady state forced vibration at frequency  $\omega$  remains which transmits a sinusoidal force to the surrounding structure.

The force transmitted is:  $F' = F'_M \sin \omega t$ .

A transmission coefficient  $\lambda$  is defined as the ratio between the amplitude of the force transmitted  $F'_M$  to the amplitude of the inducing force  $F_M$  (or, if preferred, the force that would be transmitted if the suspension was not elastic).

For a mounting system using elastomeric mounts, this coefficient is :

$$\lambda = \frac{F'_M}{F_M} = \sqrt{\frac{1 + 4 \epsilon_0^2}{\left(1 - \frac{\omega^2}{\omega_0^2}\right)^2 + 4 \epsilon_0^2}}$$

To summarize :

	Inducing force	Transmitted force	Transmission coefficient
Rigid system	$F = F_M \sin \omega t$	$F = F_M \sin \omega t$	$\lambda = 1$
Flexible system ( $\omega_0, \epsilon_0$ )	$F = F_M \sin \omega t$	$F' = F'_M \sin \omega t$	$\lambda = \frac{F'_M}{F_M} = \sqrt{\frac{1 + 4 \epsilon_0^2}{\left(1 - \frac{\omega^2}{\omega_0^2}\right)^2 + 4 \epsilon_0^2}}$

The variations of the transmission, coefficient  $\lambda$ , as a function of  $\frac{\omega}{\omega_0}$  for various values of  $\epsilon_0$  are shown in shape 5 (page 12).

**Attenuation**

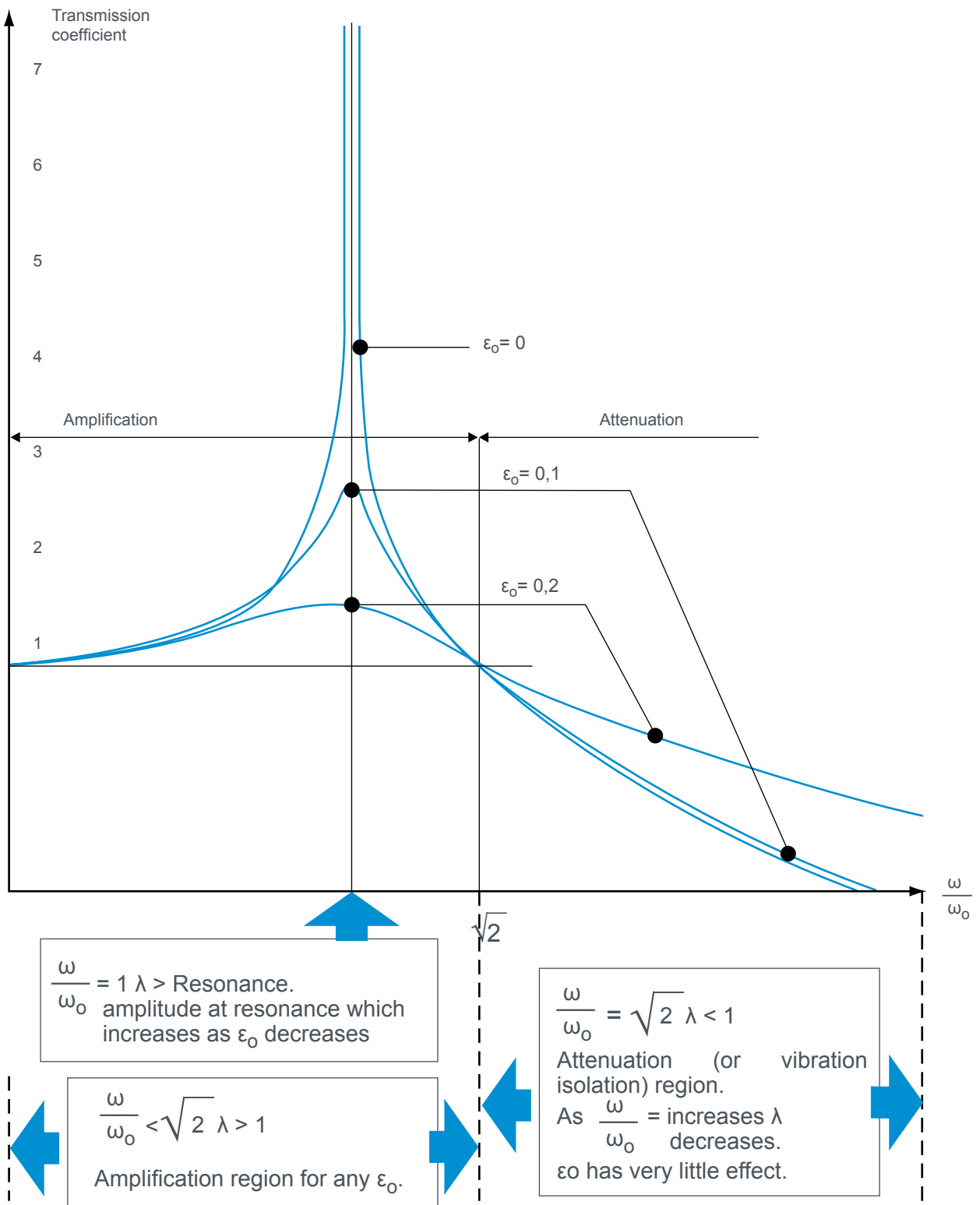
For rubber mountings, the term  $4 \epsilon_0^2$  is much smaller than 1. The attenuation in % is  $1 - \lambda$  :

$$E \% = 100 \frac{\left(\frac{\omega}{\omega_0}\right)^2 - 2}{\left(\frac{\omega}{\omega_0}\right)^2 - 1} \quad \text{ou} \quad 100 \left(1 - \frac{1}{\left(\frac{\omega}{\omega_0}\right)^2 - 1}\right)$$

For a given induced frequency  $\omega$  the attenuation depends on the natural frequency of the suspension.

For a particular direction, the relationship between the natural frequency, the suspension's sub-tangent and the induced frequency are plotted on the chart shape 6.

For a particular induced frequency (for example 1500 rpm) it is possible to find the sub-tangent which will provide an acceptable attenuation. In general, an attenuation greater than 50% is required. For this example, the chart indicates that an attenuation of 80% will be achieved for a natural frequency of 10 Hz (see section IV.3.1).



Shape 5

An efficient mounting system use :

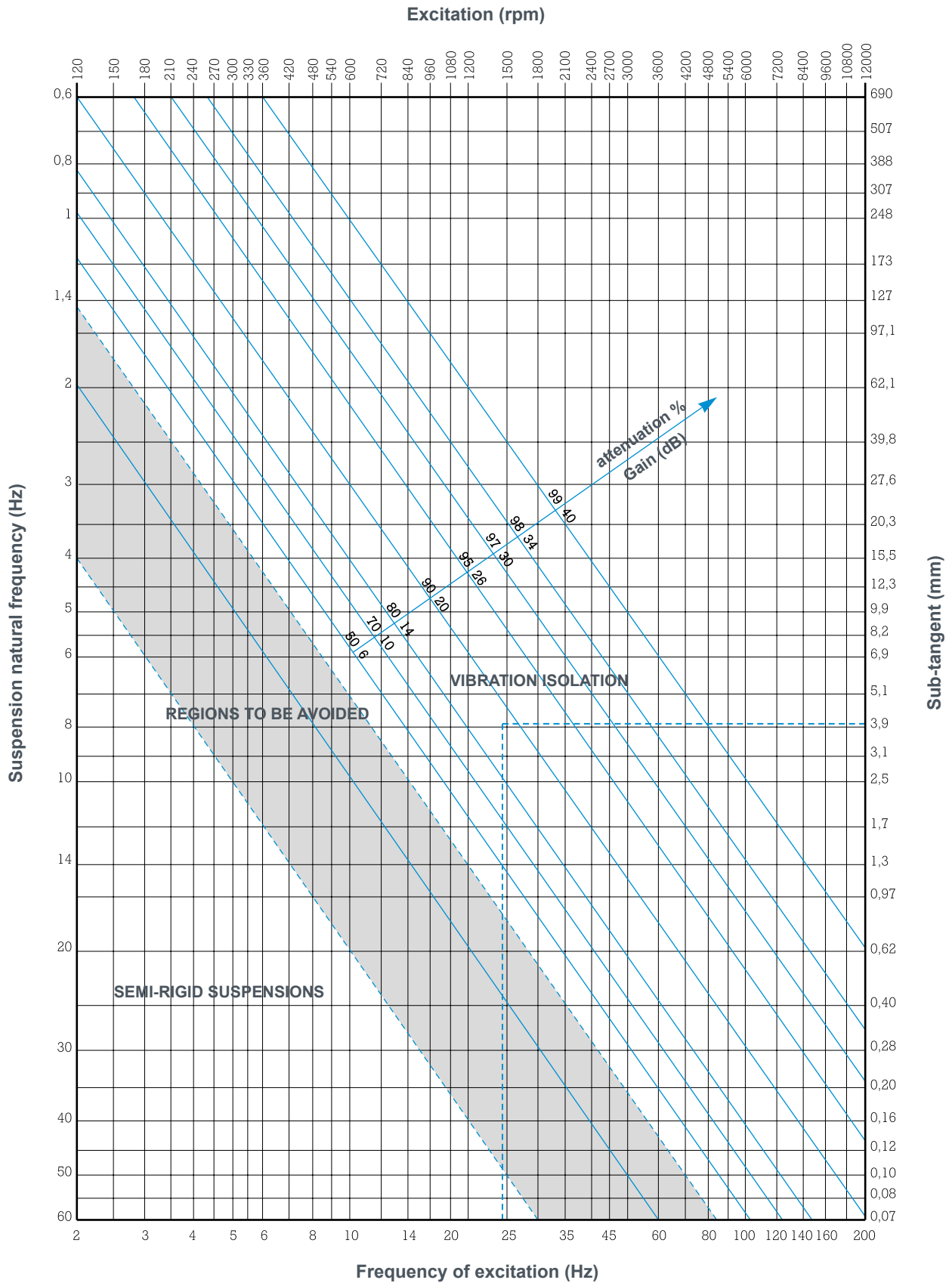
a high value of  $\frac{\omega}{\omega_0}$   $\longrightarrow$  low values  $\omega_0$   $\longrightarrow$  low values  $\lambda$

a moderate  $\varepsilon_0$   $\longrightarrow$  - limited amplification in the resonant region.  
- minor effect in the attenuation region.



# ABAQUE

Attenuation as a function of natural frequency and frequency of excitation.  
(A theoretical graph for a mounting system without damping)



- **Practical considerations**

- a - **Variable speed machines**

In practice, there may not be a single, well defined value for  $\omega$ , as machines may have a variable speed (variable  $\omega$ ).

In these cases, the vibration isolation should be determined for the lowest speed.

- b - **Passing through resonance**

All machines must start and stop.

Starting from rest to reach the speed  $\omega$  (in the vibration isolation region), it is necessary to pass through the resonant region.

It is necessary to ensure :

- that the passage through resonance is as quick as possible;
- that the suspension is sufficiently well damped so that the maximum force transmitted presents no risk for the machine, the suspension or the seating.

- c - **Elastomeric suspensions**

For the elastomers currently used in flexible mounting systems, the intrinsic damping factor  $\epsilon_0$  lies between 0.02 and 0.1 (it can be as high as 0.2 with synthetics such as butyl rubber).

In the vibration isolation region, the formula for the transmission coefficient is simplified as, for the values of  $\epsilon_0$  for natural rubber, the term  $4\epsilon_0^2$  is negligible by comparison with 1.

$$\lambda = \frac{1}{\frac{\omega^2}{\omega_0^2} - 1} \quad \text{For } \epsilon_0 \text{ between } 0.02 \text{ and } 0.1$$

$$\text{At resonance } \lambda r = \frac{1}{2 \epsilon_0} \quad \lambda = \frac{1}{2 \epsilon}$$

For natural rubber, therefore, the amplification at resonance is between :

$$\frac{1}{2 \times 0,1} = 5 \quad \text{and} \quad \frac{1}{2 \times 0,02} = 25$$

- a) **Noise and vibration**

**Noise** is a random vibration. It is formed by the combination of a number of uncorrelated fundamental frequencies. Noise gives rise to **sound**.

Airborne noise is usually treated separately from structure borne noise.

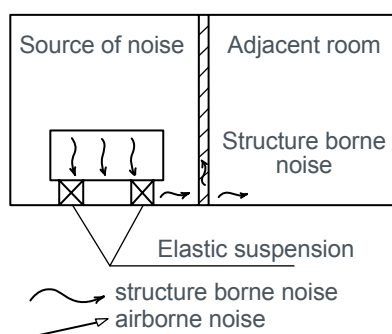
**Sound** is associated with the disturbance of a medium (solid, liquid or gaseous). This disturbance is in the form of a vibration of the molecules of the medium about their position of equilibrium.

- b) **Improving acoustics**

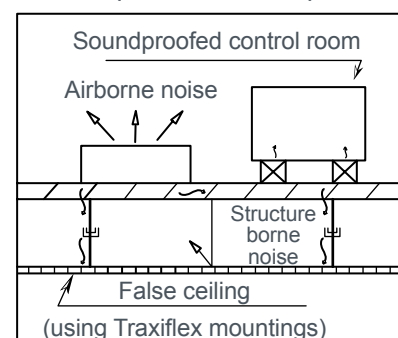
**An elastic suspension affects only structure borne noise.**

This is a vibration of the building structure and a flexible mounting system breaks the transmission close to the source. The resilience of the attachment reduces the forces transmitted to the base and its vibrational energy.

Transmission from one room to another



Example : Workshop with guillotine (shock and noise)

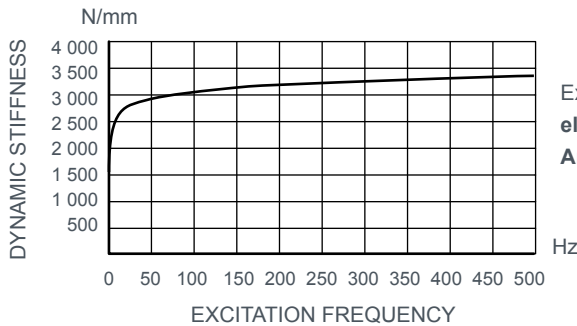


As the radiation efficiency is unchanged, the improvement in terms of radiated power (acoustic) is the same as the improvement in terms of the force transmitted. The curve giving the vibrational attenuation in % may be translated into decibels.

Attenuation in dB is :  $20 \log \frac{100}{100 - E}$  where E is the attenuation in % (structure borne, not airborne noise).

The suspension of the machinery allows the **adjacent room** to be sound insulated and to be made more quiet. The rigidity of the base supporting the suspended mass must always be taken into account. As a rule, it is considered that unless the mountings are ten times more flexible than the base the choice of suspension must be re-considered.

PAULSTRA mountings may be characterised at high frequencies.



Example of measurements made on a special Radiaflex mounting.  
**elastomer: polychloroprene hardness 47.**  
**Amplitude ± 0.01 mm about the position under static load**

### 3.2.2 - SHOCK

#### • The nature of shock

For a given period, the equipment is subjected to a brief, impulsive excitation. It is the most severe type of excitation that it may encounter during its lifetime.

During the period that the excitation is applied, the speed of the equipment will vary : it is subject to acceleration and, therefore, to a force.

A system that reacts slowly will not be subject to the same shock as a system that reacts quickly. It is necessary to compare the length of period that the stimulus is applied, against the natural frequency of the equipment.

#### • Types of shock

In practice, there are two types of problems.

- the equipment is subjected to shocks which are well defined by experiments, but are very complex and not reproducible under laboratory conditions. It is, therefore, necessary to define an equivalent shock;
- the equipment must resist shocks which are arbitrarily defined (e.g. meeting standards). A shock is defined by an excitation which varies with time: the acceleration, the speed or the displacement of the point where the excitation is applied. In some cases, it is better to define the shock as the energy transferred to the equipment (e.g. vehicle impact).

#### • Protection against shock

There are two principal cases to be considered :

##### a) Limitation of the force transmitted to the equipment :

This case often appears in the following form : the equipment, moving at a known speed meets an obstacle. The force that it can withstand without damage is limited to a known value.

A system of rubber parts, which could be the flexible mounting system of the equipment, is placed between the equipment and the obstacle.

These parts provide a constant stiffness  $K_z$  in the direction of the shock. If there is energy  $W$  to be absorbed in the absence of damping:

$$W = \frac{1}{2} K_z Z^2 \quad \text{The maximum force } F_M = K_z Z = \frac{2W}{Z} \quad \text{The maximum force is inversely proportional to the travel.}$$

The travel  $Z = \sqrt{\frac{2W}{K_z}}$  . The travel is inversely proportional to the square root of the stiffness.

**Remarque :** some systems do not have a constant stiffness, but a stiffness which increases rapidly (e.g. compression systems). It is clear that if the energy  $W$  is not absorbed before the stiffness increases, the maximum force will be much higher than predicted by this formula.

### b) Limiting the acceleration of particular parts of the equipment

In this case the shock must be described in terms of its potential to destroy. The efficiency of the protection system is measured by its ability to reduce this potential. A shock to the equipment can damage a component part if this part is induced to vibrate at an amplitude which is incompatible with its mechanical characteristics thus causing it to break.

A shock can be characterised by its action on a whole series of components.

For the same shock, each component has its own specific response, which differs from one component to the next.

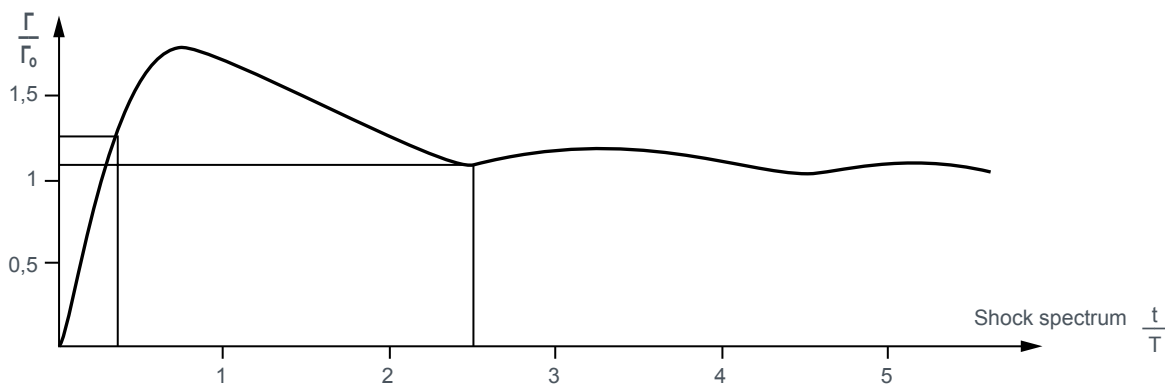
The shock spectrum is the graphical representation of the ratio of amplitude of vibration ( $\Gamma$ ) of the components to the amplitude of the shock ( $\Gamma_0$ ) as function of the ratio of the duration of the shock  $\tau$  to the natural frequency  $T$  of the elements.

This is not a representation of the amplitude as a function of time, neither of the excitation nor of the effect, but a convenient representation of the destructive power of a shock.

The representation is not reversible :

- it is not possible to recover the form of the shock from the spectrum;
- two different shocks may well produce the same spectrum.

Take, for example, the case of shock with a semi sinusoidal acceleration.



A piece of equipment must withstand a shock of  $\Gamma_0 = 400 \text{ m/s}^2$  for a period  $t = 8.75 \times 10^{-3} \text{ s}$ .

	Component A of the equipment	Component B of the equipment
Natural frequency	40 Hz	286 Hz
mass	10 kg	1 kg
$\frac{\tau}{T}$	$8,75 \cdot 10^{-3} \times 40 = 0,35$	$8,75 \cdot 10^{-3} \times 286 = 2,5$
$\frac{\Gamma}{\Gamma_0}$	1,25	1,1
Load on mounting points	$400 \times 1,25 \times 10 = 5000 \text{ N}$	$400 \times 1,1 \times 1 = 440 \text{ N}$

Study of the spectrum shows that the performance of a mounting system is acceptable when it is possible to obtain a natural frequency  $T$  such as:

$$\frac{\tau}{T} < 1 \text{ in which case the ratio } \frac{\Gamma}{\Gamma_0} \text{ is less than 1 and the component is protected.}$$

If it is not possible, it is better to set up the flexible mounting system to avoid the region of significant amplification for:

$$\frac{\tau}{T} \text{ between } 0.25 \text{ and } 2.5$$

This simple case shows the role of a flexible mounting system and the importance of knowing the details (shock spectrum, amplitude as a function of time) and, above all, the duration of the shock.

#### • The role of damping

Damping can be useful in reducing rebounds and the amplitude of successive cycles of oscillation. It is, however, important not to use just any type of damping as some can give rise to unfortunate reactions. Elastomers provide a compromise which allow the provision a high level of protection.

- **Important note**

Two points must always be borne in mind when designing equipment:

Firstly, that a high level of protection requires great flexibility which requires considerable clearance between the equipment and its surrounding;

Secondly, that the equipment will oscillate and room must be allowed for the rebound in case of shock. Travel limiters must be positioned so that they do not impede the operation of the flexible mounting system during the shocks allowed for in the design.

A flexible mounting system using rubber protects against shock by reducing the travel and maximum force. It is necessary to allow enough clearance for the rebound.

### 3.2.3 - General case

**Theoretical study** above is based on a very simple case:

movement with only one degree of freedom (vertical) with only one excitation (also vertical) aligned with both the centre of gravity of the suspended machine and the centre of elasticity of the mounting system.

**In general**, things are not so simple. The machine can move in any of the degrees of freedom (rotation or linear movement). In theory, there are as many **natural frequencies** as there are degrees of freedom.

These natural frequencies are not independent but are “coupled”. If one of these is excited in one degree of freedom, it can, as a result of the **coupling**, give rise to vibrations at the same frequency in other degrees of freedom.

To analyse the whole behaviour, the **stiffness** in all directions needs to be taken into account and not just the mass of the suspended body but also the **moments of inertia** so that rotational behaviour can be evaluated.

In addition there may be not one but several forced vibrations with variable frequencies applied to several different points, in various directions or about various axes.

Even general cases can be very complex however symmetrical structures and mounting arrangements allow the use of the single degree of freedom analysis shown above. In other cases only an in-depth study allows an effective solution to be found. Our Technical Services are there to help you to define it.

## 3.3 - Various types of flexible mounting systems

### 3.3.1 - Active isolation system

**This is a flexible mounting system designed to prevent a machine from transmitting its vibrations to its seating or foundation.**

This is the theoretical problem (with one degree of freedom), which was treated by attenuating the vibration, in the preceding pages.

**The vibration isolation does not stop the machine from vibrating, but it reduces the transmission of these vibrations.**

By comparison with a rigid suspension (which transmits the vibrations), the amplitude of the machine’s vibrations may be greater. The machine is, to an extent, freed from its fixed seating. This is the case for the automobile “floating engine” which, mounted on a flexible mounting system, no longer transmits its vibrations to the bodywork and the passengers due to increased mobility under the bonnet (hood).

If excessive movement cannot be tolerated, the only way to reduce it, without reducing the efficiency of the flexible mounting system, is to increase the suspended mass (ballasting). For a given excitation, the amplitude is inversely proportional to the mass.

This is necessary for certain machines which produce particularly severe vibration: slow single cylinder compressors, centrifuges, power hammers etc.

These machines, are therefore, rigidly fixed to a chassis or heavy slabs and the whole assembly is suspended.

Increasing the suspended mass allows good vibration isolation with limited vibration of the suspended assembly.

It is worthwhile suspending complete assemblies rather than individual machines: generating sets, motor/compressor units, motor/pump units.

### 3.3.2 - Passive isolation system

This is a flexible mounting system designed to protect a non-vibrating machine from the vibrations of its surroundings.

The design of a flexible mounting system for attenuating vibration, as defined above, is still valid. With the correct flexible mounting system, the acceleration transmitted to the machine is very small and as it is not subject to any other excitation it remains almost stationary.

The vibration of the supporting structure is almost entirely absorbed by the flexible mounts.

### 3.3.3 - Semi-rigid mounting system

This is a suspension where there is no vibration isolation for a given frequency  $\omega$

$$\left( \frac{\omega}{\omega_0} < \sqrt{2} \right)$$

As shown above, such a mounting system should be of no interest as it leads to an amplification of the vibration, not an attenuation. In practice, it can, however, give reasonable performance in the following two cases.

- **Coupling**

In practice, there is not just one movement. For a mounting system, several movements are possible. In fact, as we have seen (shape 2), a machine may have six degrees of freedom. A proper study of a mounts system will take into account the type of excitation acting on the machine and try to arrange that it does not vibrate in all directions. However, because of constraints on mounting points, the mounts may not always be put in ideal positions: if the machine is subject to an excitation in one direction, it may, therefore, move in several directions, e.g. two. These two movements are said to be “coupled”.

The natural frequencies in each direction are not identical. The coupling between the two movements has the effect of lowering the lower natural frequency and raising the higher. Instead of having one maximum (shape 5), the response curve has two. It is essential the excitation does not fall on one or the other. As it may demand an impossibly high flexibility, it is not always possible to make the coupled natural frequencies sufficiently low to put the frequency of the excitation in the vibration isolation region. On the other hand, if the two natural frequencies are placed on either side of the frequency of the excitation, a modest attenuation may be obtained.

- **Harmonics**

A vibration of frequency  $\omega$  is rarely “pure”. Frequently it also includes “harmonics”; i.e. vibrations at related frequencies  $2 \omega$ ,  $3 \omega$  ... Even if it is not possible to provide vibrational isolation of the fundamental  $\omega$ , it may be possible to attenuate the harmonics. This may be more important as the low frequencies are often inaudible and, in addition, correspond to very small mechanical accelerations whereas the higher frequencies are a source of noise which can be eliminated by an appropriate vibration isolator.

### 3.3.4 - External connections

So far, it has been assumed that the machine is only connected to its surrounding by its flexible mounting system.

In practice, there will be other connections, such as :

- pipework (inlet, exhaust, cooling);
- electric cables, remote controls...

It is necessary to ensure, or arrange, that these external connections are sufficiently flexible with respect to the relative movements.

This precaution will avoid :

- damage to pipework.
- reduced vibration isolation by introducing additional rigidity.
- direct transmission, via these connections, of the vibrations which have been suppressed elsewhere.

As the flexible mounts attenuate the transmission of the vibrations the machine is free to move, be sure to leave enough clearance in all directions to allow freedom of movement.



# 4 - DESIGNING A FLEXIBLE MOUNTING SYSTEM

When designing a flexible mounting system, it is essential to know, precisely the basic characteristics of the machine to be suspended.

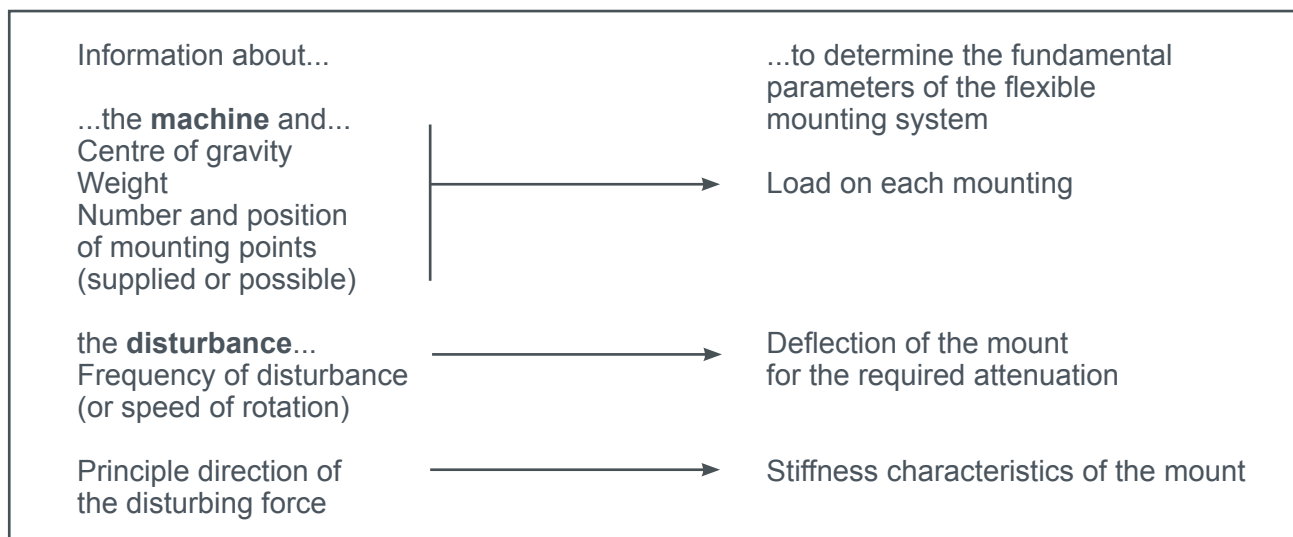
It is extremely useful to have a drawing (even if it is schematic) which shows the position of the centre of gravity and the mounting points provided.

The drawing may also allow the evaluation of certain parameters which may be necessary and which are often unknown to either the manufacturers or the users (e.g. moments of inertia).

For passive isolation, it is necessary to obtain the maximum of information about the external vibrations which may disturb the machine.

In any case, for complex problems (oscillations in many degrees of freedom, multiple excitation), it is advisable to consult our Technical Services.

For simple problems (one degree of freedom, or two degrees of freedom with the centre of gravity close to the mounting plane) it is possible to design the suspension, as shown below, with a minimum of information about the machine and the disturbance.



## 4.1 - Determining the centre of gravity

### 4.1.1 - Ask the manufacturer

In most cases, the manufacturer of the machine should be able to supply the exact position of the centre of gravity as well as the weight.

Consult the manufacturer.

### 4.1.2 - Graphical method for finding the centre of gravity of an assembly

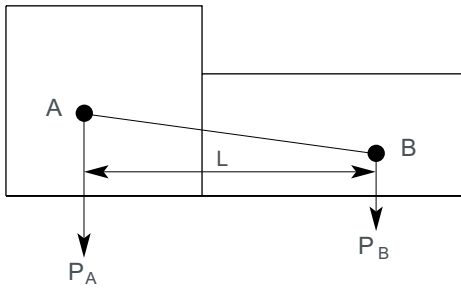
This is suitable for assemblies of units for which the individual weights and centres of gravity are known.

#### Important notes

- Using a graphical method, it is important to represent dimensions using a well determined scale and the weights by vertical lines whose lengths are proportional to their size (e.g. 1 cm for 10 daN).
- If the centres of gravity considered in this section are not in the same vertical plane, the procedures proposed here should be applied twice: for the front and for the side view with the outlines corresponding to each view.

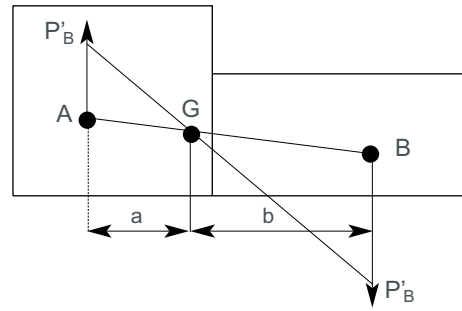


- **An assembly of two units**



**Shape 7**

Two units of weights  $P_A$  and  $P_B$  respectively with centres of gravity A and B separated by L.



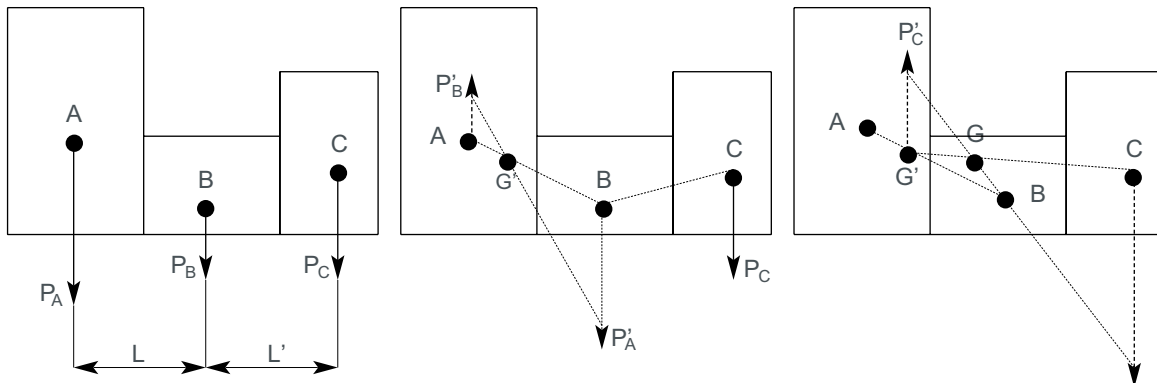
**Shape 8**

Draw :  $AP'_B = BP_B$       Join  $P'_A$  and  $P'_B$   
 $BP'_A = AP_A$   
 The centre of gravity G lies at the intersection of the lines  $P'_A P'_B$  and AB. Measure a and b.

- **An assembly of three or more units**

Proceed, stage by stage, as described above using groups of two units or sub-assemblies with centres of gravity and weight known or calculated.

**Shape 9**



### 4.1.3 - Experimental determination of the centre of gravity of a unit

This method is used where the above two methods prove to be impossible or difficult (complex geometry).

- **Using a roller**

For a given orientation (length, width and height) the centre of gravity is in the vertical plane passing through the axis of the roller when the machine is balanced. The centre of gravity is at the intersection of the three planes thus determined.

- **By «hanging»**

Suspended from a cable, the centre of gravity is on the vertical dropped from the suspension point. To find the exact centre of gravity, repeat the operation twice, using a different suspension point each time.

#### 4.1.4 - Analytical determination of the centre of gravity of an assembly of several masses

An assembly of several masses  $m_1, m_2, \dots, m_n$  is fixed in space. It is assumed that the coordinates, within an arbitrary Cartesian set, of each mass are known.

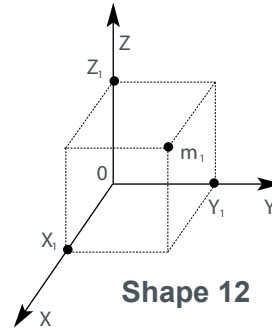
$$m_1 \begin{cases} X_1 \\ Y_1 \\ Z_1 \end{cases} \quad m_2 \begin{cases} X_2 \\ Y_2 \\ Z_2 \end{cases} \quad m_n \begin{cases} X_n \\ Y_n \\ Z_n \end{cases}$$

The mass of the assembly  $M = m_1 + m_2 + \dots + m_n$  acts at the coordinates of the centre of gravity of the whole :  $x, y, z$ .

$$x = \frac{m_1 x_1 + m_2 x_2 + \dots + m_n x_n}{M}$$

$$y = \frac{m_1 y_1 + m_2 y_2 + \dots + m_n y_n}{M}$$

$$z = \frac{m_1 z_1 + m_2 z_2 + \dots + m_n z_n}{M}$$



Shape 12

**Important note :** The coordinates of the centres of gravity may be negative and must be used with their sign.

## 4.2 - Determining the load per mount

### 4.2.1 - Number and position of the mounting points are not predetermined

In this case, the number and position of the mountings are determined in such a way that the load on each mounting is the same for all mounting points.

Taking, for example, a symmetrical machine with :

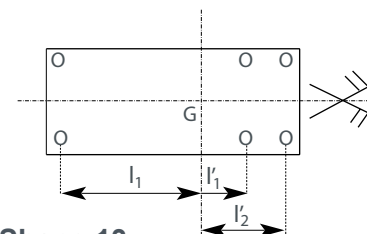
G : the centre of gravity,

P : the weight of the machine.

Calculate the position of 6 mounting points such that the load on all the mounting points is  $P_1$ .

$$P_1 l'_1 + P_1 l'_2 = P_1 l_1$$

from which  $l_1 = l'_1 + l'_2$  and the load per point =  $\frac{\text{Weight}}{6}$



Shape 13

### 4.2.2 - Number and position of the mounting points are predetermined

In this case, it may not be possible to have the same load on each mount.

#### • Four mounting points

A, B, C and D are the mounting points.

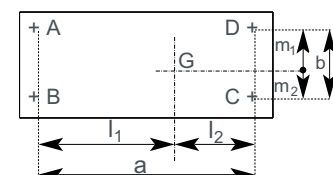
G the centre of gravity

P the total weight suspended

$P_A, P_B, P_C$  and  $P_D$  are the load on the mounting points A, B, C and D.

$$P_A = \frac{m_2}{b} \cdot \frac{l_2}{a} \cdot P \quad P_B = \frac{m_1}{b} \cdot \frac{l_2}{a} \cdot P$$

$$P_C = \frac{m_1}{b} \cdot \frac{l_1}{a} \cdot P \quad P_D = \frac{m_2}{b} \cdot \frac{l_1}{a} \cdot P$$



Shape 14

If  $P_A, P_B, P_C$  and  $P_D$  are significantly different, it is, theoretically, necessary to choose four different mounts which will give the same deflection under the various loads.

• **More than four mounting points (shape 15)**

In this case it is best if the assembly is symmetrical about a vertical plane. This is assumed to be true in the following.

To the left of G, there are 2n identical mounts.

To the right of G, there are 2p identical mounts which are, possibly, different from the 2n mounts to the left.

The problem is to set the difference between the left hand and right hand mounts so that the deflection under load of the 2n + 2p mounts are all the same.

Under these conditions, all the mounts to the left of G will be supporting the same load Q and all those to the right will be supporting the same load R.

This will give :

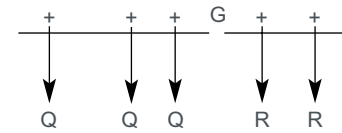
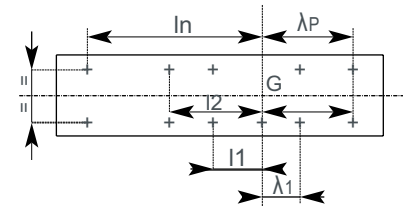
$$Q (l_1 + l_2 + \dots + l_n) = (\lambda_1 + \lambda_2 + \dots + \lambda_p)$$

$$2 nQ + 2 pR = P$$

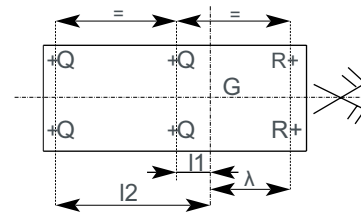
From which the mounts load is:

$$Q = \frac{\lambda_1 + \lambda_2 + \lambda_p}{2 n (\lambda_1 + \lambda_2 + \dots + \lambda_p) + 2 p (l_1 + l_2 + \dots + l_n)} .P$$

$$R = \frac{l_1 + l_2 + \lambda_p}{2 n (\lambda_1 + \lambda_2 + \dots + \lambda_p) + 2 p (l_1 + l_2 + \dots + l_n)} .P$$



**Shape 15**



**Shape 16**

If Q and R are not too different, the same size mounts may be used but with different hardness elastomers.

Example (shape16)

Taking a symmetrical machine with an offset centre of gravity G and 6 mounting points n = 2 et p = 1.

which gives :

$$Q = \frac{\lambda}{4 \lambda + 2 (l_1 + l_2)} .P$$

$$R = \frac{l_1 + l_2}{4 \lambda + 2 (l_1 + l_2)} .P$$

If the machine weighs 500 daN

and  $\lambda = 0.4$  m;  $l_1 = 0.3$  m;  $l_2 = 0.9$  m, then  $Q = 50$  daN and  $R = 150$  daN.

**4.2.3 - Important notes**

If a single size of mount is used but different hardness elastomers are chosen, there is a high risk that the mount may be interchanged which may degrade the attenuation of the suspension. The machine must be mounted with great care.

There are, however, benefits from using identical mounts to build a suspension. If the predetermined mounting points of the chassis do not allow a centered suspension, the solution is to attach these to a false chassis, as rigid as possible, to which the desired number of identical flexible mounts are attached in the positions required. If this false chassis is a slab of concrete (or inertia block) the suspended mass is increased which improves the quality of the suspension.

## 4.3 - Determining the deflection

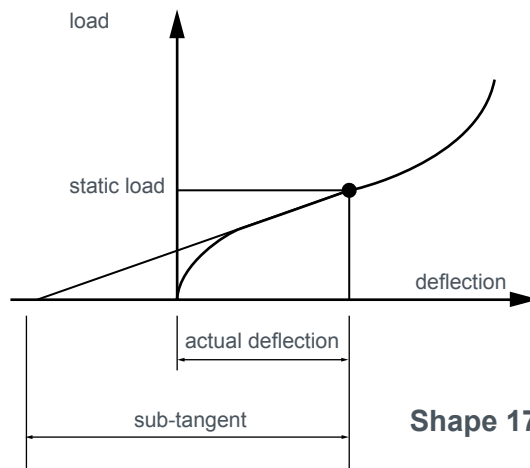
### 4.3.1 - Deflection and sub-tangent

Shape 17 is a graphical representation of the derivation of the deflection and sub-tangent from the load-deflection curve.

For a given static load, the deflection corresponds to the compression of the mount under that load, but the stiffness about the position under load is given by the sub-tangent (the projection of the tangent onto the axis). This is the elasticity which determines the natural frequency of the mounting.

$$\omega_o = \sqrt{\frac{K}{M}} = C \sqrt{\frac{1}{\text{sub-tangent}}}$$

(C = constant )



For most PAULSTRA mounts, the load/deflection curve is linear in the region of static loads and, as a result, the sub-tangent and the deflection are identical.

The curve in shape 17 is typical of EVIDGOM mounts.

For these it is best to work at the point of inflection of the curve where the sub-tangent is the largest possible and so the natural frequency is as low as possible.

**The deflection does not indicate the amplitude of the oscillations of the machine.**

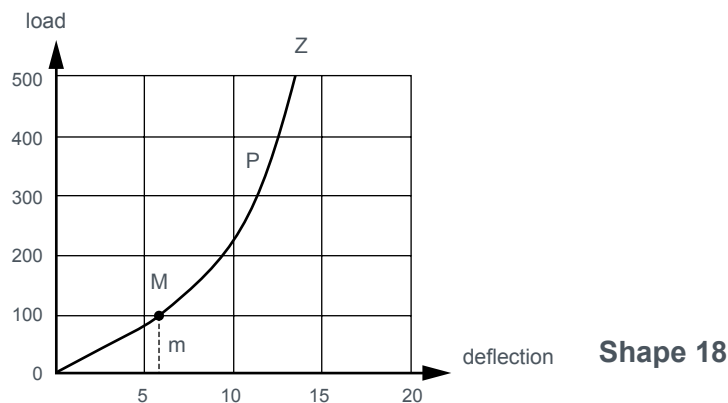
### 4.3.2 - Operating regions

The region OM is the static load region. The deflection is approximately proportional to the load.

**In the data sheets, the coordinates of the point M are given as the NOMINAL STATIC LOAD.**

The region MP is the dynamic load region corresponding to normal, repeated shocks provided that the rate and total deflection stay within normal limits.

In the region PZ, which corresponds to exceptional, accidental shocks, the curve rises rapidly. The stiffness increases progressively which has the effect of reducing the amplitude of the movement. Note that, because of the natural damping properties of the rubber, this increase also depends on the speed of impact.



### 4.3.3 - Attenuation - excitation frequency

At a given excitation frequency  $\omega$ , the attenuation depends on the natural frequency  $\omega_0$  and thus the sub-tangent. With most rotating machinery, the excitation frequency in cycles per minute can be taken to be the rotation speed in rpm.

As indicated on the chart in § 3.2.1 for a natural frequency in a known direction, the aim is to obtain the highest possible attenuation within the constraints of the load / deflection characteristics of the mounts.

The deflection selected must not be so high as to be detrimental to the stability of the suspension. If the operating point is not within the vibration isolation zone, our technical services should be consulted.

### 4.3.4 - Static stiffness - dynamic stiffness - natural frequency

Whereas deflection and sub-tangent are given by the static stiffness curve of the mounting, its natural frequency is linked to the dynamic stiffness. In the case of elastomeric mountings, static and dynamic stiffness can be different.

The ratio between static and dynamic stiffness depends on the input amplitude, the frequency and the type of elastomer. Under nominal load, the natural frequency is given for indication only.

For a different load, the natural frequency could be found with the following formula:

$$f_0 \text{ (actual load)} = f_0 \text{ (nominal load)} \times \sqrt{\frac{\text{nominal load}}{\text{actual load}}}$$

This approximate is valid only if the actual load is in the linear part of the load/deflection curve (shape 17 & 18).

## 4.4 - Design examples

PAULSTRA mounts are classified according to their stiffness characteristics

Therefore, after having determined the number and deflection of the mountings as described above, the choice of mounts depends on the direction of the excitation.

- equi-frequency mounts : the flexibility is approximately the same vertically as horizontally;
- mounts with high axial flexibility : high axial flexibility while supporting radial loads;
- mounts with high radial flexibility : high radial flexibility while supporting axial loads;
- low frequency mountings : high sub-tangent to achieve a very low natural frequency (a few Hertz).

### 4.4.1 - Suspension for a fan

#### • Characteristics of the equipment

- Weight : 3000 daN.
- Speed of rotation : 1200 rpm.
- Fan mounted on a 2.5 x 3m chassis with no constraint on the position of the mounting fixing points.
- Known centre of gravity.

Number of mounts : after trials, using successive approximation to balance the moments of inertia, 12 mounting points were selected.

Load per mounting = 3000/12 = 250 daN.

Natural frequency of the mounts (see chart).

For an input frequency (or speed of rotation) of 1200 rpm, the maximum natural frequency is 14 Hz. A natural frequency of 7 Hz will achieve a reasonable attenuation of about 85%.

Therefore, a mounting system with a natural frequency of 7 Hz under 250 daN is required.

As it is a rotating machine with no special characteristics, isometric mountings are selected.

The selection guide gives a PAULSTRADYN mount with a 8 mm deflection under a 260 daN load. According to the data sheet for PAULSTRADYN mounts, the PAULSTRADYN Ø 100 hardness 60 has a deflection of 7.4 mm under a load of 240 daN, which is just right.

#### • Suspension characteristics:

- 12 PAULSTRADYN 260. Mount part number 533712.

$$\text{- Ratio} = \frac{\text{real load}}{\text{nominal load}} = \frac{250}{260} = 0.96$$

- Attenuation ~ 85%\*.

- Loaded height ~ 32.5 mm\*.

\*These values are given by the Paulstradyn data sheet.

#### 4.4.2 - Suspension of an engine/hydraulic pump unit mounted on an excavator

- **Characteristics of the assembly**

- Weight: 1200 daN.
- Speed of rotation : 1500 rpm.
- Known centre of gravity.
- 6 mounting points.

Load per mounting :  $1200/6 = 200$  daN.

Deflection (see chart, shape 5).

For a frequency of 1500 rpm, a deflection of 3 mm will achieve an attenuation of approximately 85%.

The vibrations are predominantly vertical and the unit needs to be restrained laterally to cope with the movement of the excavator in operation. Mountings with dominant axial flexibility are selected.

The PAULSTRA mount selection guide shows a STABIFLEX mount with a deflection of 5 mm for a load of 210 daN. According to the STABIFLEX mounting data sheet, the mount required is a STABIFLEX 530622 hardness 45 with a square base.

- **Suspension characteristics (under 1 200 daN at 1 500 tr/mn)**

- 6 STABIFLEX mounts reference 530622 hardness 45.
- Deflection 4.7 mm.
- Theoretical attenuation 85% (16 dB).

#### 4.4.3 - Suspension of a sieve

- **Characteristics of the equipment**

- Weight: 400 daN.
- Vibration frequency (horizontal): 1200 cycles/mn or 20 Hz.
- Known centre of gravity.
- 6 mounting points.

Load per mounting:  $400/6 = 66$  daN.

Deflection (see chart, shape 5).

For a frequency of 20 Hz, a deflection of **6 mm** will achieve an attenuation of approximately 70%.

Mount characteristics required:

- 1) mounts which will withstand the vertical load;
- 2) mounts with a radial flexibility very much greater than the axial flexibility (mounting with dominant radial flexibility);
- 3) providing vibration isolation vertically (axially), which, taking account of requirement (2), will assure the horizontal vibration isolation.

The PAULSTRA mount selection guide gives a RADIAFLEX cylindrical stud giving a deflection of 8 mm for a load of 70 daN.

According to the RADIAFLEX mounting data sheet, the mount required is a stud  $\varnothing$  30 height 30 mm with 2 mounting bolts (ref. 521312).

The radial flexibility (shear) is considerably higher than axial flexibility (compression).

- **Suspension characteristics :**

- 6 RADIAFLEX cylindrical mounts with 2 screws reference 521312 (theoretical vibration attenuation : 80% - 14 dB).

#### 4.4.4 - Suspension of a compressor unit

- **Characteristics of the assembly**

- Weight: 6000 daN.
- Speed of rotation : 400 rpm.
- Known centre of gravity.
- 8 mounting points.
- Load per mount:  $6000/8 = 750$  daN.

- **Deflection of the mountings**

For a frequency of 400 rpm, the minimum deflection to be within the vibration isolation region is 12 mm. The PAULSTRA mounting selection guide gives a low frequency mounting which can provide sufficiently large deflections (26 mm).

According to the EVIDGOM mount series data sheet, the mounting required is an EVIDGOM mount Ø 125, height 140 mm, reference 810784 which gives a deflection of 26 mm under a load of 800 daN.

- **Suspension characteristics**

- 8 EVIDGOM mountings reference 810784, Ø 125 mm, height 140 mm.
- Deflection 26 mm.
- Attenuation 37% (4 dB).

**Note** : as the low frequency mounts are tall, for some applications (sideways forces) it may be necessary to provide lateral stops.

#### 4.4.5 - Suspension from a ceiling (false ceiling, ventilation units, pipework)

- For light loads of 15 to 135 kg per item our TRAXIFLEX mount may be used directly.

Example of use :

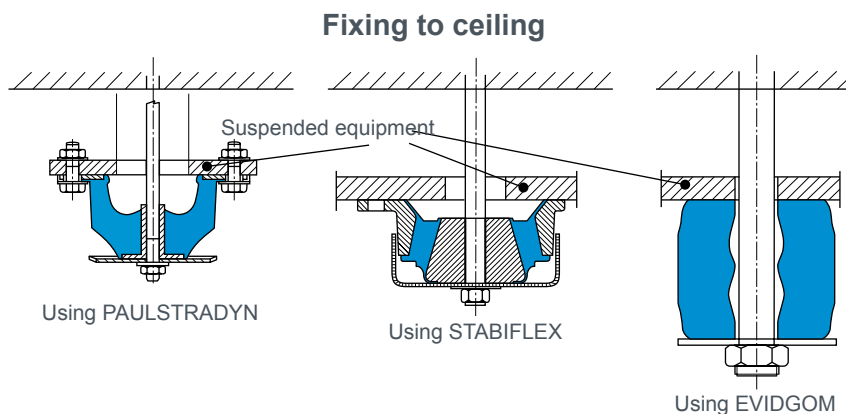
False ceiling - load per mount 50 kg - frequency of excitation 25 Hz - mounting selected 535611 hardness 45 - deflection under load 4 mm - theoretical vibration attenuation 77% - 13 dB.

- For heavy loads, it is necessary to use a PAULSTRADYN, STABIFLEX or EVIDGOM mounting with a safety fixing.

Example of use :

1. Suspending a ventilation unit - weight 1000 daN - frequency 25 Hz - 4 PAULSTRADYN mount Ø 100 reference 533712 - natural frequency. 7 Hz - theoretical vibration attenuation 90% - 20 dB.
2. Suspending a special 5 tonnes machine requiring accurate radial positioning - frequency 20 Hz - 4 STABIFLEX mount reference 530652 hardness 60 - deflection under load 8 mm - theoretical vibration attenuation 84% - 16 dB.
3. Suspending a 20 tonnes tank subject to longitudinal expansion - frequency 15 Hz - 4 EVIDGOM mount reference 810733 hardness 60 - deflection under load 50 mm - theoretical vibration attenuation 95% - 26 dB.

Mounting examples :
















# MOUNTING

APPLICATIONS	HIGH RADIAL FLEXIBILITY		HIGH AXIAL FLEXIBILITY	LOW FREQUENCY	HIGH SHEAR FLEXIBILITY	PRIMARILY AXIAL LOADING	
	RADIAFLEX®	STOPS	PAULSTRADYN®	EVIDGOM®	SANDWICH	STABIFLEX	PAULSTRAFLOAT®
							
Pages	p. 54	p. 58	p. 63	p. 67	p. 70	p. 73	p. 76
ACOUSTIC CASING							
AIR CONDITIONERS / FANS							
CEILING / PIPELINES / PIPING							
CIVIL ENGINEERING							
CONTROL AND MEASURE EQUIPMENT							
CRANES							
ELECTRICAL CABINETS							
ELEVATORS							
FLOATING FLOORS							
FRAGILE EQUIPMENT TRANSPORTATION							
GENSET							
HOPPERS							
LABORATORY EQUIPMENT, COMPUTER							
MACHINES TOOLS							
MOTO-COMPRESSORS							
MOTO-PUMPS							
ONBOARD ELECTRONIC EQUIPMENT							
POWER PRESS							
ROLL							
SHREDDERS							
SIVES							
SPEED BOX / REDUCERS							
THERMAL MOTORS							
TRANSFORMERS							
VEHICLE CABIN							





## Antivibratory suspension Survey

Date : .....

Company : ..... Address : .....

Tel : ..... Mail : .....

Contact : ..... Function : .....

### Technical informations

#### 1. Application :

Type of machine : .....

Stationary application

Embedded application

The supports will work in

- compression (straight)
- shear (lateral)
- traction (suspended from the ceiling)

#### 2. Weight of the machine :

Total weight : ..... Kg      Number of mounting points : .....

Is the gravity center centered?      Yes       No

If no, position of the gravity center : .....

#### 3. Vibration and / or shock of the equipment :

Machine rotation speed :

Minimum : ..... tr/min    Normal : ..... tr/min    Maximum : ..... tr/min

For shock machines, indicate the rate : ..... knock/min

#### 4. Environment :

Outdoor mounting  or indoor mounting

Ambient temperature : ..... °C

Presence of liquid :    Yes       No

If Yes precise : .....

# RADIAFLEX®



## DESCRIPTION

- Metalwork : mild steel, plated.
- Natural rubber, bonded, cylindrically shaped.
- Fixing by screws, nuts or mixed.

European thread standards are not always consistent with French thread standards so Paulstra has created the Radiaflex® Europe range based on those standards.

The end stop version is now available with a threaded hole in addition to the threaded stud.

## CHARACTERISTICS

The design of the RADIAFLEX® mount gives the following basic characteristics:

- radial elasticity greater than axial elasticity.
- the rubber works in :
  - compression (axial),
  - shear (radial),
  - compression/shear according to the fixing method.

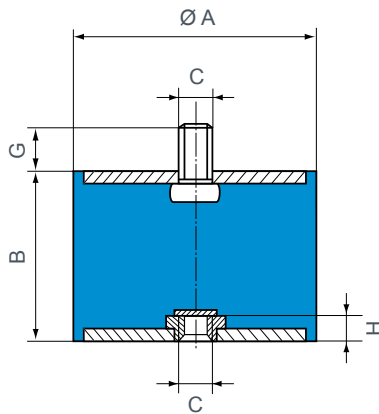
### Advantages

- Simple to fix.
- Simple and economical.
- Extensive range

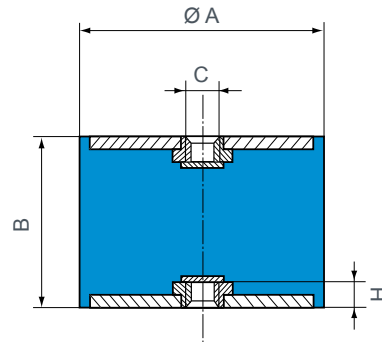


# DIMENSIONS AND COMPRESSIVE LOADS

Combination fixing



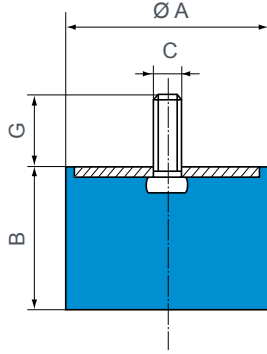
2 threaded holes



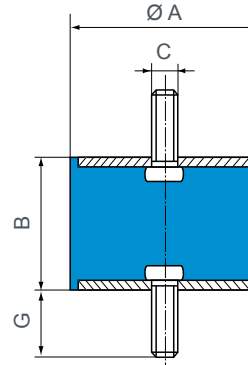
Ø A (mm)	B (mm)	C	G (mm)	H (mm)	Compression		Shear*		Ref.
					Max. load (daN)	Deflection (mm)	Max. load (daN)	Deflection (mm)	
16	10	M4	10	2	20	1,5	2,5	1,5	520053
	15				3	2,5		520054	
	10	M5	12	3	20	1,5	1,5		520010
	15				3	2,5	520011		
20	4				2,5	520012			
25	5	2	5	520013					
20	15	M6	16,5	4	35	2,5	5	2,5	520015
	20				30	4,5	5	5	520016
	25				30	5,5	4,5	4,5	520017
	30				25	7	4,5	4,5	520018
25	25	M6	18	6	40	3,5	9	5	520062
25,5	15	M6	18	4	60	2,5	8	8,5	520052
	20				3,5	8	4	520055	
	30				7,5	8	6	520057	
	22	M8	20	6	50	3,5	8	4	520021
	25				5	8	4,5	520022	
30	7,5				8	6	520023		
40	10	6	6	520024					
30	15	M8	25	6	90	3	11	2,5	520025
	22				4,5	11	4	520026	
	30				7,5	11	6	520027	
	40				9	11	7,5	520028	
40	30	M8	20	6	150	4,5	20	5,5	520056
	40				10	20	7,5	520058	
	40				10	20	7,5	520058	
	20	M10	25	8	160	4	20	3	520029
	28				5	20	5,5	520030	
	35				7,5	20	6,5	520031	
40	10				20	7,5	520032		
45	11	20	9	520033					
50	45	M10	15	8	190	11	25	9	520036/15
	20	M10	28	8	300	3	35	9,8	520047
	30				5	34	9,8	520048	
	35				25	8	25	7	520035
	40				28	7	34	8,5	520063
	45				25	11	25	9	520036
50	M10	28	10	160	9	34	11	520061	
60	36	M10	25	8	300	8	30	7	520038
	45				250	10	30	9	520039
70	35	M10	25	9	450	7,5	35	6,5	520040
	50				10	35	11	520041	
	50				14	35	15	520042	
	70				7	80	8,5	520070	
75	45	M12	30	10	400	7	80	9	520071
	55				380	10	80	12	520072
80	40	M12	28	10	600	8	40	7	520059
	40	M14	35	12	600	8	40	7	520044
	70				17	40	15	520045	
	80				19	40	17	520046	
100	40	M16	47	14	1 100	6	60	7	520100
	55				12	60	10	520101	
	80				19	60	17	520102	
	80				18	60	20	520103	
	100				18	60	20	520103	

Ø A (mm)	B (mm)	C	H (mm)	Compression		Shear*		Ref.
				Max. load (daN)	Deflection (mm)	Max. load (daN)	Deflection (mm)	
16	10	M4	2,5	20	1,5	2,5	1,5	520550
	15			3	2,5	2	520551	
	10	M5	3	20	1,5	2,5	1,5	520500
	15			3	2,5	2	520501	
20	4			2,5	4	520502		
25	5	2	5	5	520503			
20	15	M6	4	35	0,5	5	2,5	520505
	20			30	4,5	5	3,5	520506
	25			30	5,5	4,5	4,5	520507
	30			25	7	4,5	4,5	520508
25,5	20	M6	4	50	3	8	4	520554
	30			7,5	8	6	520555	
	22	M8	6	50	3	8	4	520511
	25			4,5	8	4,5	520512	
	30			7,5	8	6	520513	
40	10	6	6	520514				
30	22	M8	6	80	4	11	4	520516
	30			7,5	11	6	520517	
	40			9	11	7,5	520518	
40	30	M8	6	150	4,5	20	5,5	520552
	40			10	20	7,5	520553	
	28	M10	8	150	4,5	20	5,5	520520
	35			7	20	6,5	520521	
40	10	20	7,5	520522				
45	11	20	9	520523				
50	35	M10	8	250	7	25	7	520525
	45			10	25	9	520526	
50	30	M10	10	190	5	34	6	520524
	40			7	34	8,5	520527	
	50			9	34	11	520533	
60	36	M10	8	300	7	30	7	520528
	45			9	30	9	520529	
70	35	M10	9	450	7	35	6,5	520530
	50			9	35	11	520531	
	70			14	35	15	520532	
75	40	M12	13	450	7	80	8,5	520558
	55			10	80	12	520557	
80	40	M12	10	600	7	40	7,5	520556
	40			M14	12	600	7	40
	70	17	40			15	520535	
	80	19	40			17	520536	
100	40	M16	14	600	4	60	7	520541
	55			12	60	10	520542	
	60			8	180	10	520545	
	75			10	140	12	520546	
	80			19	60	17	520543	
	100			18	60	20	520547	

1 threaded studs



2 threaded studs



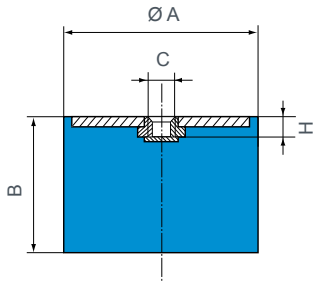
Ø A (mm)	B (mm)	C	G (mm)	Compression		Ref.
				Max. load (daN)	Deflection (mm)	
12,5	10	M5	10	12	2	511110
	13,5			11	2,5	511128
	15			10	3	511115
	20			8	3,5	511125
16	10	M4	10	20	2	511150
	15			3	511151	
	10	M5	12	20	2	511292
	15			3	511294	
20	4			511296		
25	15	5	511298			
20	5	M6	10	77	0,6	511206
	8,5			40	1,5	51120011
	8,5	M6	16,5	40	1,5	511200
	15			35	4	511215
	20			30	5	511220
	25			30	5,5	511225
30	25			7	511230	
25,5	10	M6	18	80	2	511158
	15			60	3,5	511155
	20			50	5	511159
	30			50	8	511160
	5	M8	20	82	0,6	51126550
	10			80	2	511265
	15			60	3,5	511270
	15	M8	12	60	3,5	51127013
	19	M8	20	55	4,5	511251
	22			50	5,5	511275
	25			50	6	511280
	30			50	8	511285
40	50			10	511290	
30	15	M8	25	90	3,5	511308
	22			80	6	511310
	30			70	8	511312
	40			60	9	511314
40	20	M8	20	160	5	511411
	30			120	7	511157
	40			120	10	511161
	40			120	10	511161
	20	M10	25	160	5	511450
	25			150	6	511401
35	M10	25	120	8	511452	
40			120	10	511454	
45			120	11	511456	
45			120	11	511456	
50	25	M10	25	300	6	511525
	35			250	9	511535
	45			190	11	511545
	45			190	11	511545
	45			190	11	511545
60	22	M10	25	350	3	513601
	25			400	6	511625
	36			300	9	511635
	45			250	11	511645
	45			250	11	511645
70	35	M10	25	450	9	511735
	50			350	12	511750
	70			300	14	511770
75	25	M12	37	600	4,5	511751
80	25	M14	45	1 100	6	513801
	30			950	8	511830
	40			600	10	511840
	70			500	17	511870
80	35	450	19	511880		

See current price list for availability of items.

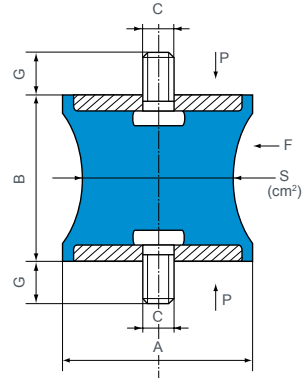
Ø A (mm)	B (mm)	C	G (mm)	Compression		Shear*		Ref.		
				Max. load (daN)	Deflection (mm)	Max. load (daN)	Deflection (mm)			
10	8	M3	6	10	1,6	1,25	0,9			
12	8	M3	6	12	1,2	1,5	0,75			
12,5	10	M5	10	12	2	1,5	1,5	521293		
	15			3	2,5	2	521128			
	20			8	2,5	4	521295			
16	10	M4	10	20	1,5	2,5	1,5	521650		
	15			3	2	521651				
	10	M5	12	20	1,5	2,5	1,5	521292		
	15			3	2,5	2	521294			
	20			4	2,5	4	521296			
	25			15	2	5	521298			
20	8,5	M6	16,5	40	0,6	5	1	521178		
	15			35	3	2,5	521249			
	20			30	4,5	5	521297			
	25			30	5,5	4,5	521299			
	30			25	7	4,5	521319			
25	25	M6	18	40	3,5	9	3,5	521654		
25,5	10	M6	18	80	1,5	8	1,5	521655		
	15			60	2,5	8	2,5	521656		
	20			50	2	8	4	521652		
	30			50	7,5	8	6	521653		
	30			50	7,5	8	6	521653		
25,5	10	M8	20	80	1,5	8	1,5	521340		
	15			60	2,5	8	2,5	521341		
	22			50	4	8	4	521251		
	25			50	5,5	8	4,5	521342		
	30			50	7,5	8	6	521343		
	40			50	10	6,5	6	521344		
30	15	M8	25	90	3	11	2,5	521308		
	22			80	5	11	4	521310		
	30			70	8	11	6	521312		
	40			60	9	11	7,5	521314		
40	30	M8	20	150	6	20	5,5	521181		
	40			120	10	20	7,5	521657		
	20	M10	25	160	4	20	3	521450		
	28			150	6	20	5,5	521401		
	35			120	8	20	6,5	521452		
	40			120	10	20	7,5	521454		
45	120	11	20	9	521456					
50	20	M10	25	300	3	35	3,5	521583		
	25			25	6	25	4,5	521580		
	30			190	5	34	6	521584		
	35			25	8	25	7	521581		
	40			28	7	34	8,5	521585		
	45			25	11	25	9	521582		
	45			M10	15	190	11	25	9	52158215
	50			M10	24	160	9	34	11	521586
60	25	M10	25	400	5	30	4,5	521601		
	36			300	8	30	7	521603		
	45			250	11	30	9	521641		
70	35	M10	25	450	8	35	6,5	521705		
	50			350	11	35	11	521710		
	70			300	14	35	15	521711		
75	25	M12	37	600	4,5	80	5	521712		
	40			450	7	80	8,5	521713		
	55			37	380	10	80	12	521714	
80	40	M12	28	600	9	40	7	521658		
	30			45	950	7	40	5	521803	
	30			35	950	7	40	5	521840	
	40			35	600	9	40	7	521841	
	70			35	500	17	40	15	521842	
	80			35	450	19	40	17	521843	
100	40	M16	47	1 100	8	60	7	521908		
	55			900	12	60	10	521909		
	80			750	19	60	17	521910		

\* The shear characteristics are measured under axial load.

### 1 threaded hole

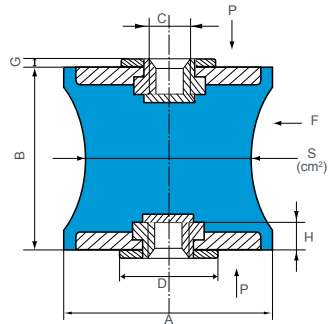


### Diabolo mounts



Ø A (mm)	B (mm)	C	H (mm)	Compression		Ref.
				Maxi. load (daN)	Deflection (mm)	
16	10	M4	2,5	20	2	511152
	15			20	3	
20	15	M6	4	35	4	511154
25,5	15	M6	4	60	3,5	511164
	20			5,5	511162	
	30			8	511163	
30	22	M8	6	80	6	511156
40	28	M8	7	110	5	511178
	40		15	100	7,5	511179
50	20	M10	10	343	3,4	511168
	30			190	5	511180
	40			170	7	511181
60	25	M10	8	400	6	511182
	45			250	11	511183
75	25	M12	12	600	4,5	511184
	40		10	450	7	511185

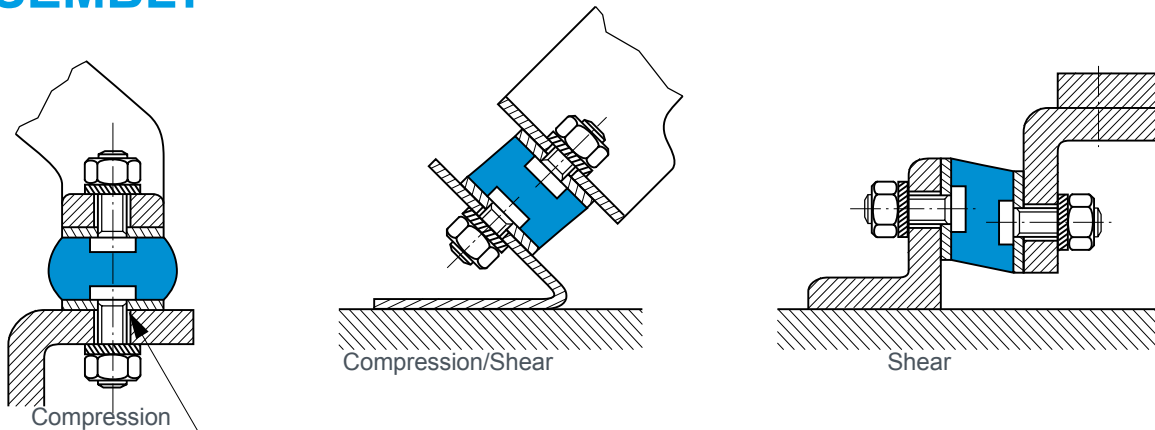
Ø A (mm)	B (mm)	C	G (mm)	Ø S (mm)	Compression (P)		Shear* (F)		Ref.
					Max. load (daN)	Deflection (mm)	Max. load (daN)	Deflection (mm)	
12,5	14	M5	10	0,3	3	1,4	0,5	1,2	521300
20	19	M6	16,5	1,6	12	2,5	3	5	521201
40	28	M10	25	3,1	30	5	2,5	4,5	521403
57	44	M8	20	5	40	5	7	5	521571
57	44	M8	20	9,5	75	5	12	6	521572
60	60	M10	25	19,5	150	8	30	10	521602
80	70	M14	35	38,5	300	9,5	55	9,5	521801
95	76	M16	45	50	400	9,5	70	8	521951



Ø A (mm)	B (mm)	C	Ø S (mm)	H (mm)	G (mm)	D (mm)	Compression (P)		Shear* (F)		Ref.
							Max. load (daN)	Deflection (mm)	Max. load (daN)	Deflection (mm)	
80	60	M14	38,5	15,5	3	30	250	5	70	8	521802

\* Shear characteristics' are measured under axial load.

## ASSEMBLY



The fixing holes for the Radiaflex mounts should have a chamfer with a depth equal to the pitch of the thread.

# STOPS

See :  
Supports and  
Bump stops



Cylindrical  
stop



Conical  
progressive  
stop



LEVAFLEX  
progressive  
stop



EVIDGOM  
stop

## DESCRIPTION

There are several types of stops :

- cylindrical or DIABOLO stops;
- conical progressive stops;
- LEVAFLEX progressive stops with central cavity;
- EVIDGOM stops.

## OPERATION

The design of the PAULSTRA elastic stops gives the following basic characteristics :

- highly deformable allowing high energies to be absorbed;
- progressive absorption of energy due to the carefully designed shape.

### Advantages

- By comparison with rigid stops, PAULSTRA elastic stops are quiet and avoid hammering and deterioration of equipment.

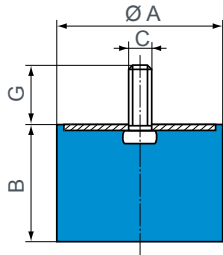
### Recommendations

- The stops must be fitted so that, on impact, the axis of the stop is perpendicular to the contact surface.
- On impact, the external diameter of the stop increases: this must be allowed for when fixing.

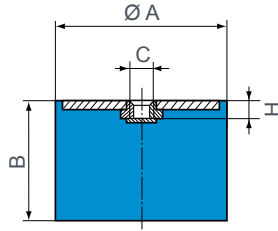
# DIMENSIONS AND OPERATING CHARACTERISTICS

## CYLINDRICAL STOPS

Shape 1



Shape 2

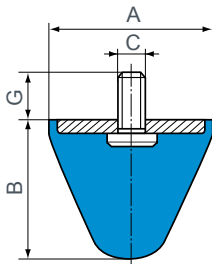


Ø A (mm)	B (mm)	C	G (mm)	Shape	H (mm)	Max. load (daN)	Deflect. (mm)	Energy (joules)	Reference
12,5	10	M5	10	1	-	12	2	0,12	511110
	13,5					2,5	0,13	511128	
	15					3	0,16	511115	
	20					3,5	0,14	511125	
16	10	M4	10	1	-	20	2	0,20	511150
	15					3	0,30	511151	
	10					2	0,20	511152	
	15					2	0,30	511153	
	20					3	0,30	511153	
20	15	M6	-	2	4	35	4	0,70	511154
	8,5					40	1,5	0,30	511200
	15					35	4	0,70	511215
	20					30	5	0,70	511220
25,5	10	M6	18	1	-	80	2	0,80	511158
	15					60	3,5	1,00	511155
	20					50	5	1,20	511159
	30					50	8	2,00	511160
	15					60	3,5	1,00	511164
30	15	-	-	2	4	55	5,5	1,20	511162
	20					4	1,20	511163	
	25					4	2,00	511163	
	30					4	2,00	511163	
	30					4	2,00	511163	

Ø A (mm)	B (mm)	C	G (mm)	Shape	H (mm)	Max. load (daN)	Deflect. (mm)	Energy (joules)	Reference
25,5	10	M8	20	1	-	80	2	0,80	511265
	15					3,5	1,00	511270	
	19					5,5	1,20	511251	
	22					5,5	1,30	511275	
	25					6	1,50	511280	
	30					8	2,00	511285	
	40					10	2,50	511290	
30	22	M8	-	2	6	80	6	2,40	511156
	15					90	3,5	1,50	511308
	22					80	6	2,40	511310
	30					70	8	2,80	511312
40	30	M8	20	1	-	120	7	4,60	511157
	40					120	10	6,00	511161
	20					160	5	4,00	511450
	25					150	6	4,50	511401
	35					120	8	4,80	511452
50	25	M10	25	1	-	300	6	9,00	511525
	35					250	9	11,20	511535
	45					190	11	10,00	511545
	25					400	6	12,00	511625
	36					300	9	13,50	511635
60	45	M10	25	1	-	250	11	13,70	511645
	35					450	9	20,00	511735
	50					350	12	21,00	511750
70	70	M10	25	1	-	300	14	21,00	511770
	35					450	9	20,00	511735
75	24	M12	37	1	-	600	4,5	13,50	511751
80	25	M14	45	1	-	1100	6	33,00	513801
	30					950	8	38,00	511830
	40					600	10	30,00	511840
	70					500	17	42,50	511870
	80					450	19	43,00	511880

See current price list for availability of items.

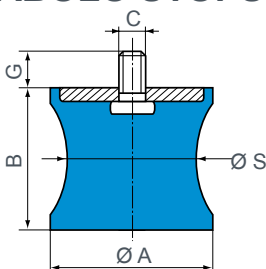
## CONICAL PROGRESSIVE STOPS



Reference	Ø A (mm)	B (mm)	C	G (mm)	Repetitive shocks			Exceptional shock energy (joules)	Weight (g)
					Energy (joules)	Deflect. (mm)	Reaction (daN)		
512251	25,5	19	M8	20	3	8	100	9	20
512307	30	30	M8	25	6	15	140	18	31
512301	30	30	M6	13,5	6	15	140	18	25
511962	40	39	M8	16	15	16	250	45	62
512515	50	50	M10	25	30	25	340	90	118
512501	50	50	M8	20	30	25	340	90	105
512516	50	64	M10	25	40	32	370	120	154
512502	50	64	M8	35	40	32	370	120	145
512517	50	58	M10	25	37	28	400	110	143
512503	50	58	M8	15	37	28	400	110	125
512608	60	40	M10	25	27	18	550	70	120
512601	60	40	M14	62	27	18	550	70	180
512700	72	58	M10	25	50	26	550	150	230
512721	72	58	M12	30	50	26	550	150	243
512951	95	80	M16	45	120	37	1 100	350	565

See current price list for availability of items.

## DIABOLO STOPS



References	Ø S (mm)	Ø A (mm)	B (mm)	C	G (mm)	Max. instant. load (daN)	Deflect. (mm)	Max. static load (daN)	Deflect. (mm)	Energy (joules)	Weight (g)
511571	22	57	42	M8	20	100	10	10	4	1	60
511572	30	57	42	M8	20	200	12	75	5,5	2	80
511601	44	60	57	M10	25	350	15	150	8	6	190
511801	62	80	65	M14	30	800	16	300	9,5	15	500
511951	70	95	70	M16	47	1 000	18	400	9,5	20	790

# LEVAFLEX PROGRESSIVE STOPS

Reference	A (mm)	B (mm)	Ø C (mm)	D (mm)	Ø E (mm)	Ø G (mm)	H (mm)	Weight (g)
514085	85	85	8,5	69	8,5	20	5	600
514110	110	110	12,5	90	8,5	30	6	1 200
514130	130	130	19	106	11	40	6	2 000
514160	160	160	23	132	11	45	8	3 000
514200	200	200	28	168	13	60	10	7 000

See current price list for availability of items.

Repetitive shocks			Exceptional shock energy (joules)	Reference hardness
Energy (joules)	Corresponding deflection (mm)	Reaction (daN)		
170	40	1 200	500	514085/60
280	40	1 700	850	514085/75
330	50	1 800	1 000	514110/60
550	50	3 400	1 500	514110/75
600	65	2 800	1 800	514130/60
650	60	3 000	1 900	514130/75
1 050	75	4 500	3 000	514160/60
1 200	90	4 000	3 600	514200/60
1 300	70	6 000	3 900	514160/75
2 200	85	7 800	6 600	514200/75

See current price list for availability of items.

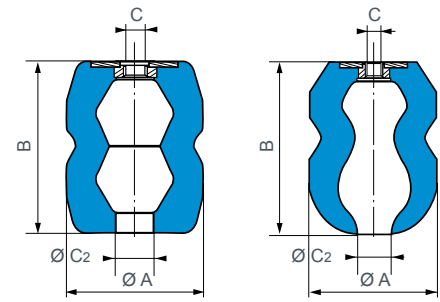
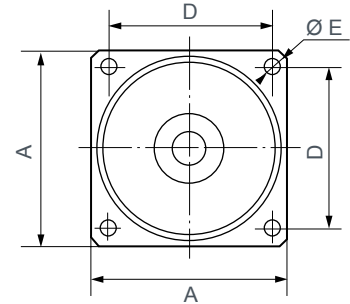
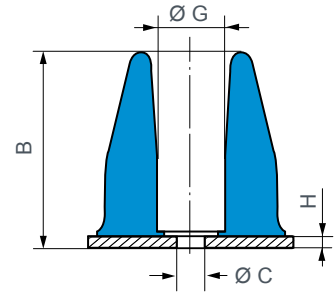
# EVIDGOM STOPS

Repetitive shocks			Exceptional shock energy (joules)	Reference hardness
Energy (joules)	Corresponding deflection (mm)	Reaction (daN)		
31	30	190	95	810644
100	50	580	300	810645
110	45	600	330	810666
180	67	750	540	810642
350	75	1 250	1 050	810653
360	65	1 400	1 100	810655
400	85	1 500	1 200	810669
300	70	900	-	810784
600	75	1 625	-	810775
1 050	90	2 375	-	810776
2 500	90	5 500	-	810733/60
7 100	150	11 000	-	810732/60
9 500	200	9 500	-	810731/60
13 000	130	18 000	-	810732/75
17 500	175	19 000	-	810731/75
21 000	200	25 000	-	810735/60
29 000	250	35 000	-	810734/60
41 000	200	70 000	-	810735/75
50 000	250	55 000	-	810734/75

See current price list for availability of items.

Stop reference	Shape	All rubber Evidgom reference	Ø A (mm)	B (mm)	C	Ø C1 (mm)	Ø C2 (mm)	Ø D (mm)	Ø A under load (mm)
810642	1	810022	85	120	M16	20	30	-	114
810644	1	810004	55	55	M10	14	14	-	72
810645	2	810035	66	93	M16	20	14	-	100
810653	1	810023	100	130	M16	20	30	-	140
810655	1	810025	110	132	M16	20	30	-	142
-	3	810026	60	100	-	14	20	-	75
-	3	810027	66	93	-	14	20	-	80
810666	2	810046	76	90	M16	20	14	-	98
810669	2	810029	110	150	M16	20	30	-	155
810731	3	-	250	400	2 x 6 x M24	70	70	150	360
810732	3	-	250	315	2 x 6 x M24	70	70	150	380
810733	3	-	250	230	2 x 6 x M24	70	70	150	370
810734	3	-	350	500	2 x 8 x M24	85	85	196	445
810735	3	-	350	395	2 x 8 x M24	85	85	196	500
810775	1	810015	155	150	M16	25	30	-	202
810776	1	810016	188	180	M24	40	40	-	256
810784	1	810014	125	140	M16	30	25	-	168

NOTA : The values are given for test conditions with an impact speed of 1 m/s. Consult us for speeds that are much higher.



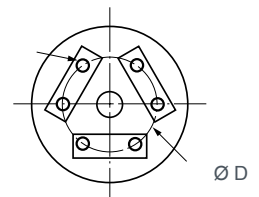
Shape 1

Shape 2

Ø A  
Ø C<sub>1</sub>

Ø C<sub>2</sub>  
P  
Ø W T

Shape 3



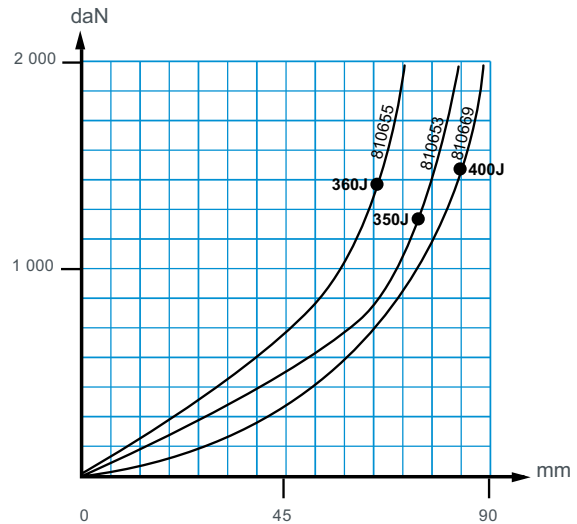
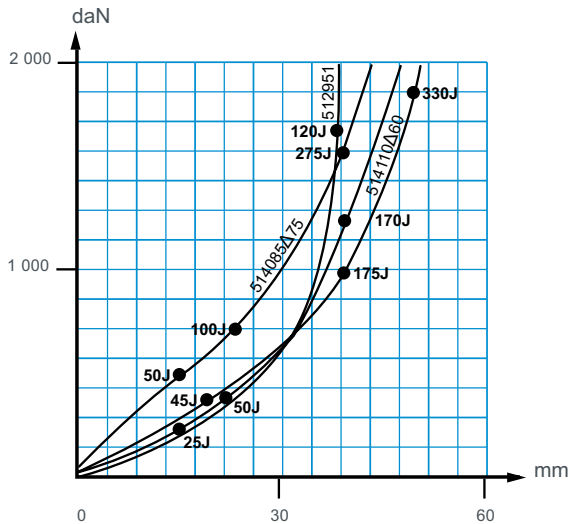
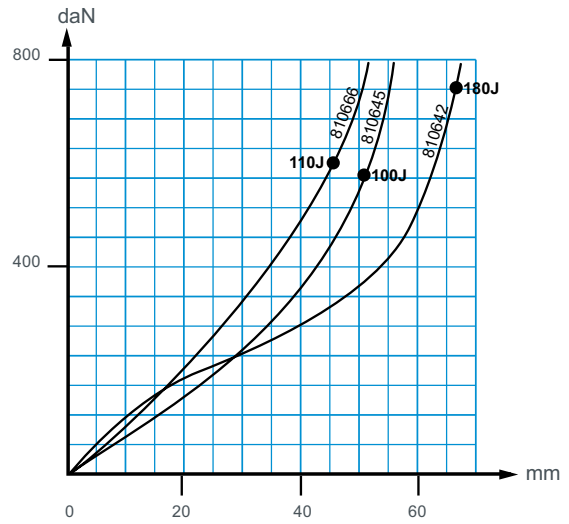
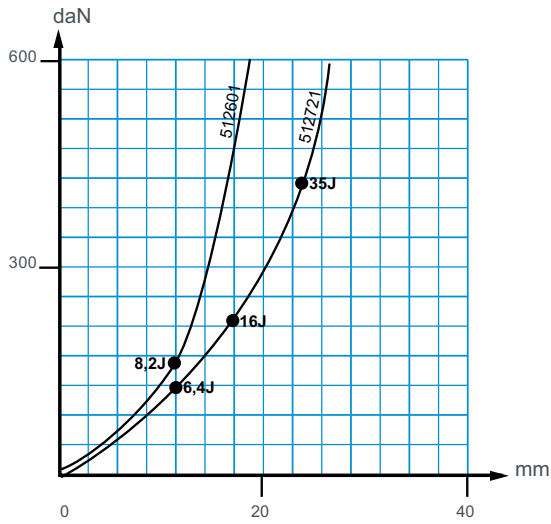
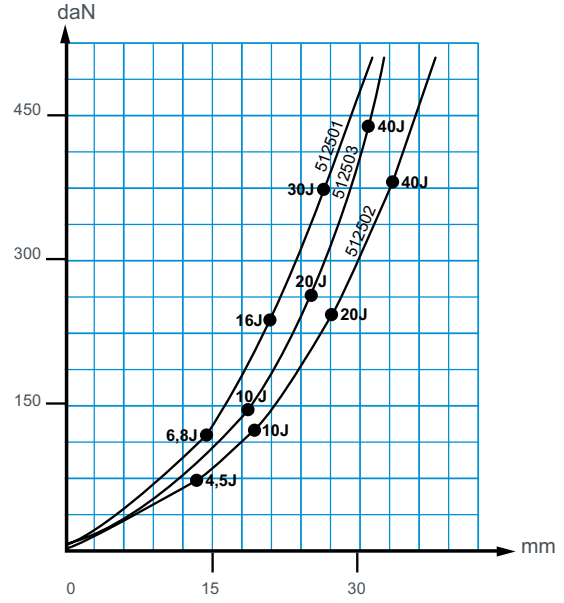
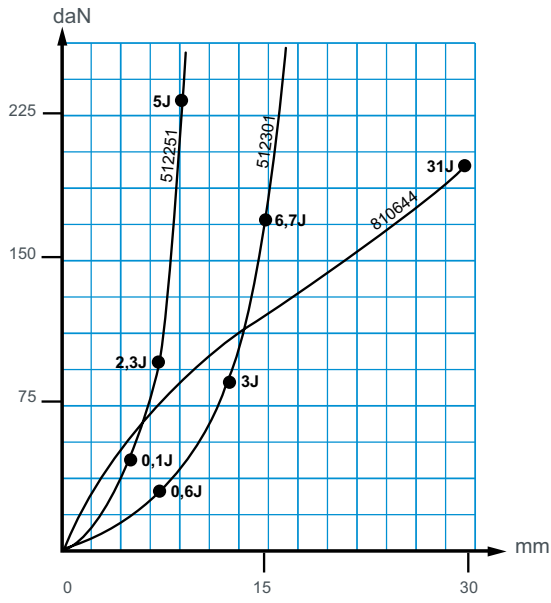
Ø A  
Ø C

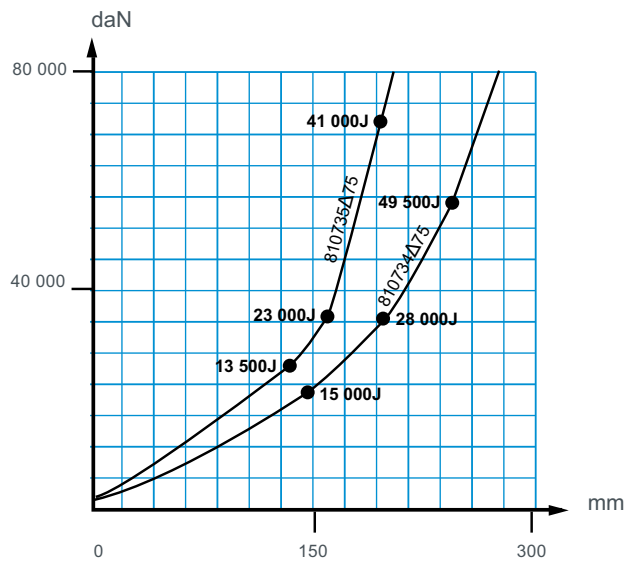
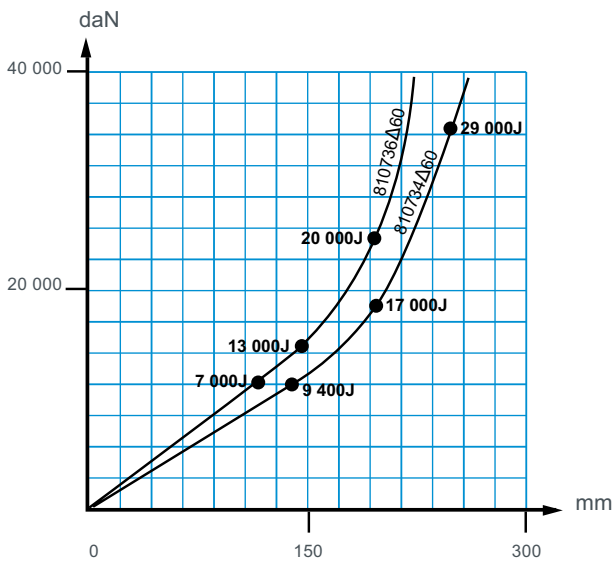
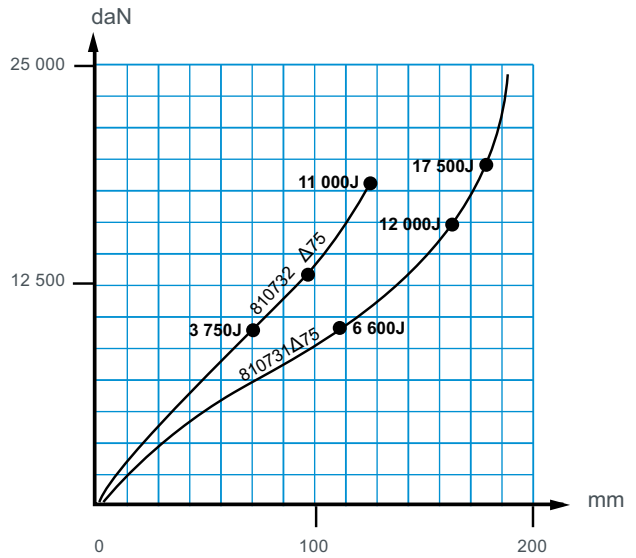
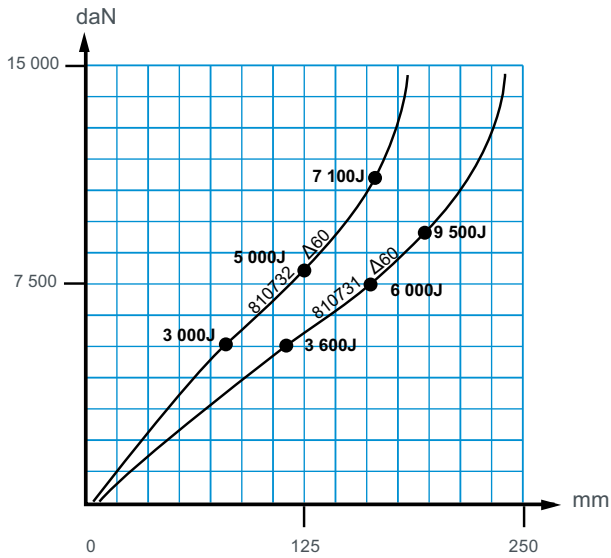
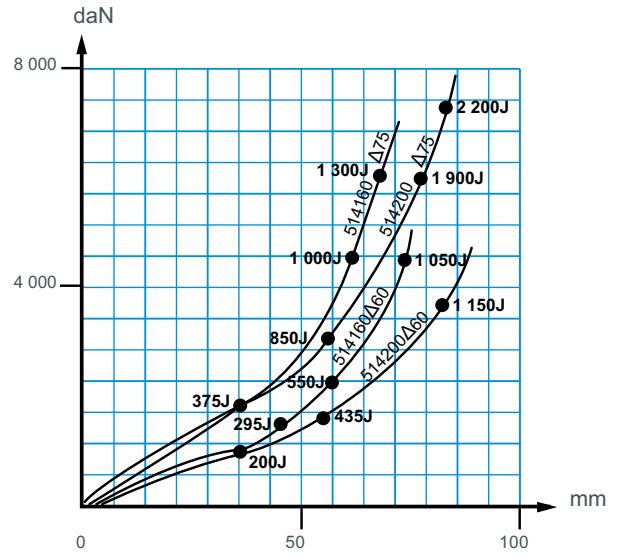
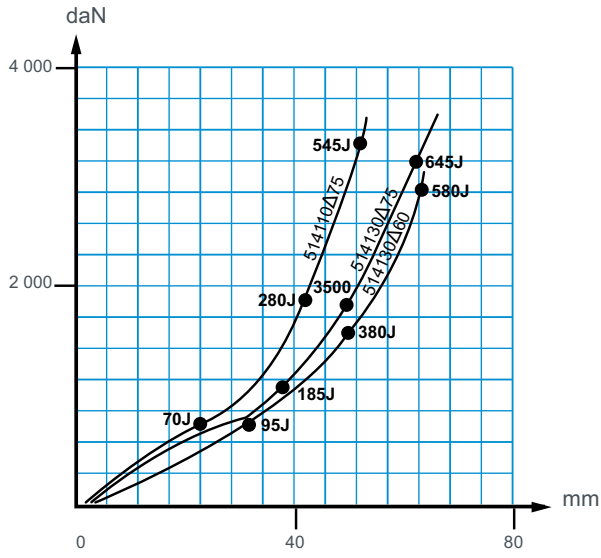
Ø C<sub>3</sub>

Ø W 3 x Ø T

Shape 4

# DEFLECTION CURVES AND ENERGY VALUES FOR PROGRESSIVE, LEVAFLEX AND EVIDGOM STOPS







# PAULSTRADYN®

Natural frequency : (1)  
- axial : 7 Hz  
- radial : 3 to 5,5 Hz



## ADVANTAGES

- Better than 90% isolation at 1.500 rpm (25 Hz).
- Constant height over wide load range.
- Stabilised characteristics during Service Life.
- Simple to fit.
- 500 hours protection against salt spray\*.
- Design.

\*When mounted according to the recommendations given in the catalogue.

**Resilient Element = SILTECH**  
- Low increase of stiffness with frequency  
- Low creep



Finite element modeling (FEM) was used when designing the Paulstradyn® series resulting in the lowest possible elastomer stresses and most efficient performance for a high deflection mount of this type.

## APPLICATIONS

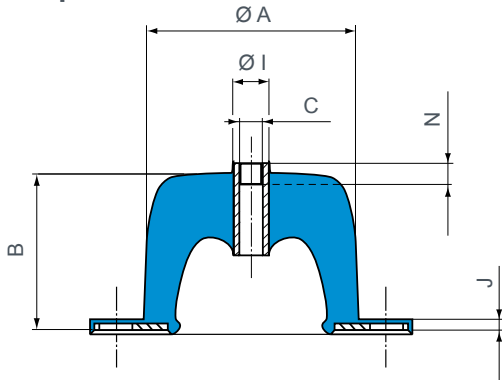
Antivibration isolation for static equipment :

- rotating machinery such as fans, air-conditioning, pumps, compressors, generator sets;
- pipeworks, ceilings, transformers, electrical enclosures.

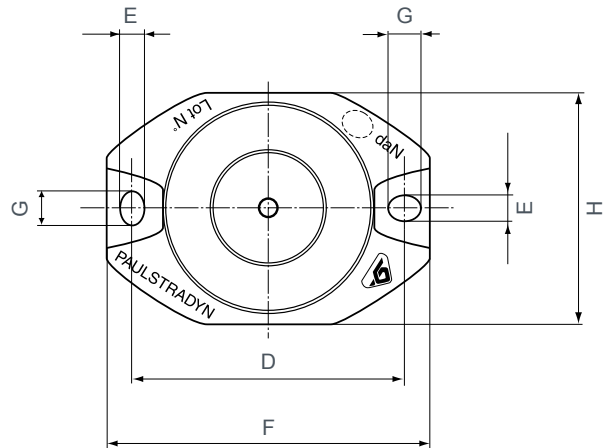
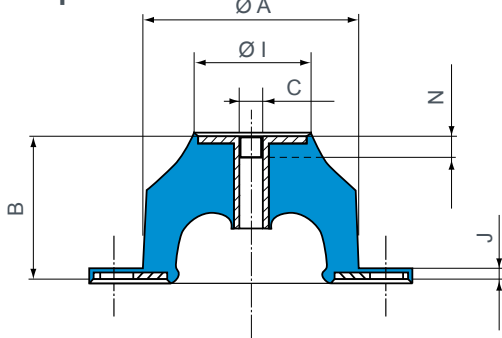
1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS CHARACTERISTICS

Shape 1



Shape 2



Designation	Ref.	Nominal Load NL (daN)	Shape	Dimensions (mm)										
				Ø A	B*	C	D	E	F	G	H	Ø I	J	N
Paulstradyn® 4	533701	4	1	40	40	M6	52	6,2	64	6,2	44	12	2,5	6
7	533702	7												
12	533703	12												
Paulstradyn® 20	533704	20	2	60	40	M6	76	6,2	90	8,2	64	31	2,5	6
30	533705	30												
50	533706	50												
Paulstradyn® 70	533707	70	2	80	40	M8	100	8,2	122	12,2	84	48	2,5	12
100	533708	100												
130	533709	130												
Paulstradyn® 160	533710	160	2	100	40	M10	124	10,2	152	16,2	104	68	3	10
200	533711	200												
260	533712	260												
Paulstradyn® 325	533713	325	2	150	40	M12	182	12,2	214	20,2	154	116	4,5	10
400	533714	400												
500	533715	500												
Paulstradyn® 640	533716	640	2	200	40	M16	240	14,2	280	24,2	204	159	5,5	20
820	533717	820												
1050	533718	1050												
1350	533719	1350												

\* Height, unloaded 40 mm, under load 32 mm (see Technical Characteristics).

NL : Nominal static load with mounting under axial compression.

# TECHNICAL CHARACTERISTICS

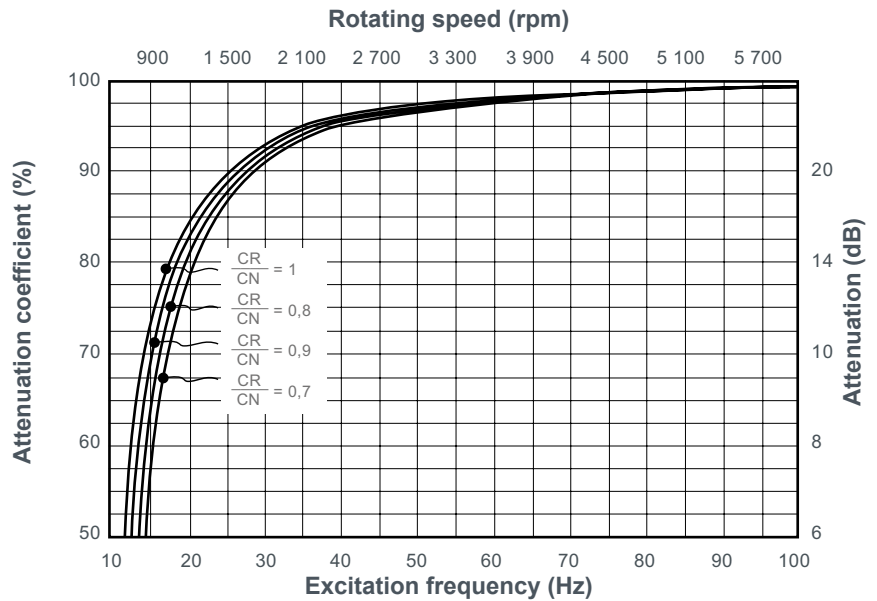
The vibration attenuation and height characteristics under nominal loads are **stabilised after one month under a load at 20°C**.

## General characteristics

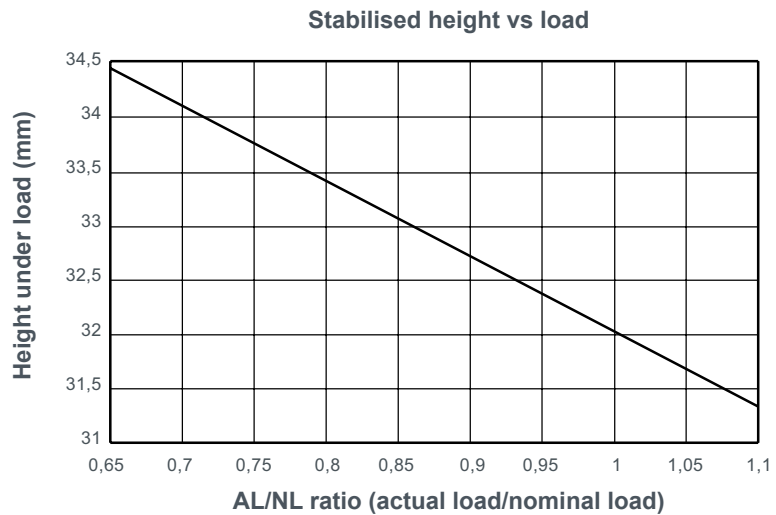
- Natural axial frequency : 7 Hz, with nominal load.
- Natural radial frequency : 3 to 5.5 Hz.
- Maximum displacement :
  - axial : 12 mm
  - radial : ± 10 mm.

## Vibration attenuation

$$\frac{AL}{NL} = \text{Ratio} \frac{\text{actual load}}{\text{nominal load}}$$



## Height under load



## Temperature

Operating temperature : - 20 °C to + 70 °C.

## Other characteristics\*

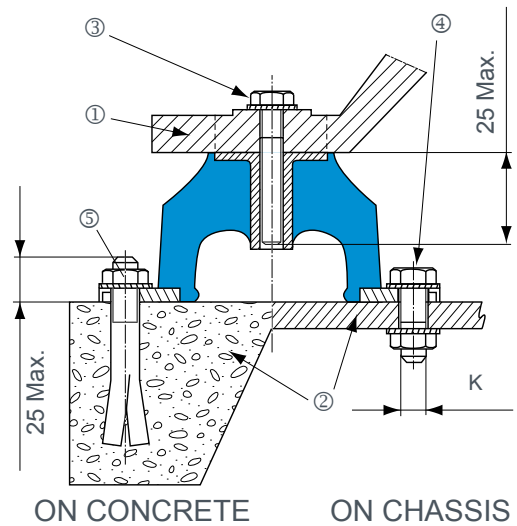
Good dynamic performance at high frequency  
 Withstand fatigue and shocks.  
 Reduced creep.

\* Detailed Technical Characteristics can be sent on request. Ask us for details.

# MOUNTING

## Standard Mounting

- ① machine base or foot dimensions > Ø M\*
- ② supporting structure (floor) dimensions > base of mounting F\*
- ③ screw Ø C\*\*
- ④ screw HM Ø K, a washer is required between the screw head and the PAULSTRADYN®\*\*
- ⑤ screw Ø K, a washer is required between the screw head and the PAULSTRADYN®\*\*



Shape 1

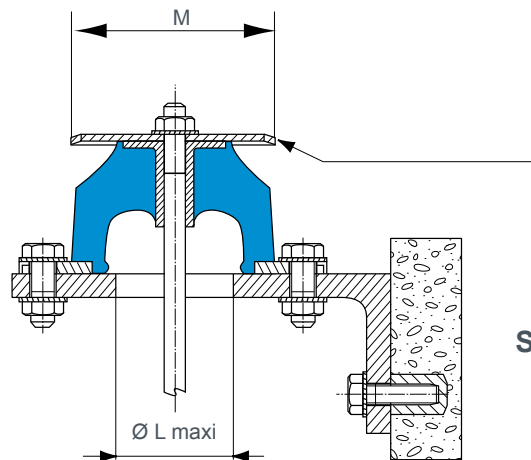
\* to distribute the load and resist corrosion.  
 \*\* nuts and screws grade 4.6 minimum.

## Recommended torque

Diameter K (mm)	M6	M8	M10	M12
Torque N.m	2	5	12	20

**Note :** Do not paint the mountings after fitting.

## Alternative mounting



Shape 2

## Mounting and cap references

Paulstradyn® references	Dimensions (mm)			Protective cap reference (optional)
	K Shape 1	L max. shape 2	M min. shape 2	
533701, 533702, 533703,	M5	27	14	342919
533704, 533705, 533706	M5	40	34	342356
533707, 533708, 533709	M6	46	50	342733
533710, 533711, 533712	M8	47	70	342734
533713, 533714, 533715	M10	99	118	342353
533716, 533717, 533718	M12	127	162	342354
533719				

# EVIDGOM<sup>®</sup>

Natural frequency : (1)  
2,5 to 7 Hz



## DESCRIPTION

The EVIDGOM<sup>®</sup> mount is formed from two thick conical membranes joined at their bases to create a highly elastic mounting.

There are two variations :

- all rubber EVIDGOM<sup>®</sup>;
- EVIDGOM<sup>®</sup> with bonded fixing;

## OPERATION

The design of the EVIDGOM<sup>®</sup> mount gives the following basic characteristics:

- a very high axial elasticity;
- very low natural frequency (a few Hertz);
- progressive buffer against shocks or accidental overload.

### Advantages

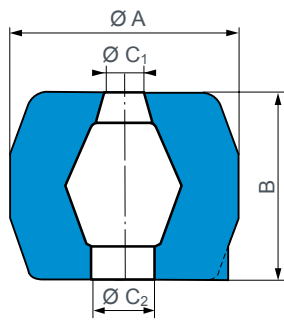
- As the load/deflection curve has a point of inflection, a suspension may be designed to have a sub-tangent greater than the static deflection.
- The elastomer used provides intrinsic damping with a corresponding ability to absorb energy which gives appreciable advantages over metallic springs.

### Recommendations

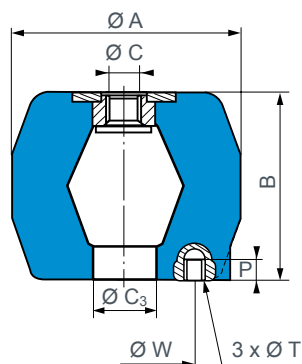
- The selection of a low natural frequency (large deflection) must not be allowed to endanger the stability of the suspension (tall equipment).
- In certain cases (use under maximum load) the use of side stops is recommended.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

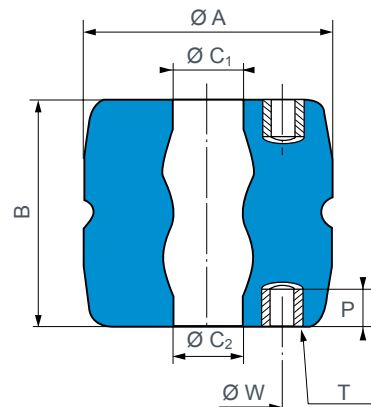
# DIMENSIONS CHARACTERISTICS



**Shape 1**



**Shape 2**

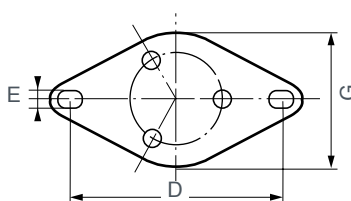
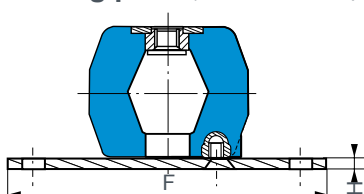


**Shape 3**

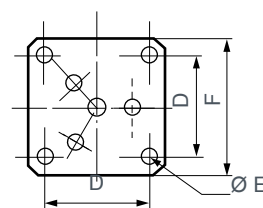
all rubber		without fixings		Ø A (mm)	B (mm)	C	Ø C1 (mm)	Ø C2 (mm)	Ø C3 (mm)	Ø W (mm)	T	P (mm)
Reference	Shape	Reference	Shape									
810002	1	-	-	34	25	-	8	8	-	-	-	-
810003	1	-	-	40	55	-	14	14	-	-	-	-
810005	1	-	-	50	70	-	14	14	-	-	-	-
-	-	810780	2	60	40	M10	-	25	25	40	M6	6
810006	1	810766	2	85	70	M16	20	30	30	60	M8	8
810008	1	810768	2	95	90	M16	20	30	30	60	M8	8
810009	1	810769	2	108	90	M16	20	30	34	70	M10	10
810012	1	-	-	120	110	-	20	30	-	-	-	-
810013	1	810773	2	140	120	M16	25	40	35	70	M10	10
810014	1	810784	2	125	140	M16	25	30	25	70	M10	10
-	1	810774	2	125	140	M16	25	30	25	70	4 x M12	12
810019	1	810779	2	140	90	M16	28	12	28	70	M10	10
810020	1	810770	2	140	56	M16	30	30	30	70	M10	10
810015	1	810775	2	155	150	M16	25	30	30	90	M14	14
810016	1	810776	2	188	180	M24	40	40	40	90	M14	14
-	-	810733	3	250	230	-	70	70	-	150	6 x M24	40
-	-	810736	3	350	290	-	85	85	-	196	6 x M24	40
-	-	810735	3	350	395	-	85	85	-	196	8 x M24	40

See current price list for availability of items

## Lower fixing plate (to be ordered separately)



**Shape A**



**Shape B**

Reference	Fixing pack reference (1)	Shape	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)
810780	337566	A	98/102	8,2	117	65	5
810766	337567	A	124/128	10,2	158	110	5
810768	337567	A	124/128	10,2	158	110	5
810769	337568	A	178/182	10,2	214	150	6
810773	337568	A	178/182	10,2	214	150	6
810784	337568	A	178/182	10,2	214	150	6
810779	337568	A	178/182	10,2	214	150	6
810770	337568	A	178/182	10,2	214	150	6
810775	337569	B	170	10,5	200	-	8
810776	337569	B	170	10,5	200	-	8

(1) composition of the mounting pouches: 1 plate of inferior fixation + 3 FHC screws

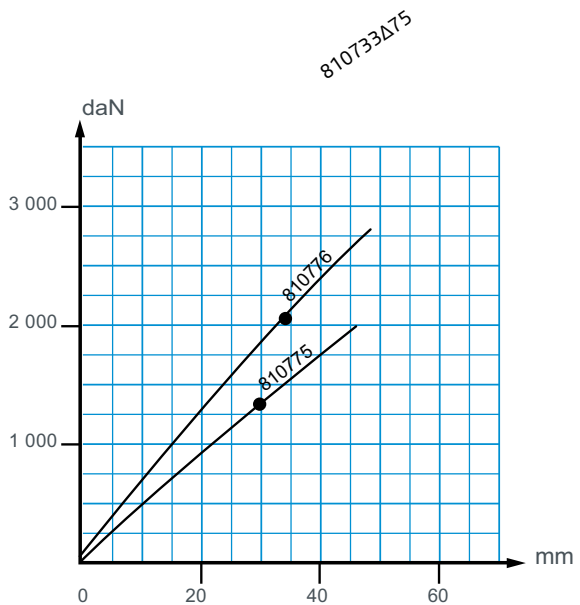
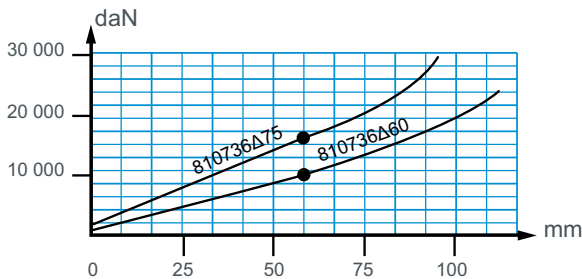
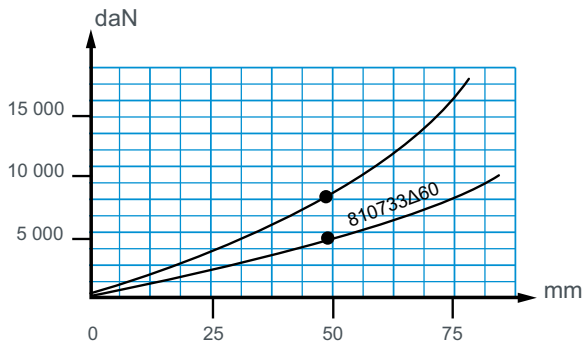
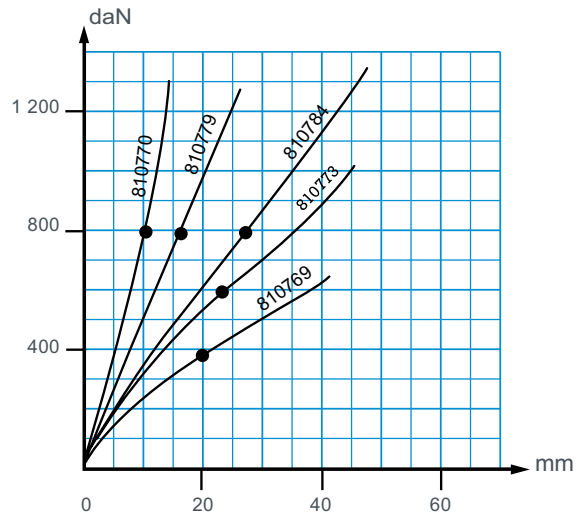
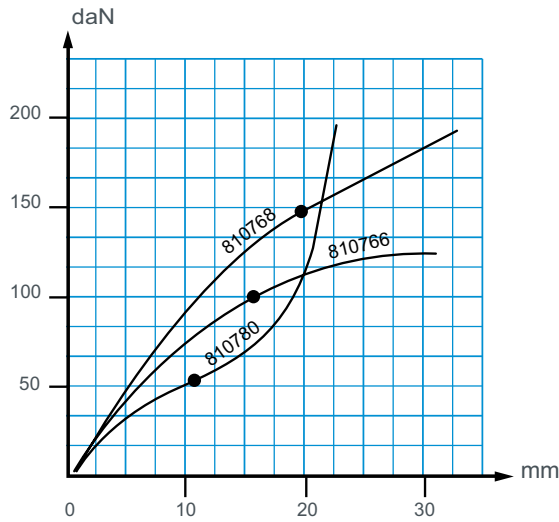
# OPERATING CHARACTERISTICS

Reference	Nominal static load (daN)	Deflecty ±15% (mm)	Ø A mm under nominal charge	Height B (mm)
810002	5-15	5	40	25
810003	10-40	11	50	55
810005	20-80	14	63	70
810780	15-60	10	80	40
810766	25-100	15	105	70
810768	35-150	18	124	90
810769	100-400	20	136	90
810012	100-390	23	134	110
810773	150-600	24	175	120

Reference	Nominal static load (daN)	Deflecty ±15% (mm)	Ø A mm under nominal charge	Height B (mm)
810784	00-800	26	170	140
810779	200-800	16	175	90
810770	200-800	10	166	56
810775	325-1300	30	175	150
810776	500-2000	35	240	180
810733-60	1250-5000	50	345	230
810733-75	2000-8000	50	345	230
810736-60	2250-9000	60	500	290
810736-75	3500-14000	60	500	290

See current price list for availability of items.

## LOAD/DEFLECTION CURVES IN AXIAL COMPRESSION



# “SANDWICH” MOUNTS

Natural frequency : (1)  
5 to 13 Hz



## DESCRIPTION

The SANDWICH mount comprises one or more layers of elastomer bonded to flat, parallel metallic plates. These mountings may be cylindrical or rectangular. They are designed to withstand very high compressive loads. The range of mechanical characteristics is governed by the hardness of the rubber and the number of intermediate metallic plates.

These mountings can support compression from 20 to 100 bars.

The elastomer is polychloroprene which provides a high resistance to atmospheric exposure.

## OPERATION

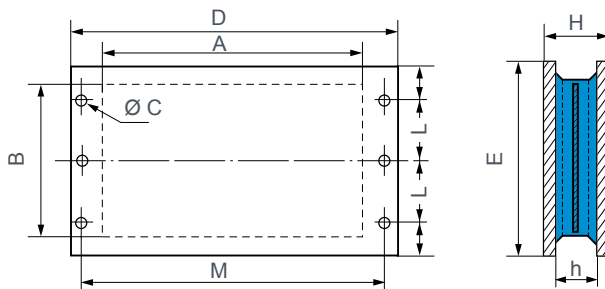
The design of the SANDWICH mount gives the following basic characteristics :

- very slim;
- large surface area;
- stackable mountings;
- the suspended equipment is free to move in all directions;
- high ratio of compression stiffness to shear stiffness;
- very high compression loads.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.



# BRACKET WITH FIXING

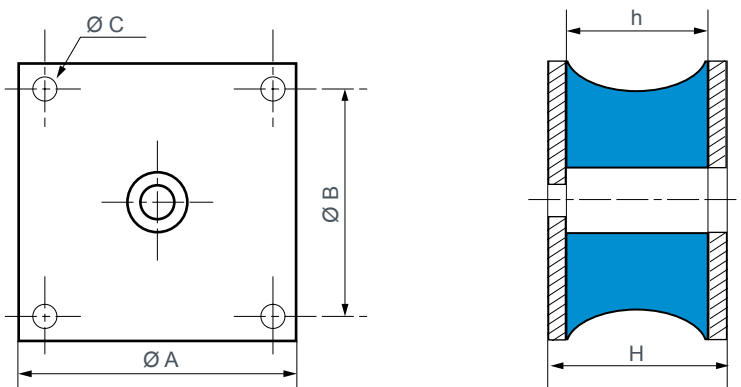


Ref. without intermediate plate	Ref. with intermediate plate	A (mm)	B (mm)	D (mm)	E (mm)	H (mm)	h (mm)	Nr holes x Ø C (mm)	L (mm)	M (mm)	Weight (kg)
<b>539608</b>	<b>539607</b>	182	142	255	170	49	40	6 x 9	58	235	5
<b>539612</b>	539933	372	252	460	300	61	50	6 x 13	100	430	18
539613	-	702	252	805	300	61	50	6 x 17	95	765	35
-	539267	160	110	230	110	58	44	4 x 15	35	202	5
539821	-	283	140	380	140	76	60	6 x 18	50	340	9,5

See current price list for availability of items.

Référence	Hardness	Nominal static load (daN)	Deflection (mm)	Stiffness/shear (daN/mm)
<b>539821</b>	50	1000-4000	8	44
<b>539608</b>	60	1250-5000	4	63
<b>539607</b>	45	2500-10000	6	44
539267	70	6250-25000	3,5	54
<b>539607</b>	60	3750-15000	5	74
<b>539612</b>	45	5000-20000	6	112
<b>539612</b>	60	7500-30000	7	187
<b>539613</b>	60	11250-45000	5	355
539933	60	15000-60000	4	210

# DOMINANTLY RADIAL MOUNTINGS



Dimensions can change. Please contact us.

Reference	Hardness	A (mm)	h (mm)	B (mm)	H (mm)	Ø C (mm)	Shear		Compression	
							(daN)	(mm)	(daN)	(mm)
534646	45	150	62	120	70	12,5	200	20	200	17
534647	60	150	62	120	70	12,5	150	20	800	10
534455	38	232	74	190	86	16,5	500	25	2 000	11
534456	45	232	74	190	86	16,5	625	25	2 400	15

# STABIFLEX

Natural frequency : (1)  
6 to 11 Hz



## DESCRIPTION

The STABIFLEX mount comprises a conical rubber section bonded between inner and outer metal parts.

- Steel Centre axis with threaded hole.
- Aluminium Square (four holes) or diamond base (two holes) with clearance hole.
- Bonded natural rubber, anti-slip bead.
- Cup to protect the rubber and distribute the load.

## OPERATION

The design of the STABIFLEX mount gives the following basic characteristics :

- axial elasticity two or three times higher than radial elasticity;
- the rubber works in shear/compression;
- progressive buffer against shocks or accidental overload;
- anti-slip (may be placed directly on the ground).

### Advantages

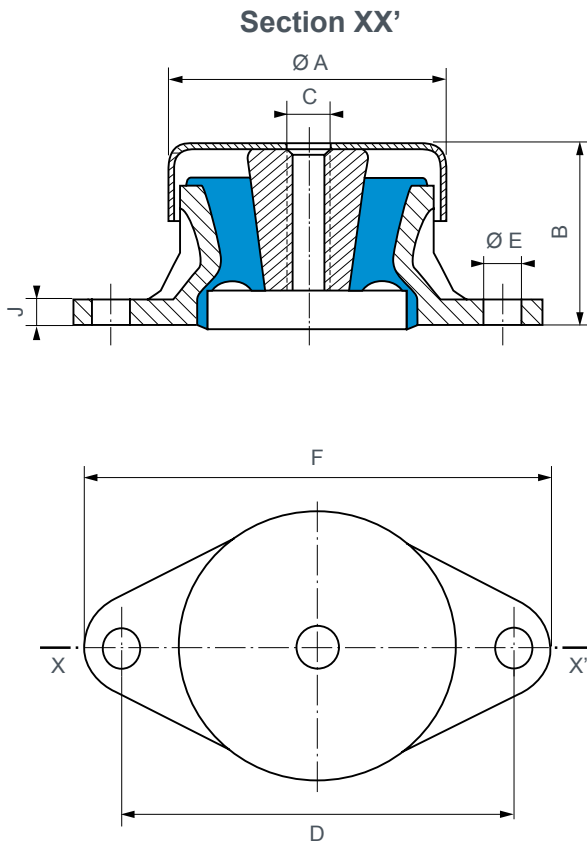
- The machine may be placed with its mounts directly on the ground.
- Speed of fixing.
- Easy movement of suspended machinery.
- Rubber protected against harmful liquids.
- Extensive range : 3 hardnesses of rubber for five existing types, allowing the mount to be optimised as a function of the load and exciting frequency.
- May be used with an anti-rebound washer.

### Recommendations

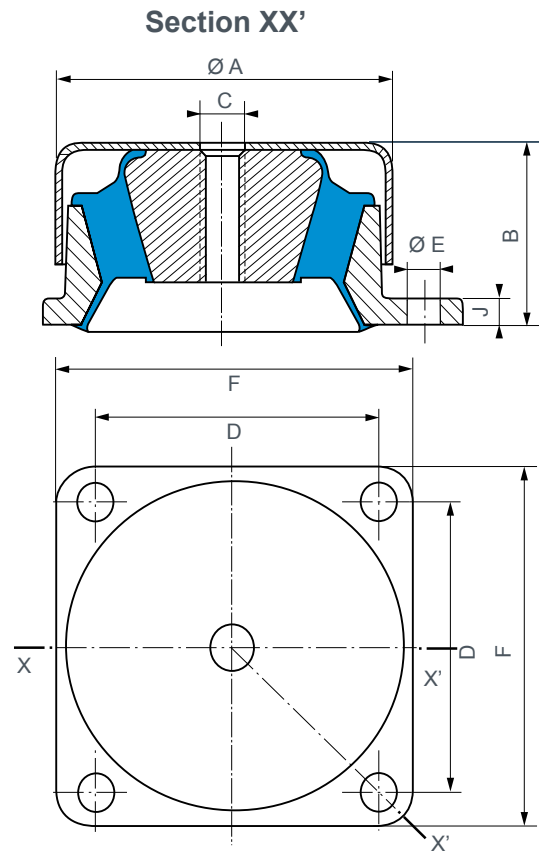
- In order not to affect the performances of the mounting system, all external connections must be flexible.
- STABIFLEX mounts must be fitted so that the vibration input is in the axial direction.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



**STABIFLEX - diamond base**



**STABIFLEX - square base**

Type	Reference	Hardness	Ø A (mm)	B (mm)	C	D (mm)	E (mm)	F (mm)	J (mm)	Weight (gr)
Diamond base	<b>530603</b>	45.60.75	69	41	M12	98	9	114	6	250
	<b>530613</b>	45.60.75	84	51	M12	115	11	137	7	450
Square base	<b>530622</b>	45.60.75	100	52	M12	90	11	114	7	1000
	<b>530642</b>	45.60	133	69	M16	114	13	144	9	2300
	<b>530652*</b>	45.60.75	133	69	M16	114	13	144	9	2700

\* Part identified by the letter "R" (reinforced)

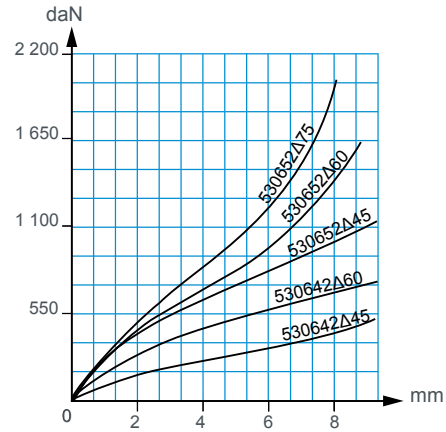
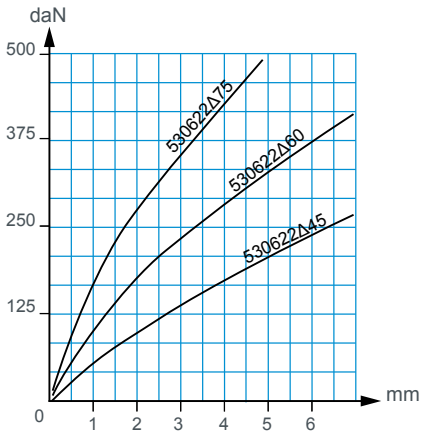
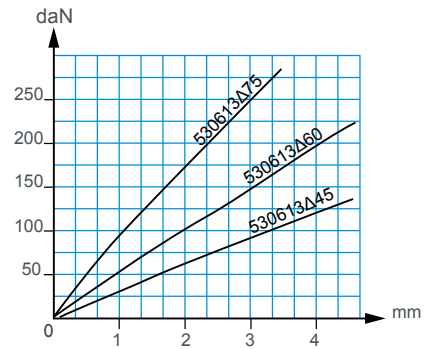
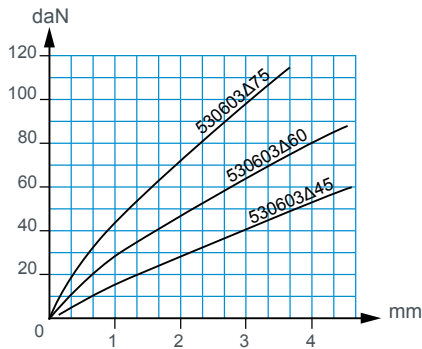
See current price list for availability of items.

# OPERATING CHARACTERISTICS

Nominal static load (daN)	Deflection (mm)	Reference	Hardness
10 - 42	3,5	<b>530603</b>	45
15 - 60	3	<b>530603</b>	60
20 - 93	3,5	<b>530613</b>	45
30 - 125	4	<b>530603</b>	75
40 - 165	3,5	<b>530613</b>	60
50 - 210	5	<b>530622</b>	45
65 - 260	3	<b>530613</b>	75

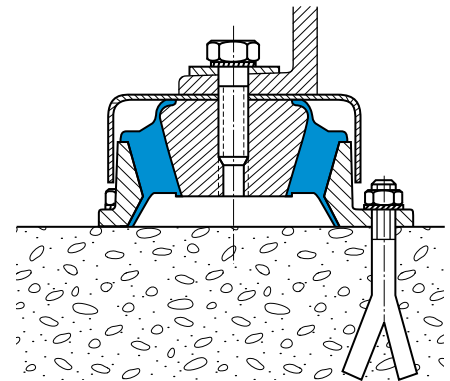
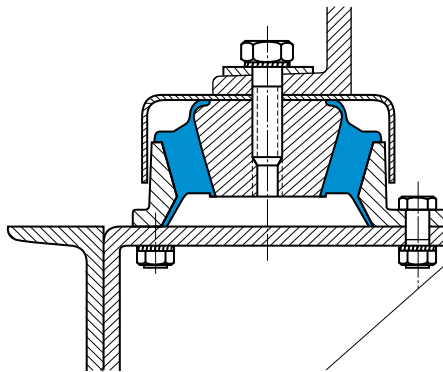
Nominal static load (daN)	Deflection (mm)	Reference	Hardness
65 - 275	4,5	<b>530622</b>	60
95 - 380	3,5	<b>530622</b>	75
110 - 450	8	<b>530642</b>	45
175 - 700	8	<b>530642</b>	60
250 - 1000	8	<b>530652</b>	45
325 - 1300	8	<b>530652</b>	60
450 - 1800	8	<b>530652</b>	75

## LOAD/DEFLECTION CURVES IN AXIAL COMPRESSION



## ASSEMBLY

### Standard fixing methods



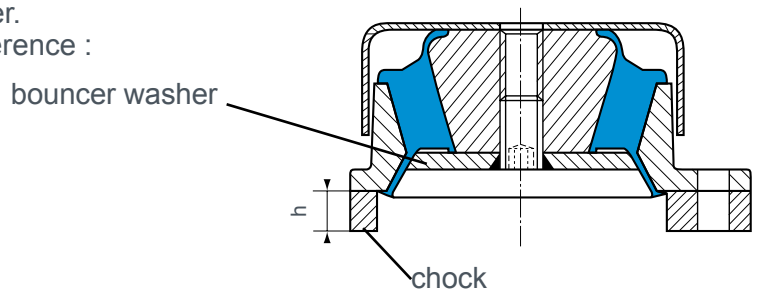
### Fixing with anti-rebound washer (not included)

- The anti-rebound washer (not supplied, plan on demand) is fixed to the lower side of the centre axis.

- In this case, do not forget to fit a spacer.

Spacer thickness required for reference :

- 530603 h= 2 mm
- 530613 h= 4 mm
- 530622 h= 7 mm
- 530642 h= 14 mm
- 530652 h= 14 mm



# PAULSTRAFLOAT

Natural frequency : (1)  
- axial 8 Hz



## DESCRIPTION

Paulstrafloat mount of rectangular design is composed of :

- diamond base (2 holes) with clearance hole;
- cup to protect the rubber and distribute the load;
- progressive stiffness and rebound for protection against shocks.

## OPERATION

The design of the Paulstrafloat mount gives the following basic characteristics :

- different stiffness in 3 axis : vertical - longitudinal (length) - width;
- the rubber works in shear/compression;
- set position control with the slots;
- higher axial stiffness;
- this mount is suitable for mobile equipment.

### Advantages

- The machine may be placed with its mounts directly on the ground.
- Quick installation.
- Rubber protected against harmful liquids.
- Extensive range : 3 hardnesses of rubber for 3 existing types, allowing the mount to be optimized as a function of the load and forcing frequency.
- Anti-rebound and fail-safe.

### Recommendations

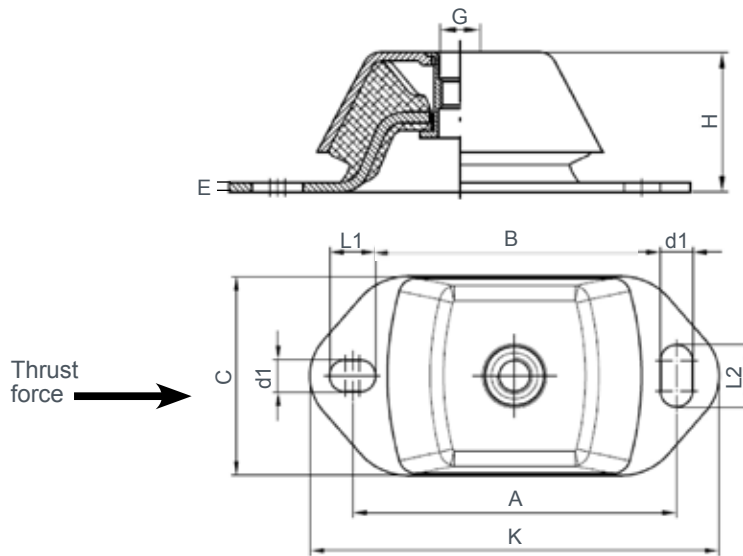
- Paulstrafloat mounts must be installed on the longitudinal axis to handle thrust force.

## APPLICATIONS

Paulstrafloat mount is perfectly suitable for shipboard equipment, motor suspension, transports and boarding equipment. Used for static applications : generator, pump, fan ...

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



# OPERATING CHARACTERISTICS

References	Hardness	A	B	C	d1	E	G	H	K	L1	L2
544397	45/55/65	100	80	60	11	3	M12	38	120	14	14
544396	45/55/65	140	104	75	13	4	M16	50	183	20	30
544395	45/55/65	182	142,7	112	18	5	M20	70	230	26	39

References	Hardness	Max. load (daN)	Max. deflection under load (mm)	Max. load with thrust force (daN)
544397	45	60	5.5	40
	55	70		60
	65	110		90
	75	380		290
544396	45	160		100
	55	220		145
	65	310		220
	75	620		410
544395	45	350		250
	55	550		390
	65	810		565
	75	1380		975

# S.C. MOUNTS

Natural frequency : (1)  
6 to 30 Hz



## DESCRIPTION

The S.C. mount comprises an annular section bonded between the inner tube and outer housing. The outer housing has a mounting flange (four different types).

## OPERATION

The design of the S.C. mount gives the following basic characteristics :

- axial elasticity four times higher than radial elasticity;
- the rubber works in shear;
- progressive buffer against shocks or accidental overload, provided that a large metal washer is used to bear against the rubber dome;
- can be used as a fail safe assembly when fitted as in shape 1.

### Advantages

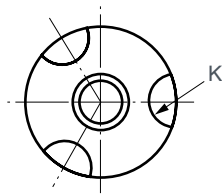
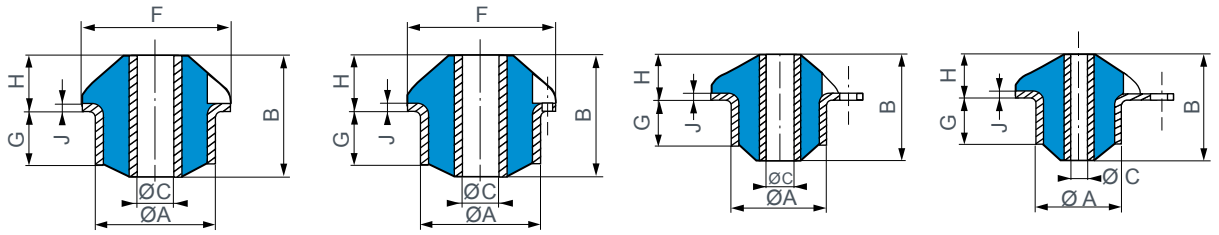
- Extensive range: three hardnesses of rubber for 20 existing types, allowing the mounting to be optimised as a function of the load and exciting frequency.

### Recommendations

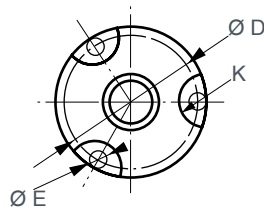
- In order not to affect the performance of the mounting system, all external connections must be flexible.
- S.C. mounts must be fitted so that the vibration input is in the axial direction.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

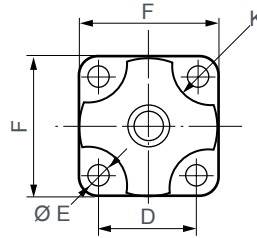
# DIMENSIONS



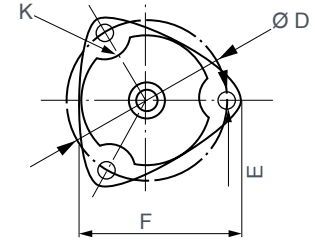
Shape A



Shape B



Shape C



Shape D

Type	Reference				Ø A (mm)	B (mm)	Ø C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	Weight (g)
	With fixing holes	Without fixing holes	Shape												
S.C. 000	531201	Shape C	-	-	20	11	6,2	19	3,2	25	3	7	1	4	8
S.C. 00	531301	Shape C	-	-	26	28	8	26	5,2	36	12,5	11,5	1,5	12	40
S.C. 01	-	-	531401	Shape A	37,5	40	12,1	-	-	48	18	18	2	8	110
S.C. 02	-	-	531402	Shape A	37,5	51	12,1	-	-	48	24	18	2	8	130
S.C. 10	531216	Shape D	-	-	49,1	47	12,2	69	8,2	72	20	18	2	12	190
S.C. 11	531611	Shape D	-	-	49,1	60	12,2	69	8,2	72	31	18	2	12	290
S.C. 20	-	-	531701	Shape A	55,7	55	18,2	-	-	70	27	19	3	10	370
S.C. 21	-	-	531702	Shape A	55,7	70	18,2	-	-	70	39	19	3	18	480
S.C. 21	531240	Shape D	-	-	57,2	70	18,2	86	10,5	90	39	19	3	18	500
S.C. 30	531259	Shape B	-	-	65	75	20,2	78	8,5	90	29	28	3	18	560
S.C. 31	531261	Shape D	-	-	66,5	93	20,2	95	8,5	107	47	28	3	18	780
S.C. 40	531714	Shape D	-	-	76	90	22,2	100	8,5	112	41,5	28,5	3	18	880
S.C. 41	531327	Shape D	-	-	76	110	22,2	100	8,5	112	49	28,5	3	18	960
S.C. 41	-	-	531902	Shape A	74	110	22,2	-	-	100	49	28	3	18	960
S.C. 50	531939	Shape D	-	-	87,5	100	40,2	114	8,5	127	47	33	3	20	1300
S.C. 51	531947	Shape B	531912	-	86	120	40,2	104	10,5	120	63	33	3	20	1500
S.C. 70 Réd.	531933	Shape B	-	-	118	98	60,2	145	10,5	164	36	46	4	22	2200
S.C. 70	531932	Shape B	-	-	118	140	60,2	145	10,5	164	66	46	4	22	3000
S.C. 71	531931	Shape B	-	-	118	170	60,2	145	10,5	164	96	46	4	22	3800
S.C. 80	531940	Shape B	-	-	170	167	80	204	12,2	230	95	53	5	30	7100
S.C. 81	531941	Shape B	-	-	170	185	80	204	12,2	230	113	53	5	30	7700

See current price list for availability of items.



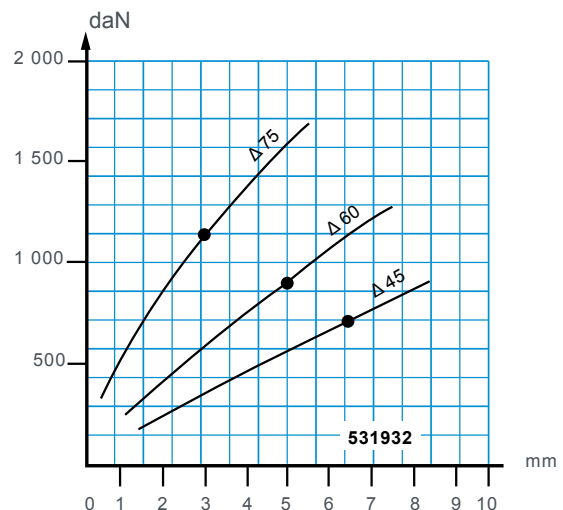
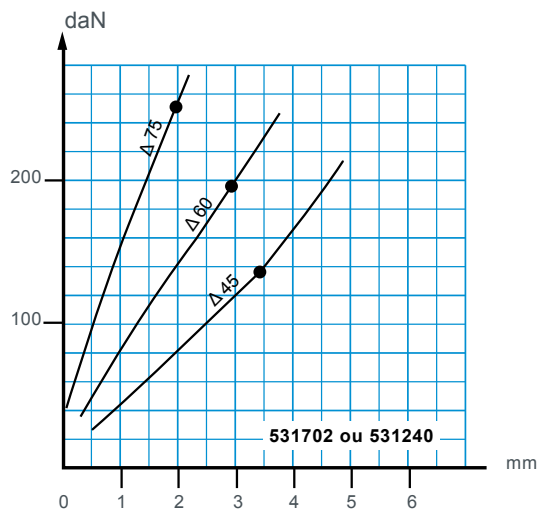
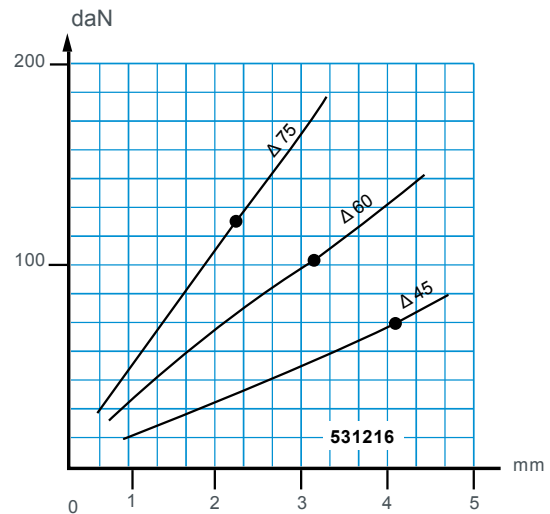
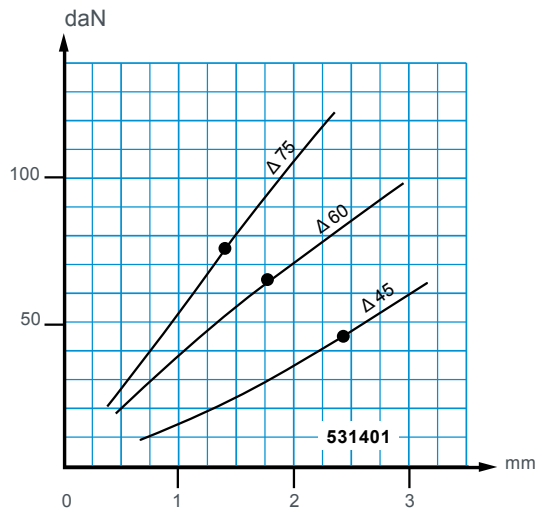
# TECHNICAL CHARACTERISTICS

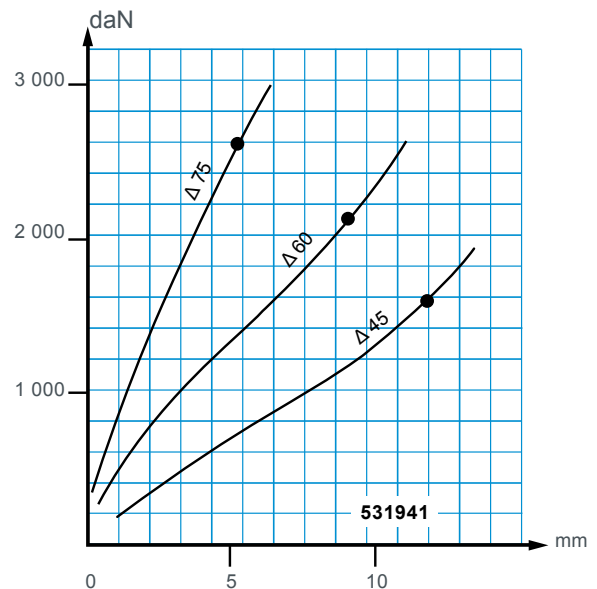
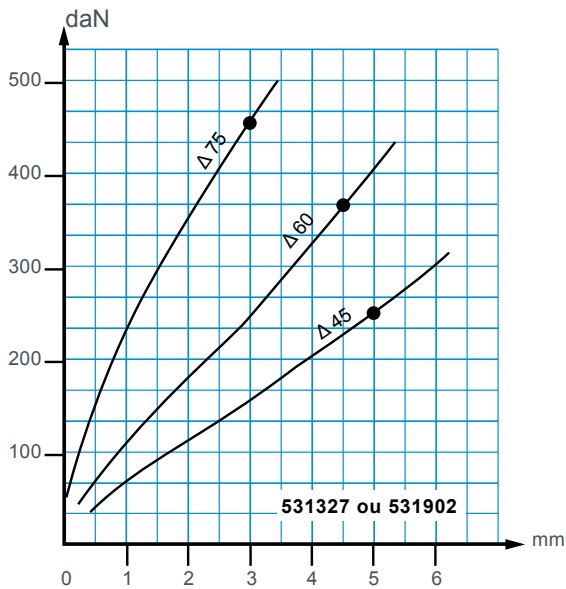
Nominal static load (daN)	Deflect. (mm)	Reference	Hard. Shore A
1-6	1	531201	45
2-8	0,8	531201	60
2-10	0,5	531201	75
5-20	1,5	531301	45
7-30	1,2	531301	60
10-40	0,8	531301	75
10-50	2,5	531401	45
15-65	1,8	531401	60
15-65	2,5	531402	45
15-70	4	531216	45
20-80	1,5	531401	75
20-85	1,8	531402	60
20-85	4	531611	45
20-85	3	531216	60
25-100	3,5	531701	45
25-100	1,5	531402	75
25-110	2	531216	75
30-120	3	531611	60
30-135	3,5	531240	45
30-135	3,5	531702	45
35-150	1,5	531611	75

Nominal static load (daN)	Deflect. (mm)	Reference	Hard. Shore A
35-150	3	531701	60
40-175	5	531259	45
45-180	2	531701	75
45-190	3	531240	60
45-190	3	531702	60
55-225	5	531714	45
60-240	3,5	531259	60
60-250	2	531240	75
60-250	2	531702	75
60-250	5	531261	45
60-250	5	531327	45
60-250	5	531902	45
75-300	2	531259	75
80-320	4,5	531714	60
80-325	4,5	531939	45
85-350	3,5	531261	60
90-360	4,5	531327	60
90-360	4,5	531902	60
95-380	3	531714	75
100-400	4,5	531947	45
105-420	2	531261	75

Nominal static load (daN)	Deflect. (mm)	Reference	Hard. Shore A
110-450	3,5	531939	60
110-450	3	531327	75
110-450	3	531902	75
110-450	6,5	531933	45
135-550	2,5	531939	75
135-550	3,5	531947	60
150-600	5	531933	60
165-670	2,5	531947	75
175-700	6,5	531932	45
210-850	6,5	531931	45
225-900	5	531932	60
275-1100	3	531932	75
275-1100	5	531931	60
310-1250	11	531940	45
350-1400	3	531931	75
400-1600	11	531941	45
450-1800	8,5	531940	60
525-2100	8,5	531941	60
575-2300	5	531940	75
650-2600	5	531941	75

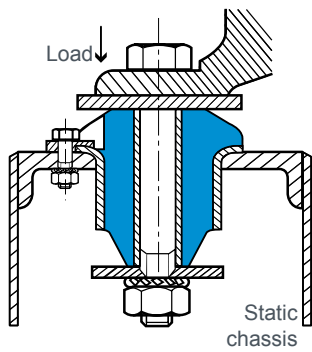
## LOAD/DEFLECTION CURVES IN AXIAL COMPRESSION



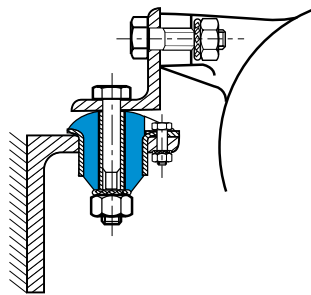


## ASSEMBLY

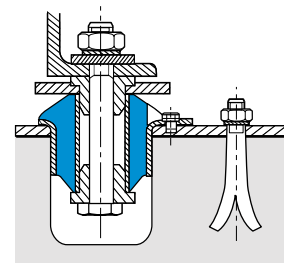
### Exemples of installations



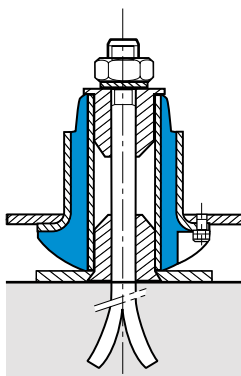
Shape 1 - Fixing between the equipment and a metallic chassis (failsafe in mobile applications).



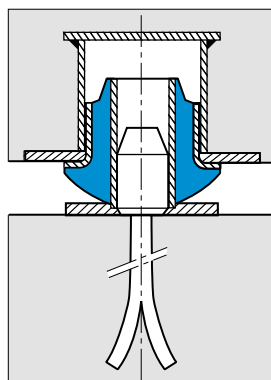
Shape 2 - Fixing between two brackets onto a vertical surface (non failsafe).



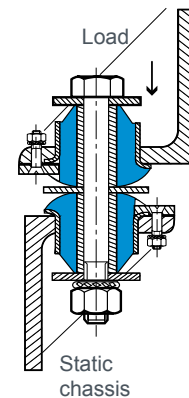
Shape 3 - Fixing between the equipment and concrete (using locating rings).



Shape 4



Shape 5



Shape 6 - Two mounts fixed face to face. Provides twice the deflection under the same load.

# S.T.C.

Natural frequency : (1)  
10 to 25 Hz



## DESCRIPTION

The S.T.C. mount comprises a rubber ring bonded to a central tube.

- Inner tube : mild steel.
- Bonded rubber in the form of a ring at the top with a collar below which is used for fixing.

## OPERATION

The design of the S.T.C. mount gives the following basic characteristics :

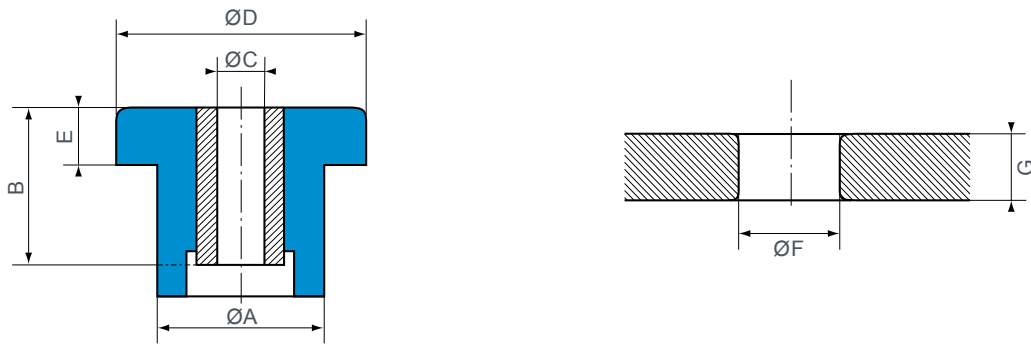
- the rubber works in compression;
- anti-rebound;
- can be used as safety mounting.

### Advantages

- Simple to fix.
- Simple and economical.
- Extensive range of loads.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



Reference	Ø A (mm)	B (mm)	Ø C (mm)	Ø D (mm)	E (mm)	Ø F (mm)	G (mm)
539887	20,6	17,5	10	27,7	5,6	20,6	8
539190	31,5	25,4	13	44,5	10,4	31,5	10
539886	34,3	35	13	50,8	13,5	34,3	16
539191	41,1	44,5	16	63,5	15,7	41,1	19
*539920	38	23	16	64	16	38,5	19
539951	56,6	50,8	20	95	25,4	56	20

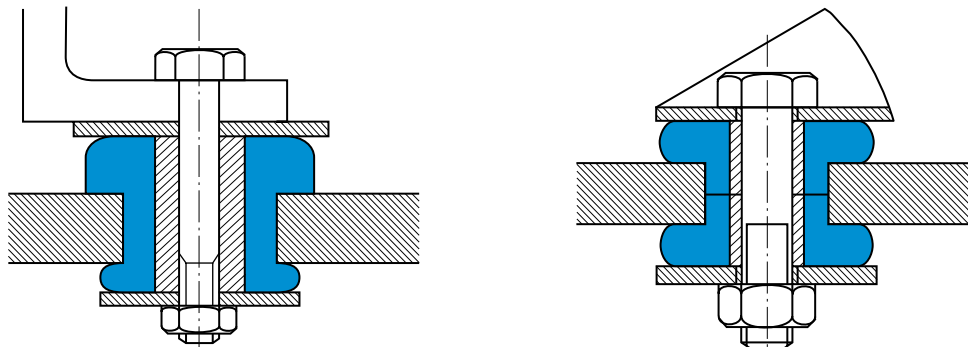
\* This S.T.C. is mounted in pairs : see assembly  
See current price list for availability of items.

# OPERATING CHARACTERISTICS

Reference	Hard. Shore A	Nominal static load (daN)	Deflection (mm)
539887	45	8-35	0,7
	60	10-50	0,7
539190	45	15-75	1,2
	60	25-100	1,2
539886	60	35-150	1,2
	75	80-330	1,2

Reference	Hard. Shore A	Nominal static load (daN)	Deflection (mm)
539191	60	60-250	2
	75	125-500	2
539920	45	100-400	2
	75	250-1 000	1
539951	45	175-700	3
	65	250-1 000	3

# ASSEMBLY



For **539920**

This S.T.C. is mounted in pairs : see assembly

# MOUNT 22000

Natural frequency : (1)  
10 to 15 Hz



## DESCRIPTION

The 22000 mount is made of two parts of elastomer bonded to a central tube.

- Interior reinforced : cylindrical tube.
- Elastomer : chloroprene. Range of five different stiffnesses.

## OPERATION

The design of the 22000 mount gives the following basic characteristics :

- elastomer element resistant to oils, supporting axial and radial loadings;
- axial to radial stiffness of 1:1;
- absorb vibration and reduce noise in all directions.

### Advantages

- Good isolation against structural noises.
- Chloroprene resistant to oils.
- Simple and economical.
- Simple to fix.
- Five sizes for a load capacity under axial pressure from 18 to 954 daN and under radial pressure until 443 daN
- Anti-rebound effect when it is assembled with a washer.

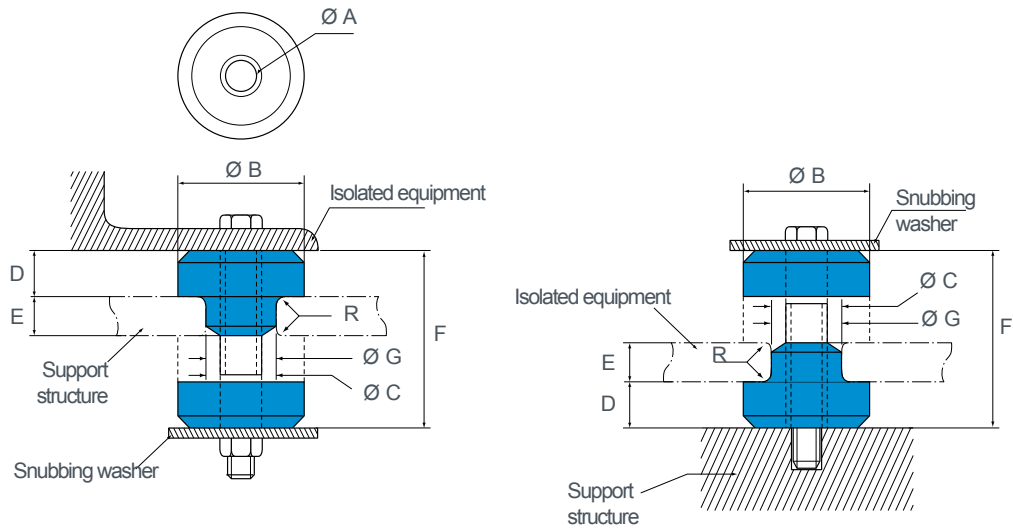
## APPLICATION

22000 mounts can be used in static or mobile applications, such as : pumps, compressors, generators, electronic equipment, HVAC equipment, engines with internal combustion, transmissions, plant cabs, radiators, etc.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

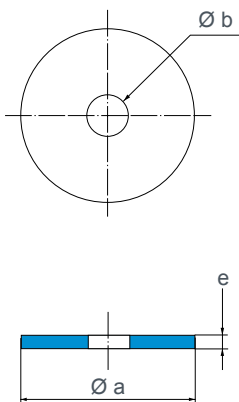
# DIMENSIONS CHARACTERISTICS

G :  $\varnothing$  mounting hole  
 C :  $\varnothing$  elastomer  
 F : Free height  
 R : Radius required



E : support structure thickness can be  $E_1$  or  $E_2$  depending on the required load and natural frequency (see technical chart next page).

Reference	Barry Control Reference	$\varnothing A$ (mm)	$\varnothing B$ (mm)	$\varnothing C$ (mm)	D (mm)	F (mm)	Mounting hole		Weight (g)
							$\varnothing G$ (mm)	R (mm)	
<b>530903 11 to 15</b>	22001-11 to 15	10,4	33,2	20,1	12,3	31,7	19	1	43
<b>530903 21 to 25</b>	22002-11 to 15	13,5	47,7	33	19,8	49,2	31,7	1,5	142
<b>530903 31 to 35</b>	22003-11 to 15	16,7	64,8	40,1	22,8	61,7	38,1	2,3	313
<b>530903 41 to 45</b>	22004-11 to 15	23,8	88,9	58,4	25,4	73,1	57,1	3	670
<b>530903 51 to 55</b>	22005-11 to 15	27	123,9	64,8	31,7	85,8	63,5	3	1 306



Zinc plated steel washers are recommended for the assembly of the mount.  
 They make it possible to carry out debouncing.

Reference*	Washer*			Weight (g)
	$\varnothing a$ (mm)	$\varnothing b$ (mm)	e (mm)	
<b>530903 11 to 15</b>	39,6	10,3	2,2	24
<b>530903 21 to 25</b>	54,1	13,5	3,4	54
<b>530903 31 to 35</b>	71,3	16,7	4,7	140
<b>530903 41 to 45</b>	98,5	23,8	6,3	368

\* Not supplied

# OPERATING CHARACTERISTICS

The maximum loadings depend on the compression of the assembly by comparing the thicknesses  $E_1$  and  $E_2$ .

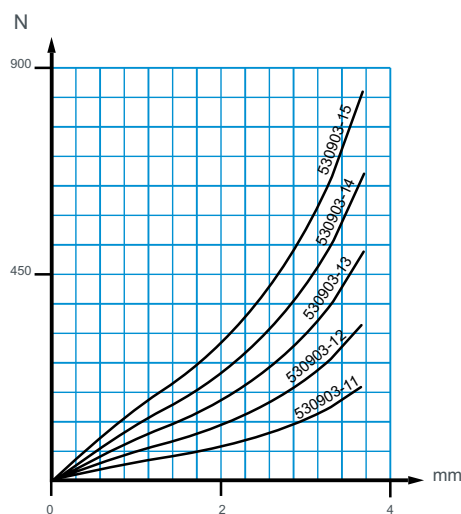
Paulstra reference	Barry Control Reference	Support structure thickness $E_1$ Load per mount				Support structure thickness $E_2$ Load per mount				Colour marking
		Axial (daN)	Radial (daN)	Fo (Hz)	$E_1$ (mm)	Axial (daN)	Radial (daN)	Fo (Hz)	$E_2$ (mm)	
530903 11	22001- 11	18	9			18	9			Red & White Yellow & White Green & White Blue & White Purple & White
530903 12	22001- 12	40	13			40	13			
530903 13	22001- 13	63	18	15	9,5	63	18	15	9,5	
530903 14	22001- 14	113	22			113	22			
530903 15	22001- 15	136	27			136	27			
530903 21	22002- 21	59	22			27	18			Red & White Yellow & White Green & White Blue & White Purple & White
530903 22	22002- 22	79	29			54	36			
530903 23	22002- 23	109	40	12	14	72	56	15	12,5	
530903 24	22002- 24	172	75			118	81			
530903 25	22002- 25	286	127			172	127			
530903 31	22003- 31	95	40			40	31			Red & White Yellow & White Green & White Blue & White Purple & White
530903 32	22003- 32	159	63			68	47			
530903 33	22003- 33	222	102	11	22	102	72	15	19	
530903 34	22003- 34	390	175			147	111			
530903 35	22003- 35	604	313			227	163			
530903 41	22004- 41	122	61			68	50			Red & White Yellow & White Green & White Blue & White Purple & White
530903 42	22004- 42	231	104			136	100			
530903 43	22004- 43	350	156	10	28,5	181	136	15	25,5	
530903 44	22004- 44	531	268			227	181			
530903 45	22004- 45	954	443			272	263			
530903 51	22005- 51	518	109			136	68			Red & White Yellow & White Green & White Blue & White Purple & White
530903 52	22005- 52	877	154			227	100			
530903 53	22005- 53	1 172	277	10	32	318	136	15	25,5	
530903 54	22005- 54	1 609	404			409	213			
530903 55	22005- 55	2 072	640			545	300			

See current price list for availability of items.

\* Barry Controls part numbers are shown as a reference only.

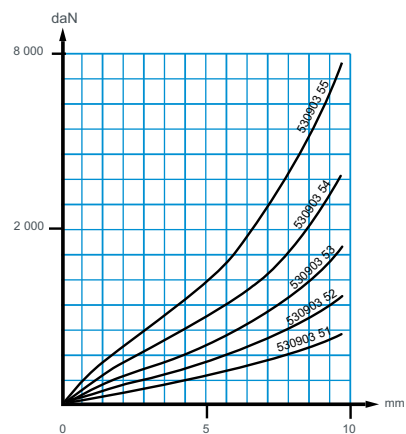
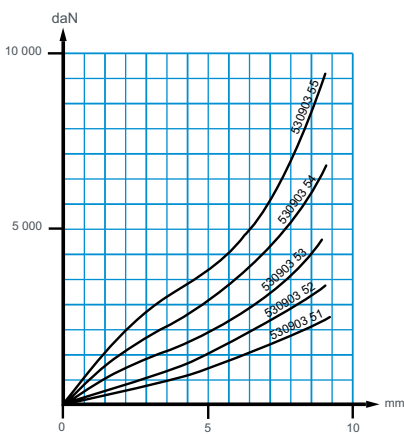
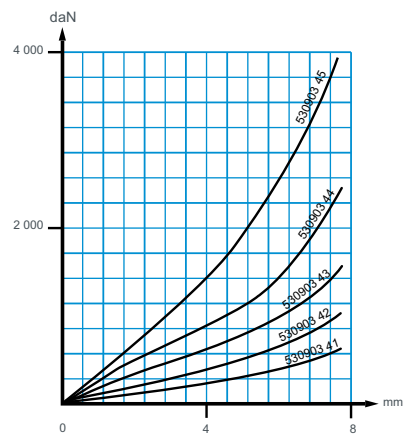
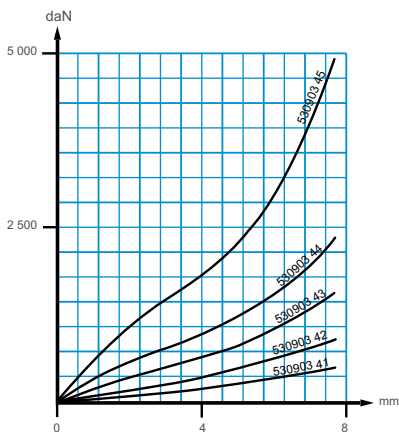
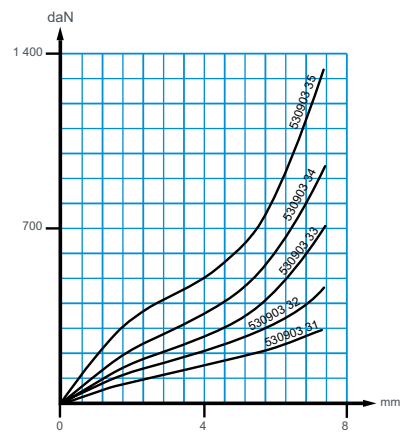
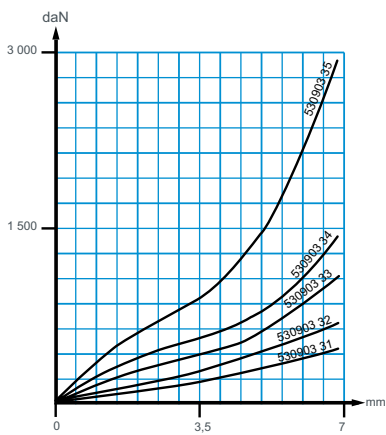
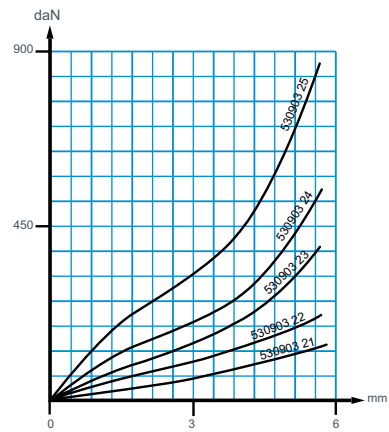
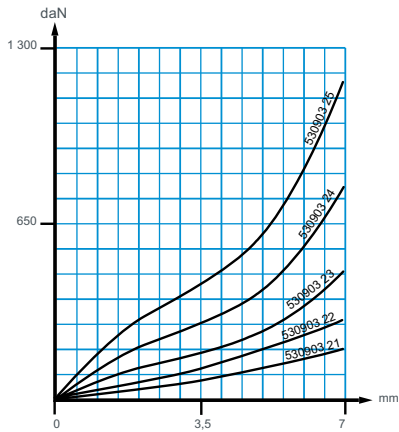
## LOAD/DEFLECTION CURVES IN AXIAL COMPRESSION

Support structure thickness  $E_1$  and  $E_2$



## Support structure thickness E<sub>1</sub>

## Support structure thickness E<sub>2</sub>





# FLEX-LOC



## DESCRIPTION

A flexible fixing resistant to oils, the majority of solvents and ageing.

## OPERATION

The design of the FLEX-LOC mount gives the following basic characteristics :

- the rubber works in :
  - compression (axial);
  - shear (radial);
  - compression/shear according to the fixing method.

### Advantages

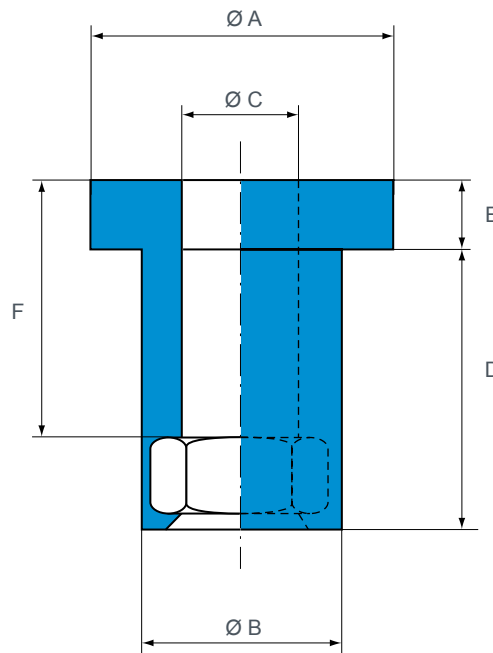
- 80% reduction at 150 Hz of vibrational energy transmitted from normal structural frequencies.
- Simple and economical.
- Simple to fix.
- Light weight.

## APPLICATIONS

FLEX-LOC are suitable for the fixing of sheets, frameworks, engines, ventilators, electronic equipment, computers, etc.

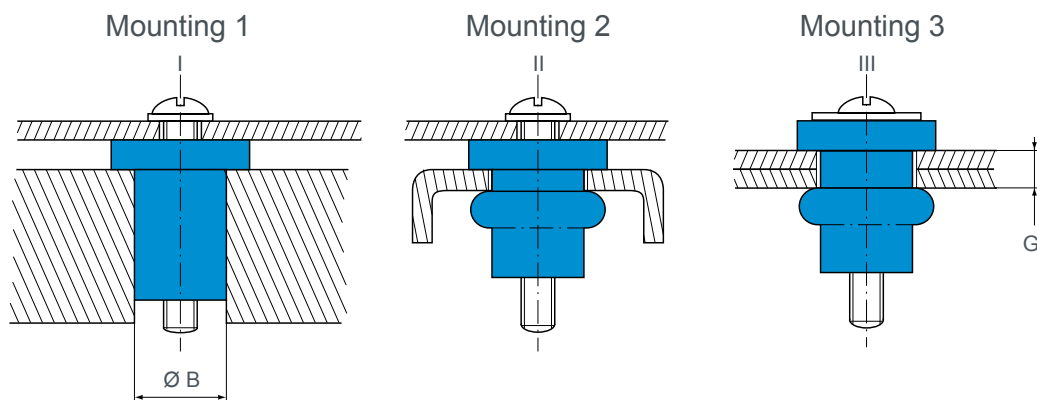
They have, moreover, a function of insulation against the structure borne noises, unlike other fasteners.

# DIMENSIONS



Paulstra reference	Barry Control reference	Nut	Ø A (mm)	Ø B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
530909 03	Q3	M3	9	7,2	3,4	9	2,5	8
530909 04	Q4	M4	12	9,3	4,4	11,5	3	10,5
530909 05	Q5	M5	15	10,2	5,4	14,5	3,5	13
530909 06	Q6	M6	18	12,7	6,4	17	4	15
530909 07	Q8	M8	24	16,5	8,4	22	5	19,5

# OPERATING CHARACTERISTICS



Paulstra reference	Clearance hole Ø B (mm)	Plate thickness G (mm)	Torque range		Static load (daN)		
			1 (Nm)	2 or 3 (Nm)	1	2 or 3	
					Compression / shear	Compression	Shear
530909 03	7,2 - 7,5	0,6 - 2,5	0,5	0,4	1	5	2,5
530909 04	9,3 - 9,6	0,8 - 3,3	0,6	0,5	1	7	3,5
530909 05	10,2 - 10,5	0,8 - 4,3	1,0	0,6	1,5	10	5
530909 06	12,7 - 13,0	1,5 - 5,0	3,5	0,9	3	14	7
530909 07	16,5 - 16,8	1,5 - 6,5	4,0	1,8	5	28	14

\* Barry Controls part numbers are given for reference only.

# PAULSTRACAB

## Cabin mount

Natural frequency :  
7 to 14 Hz



## APPLICATIONS

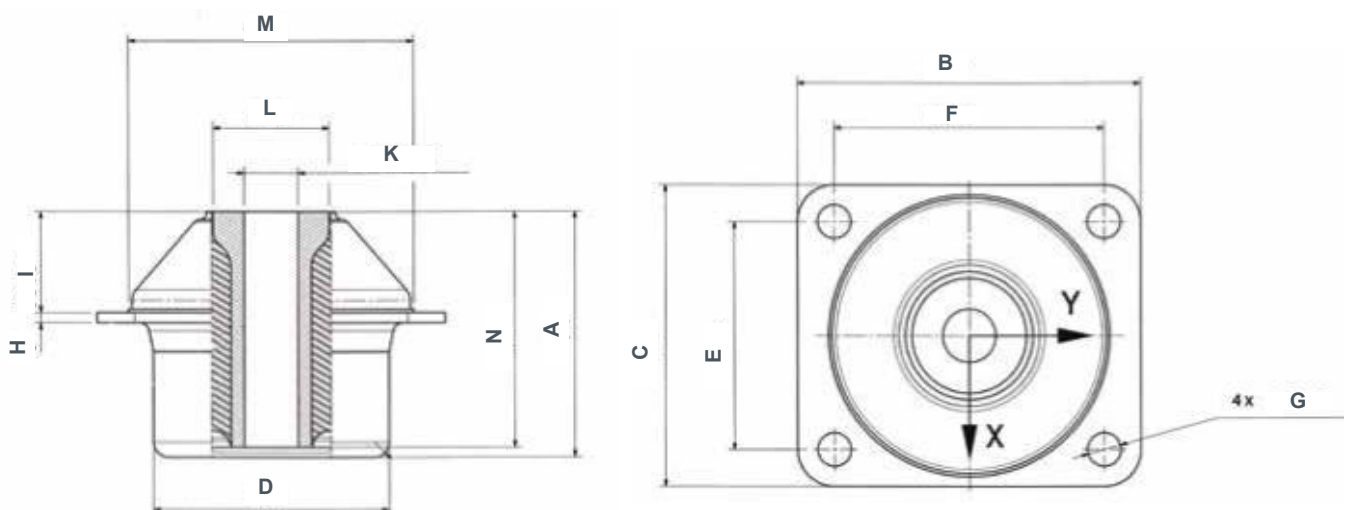
Anti-vibration and shockproof cabin mount dedicated to the cabin suspension of vehicles.

## ADVANTAGES

- Comfort improvement
- Fail-safe assembly
- Tear resistance (EN ISO 3471 - ROPS)
- 480 hours protection against salt spray
- Differential stiffness in the three axes
- Withstand temperature -40 ° C / + 110 ° C (CALTHANE<sup>®</sup> mixture)

## DIMENSIONS CHARACTERISTICS

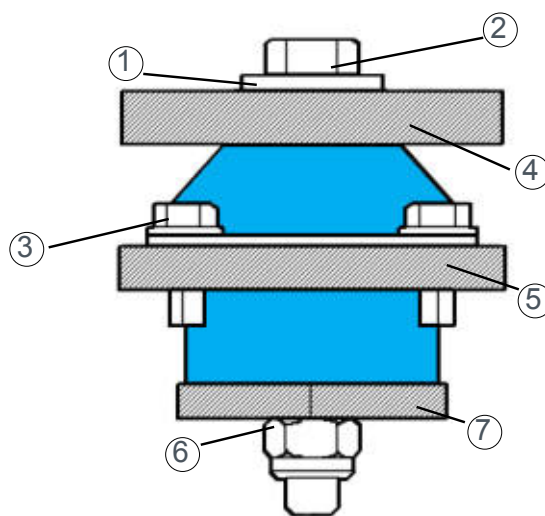
Reference	A (mm)	B (mm)	C (mm)	D Ø (mm)	E (mm)	F (mm)	G Ø (mm)	H (mm)	I (mm)	K Ø (mm)	M Ø (mm)	N (mm)
544453	75	105	92	71	69,5	82,5	10,2	3	30,5	16,25	86	71



# OPERATING CHARACTERISTICS

Reference	Hardness	Load Range (daN)	Deflection max (mm)	Color
544453	45	200-450	7	Yellow & White
544453	50	225-500	6	Yellow & Green
544453	55	250-550	5	Green & White
544453	60	325-775	4	Green & Blue

## ROPS MOUNTING



### Elements not provided

- ① Washer HR 16.5 x 40 x 4
- ② Screw H M16x1.5 class 10.9 and long = 110mm
- ③ Screw H EMB M10x1.5 class 10.9 and long = 20 mm
- ④ Cabin structure thickness 15
- ⑤ Frame thickness. 12 mm in S335
- ⑥ Nut H FR M16x1.5 class 10
- ⑦ Bounce washer thickness 10 mm

# TRIAXDYN

Natural frequency : (1)  
10 Hz



## DESCRIPTION

This anti-vibration mount Triaxdyn comprises two elastomers which are assembled into a casting and pre-loaded.

The mounting is designed to offer :

- a large deflection (in axial);
- different stiffness in three axis;
- built-in stops to limit movement in all directions.

**Note** : the mount body can be modified to offer alternative interface dimensions providing the internal interface with the elastomer is maintained.

## APPLICATIONS

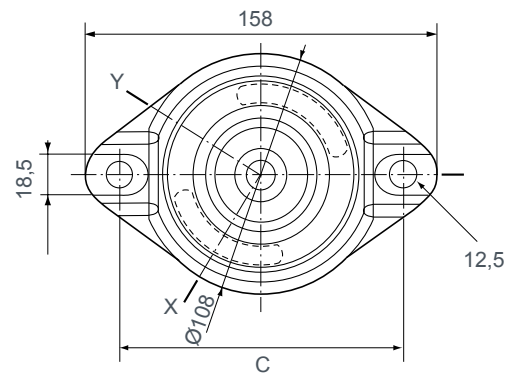
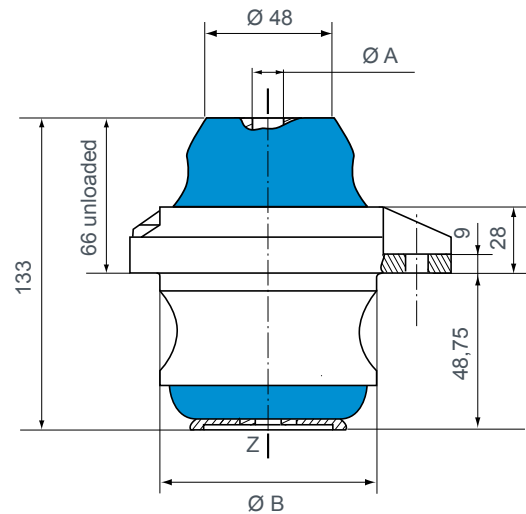
This mount has been designed to isolate engines or cabs in fixed or mobile applications with a high level of isolation and shock protection. Its compact design enables fail safe suspension of loads from 150 to 280 kg.

It is suitable for :

- engine mounting;
- cab mounting;
- equipment mounting.

# DIMENSIONS CHARACTERISTICS

- Nominal load : 150 to 280 kg.  
Possibility to extend, on request, the load range up to 350 kg.
- Different stiffness in three axis (for a hardness 50) :
  - axial on Z : 500 N/mm;
  - radial on X (in direction of voids) : 350 N/mm;
  - radial on Y (at 90 deg. to voids) : 500 N/mm.
 The geometry of the part provides low dynamic stiffness in the vertical dimension.
- Maximum deflection :
  - axial :  $\pm 10$  mm,  $\pm 4$  g;
  - radial :  $\pm 6$  mm,  $\pm 2.5$  g.
- Operating temperature :  
- 40 up to + 80°C.
- Salt spray protection 400 h. for external aluminium metalwork.



## Mounting

Reference	Ø A (mm)	Ø B (mm)	C (mm)
905233	12,4	94	128

\* Note: custom made part, many variants available, contact us.

# ENGINE MOUNTING SYSTEMS

Natural frequency : (1)  
6 Hz



## DESCRIPTION

This ENGINE MOUNT is made of one conical elastomeric element enclosed in a cast iron assembly. A built-in adjustable stop limits the vertical and lateral displacement during shock. It can be supplied with or without levelling system and with a threaded hole or a threaded stud.

## OPERATION

This mount has been designed to suspend fixed or mobile generators which require a high level of vibration isolation and shock protection. The load per mount varies from 600 kg to 2300 kg. This load range is covered by 5 different variants (12 to 16) clearly identified by a coloured marking (see table).

This mount is available in two different alternatives depending on the type of upper fixing needed :

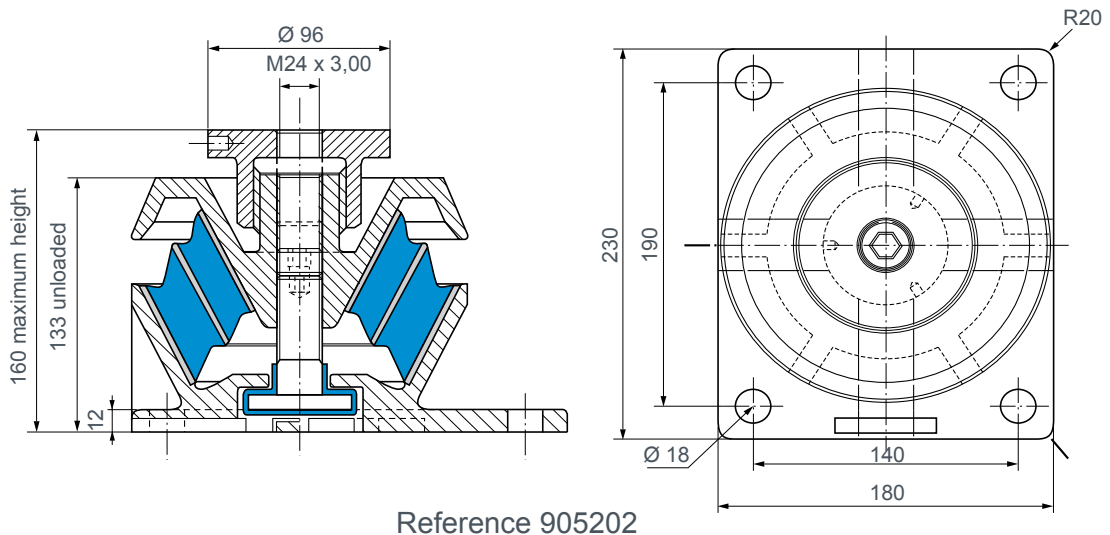
- 905201 : No levelling system - M24 x 3.00 threaded hole.
- 905202 : Built-in levelling system - M24 x 3.00 threaded hole.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# OPERATING CHARACTERISTICS AND DIMENSIONS

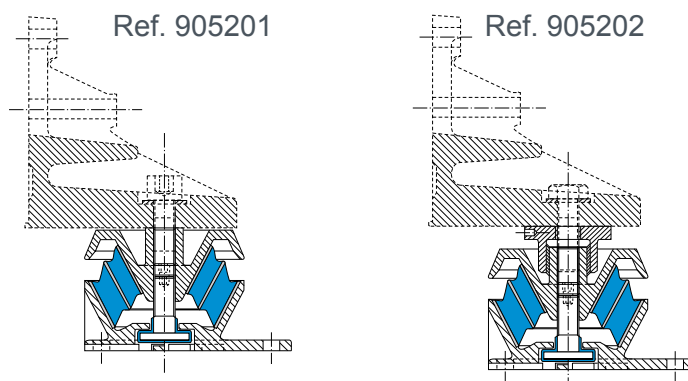
- Load range : please refer to the chart below for the different variants and their colour marking.
- Deflection under static load :  
4,5 to 7,5 mm (Natural frequency : 5 to 6,5 Hz.)
- Maximum displacement :  
vertical (Axial) :  $\pm 6$  mm;  
lateral (Radial) :  $\pm 4$  mm.
- Structural resistance :  
vertical (Axial) :  $\pm 4$  g;  
lateral (Radial) :  $\pm 2$  g.
- Operating temperatures : - 10°C up to + 70°C.
- Unit weight : 11.5 to 12.8 kg (depending on the variant).

Load range (daN)	Variant	Color
600 - 850	12	White
850 - 1 150	13	Yellow
1 100 - 1 450	14	Green
1 400 - 1 900	15	Blue
1 700 - 2 300	16	Purple



## ASSEMBLY

The installation of these mounts and the adjustments of their limit stops once loaded are detailed in an assembly procedure supplied with the mounts.

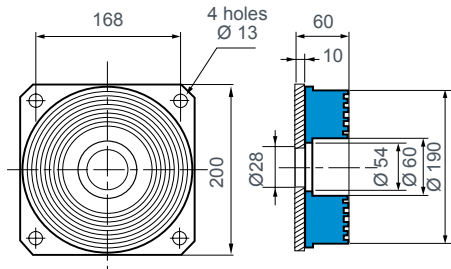




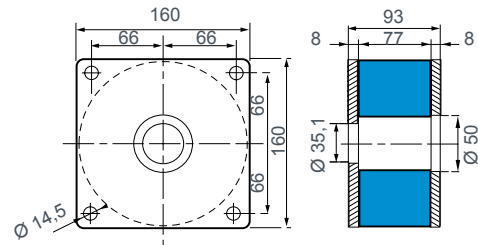
# SUPPORTS AND BUMP STOPS



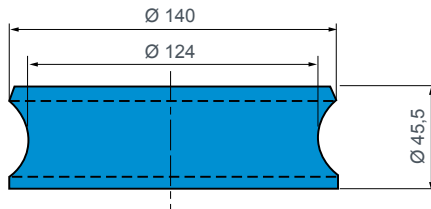
Reference : **514202** - Hardness : 75  
Compressive load : 5000 daN - Deflection : 8mm



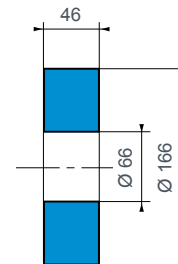
Reference : **534501** - Hardness : 60  
Load : Compression : 2500 daN - Deflection : 15 mm  
Shear load : 300 daN - Deflection : 10 mm



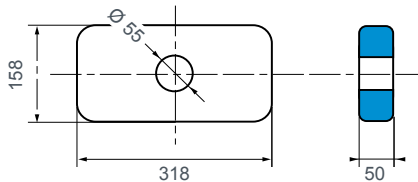
Reference : **813501** - Hardness: 60 -  
Compressive load : 1000 daN - Deflection : 4mm



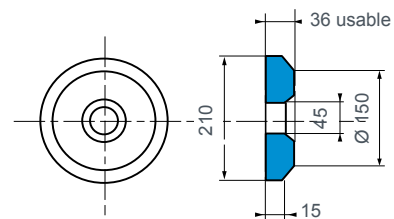
Reference : **817505** - Hardness 60 -  
Compressive load : 1500 daN - Deflection : 5 mm



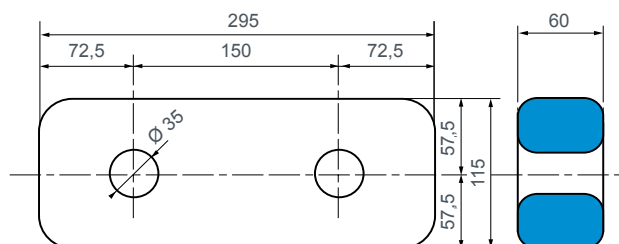
Reference : **813506** - Hardness 60 -  
Compressive load : 4000 daN - Deflection : 2.4mm



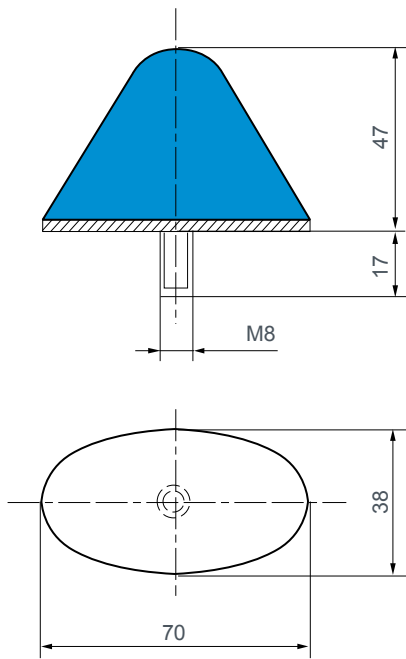
Reference : **817605** - Hardness 60 -  
Compressive load : 2000 daN - Deflection : 1.4mm



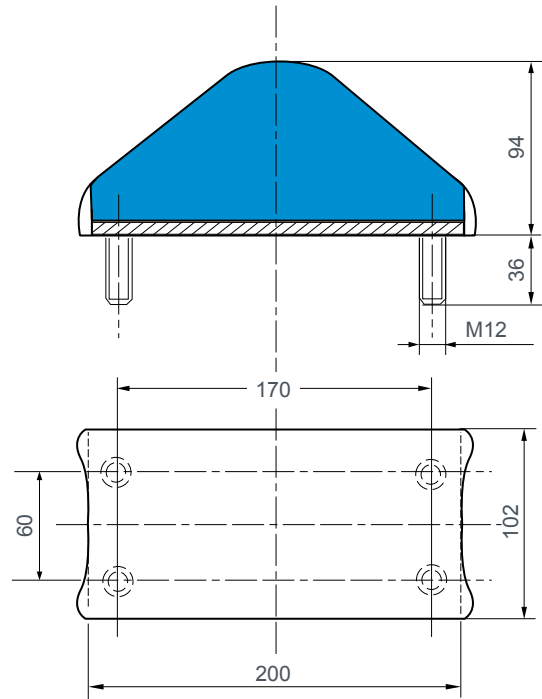
Reference : **813504** - Hardness 60  
Compressive load : 3000 daN - Deflection : 9 mm



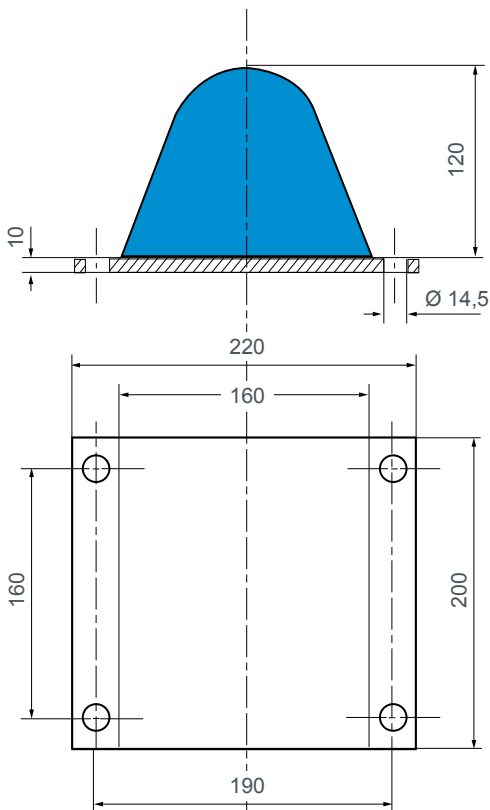
See current price list for availability of items.



reference **512389**  
 deflection : 14 mm  
 maximal charge : 150 daN

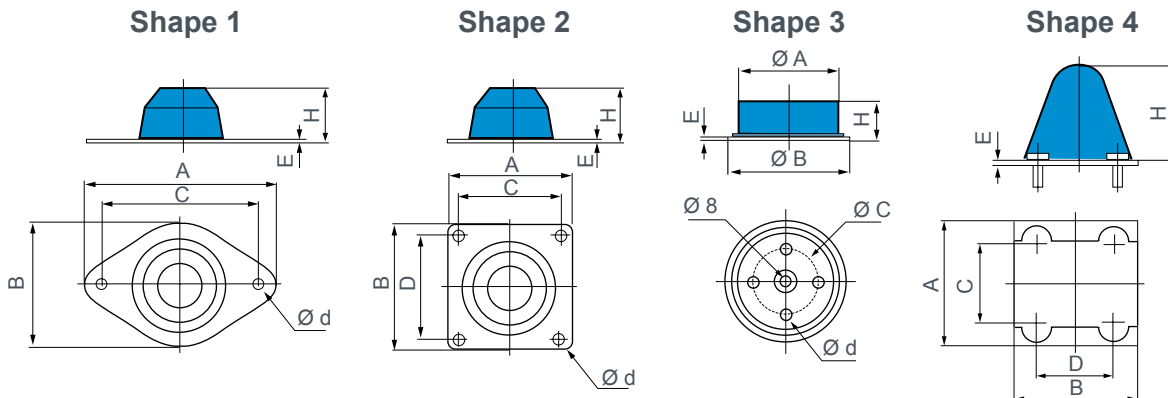


reference **519186**  
 deflection : 35 mm  
 maximal charge : 3 000 daN



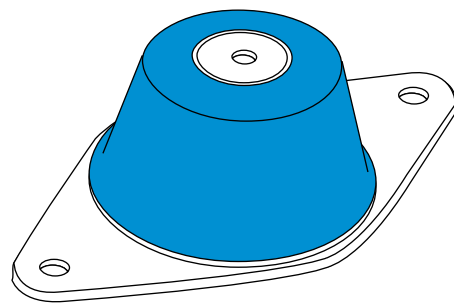
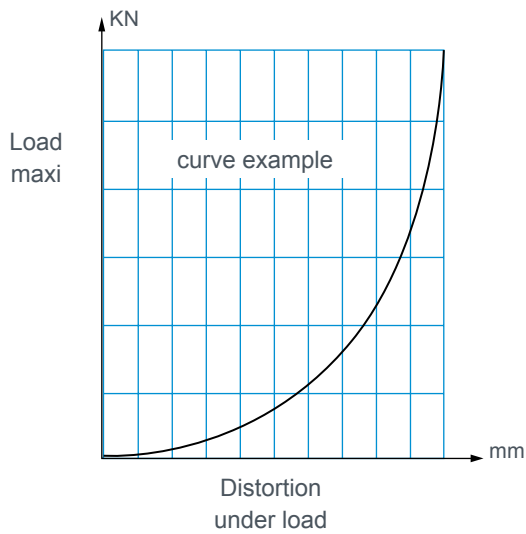
reference **512991**  
 deflection : 45 mm  
 maximal charge : 4 800 daN

See current price list for availability of items.



See also stops range (page 58)

Reference	Shape	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	H (mm)	Load maxi (daN)	Deflection under load (mm)	Ø d (mm)
E1V-3245-04	4	135	125	106	85	5	110	50	-	M10
E1V-3568-01	3	110	126	80	-	3	36	59	10	5/16 or M8
E1V-3892-01	2	196	140	174	118	5	85	25	40	13
E1V-3914-01	1	170	110	140	-	3	40	20	25	15
E1V-3921-01	1	170	110	140	-	3	50	28	31	15
E1V-3922-01	2	180	180	148	148	6	56	60	32	15
E1V-3927-01	1	170	110	140	-	3	40	28,5	25	15
E1V-3931-01	2	110	110	92	92	3	90	26	-	9
E1V-3932-01	1	170	110	140	-	3	30	50	15,5	15
E1V-3940-01	1	170	88	140	-	3	20	30	10	15
E1V-4031-01	1	170	110	140	-	3	65	25	41	15
E1V-4059-11	1	234	125	200	-	5	70	51,2	40	14
519805	1	170	110	140	-	3	50	28	31	15
519830	2	100	110	80	90	3	62	12,5	25	11



- Avantages**
- Sliding plate.
  - Integrated stop.
  - Progressive stiffness.

# NIVOFIX®

See Vibrachoc  
metallic range  
V43 - V44  
V45 - V46



## DESCRIPTION

The NIVOFIX® mount is an adjustable equipment foot comprising a circular disc bonded to a protected rubber base. An adjustment screw permits the levelling.

The rubber base has anti-slip ridges.

## OPERATION

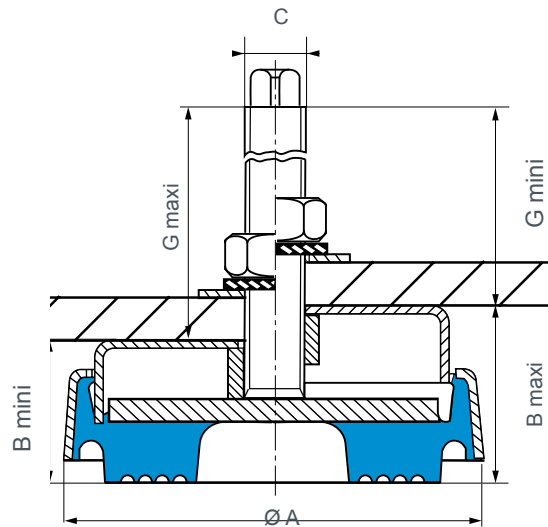
The design of the NIVOFIX® mount gives the following basic characteristics :

- accurate adjustment of the mount to correct the equipment's seating (adjustment screw, correction of altitude);
- absorbs high frequency vibrations;
- corrosion resistant (nitrile elastomer, protective shroud, galvanised metallic parts);
- anti-slip sole (no need to fix).

### Advantages

- Speed of fixing.
- Simple removal of the equipment.
- No shimming.

# DIMENSIONS



Reference Stainless steel	Reference Steel	Ø A (mm)	B (mm)			C	G (mm)		Stud lenght (mm)	Weight (g)
			B max. = B min. + adjustment				min.	max.		
530815	530810	65	31,5	26,5	5	M12	105	110	128	280
530825	530820	88	46	33	13	M16	114	127	150	690
530835	530830	133	58	46	12	M20	130	142	173	1 820
-	530840	200	70	58	12	M24	145	157	195	5 250
-	530850	260	83	65	18	M24	158	176	215	10 000

See the current price list for availability of items.

# OPERATING CHARACTERISTICS

Reference	Nominal static load min. - max. (daN)	Deflection (mm)
530810	100 - 600	1 - 3,5
530815	100 - 600	1 - 3,5
530820	325 - 1 300	2 - 4
530825	325 - 1 300	2 - 4

Reference	Nominal static load min. - max. (daN)	Deflection (mm)
530830	650 - 2 600	2 - 4
530835	650 - 2 600	2 - 4
530840	1 500 - 6 000	1,5 - 3
530850	3 000 - 12 000	2 - 4

# APPLICATIONS

NIVOFIX® mounts are used for all equipment requiring height adjustment.

Equipment already using NIVOFIX® mounts :

- Vertical mill
- Mortiser
- Multichuck drill
- Sheet metal bender
- Polisher
- Press
- Plane
- Horizontal mill
- Lathe
- Gear cutter
- Textile machinery
- Packaging machine
- Test equipment
- Printing press

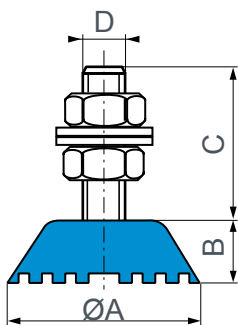
# MINIFIX®



## DESCRIPTION

The MINIFIX® mount comprises an elastomer pad with an anti-slip ridged surface and a threaded stud allowing accurate height adjustment of equipment. Made in two hardnesses (50 and 80 Sh) the MINIFIX® mount is perfectly suited to a variety of applications and is delivered complete with fixing nuts and washers. MINIFIX® mounting nuts and screws are made of steel or stainless steel.

## CHARACTERISTICS



Load range (daN)	Reference Stainl. steel	Reference Steel	Hardness	Colour	Ø A (mm)	B (mm)	C (mm)	D
5-30 15-70	-	530801	50 SBR 80 Nitrile	grey black	32	15	38	M8 stud
10-40 25-100	-	530802*	50 SBR 80 Nitrile	grey black	46	15	-	M10 nut
10-40 25-100	530806	530805	50 SBR 80 Nitrile	grey black	46	15	38	M10 stud
50-120 100-350	-	530807	50 SBR 80 Nitrile	grey black	70	25,5	55,5	M12 stud

See current price list availability of items.

\* Threaded centre hole.

## APPLICATIONS

Simple and economic, MINIFIX® mountings are particularly suitable for the installation of equipment such as :

- electrical or electronic enclosures.
- packaging equipment.
- test and measuring equipment.
- equipment for the food industry.
- laboratory equipment.
- household appliances.

# BECA

Natural frequency : (1)  
8 to 14 Hz



## DESCRIPTION

The BECA mount comprises one piece elastomer bonded to a top and bottom plate.

- Top plate : smooth or threaded (welded nut) hole.
- Bottom plate : fixing lugs or direct bearing on the ground.
- Bonded rubber.
- Domed rubber ring.
- Anti-slip bead or grooved anti-slip sole.
- Removable protective top cover : protects the rubber and distributes the load.

## OPERATION

The design of the BECA mount gives the following basic characteristics :

- transverse elasticity approximately the same as the axial elasticity (equipfrequency);
- rubber works in compression;
- progressive buffer against shocks or accidental overload;
- anti-slip (may be placed directly on the ground).

### Advantages

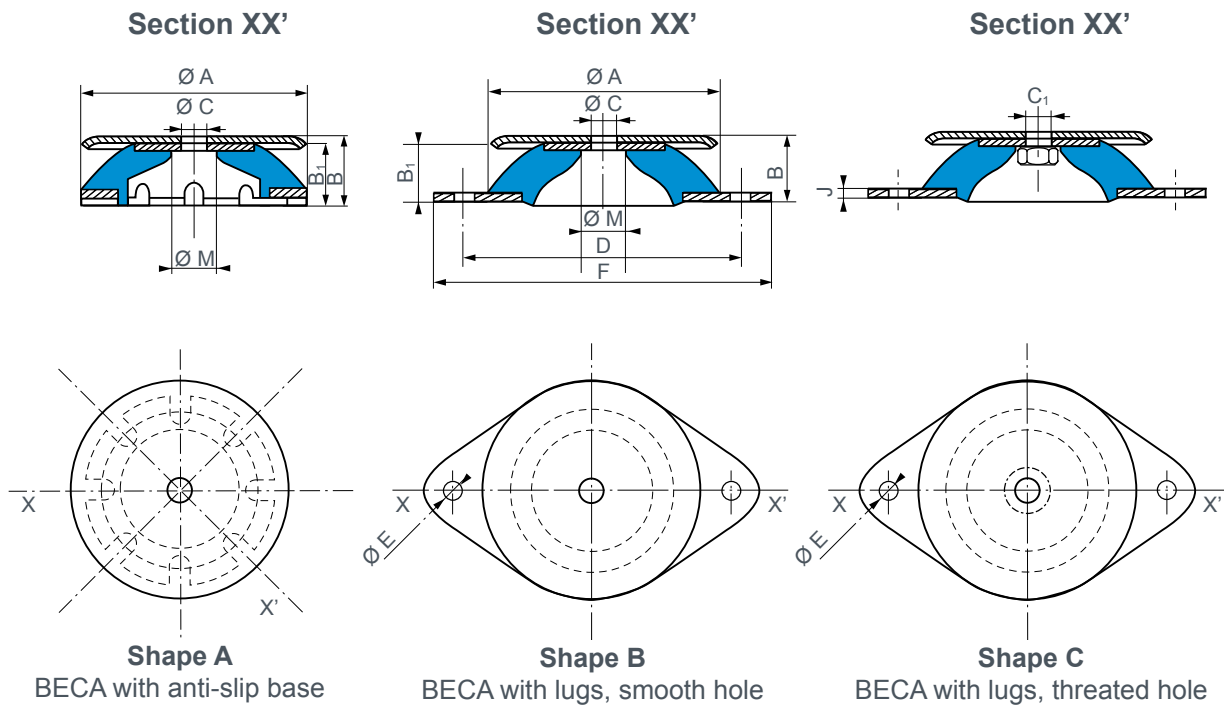
- The machine may be placed (with its mounts) directly on the ground.
- Very slim.
- Speed of fixing.
- Simple removal of the assembly.
- Extensive range : 3 hardnesses of rubber for 6 existing sizes, allowing the mounting to be optimised as a function of the load and stimulation frequency.
- A choice of 3 fixing styles.

### Recommendations

- In order not to affect the suspension of the machine, all external connections must be flexible.
- BECA mount can be used for fixed, well-balanced rotating machinery, otherwise a ballasting slab should be used.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



Reference			Type	Hardness	Ø A (mm)	B (mm)	B1 (mm)	Ø C (mm)	C1	D (mm)	Ø E (mm)	F (mm)	J (mm)	Ø M (mm)	Weight (g)
Anti-slip base	Diamond base														
Smooth hole Shape A	Smooth hole Shape B	Threaded hole Shape C													
-	-	533641*	Ø 40	45.60	40	20	18	-	M6	52	6,2	64	2	19	50
-	-	533661	Ø 60	45.60.75	60	24	22,5	-	M6	76	6,2	90	2	18	140
-	533581	533681	Ø 80	45.60.75	80	27	25	8,1	M8	100	8,2	120	2	22	250
533108	-	-	Ø 100	45.60.75	100	30	28	10,2	-	-	-	-	-	22	420
-	533109	533609	Ø 100	45.60.75	100	27,5	25,5	10,2	M10	124	10,2	148	2,5	22	460
533151	-	-	Ø 150	45.60.75	150	41	38	14,2	-	-	-	-	-	34	1220
-	533152	533652	Ø 150	45.60.75	150	39	36	14,2	M14	182	12,2	214	4	34	1340
533202	-	-	Ø 200	45.60.75	200	46	42	18	-	-	-	-	-	44	2750
-	533203	533623	Ø 200	45.60.75	200	44	40	18	M18	240	14,5	280	5	44	3030

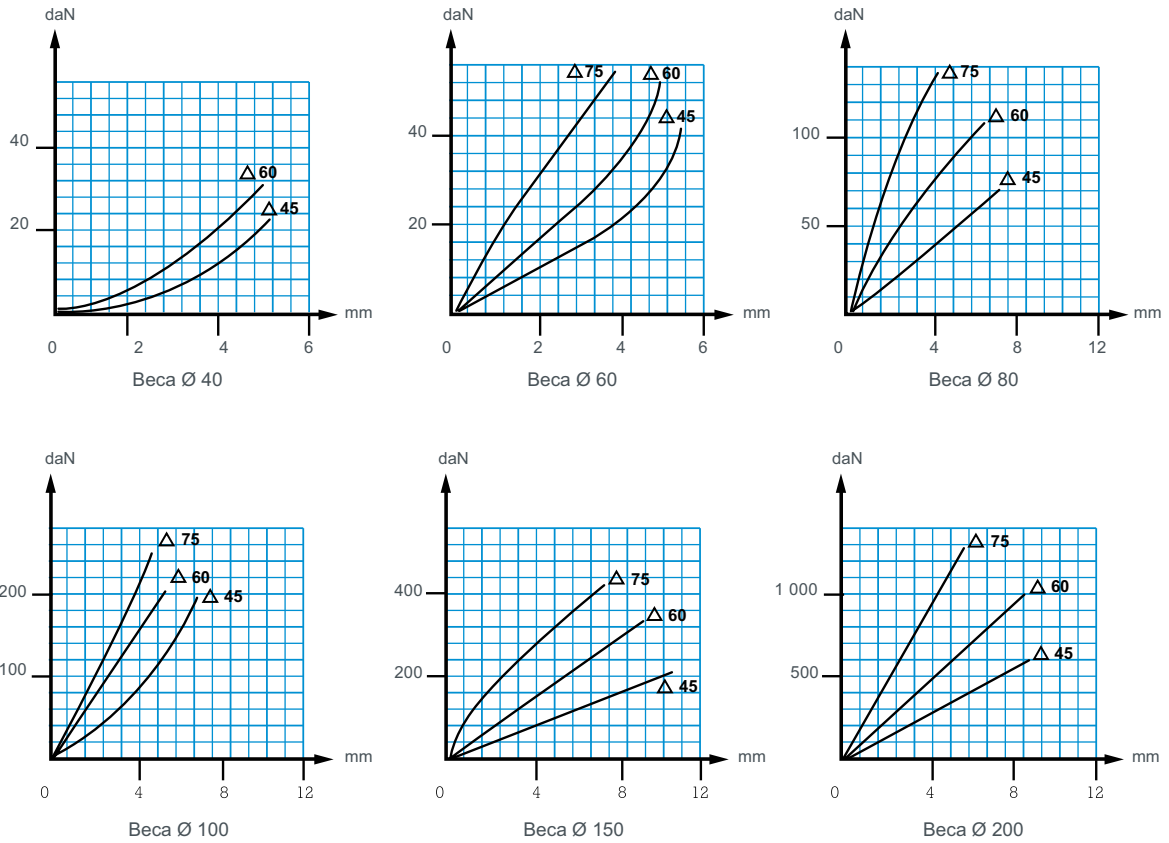
See current price list for availability of items.

# OPERATING CHARACTERISTICS

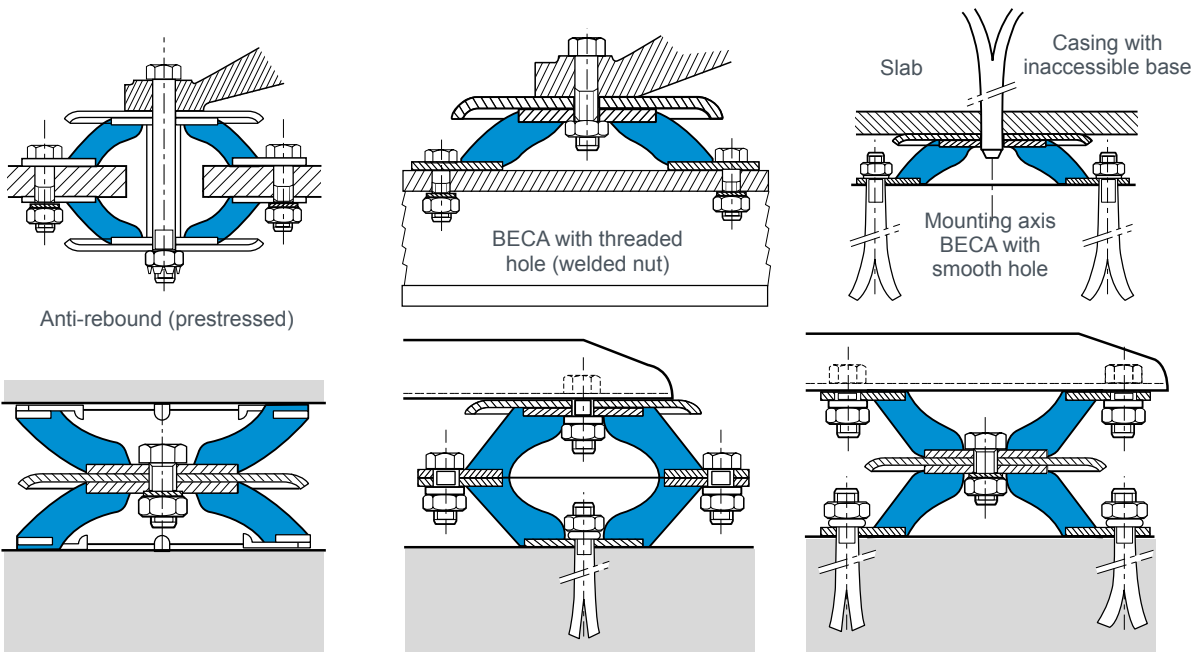
Type	Hardness	Nominal static load (daN)	Deflection (mm)	Type	Hardness	Nominal static load (daN)	Deflection (mm)
Ø 40	45	1 - 4	2	Ø 150	45	30 - 130	7
Ø 40	60	2 - 10	2,5	Ø 100	60	40 - 160	4
Ø 60	45	3 - 15	3	Ø 100	75	50 - 220	4
Ø 60	60	6 - 25	3	Ø 150	60	60 - 250	7
Ø 60	75	11 - 45	3	Ø 150	75	85 - 350	6
Ø 80	45	11 - 45	4,5	Ø 200	45	125 - 500	7
Ø 80	60	20 - 80	4,5	Ø 200	60	200 - 825	7
Ø 100	45	22 - 90	4	Ø 200	75	310 - 1250	6
Ø 80	75	30 - 120	4				



# LOAD/DEFLECTION CURVES IN AXIAL COMPRESSION



## ASSEMBLY

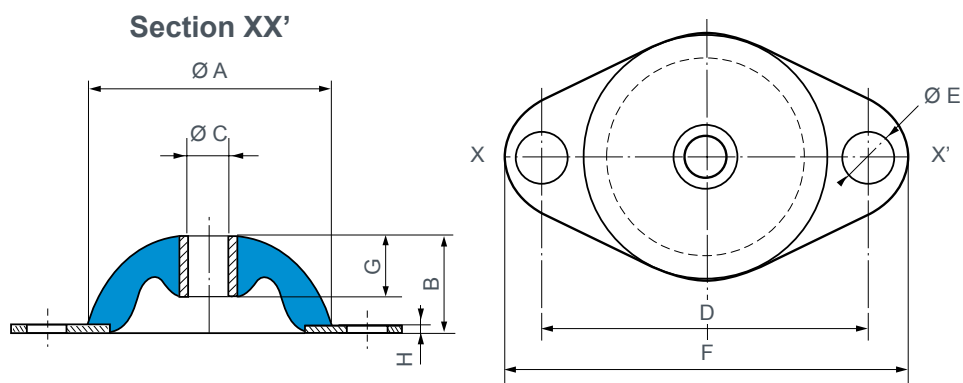


BECA mounts in tandem (to double the deflection)

All of our mounts are identified by conventional markings, either a paint spot or figures indicating the hardness: grey = hardness 45, green = hardness 60, blue = hardness 75.

# POLYFLEX

Natural frequency : (1)  
9 to 20 Hz



## DIMENSIONS

Reference	Ø A (mm)	B (mm)	Ø C (mm)	D (mm)	Ø E (mm)	F (mm)	G (mm)	H (mm)
<b>532300</b>	30	16	6	40	6,1	50	8	1,5
<b>532500</b>	50	20	8	66	8,2	82	13	2
532563	55	23	10,1	90	8,2	106	15	3
<b>532561</b>	60	25	12,2	76	8,5	95	20	4
<b>532750</b>	75	30	12,2	95	11,0	118	25	6

See current price list for availability of items.

## OPERATING CHARACTERISTICS

Reference	Hardness	Deflection (mm)	Nominal static load (daN)
<b>532300</b>	45	3	1-5
<b>532300</b>	60	2	1-7
<b>532300</b>	75	1	2-8
<b>532500</b>	45	4	2-10
<b>532500</b>	60	3	3-15
532563	45	5	4-18
<b>532500</b>	75	2,5	5-20
<b>532561</b>	45	3	7-30

Reference	Hardness	Deflection (mm)	Nominal static load (daN)
532563	60	5	7-30
<b>532561</b>	60	2	10-40
<b>532561</b>	75	1,5	10-50
<b>532750</b>	45	4	10-50
532563	75	5,5	15-60
<b>532750</b>	60	3	15-65
<b>532750</b>	75	1,5	20-80

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# TRAXIFLEX®

Natural frequency : (1)  
8 à 10 Hz

See Vibrachoc  
metallic range :  
VE101 - VE111  
VE112 - VE113



## DESCRIPTION

The TRAXIFLEX® hanger comprises two metallic U armatures joined by two bonded rubber blocks. It is available in two versions : male/female and female/female.

## OPERATION

The design of the TRAXIFLEX® hanger gives the following basic characteristics :

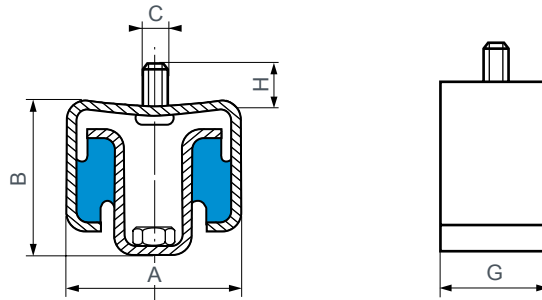
- rubber works in compression-shear;
- the same deflection under nominal load for all types;
- safety system in case of elastomer failure.

### Advantages

- Economic solution for suppressing structure borne noise.
- Several fixing methods.
- High resistance to atmospheric exposure :
  - galvanised armatures;
  - chloroprene elastomer.
- Upper metallic part is shaped to simplify orientation while fixing.
- Two hardnesses of elastomer to extend the choice of mounting as a function of load.
- Filtration of vibration and the attenuation of the consequent noise.
- Allows movement due to thermal expansion.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



Type	Reference		A (mm)	B (mm)	C	G (mm)	H (mm)
	1 screw - 1 nut	2 nuts					
TR 12-30	535600	-	47	38	M7 x 1,50	16	7
TR 12-30	<b>535603/61*</b>	-	47	38	M6 x 1,00	16	17
TR 12-30	<b>535603</b>	-	47	38	M6 x 1,00	16	17
TR 40-80	<b>535611</b>	<b>535621</b>	55	47	M8 x 1,25	30	13
TR 100-250	<b>535612</b>	<b>535622</b>	74	50	M12 x 1,75	40	17

See current price list for availability of items.

\* Elastomer resistant to fire M1.

# OPERATING CHARACTERISTICS

Recommended load (daN)	Deflection (mm)	Reference		Hardness Shore A
		1 screw - 1 nut	2 nuts	
4-18	4	535600	-	45
4-18	4	<b>535603</b>	-	45
7-30	4	535600	-	60
7-30	4	<b>535603/61*</b>	-	60
7-30	4	-	<b>535623/61</b>	60
10-52	4	<b>535611</b>	<b>535621</b>	45
20-80	4	<b>535611</b>	<b>535621</b>	60
20-80	4	<b>535611*</b>	<b>535621</b>	60
20-92	4	<b>535612</b>	<b>535622</b>	45
30-136	4	<b>535612</b>	<b>535622</b>	60

TRAXIFLEX® mounts have been subjected to acoustic trials at the Centre Expérimental de Recherches et d'Études du Bâtiment et des Travaux Publics which has given the P.V nr. 554.6.078.

\* Elastomer resistant to fire M1.

# ASSEMBLY

When fixing, ensure that all the TRAXIFLEX® hanger are supporting the same load. It is necessary to ensure that they are all the same distance from the fixing surface (ceiling, girder, plank...). TRAXIFLEX® mounts can be used to suspend pipework : the whole assembly being fixed to the ceiling.

- suspending hot air ducts;
- suspending a fan unit and distribution ducts;
- suspending a hot air generator with continuous airflow;
- suspending an integral cased air conditioner.

# ISOFLEX®

Natural frequency : (1)  
11 to 15 Hz



## DESCRIPTION

The ISOFLEX® mount comprises two concentric metallic parts joined by a bonded, perforated rubber ring.

## OPERATION

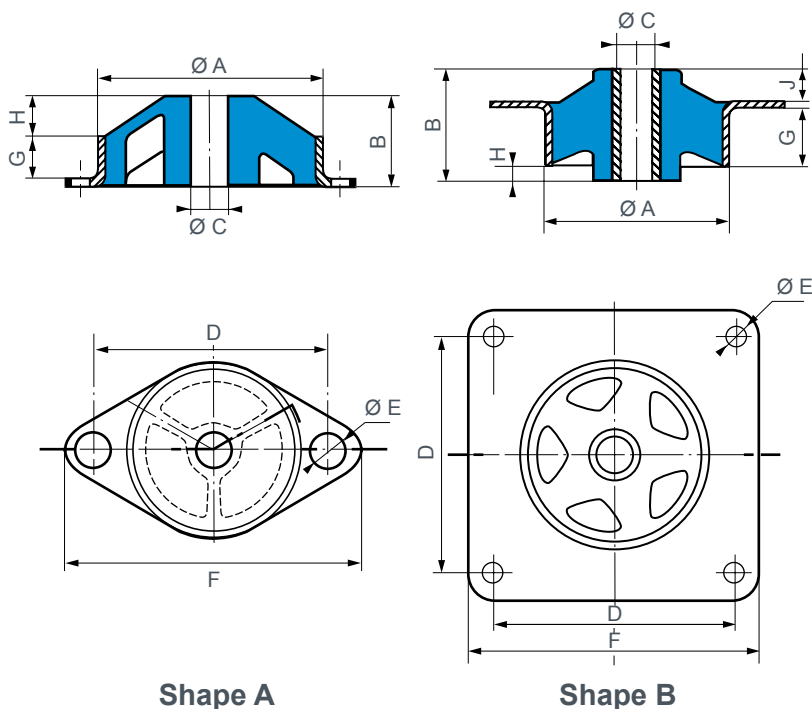
The design of the ISOFLEX® mount gives the following basic characteristics : elasticity approximately the same in all directions (equi-frequent mounting).

## APPLICATIONS

ISOFLEX® mounts may be used for suspending any small measuring or recording equipment, mobile equipment, machine tool controls.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



Shape A

Shape B

Type	Shape	Reference	Hardness	Ø A (mm)	B (mm)	Ø C (mm)	D (mm)	Ø E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	Weight (g)
R	A	552428	50	28	8	4,2	36	3,2	44	4	3	-	9
I.20	B	552231	45 - 60	25,4	10,3	4,2	25,4	3,6	31,8	4,2	1	4,3	10
I.30	B	552241	45 - 60	38,1	15,9	6,2	34,9	4,2	44,5	7,3	-	7,3	30

See current price list for availability of items.

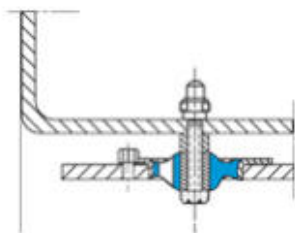
# TECHNICAL CHARACTERISTICS

Nominal static load (daN)	Deflection (mm)	Type	Reference	Dureté
0,25 - 1	3	R	552428	50
0,50 - 2	3	I.20	552231	45
0,75 - 3	2,5	I.20	552231	60

Nominal static load (daN)	Deflection (mm)	Type	Reference	Dureté
1 - 4	3	I.30	552241	45
1,5 - 6	2	I.30	552241	60

All of our mounts are identified by conventional markings, either a paint spot or figures indicating the hardness : grey = hardness 45, green = hardness 60, blue = hardness 75.

# ASSEMBLY



Fixing method

To avoid toppling or canting, the suspension should be designed so that the centre of gravity of the suspended equipment is close to the geometrical centre of the suspension.

# ISODYNE®



## DESCRIPTION

The ISODYNE® mount comprises two half mountings joined together.

## OPERATION

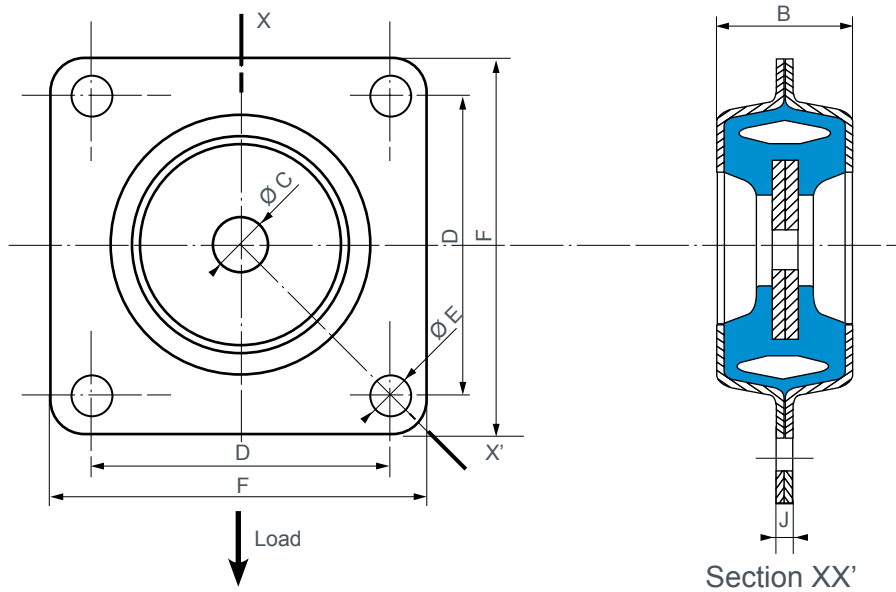
The design of the ISODYNE® mount gives the following basic characteristics :

- a very high axial to radial stiffness ratio;
- vertical fixing avoiding excessive inclination of the equipment;
- fixing at any angle;
- safe (551571), anti-rebound.

## APPLICATIONS

ISODYNE® can be used to suspend lightweight equipment in a vertical plane.

# DIMENSIONS



Reference	Hardness	B (mm)	Ø C (mm)	D (mm)	Ø E (mm)	F (mm)	J (mm)	Weight (g)
551321	50	16	4,2	25,4	3,5	32	1,6	10
551441	45	18	6,5	35	4,2	44,5	2	24
551571	45.60	20	8,2	45,5	6,2	57,5	2	50

See current price list for availability of items.

# OPERATING CHARACTERISTICS

Nominal static load (daN)	Deflect. (mm)	Reference	Hardness
2,5	1	551321	50
10	3	551441	45

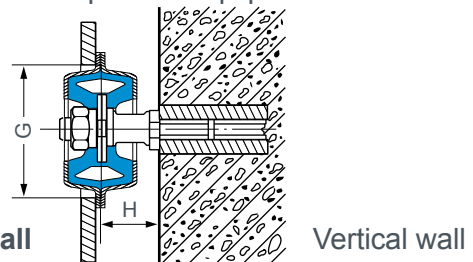
Nominal static load (daN)	Deflect. (mm)	Reference	Hardness
25	2,5	551571	45
35	2,5	551571	60

# ASSEMBLY

Fixing clearances (approximate).

Reference	G (mm)	H (mm)
551321	28	18
551441	40	20
551571	47	22

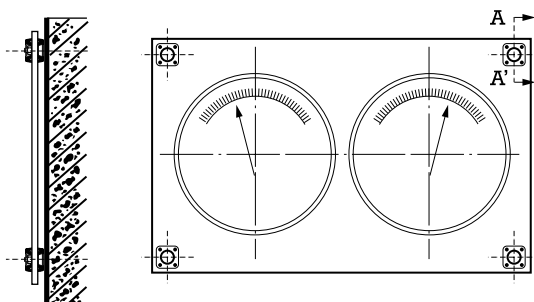
Suspended equipment



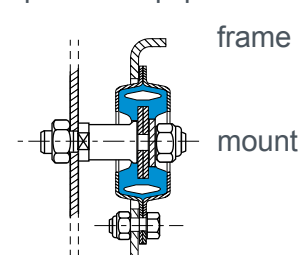
Fixing to wall

Vertical wall

Fixing a control panel against a wall or vertical frame.



Suspended equipment



Fixing to frame



# RINGS AND BUSHINGS

Natural frequency : (1)  
6 to 28 Hz



## DESCRIPTION

These all elastomer parts are compatible with the majority of the industrial environments and have an operating temperature range of - 40°C to + 83°C.

## OPERATION

A ring assembled with the associated bushing constitutes a flexible interface and a simple solution to decrease noise and vibrations.

- These supports can be installed in parallel for a greater load capacity and may also be stacked in series when greater deflection capacity is required.
- Bushings can be used in pairs, bushing end to bushing end, without rings for a more robust installation or where the structure thickness does not allow for a standard ring and bushing assembly.

### Advantages

- Highly efficient noise reduction,
- Absorb shock and vibrations,
- Simple and economic,
- Four models in four stiffnesses for load capacities going from 0.5 to 160 kg per isolator.

## APPLICATIONS

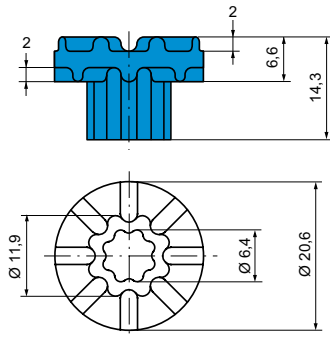
- Office machines, motors, fans, HVAC equipment, electronics equipment, telecommunication equipment; etc.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

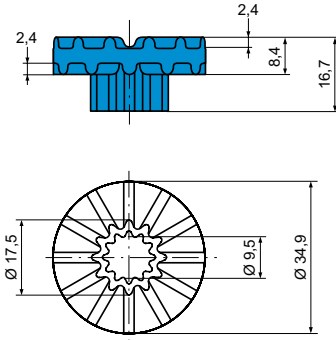
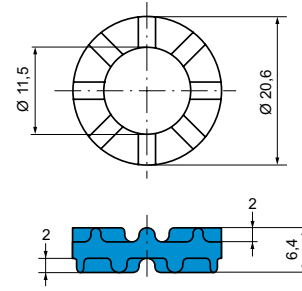
# DIMENSIONS CHARACTERISTICS

Rings

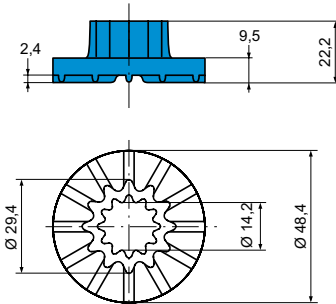
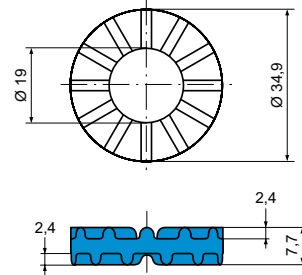
Bushings



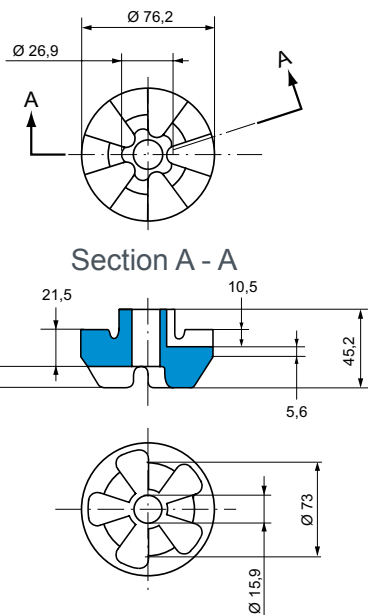
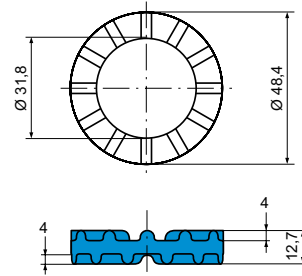
Shape 1



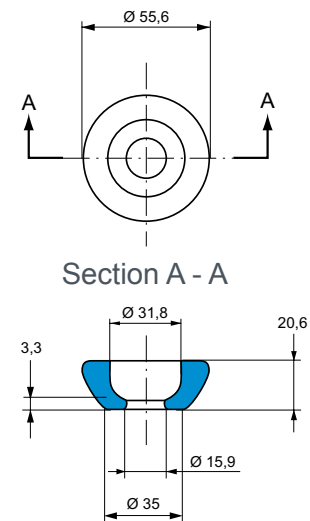
Shape 2



Shape 3



Shape 4



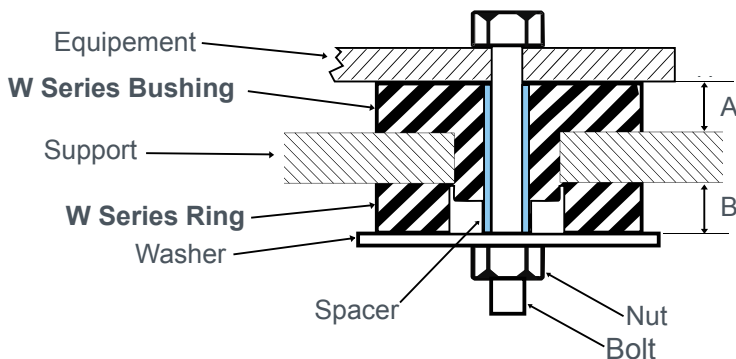
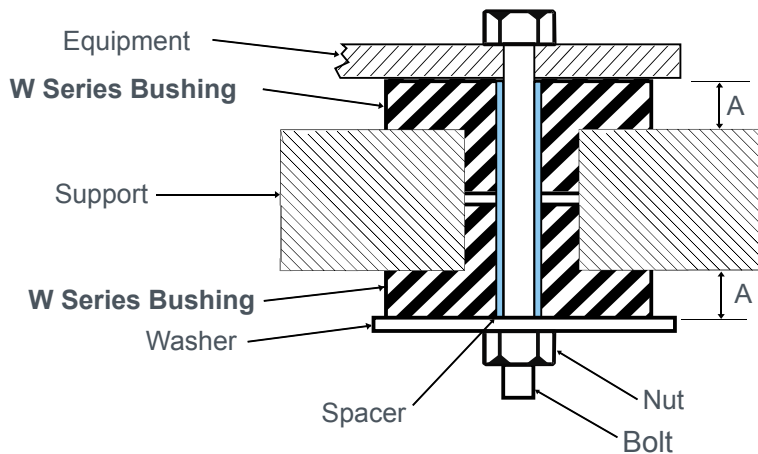
# OPERATING CHARACTERISTICS

Group Paulstra reference Barry Controls* reference		Colour	Shape	Load range	
Brushings	Rings			Min. (daN)	Max. (daN)
530907 13 WB1-030	530908 13 WR1-030	blue	1	0,4	1,8
530907 14 WB1-040	530908 14 WR1-040	brown	1	0,9	2,7
530907 15 WB1-050	530908 15 WR1-050	black	1	1,4	3,6
530907 16 WB1-060	530908 16 WR1-060	grey	1	2,3	5,4
530907 43 WB4-030	530908 43 WR4-030	blue	3	4,5	16
530907 44 WB4-040	530908 44 WR4-040	brown	3	9	23
530907 45 WB4-050	530908 45 WR4-050	black	3	13,6	27
530907 46 WB4-060	530908 46 WR4-060	grey	3	18	74

Group Paulstra reference Barry Controls* reference		Colour	Shape	Load range	
Brushings	Rings			Min. (daN)	Max. (daN)
530907 33 WB3-030	530908 33 WR3-030	blue	2	2,7	9
530907 34 WB3-040	530908 34 WR3-040	brown	2	3,2	10,7
530907 35 WB3-050	530908 35 WR3-050	black	2	4,5	11,4
530907 36 WB3-060	530908 36 WR3-060	grey	2	6,8	16
530907 63 WB6-030	530908 63 WR6-030	blue	4	27	55
530907 64 WB6-040	530908 64 WR6-040	brown	4	50	73
530907 65 WB6-050	530908 65 WR6-050	black	4	61	114
530907 66 WB6-060	530908 66 WR6-060	grey	4	73	159

\* Barry Controls part numbers are given as a reference only

## ASSEMBLY



Dimensions (mm)		
Reference	A	B
530907 1x	5,8	-
530908 1x	-	5,8
530907 3x	7,6	-
530908 3x	-	7,6
530907 4x	8,4	-
530908 4x	-	11,4
530907 6x	31,75	-
530908 6*	-	19,1

# ELASTOMER MOULDED PARTS

SILICONE RUBBER / SPECIAL ELECTRONICS /  
LOW LOADS



## CHARACTERISTICS

These parts are usually supplied in VHDS (very high density silicone) rubber and the full reference should include:

- the letter S,
- the appropriate grade which corresponds :
  - to the young's modulus of the rubber under static compression in accordance with ASTM D945 (ref. 33 to 77),
  - or to the stiffness measured on a part (ref. 16 to 25).

These standard VIBRACHOC grades are shown in the following table: EPDM, butyle, nitrile.

Hardness	Color	Characteristics		
		G : Shear modul. (MPa)	E : Elast. modul. (MPa)	Stiffness (1)(2) (N/mm) Tolerance : ± 10%
		Tolérance : ± 15 %		
16 20 25	yellow dark blue black			19 20 25
33 38 42 48 55 63 72 77	light blue grey brown dark green brick red orange light green ultramarine blue	0,4 0,47 0,53 0,6 0,67 0,8 1 1,1	1,2 1,4 1,6 1,8 2,0 2,4 3,0 3,3	36 40 45 50 55 65 75 100

(1) measured on standardised Ø 19 - h 12.7 mm high part.

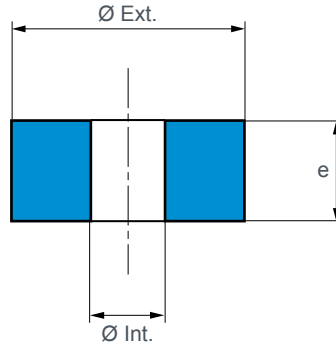
(2) For linear domain.

Example : E3RP0754S55 flat washer internal diameter 7, external diameter 30, height 6, in VHDS silicone, young modulus 2 MPa; washer colour: brick red.

Other elastomers may be used: natural rubber, neoprene, EPDM, butyl rubber, nitrile rubber.

# DIMENSIONS

## FLAT WASHERS

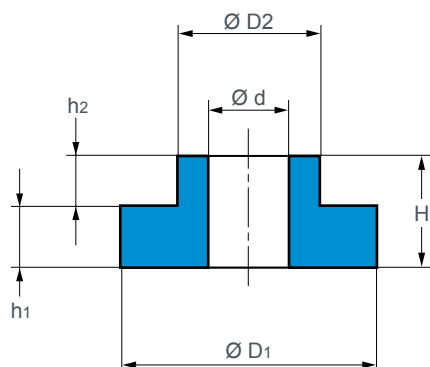


Reference	$\varnothing$ Int. (mm)	$\varnothing$ Ext. (mm)	e (mm)
E3RP2439	2	6	10
E3RP3419	2	7	1
E3RP2062	4	8	5
E3RP3291	4	9	3,4
E3RP2061	4	12	4
E3RP2667	5	12	5
E3RP2025	5	15	4
E3RP2024	5	22	4
E3RP2401	6	18	6
E3RP2282	6,1	12	6
E3RP2281	6,1	20	4
E3RP2959	6,4	12	3
E3RP2453	6,5	11,8	2,5
E3RP2403	6,5	13,5	10
E3RP3534	6,5	15	4,5
E3RP2402	6,5	18	14,5
E3RP3162	6,5	25	2
E3RP2882	7	12	4
E3RP0590	7	12	6
E3RP2883	7	16	6
E3RP0591	7	16	8
E3RP2404	7	30	3
E3RP0754	7	30	6
E3RP2148	7,4	11,5	7,5
E3RP2149	7,6	17,6	6
E3RP2454	7,7	11,8	7,7
E3RP2406	8	13	4
E3RP2405	8	16	4
E3RP0607	8	18	6
E3RP0608	8	18	8
E3RP0588	8	22	4
E3RP0777	8	24	4
E3RP2436	8	26	6
E3RP0609	8	26	10
E3RP2045	8,5	26	4

Reference	$\varnothing$ Int. (mm)	$\varnothing$ Ext. (mm)	e (mm)
E3RP2604	9	13	4
E3RP2605	9	19	4
E3RP2330	9	36	6
E3RP2181	9,5	20	6
E3RP2570	9,5	24	4
E3RP2446	9,5	26	4
E3RP3500	10	18	4
E3RP0613	10	20	6
E3RP2346	10	21	6
E3RP2437	10	22	4
E3RP0584	10	22	6
E3RP2345	10	24	6
E3RP2645	10	25	4
E3RP0614	10	26	6
E3RP0615	10	26	12
E3RP2435	10	30	6
E3RP0644	10	30	12
E3RP0585	10	34	6
E3RP0643	10	34	8
E3RP0586	10	34	12
E3RP2329	11	36	4
E3RP2328	11	36	6
E3RP0694	12	17	4
E3RP0695	12	18	4
E3RP0738	12	50	12
E3RP2407	14	22	6,5
E3RP3222	14	30	3
E3RP2408	16	29	7
E3RP2409	20	32	10,5
E3RP3532	20	38	3
E3RP0782	21	29	5
E3RP2434	22	38	17
E3RP0744	31	36	3
E3RP0745	36	44	3
E3RP2341	44,5	83	3,2

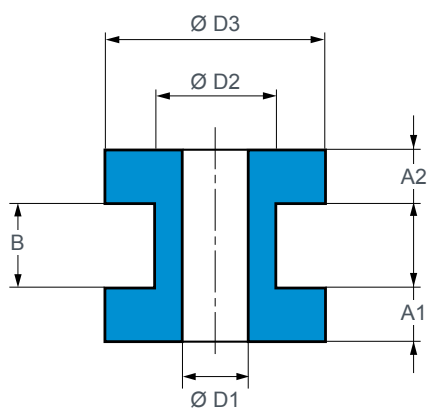
# DIMENSIONS

## FLANGED WASHERS



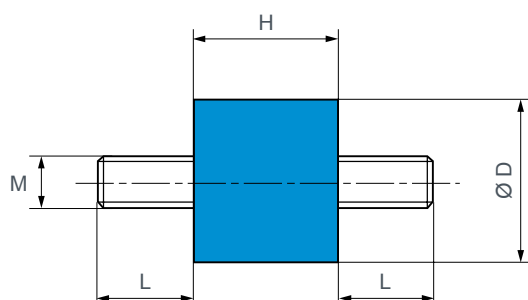
Reference	Ø d (mm)	Ø D1 (mm)	Ø D2 (mm)	H (mm)	h1 (mm)	h2 (mm)
E3RP0712	3,5	10	7,5	4,7	3,2	1,5
E3RP2292	3,5	13	6	7	3,3	3,7
E3RP3290	4	9	6	5,4	3,4	2
E3RP0647	4,2	8	5,8	3,3	1,7	1,6
E3RP0997	5	18	10	24	14	10
E3RP2192	6	12	8,5	7	4	3
E3RP2410	6	18	10	10	6	4
E3RP3533	6,5	15	11	8	4,5	3,5
E3RP0755	7	30	17	14	6	8
E3RP2374	8	18	12	6	3	3
E3RP2379	8	18	13	3,5	2	1,5
E3RP0563	8	19,8	13,8	7	2	5
E3RP2173	8	21	13	6	4	2
E3RP0778	8	24	14	8	4	4
E3RP2042	8,5	26	17	8	4	4
E3RP3491	9,5	24	18	8	4	4
E3RP3490	10	18	14	8	4	4
E3RP0553	11	24	17	9	4	5
E3RP0575	12	50	28	22	12	10
E3RP2315	16	50	28	22	12	10

## GROMMETS



Reference	Ø D1 (mm)	Ø D2 (mm)	Ø D3 (mm)	A1 (mm)	A2 (mm)	B (mm)
E3RP2364	4	6	8	2,2	2,2	1,6
E3RP0648	4,2	5,8	8	1,7	1,7	1,6
E3RP0576	5	8	12	2	2	4
E3RP3295	8	12	18	5,5	5,5	3
E3RP3258	8	12	18	5,5	5,5	6

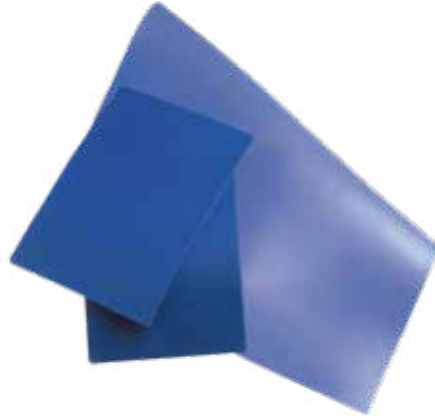
## THREADED STUDS



Reference	Ø D (mm)	H (mm)	L (mm)	M (mm)
E4432F01	10	8	6	M3
E3RP0956	12	8	6	M3
E3RP2118	16	16	8 / 9,5	M5
E3RP0757	20	23	12	M5
E3RP0954	33	26	13,2	M6
E3RP0708	33	39	13,2	M6
E3RP0686	33,2	53,5	12	M6

# ELASTOMER PLATES E3PEPL

SILICONE RUBBER / SPECIAL ELECTRONICS / LOW  
LOADS



## DESCRIPTION

VHDS elastomer sheet.

## APPLICATIONS

These sheets may be used for making grommets, washers or anti-vibration mountings for equipment.

There is a wide range of VIBRACHOC moulded parts, but in certain cases, such as prototypes, undefined specification, etc, it is often advantageous to determine the suspension using elastomer components cut from sheet and bonded.

## CHARACTERISTICS

- Overall tolerances :
  - on the lengths :  $\pm 5\%$ ;
  - on the thickness :  $\pm 3\%$ .

Shape	Dimensions (mm)	Thickness (mm)
SQUARE	300 x 300	2, 3, 4, 5, 6, 8, 10

VIBRACHOC plates should be ordered using the following reference :

E3PEPL  $\underbrace{\square\square}_1$   $\underbrace{S\square\square}_2$   $\underbrace{C\square\square\square}_3$

1 : dimension in cm - 2 : hardness (see p 114 ) - 3 : thickness in 1/10 mm.

For example : E3PEPL30S55C060 =

- square plate 300 X 300 mm;
- 6 mm thick;
- VHDS rubber compound, grade 55.

For other shapes, sizes or materials, ask us for details.

# DISC DRIVE SUSPENSION E4330F\*\*

SILICONE RUBBER / SPECIAL ELECTRONICS /  
LOW LOADS



Natural frequency : (1)  
20 to 30 Hz

## DESCRIPTION

A silicone (VHDS) elastomer with a bonded metal insert. The legs have tangs which enable each leg to be pulled through mounting holes in the equipment. The suspended component can then be attached with an M3 screw through the insert. The tangs can be cut off after insertion.

## APPLICATIONS

- Suspension of disc drives.
- Protection of electronic components and printed circuit boards with very low mass in mobile or static environments.

## CHARACTERISTICS

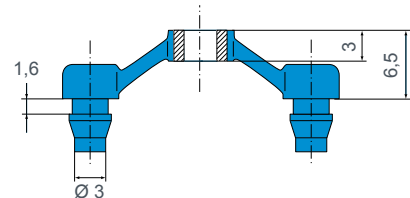
Natural Frequency :

- axial : 15 to 30 Hz;
- radial : 15 to 30 Hz.

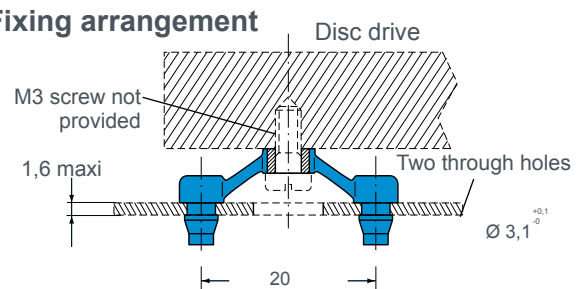
Amplification factor at resonance < 5.

Operating temperature range : -50°C to +150°C.

Reference	Nominal load (daN)
E4330F01	0,03
E4330F11	0,035
E4330F21	0,036
E4330F31	0,042
E4330F71	0,1



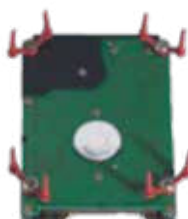
### Fixing arrangement



Possible installation configurations :



Mounting in compression



Mounting in shear

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.



# S.L.F.<sup>®</sup> MOUNTS

SILICONE RUBBER / SPECIAL ELECTRONICS /  
LOW LOADS

Natural frequency : (1)  
10 to 25 Hz



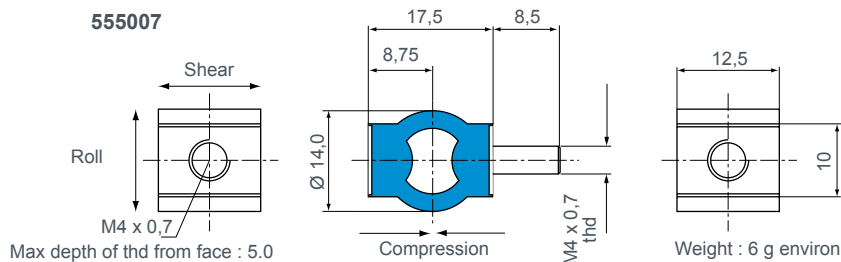
## DESCRIPTION

Low frequency high deflection antivibration mount available in rubber silicone. The zinc plated mild steel metalwork is fully bonded for improved fatigue strength.

## APPLICATIONS

These mounts have been designed to protect low mass components and instruments from vibration and shock and to isolate small rotating machines e.g. pumps and electric motors.

## DIMENSIONS



## OPERATING CHARACTERISTICS

Maximum sinusoidal input at resonance :  $\pm 0.5$  mm.  
 Resonance frequencies at maximum input : 10 to 25 Hz dependent on axis and load.  
 Axial to radial stiffness : 3 : 1.  
 Amplification at resonance : silicone : 4 / natural rubber : 10.  
 Maximum displacement during shock : axial : 5 mm.  
 radial : 7 mm.

Mechanical strength corresponding to a continuous acceleration of 10 g at maximum load.

Reference	Mix	Static load in compression (daN)	Static load in shear (daN)	Static load in roll en roulis (daN)	Temperature for continuous operation
55500x-42	Silicone 42 Sh	0,10 - 0,50	0,10 - 0,25	0,10 - 0,15	-54 to + 150 °C
55500x-72	Silicone 70 Sh	0,60 - 0,80	0,25 - 0,50	0,15 - 0,30	
55500x-01	NR 50 Sh	0,10 - 1,50	0,10 - 0,50	0,10 - 0,40	- 40 to + 70 °C
55500x-02	NR 70 Sh	1,50 - 3,00	0,50 - 1,00	0,40 - 0,80	

NB : The \* define the type of fixing : combination fixing : 555007, male/male fixing : 555005, female/female fixing : 555006.

## ASSEMBLY

Improved stability can be achieved if the mounts are inclined at 45° towards the centre of gravity.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# E1E931S

# E1E4045

SILICONE RUBBER / SPECIAL ELECTRONICS /  
LOW LOADS

Natural frequency : (1)  
15 to 25 Hz



## DESCRIPTION

- High damped silicon elastomer (VHDS).
- Stainless Steel flange and centre axis.

## APPLICATIONS

- Protection of electronic equipment, navigation equipment, control consoles, measuring instruments, onboard aircraft, trains and trucks.

## CHARACTERISTICS

Natural frequency :

- axial : 15 to 25 Hz;
- radial : 10 to 20 Hz.

Maximum sinusoidal input amplitude at resonance frequency :  $\pm 0,4$  mm.

Amplification factor at resonance < 4.

Operating temperature range : - 54 °C to + 150 °C.

Mechanical strength corresponding to a continuous acceleration of 10 g at maximum load.

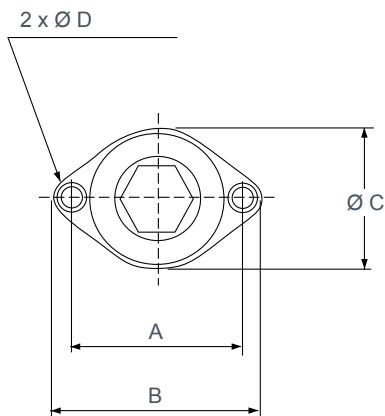
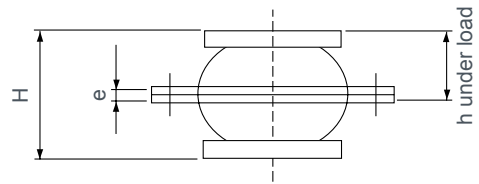
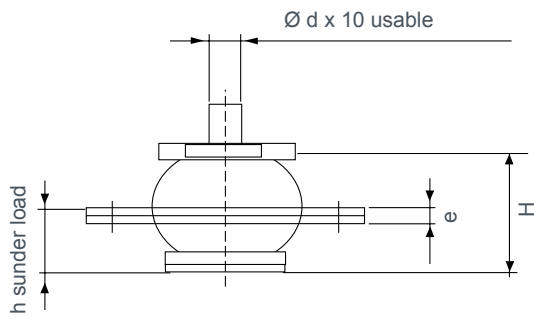
Maximum axial displacement during shock : 3 mm

Weight : E1E931S : 31 g.

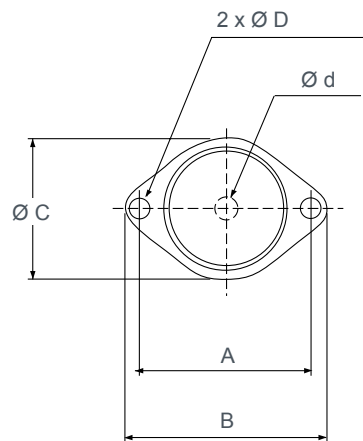
Part number	Axial static load (daN)
E1E931S38 E1E4045-38	0,8 - 2
E1E931S55 E1E-4045-55	1 - 2,5
E1E931S72 E1E-4045-72	1,5 - 4

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS CHARACTERISTICS



**E1E931S**



**E1E4045**

Reference	A (mm)	B (mm)	Ø C (mm)	Ø D (mm)	H (mm)	Ø d (mm)	e (mm)	h (mm)
E1E931S □□	34,9	44	30	4,2	24,5	M5	2,5	12,5
E1E4045-□□	35,9	44	30	4,2	20	5,1	2	11

E1E11S\*\*E\*

E1E12S\*\*E\*

E1E13S\*\*E\*

SILICONE RUBBER / SPECIAL ELECTRONICS /  
LOW LOADS



Natural frequency : (1)  
20 to 25 Hz

## DESCRIPTION

- VHDS elastomer able to carry loads under compression and traction.
- Pedestal, washer and shaft in 18/8 stainless steel.

## APPLICATIONS

- Protecting electronic equipment, navigation equipment, instrument panels, measuring instruments, control panels on aircraft, road vehicles and railway trains.

## CHARACTERISTICS

Natural frequency :

- axial : 20 to 25 Hz;
- radial : 20 to 25 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 0.5$  mm.

Amplification factor at resonance  $< 5$ .

Operating temperature :  $- 54^{\circ}\text{C}$  to  $+ 150^{\circ}\text{C}$ .

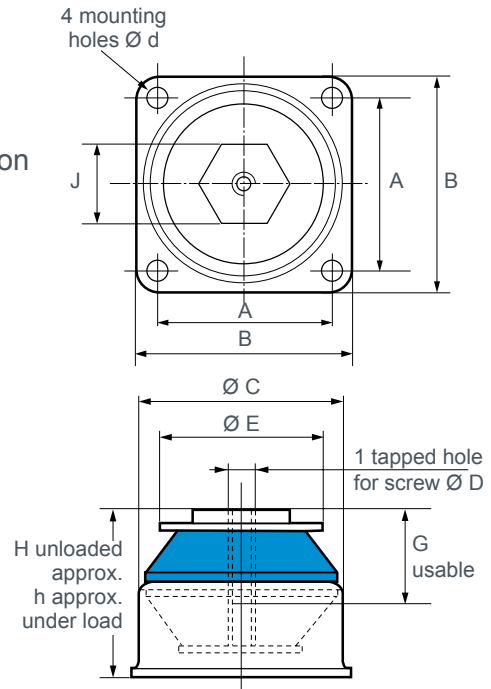
Structural strength corresponds to a continuous acceleration of 10 g at maximum load.

Maximum axial travel available for shock :

E1E11 : + 4mm / E1E12 : + 5 mm / E1E13 : + 7 mm.

Weight : E1E11 : 60 g / E1E12 : 120 g / E1E13 : 225 g.

These mounts meet the standard AIR7304 curve ZF



Reference	Range of use (daN)
E1E11S38EC	1,60 - 2,80
E1E11S42EC	1,80 - 3,20
E1E11S48EC	2,10 - 3,80
E1E11S55EC	2,50 - 4,50
E1E11S63EC	3,00 - 5,30
E1E11S72EC	3,50 - 6,20
E1E12S38ED	3,70 - 5,70
E1E12S42ED	4,00 - 6,30
E1E12S48ED	4,60 - 7,10
E1E12S55ED	5,20 - 8,10
E1E12S63ED	6,00 - 9,30
E1E12S72ED	6,60 - 10,30
E1E13S38EE	5,50 - 8,50
E1E13S42EE	6,00 - 9,50
E1E13S48EE	6,50 - 10,50
E1E13S55EE	7,50 - 12,00
E1E13S63EE	8,50 - 14,00
E1E13S72EE	10,00 - 16,00

Reference	A (mm)	B (mm)	Ø C (mm)	D	Ø E (mm)	H (mm)	J (mm)	Ø d (mm)	h (mm)	G (mm)
E1E11S□□EC	25,4	34	28,5	M5	23	29	14	4,3	28	10
E1E12S□□ED	34,9	44,4	40	M6	34,6	35,6	19	4,3	34,5	12
E1E13S□□EE	49,2	60,5	57	M8	45	47	23	5,3	45,5	16

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# E1E11S\*\*AL E1E12S\*\*AL E1E13S\*\*AL

SILICONE RUBBER / SPECIAL ELECTRONICS



Natural frequency : (1)  
20 to 25 Hz

## DESCRIPTION

VHDS elastomer able to carry loads under compression and traction.  
Flange, washer and shaft in 18/8 stainless steel.

## APPLICATIONS

Protecting electronic equipment, navigation equipment, instrument panels, measuring instruments, control panels on aircraft, road vehicles and railway trains.

## CHARACTERISTICS

Natural frequency :

- axial : 20 to 25 Hz;
- radial : 20 to 25 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 0.5$  mm.

Amplification factor at resonance < 5.

Operating temperature : - 54°C to + 150°C.

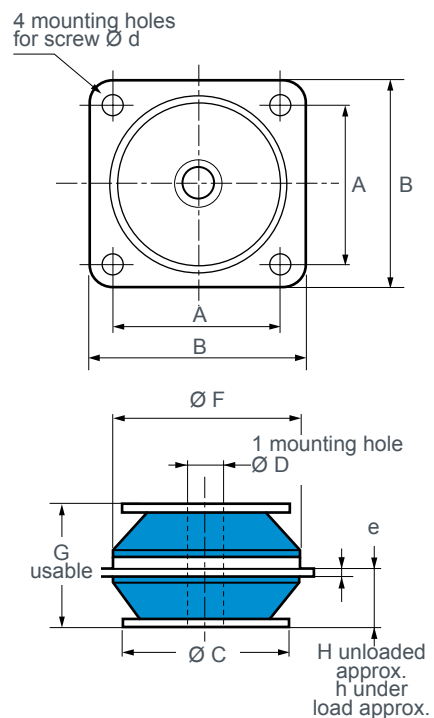
Structural strength corresponds to a continuous acceleration of 10 g at maximum load.

Maximum axial travel available for shocks :

E1E11 : + 4mm / E1E12 : + 5 mm / E1E13 : + 7 mm.

Weight : E1E11 : 25 g / E1E12 : 75 g / E1E13 : 225 g.

These mounts meet the standard AIR7304 curve ZF.



Reference	Range of use axial (daN)
E1E11S38AL	1,60 - 2,80
E1E11S42AL	1,80 - 3,20
E1E11S48AL	2,10 - 3,80
E1E11S55AL	2,50 - 4,50
E1E11S63AL	3,00 - 5,30
E1E11S72AL	3,50 - 6,20
E1E12S38AL	3,70 - 5,70
E1E12S42AL	4,00 - 6,30
E1E12S48AL	4,60 - 7,10
E1E12S55AL	5,20 - 8,10
E1E12S63AL	6,00 - 9,30
E1E12S72AL	6,60 - 10,30
E1E13S38AL	5,50 - 8,50
E1E13S42AL	6,00 - 9,50
E1E13S48AL	6,50 - 10,50
E1E13S55AL	7,50 - 12,00
E1E13S63AL	8,50 - 14,00
E1E13S72AL	10,00 - 16,00

Reference	A (mm)	B (mm)	$\varnothing C$ (mm)	$\varnothing F$ (mm)	G (mm)	$\varnothing d$ (mm)	e (mm)	H (mm)	h (mm)	$\varnothing D$ (mm)
E1E11S□□AL	25,4	32	23	25,6	19	3,6	1,5	10	9	5,2
E1E12S□□AL	34,9	44,4	34,6	38,7	25,4	4,2	1,8	11,5	10,5	6,7
E1E13S□□AL	49,2	60,5	45	53	38	5,3	2,5	17,75	18,5	8,5

# E1E21

# E1E22

# E1E23

SILICONE RUBBER / SPECIAL ELECTRONICS



Natural frequency : (1)  
20 to 25 Hz

## DESCRIPTION

- VHDS elastomer.
  - Flange and shaft in 18/8 stainless steel.
- Two Ø C fail safe rings must be provided.

## APPLICATIONS

- Protecting electronic equipment, navigation equipment, instrument panels, measuring instruments, control panels on aircraft, road vehicles and railway trains.

## CHARACTERISTICS

Natural frequency :

- axial : 15 to 25 Hz;
- radial : 20 to 35 Hz.

Maximum permitted excitation at natural frequency of suspension : ± 0.5 mm.

Amplification factor at resonance < 4.

Operating temperature : - 54°C to + 150°C.

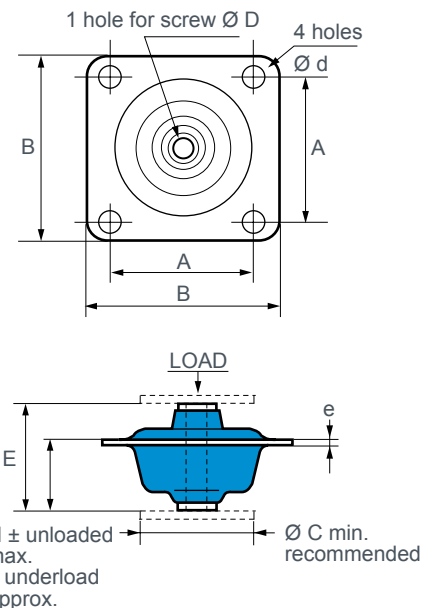
Structural strength corresponds to a continuous acceleration of 10 g at maximum load.

Maximum axial travel available for shock :

E1E21 : ± 6 mm / E1E22 : ± 8 mm for f min

Weight : E1E21 : 9 g / E1E22 : 25 g / E1E23 : 63 g.

These mounts meet the standard AIR7304 curve ZF



Reference *	A (mm)	B (mm)	Ø C (mm)	D	E (mm)	Ø d (mm)	e (mm)	H (mm)	h (mm)
E1E21S□□AL	25,4	32	24	M4	19	3,6	0,8	12,5	11
E1E22S□□AL	34,9	44,5	28	M5	25,4	4	1,5	16,5	15
E1E23S□□AL	49,2	60,5	42	M6	36	5	2	22	20

\* Exist with a diamond flange (BL)

Reference	Range of use (daN)	Frequency (Hz)	Range of use (daN)	Frequency (Hz)
E1E21S38AL E1E21S63AL E1E21S77AL	0,10 - 0,40 0,20 - 0,90 0,26 - 1,20	15 - 25	0,10 - 0,15 0,20 - 0,30 0,26 - 0,40	20 - 25
E1E22S38AL E1E22S63AL E1E22S77AL	0,20 - 1,00 0,40 - 1,70 0,50 - 2,20	12 - 25	0,20 - 0,40 0,40 - 0,70 0,50 - 0,90	12 - 25
E1E23S42AL E1E23S77AL	0,40 - 1,20 1,00 - 2,90	10 - 15		

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# E1E31

# E1E32

SILICONE RUBBER / SPECIAL ELECTRONICS



Natural frequency : (1)  
15 to 25 Hz

## DESCRIPTION

- VHDS elastomer.
  - Flange and shaft in 18/8 stainless steel.
- Two  $\varnothing K$  fail safe rings must be provided.

## APPLICATIONS

- Protecting electronic equipment, navigation equipment, instrument panels, measuring instruments, control panels on aircraft, road vehicles and railway trains.

## CHARACTERISTICS

Natural frequency :

- axial : 15 to 25 Hz;
- radial : 20 to 35 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 0.5$  mm.

Amplification factor at resonance  $< 4$ .

Operating temperature : - 54°C to + 150°C.

Structural strength corresponds to a continuous acceleration of 10 g with maximum load.

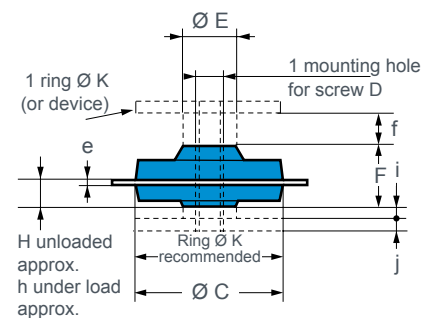
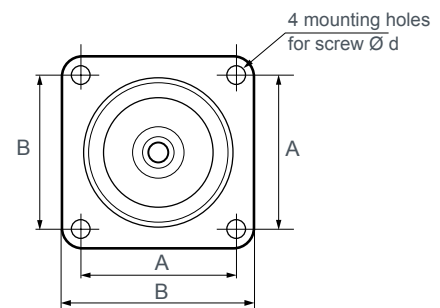
Maximum axial travel available for shocks :

E1E 31:  $\pm 4$  mm for f min;  
 $\pm 6$  mm for f max.

E1E 32 :  $\pm 4.5$  mm for f min;  
 $\pm 6$  mm for f max.

Weight : E1E31 : 9 g / E1E32 : 25 g.

These mounts meet the standard AIR7304 curve ZF



Reference	Range of use (daN)	Frequency (Hz)
E1E31S38AL E1E31S55AL E1E31S77AL	0,20 - 0,70 0,30 - 1,00 0,40 - 1,70	15 - 25
E1E32S38AL E1E32S55AL E1E32S77AL	0,30 - 1,10 0,60 - 1,80 0,80 - 2,60	

Reference	A (mm)	B (mm)	$\varnothing C$ (mm)	D	$\varnothing E$ (mm)	F (mm)	J (mm)	$\varnothing K$ (mm)	$\varnothing d$ (mm)	e (mm)	f (mm)		H (mm)	j (mm)		h (mm)
											Min.	Max.		Min.	Max.	
E1E31S□□AL	25,4	32	25	M4	8,5	10,5	2	25	3,6	1	3,2	5	4,5	0	1,75	3,5
E1E32S□□AL	34,9	44,5	35	M5	13	14,5	3	35	4,3	1,5	4,5	7	6,2	0	2,5	5

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# E1E41 E1E42 E1E43

SILICONE RUBBER / SPECIAL ELECTRONICS



Natural frequency : (1)  
10 to 25 Hz

## DESCRIPTION

- VHDS elastomer able to carry loads under compression.
- Base and centre axis in 18/8 stainless steel.

## APPLICATIONS

- Protecting electronic equipment, navigation equipment, instrument panels, measuring instruments, control panels on aircraft, road vehicles and railway trains.

## CHARACTERISTICS

Natural frequency :

- axial and radial : 10 to 25 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 0.5$  mm.

Amplification factor at resonance < 4.

Operating temperature : - 54°C to + 150°C.

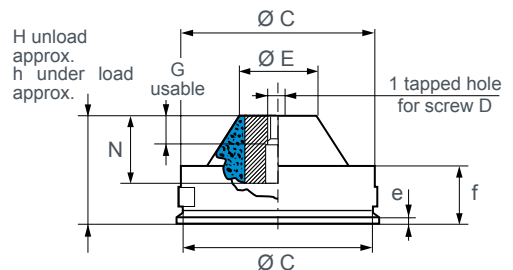
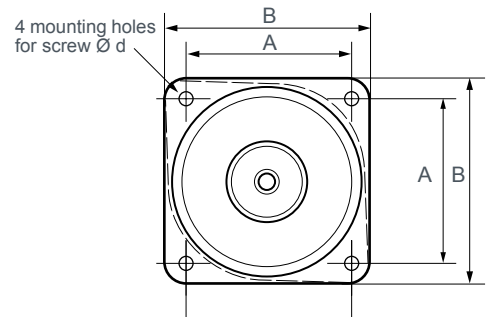
Structural strength corresponds to a continuous acceleration of 10 g at maximum load.

Maximum axial travel available for shocks :

E1E41: 8.8 mm / E1E42, E1E43 : 12 mm.

Weight : E1E41 : 22 g / E1E42 : 60 g / E1E43 : 96 g.

These mounts meet the standard AIR7304 curve ZF.



Reference	Axial static loads (daN)
E1E41S38EB	1,20 - 2,10
① E1E41S63EB	2,20 - 3,80
E1E41S77EB	3,00 - 5,20
E1E42S38EC	1,75 - 3,30
E1E42S63EC	3,20 - 5,90
E1E42S77EC	4,40 - 8,30
E1E43S38ED	3,10 - 5,50
E1E43S63ED	6,00 - 10,80
E1E43S77ED	7,50 - 13,60

① These isolators exist with an oval flange (FB).

Reference	A (mm)	B (mm)	Ø C (mm)	D	Ø E (mm)	G (mm)	H (mm)	N (mm)	Ø d (mm)	e (mm)	f (mm)	h (mm)
E1E41S□□EB	25,4	34	30,5	M4	10	6	23	14,2	4,3	0,8	14	21
E1E42S□□EC	34,9	43	41,5	M5	12	8	33	20	4,3	1,5	18	31
E1E43S□□ED	49,2	60,5	57	M6	21,5	8	33	20	5,3	2	16	31

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.



# E1E941S

Natural frequency : (1)  
15 to 30 Hz



## DESCRIPTION

- High damped silicon elastomer (VHDS).
- Stainless Steel flange and centre axis.

## APPLICATIONS

- Protection of electronic equipment, navigation equipment, control consoles, measuring instruments, onboard aircraft, trains and trucks.

## CHARACTERISTICS

Natural frequency :

- axial and radial : 12 to 30 Hz.

Maximum sinusoidal input amplitude at resonance frequency :  $\pm 0,5$  mm.

Amplification factor at resonance < 5.

Operating temperature range : - 54 °C to + 150 °C.

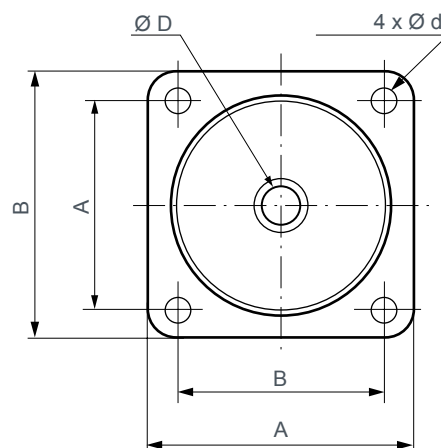
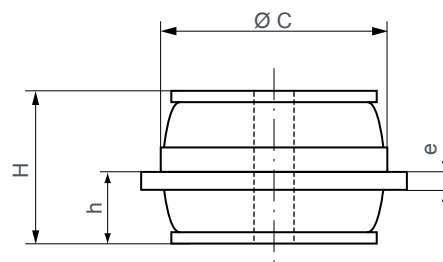
Mechanical strength corresponding to a continuous acceleration of 10 g at maximum load.

Maximum axial displacement during shock:

E1E941S : 4 mm.

Weight : E1E941S : 80 g.

These mounts meet the standard AIR7304 curve ZF.



Reference	Axial static loads (daN)
E1E941S38	5 - 14
E1E941S55	7 - 20
E1E941S72	12 - 30

Reference	A (mm)	B (mm)	Ø C (mm)	Ø D (mm)	H (mm)	Ø d (mm)	e (mm)	h (mm)
E1E941S□□EB	34,9	44,5	38	6,7	26,2	4,3	3	12

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# ARDAMP®

Natural frequency : (1)  
10 to 25 Hz



## DESCRIPTION

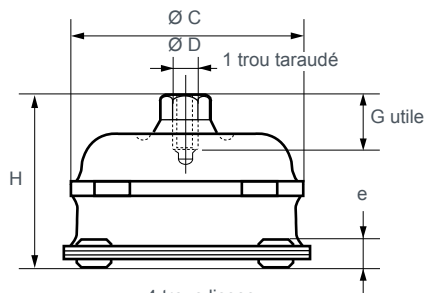
The ARDAMP® series dampers have a spring and piston embedded in high viscosity silicone rubber gel which itself is embedded in an elastomer membrane bonded to the case.

## APPLICATIONS

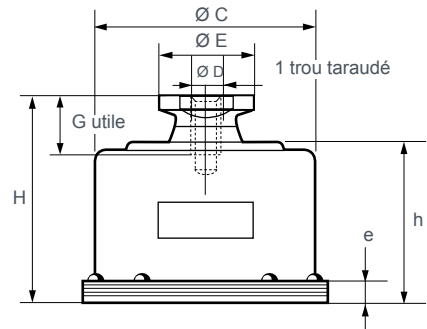
Due to their high performances and high shock damping capacity ARDAMP® dampers are designed to protect fragile electronic equipment, control panels and measuring instruments on ground vehicles, aircrafts, helicopters, civil and military submersible crafts.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

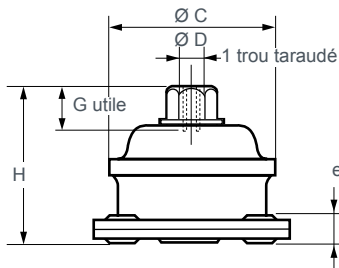
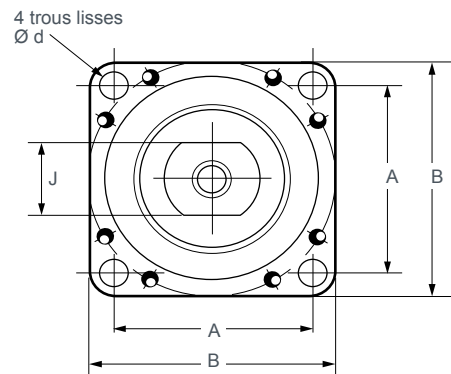
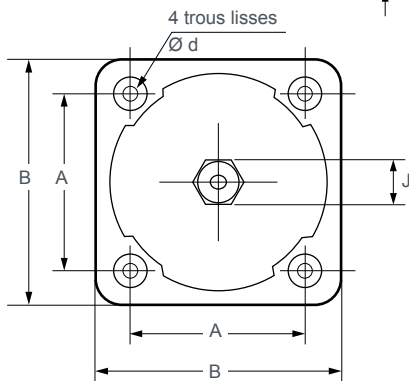
# DIMENSIONS



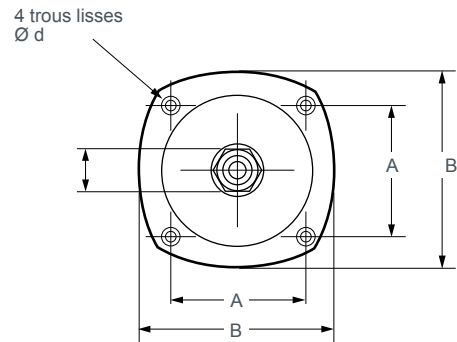
**E1FH 866C01  
E1FH 2507-01**



**E1FH 76  
E1FH 77  
E1FH 78**



**E1FH781  
S01  
C01**



Reference	H Unload. (mm)	H approx. under load (mm)	A (mm)	B (mm)	Ø C (mm)	D	Ø E (mm)	G max. (mm)	J (mm)	Ø d (mm)	e (mm)	h (mm)	Weight approx.
<b>E1FH781S01 E1FH781C01</b>	42 43	39 41	35	54	43	M5		10	12	4,5	5,5		120 g
<b>E1FH866C01 E1FH2507-01</b>	47	46	49,2	65,3	61,5	M6		15	12	5,2	5		230 g 215 g
<b>E1FH76-01 E1FH76-02</b>	70 67	66 65	63,5	77	70	M10	30	19	24	8,4	7,2	49	390 g
<b>E1FH77-01</b>	86	82	88	110,5	96	M12	40	24	34	8,4	8,5	62	930 g
<b>E1FH78-01 E1FH78-02</b>	102 98	99 95	107,9	132	117	M16	54	25	44	11	9,5	77,5	1,5 kg

# OPERATING CHARACTERISTICS

Natural frequency :

- axial : 10 to 25 Hz;
- radial : 10 to 20 Hz.

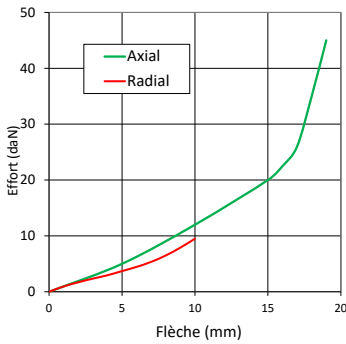
Damping : 20% c/cc (E1FH781, 866, 2507-01);  
17% c/cc (E1FH76, 77, 78).

Amplification factor at resonance : 2.5 to 3 max.

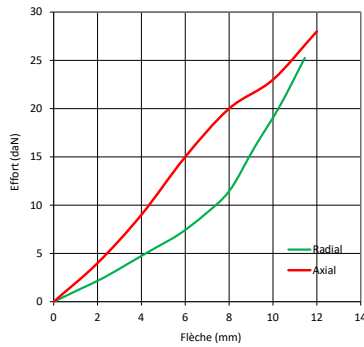
These dampers comply with SEFT 001A, AIR 7304, MIL STD 810 C.

Reference	SEFT 001 A			AIR 7304			MIL STD 810 C		Non standard applications		Shocks and bumps OZ axis	
	Load kg per damper	Axial Fn (Hz)	Radial Fn (Hz)	Load kg per damper	Axial Fn (Hz)	Radial Fn (Hz)	Load kg per damper	Axial Fn (Hz)	Load kg per damper	Radial Fn (Hz)	6 ms 1/2 sine shocks max. input (g)	11 ms 1/2 sinus shocks max. input (g)
E1FH781S01 E1FH781C01	-	-	-	0,2 - 2 2 - 5	20 - 25	15 - 20	4	16	1,5 - 3,5 3,5 - 8	10 - 20	70 g	38 g
E1FH866C01	8 - 15	10 - 20	12 - 20	6 - 8	20 - 25	15 - 20	8	20	8 - 15	10 - 20	50 g	27 g
E1FH2507-01	-	-	-	-	-	-	-	-	5 - 8	6 - 10	-	-
E1FH76-01 E1FH76-02	14 - 20 18 - 30	10 - 20	12 - 20 11 - 16	7 - 12 9 - 20	20 - 25	15 - 20	14 18	18 17	14 - 20 18 - 30	10 - 20	40 g 55 g	22 g 30 g
E1FH77-01	20 - 50	10 - 20	10 - 17	-	-	-	30	15	20 - 50	10 - 20	50 g	25 g
E1FH78-01 E1FH78-02	50 - 100 90 - 130	10 - 20	10 - 16 10 - 15	-	-	-	75 100	10 11	50 - 100 90 - 130	10 - 20	40 g	22g

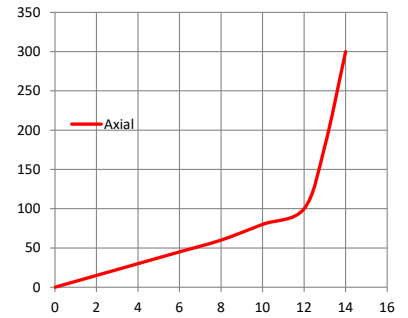
E1FH 781 S01



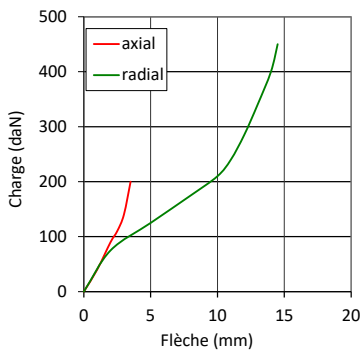
E1FH781 C01  
Axial et radial



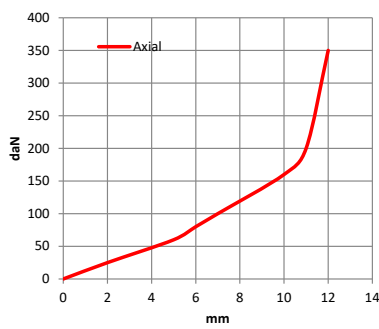
E1FH866C01



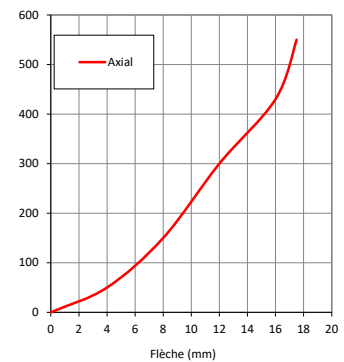
E1FH 78 - 02



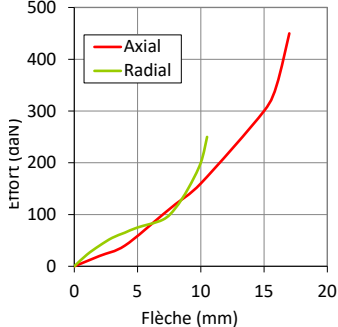
E1FH76-01



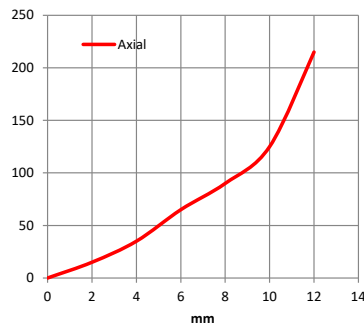
E1FH78-01



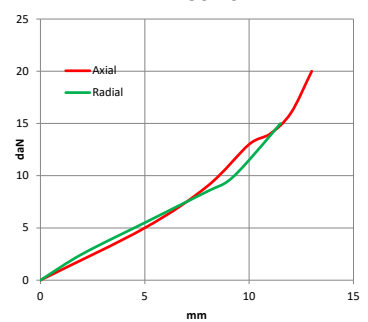
E1FH 77 - 01



E1FH76-02



E1FH2507-01

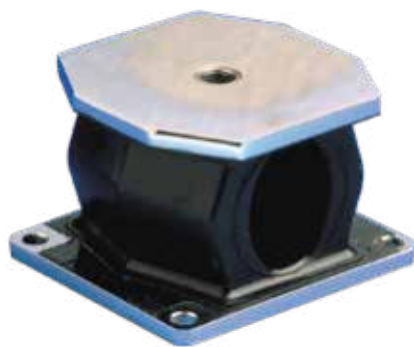


# E1C2321

# E1T2105

SPECIAL PACKAGING

Natural frequency : (1)  
10 to 25 Hz



## DESCRIPTION

The special packing dampers have a flexible elastomer element designed for various applications, bonded to two steel mounting plates.

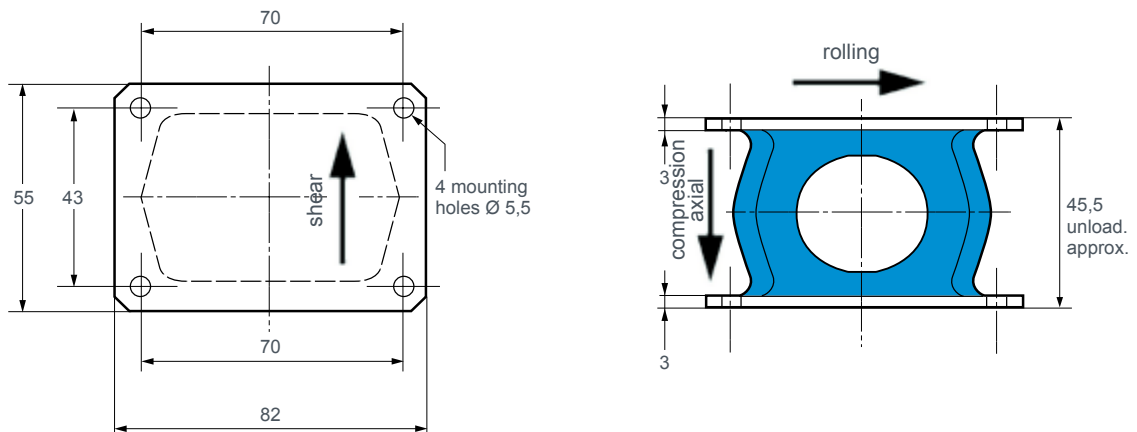
## APPLICATIONS

These multi-directional dampers allow considerable deflection to protect equipment transported in containers against drops and transport shocks (missiles, aeronautical equipment). These dampers are also suitable for suspending equipment to be protected against shocks and vibrations caused by explosions or earthquakes.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

E1C2321

## DIMENSIONS



## OPERATING CHARACTERISTICS

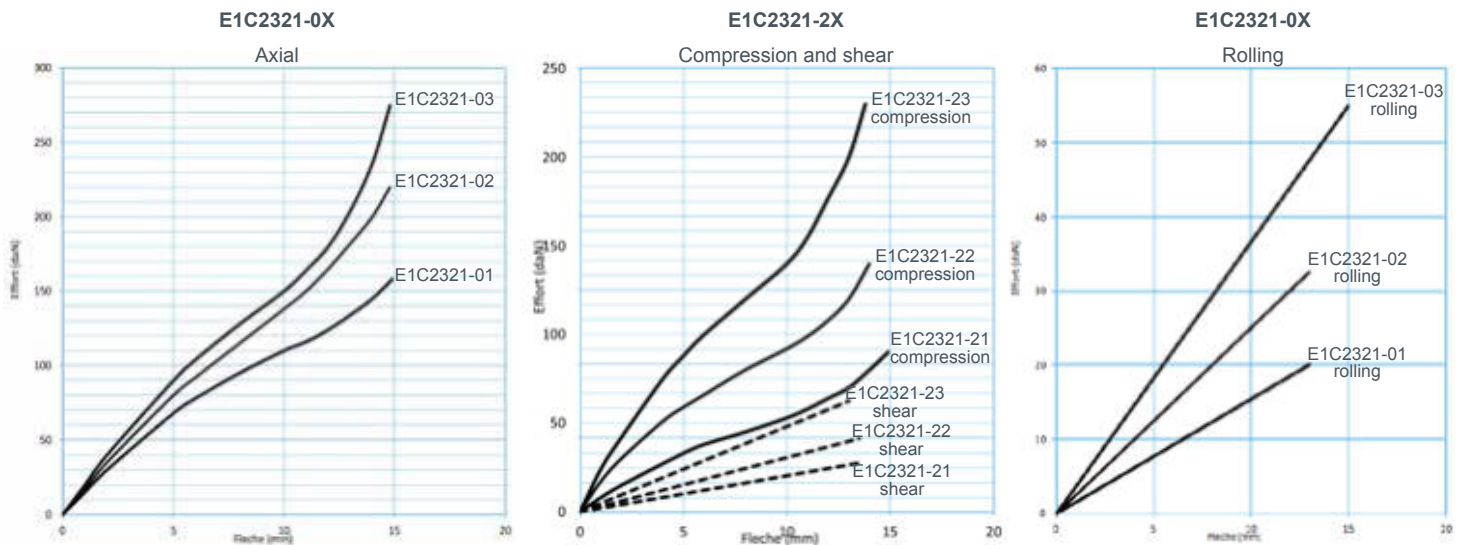
Natural frequency :  
 • axial : 10 to 25 Hz;  
 • radial : 10 to 25 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 1.6$  mm.  
 Maximum travel available for shocks : - axial : 15 mm;  
 - radial : 40 mm.

Operating temperature : see table.  
 Weight : 0.3 kg.

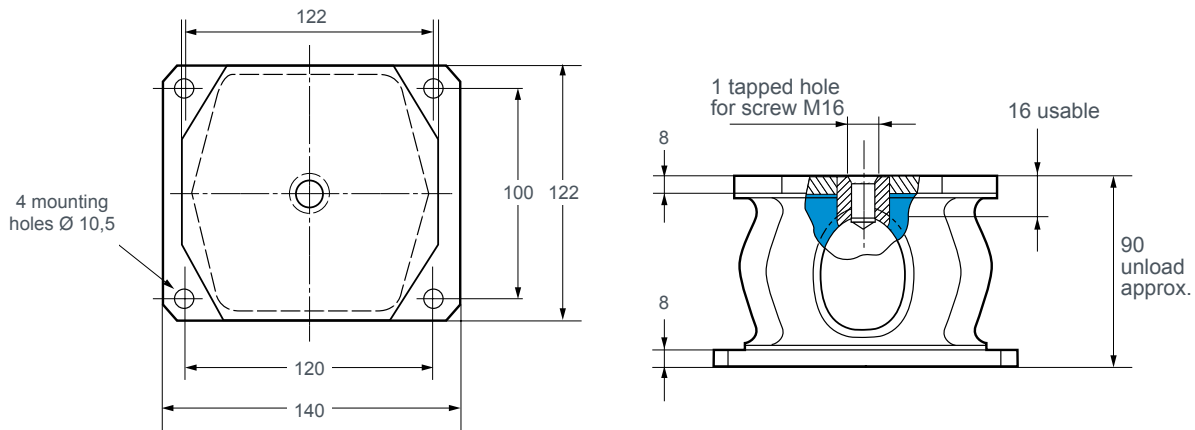
Reference	Axial static load (daN)	Damping	Resistance to oils and hydrocarbons	Resistance to fatigue	Operating temperature	Material (1)
E1C2321S01	1-10	***	*	*	- 54 to + 150 °C	SIL 33 Sh
E1C2321S02	2-20					SIL 55 Sh
E1C2321-01	2-20	*	**	***	- 30 to + 100 °C	CR 60 Sh
E1C2321-02	5-50					CR 70 Sh
E1C2321-03	10-100					CR 75 Sh
E1C2321-21	2-20	***	*	***	- 40 to + 90 °C	BR 60 Sh
E1C2321-22	5-50					BR 70 Sh
E1C2321-23	10-100					BR 80 Sh

(1) SIL : Silicone; CR : Chloroprene-Rubber; BR : Butadiene-Rubber.



E1C2105

## DIMENSIONS



## OPERATING CHARACTERISTICS

Natural frequency :

- axial : 10 to 25 Hz;
- radial : 10 to 25 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 1.6$  mm.

Maximum travel available for shocks : - axial 40 mm;  
- radial 75 mm.

Operating temperature : see table.

Weight : 2.6 kg.

Reference	Axial static load (daN)	Damping	Resistance to oils and hydrocarbons	Resistance to fatigue	Operating temperature
E1T2105S01 E1T2105S02	2-20 4-40	***	*	*	- 54 to + 150 °C
E1T2105-41 E1T2105-42 E1T2105-43	10-100 20-200 40-400	*	***	**	- 25 to + 90 °C
E1T2105-21 E1T2105-22 E1T2105-23	10-100 20-200 50-400	***	*	***	- 40 to + 90 °C

# SUSPENSION OF EQUIPMENT IN MOBILE APPLICATIONS

Natural frequency : (1)  
16 to 22 Hz



## DESCRIPTION

This mount has rubber moulded around a metal centre axis.  
The elastomer is shaped so that the mount can be pressed into the mounting structure.

## OPERATION

The mount combines the advantages of low natural frequency and easy installation.  
The simple design means the part can be assembled using a single bolt or screw fixing.

## APPLICATIONS

- Anti-vibration mounts suitable for mobile equipment mounted in light and heavy vehicles, construction equipment (hydraulic pumps, acoustic panels, control boxes, air conditioning sets, compressors,...).
- Isolation of light weight equipment in static environments.

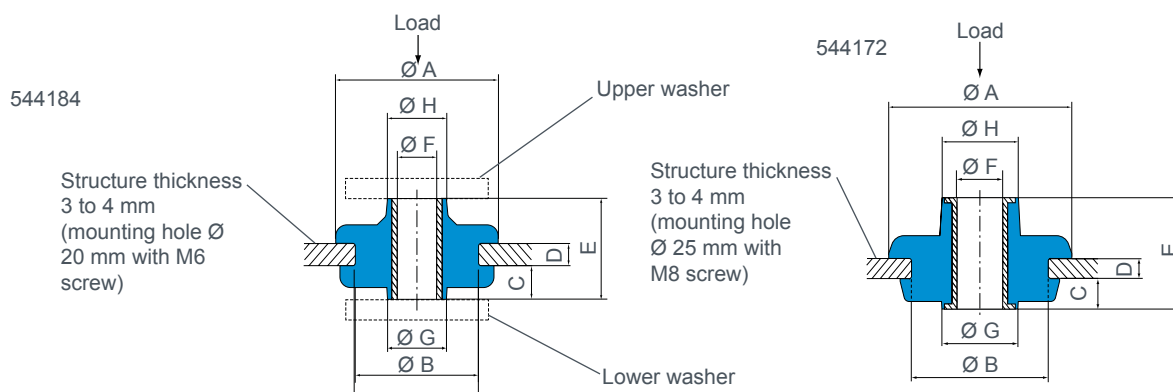
## CHARACTERISTICS

Natural frequency :

Axial and radial : 16 to 22 Hz.

Fail safe assembly possible with washers fitted above and below the mount.

(dim  $\varnothing 6,2 \times \varnothing 30$ , thickness 1,5)



Reference	Ø A (mm)	Ø B (mm)	C (mm)	D (mm)	E (mm)	Ø F (mm)	Ø G (mm)	Ø H (mm)
544184	29	22	6	4	18	6,2	10,5	10,5
544172	36	27	6	4	22	9	15	15

See current price list for availability of items.

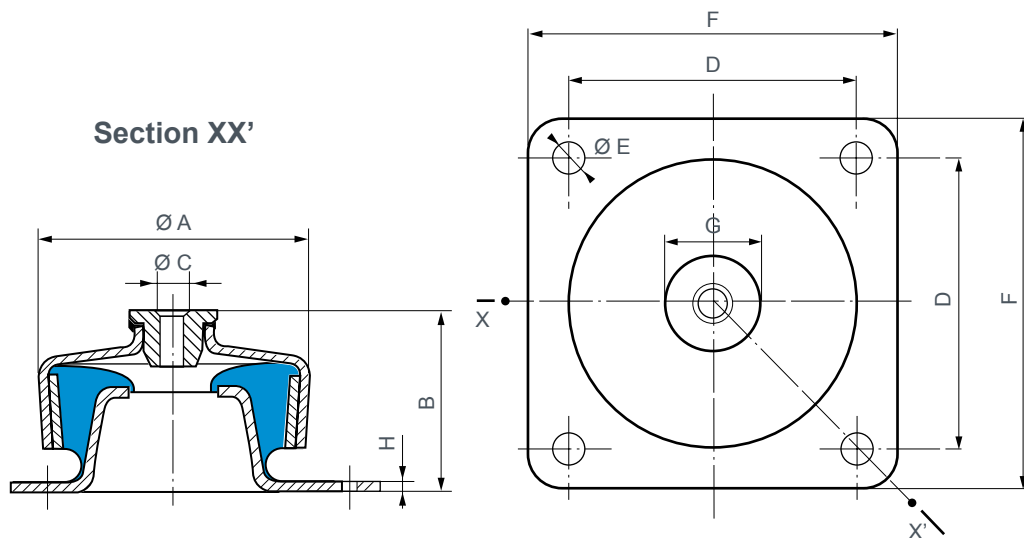
Reference	Load range (daN)	Temperature range
544184 - 11	2 - 3	-30 to +80°C
544184 - 16	2,5 - 3,5	-30 to +60°C
544172 - 11	2 - 3	-30 to +60°C

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.



# S.C.P. MOUNTING

Natural frequency : (1)  
9 to 15 Hz



## DIMENSIONS

Reference	Ø A (mm)	B (mm)	Ø C (mm)	D (mm)	Ø E (mm)	F (mm)	G (mm)	H (mm)
530120	74	53	M10	72	9	90	32	3
530220	92	63	M12	90	11	114	36	3
530420	124	94	M16	114	13	144	60	4

## OPERATING CHARACTERISTICS

Reference	Hardness 45		Hardness 60		Hardness 75		Weight (g)
	Load (daN)	Deflect. (mm)	Load (daN)	Deflect. (mm)	Load (daN)	Deflect. (mm)	
530120	70	3	120	2,5	175	2	580
530220	140	4	200	3	300	2,5	1 000
530420	300	5	500	5	800	4	2 550

See current price list for availability of items.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# BATRA® RING

Natural frequency : (1)  
7 to 22 Hz



## DESCRIPTION

The BATRA® ring comprises a rubber ring bonded to two metallic washers one with a circular groove, the other with a mating circular ridge which allows BATRA® rings to be mounted one on top of another.

## OPERATION

The design of the BATRA® ring gives the following basic characteristics :

- behaviour identical to that of a metallic spring plus damper;
- robustness :
  - well behaved under shock;
  - removal of the risks of suspension collapse;
- flexibility easily tailored by stacking BATRA® rings;
- transverse creep limited by the two bonded armatures.

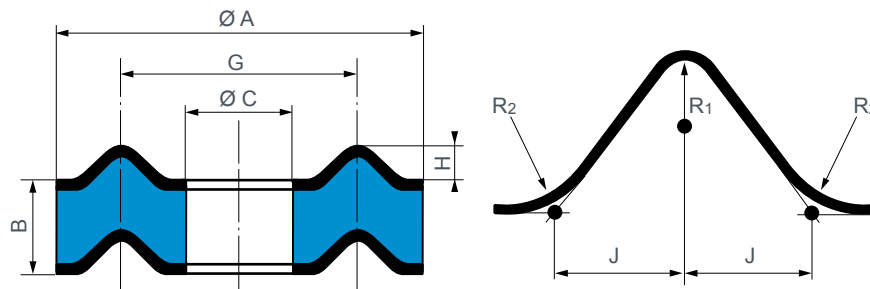
## APPLICATIONS

BATRA® rings may be used :

- for making suspensions that are very flexible vertically and also damped by the natural properties of the rubber (road and rail vehicles);
- for making very effective anti-shock buffers (wagons, cars, gantries).  
For special applications, where the quantities would justify custom manufacture, it is possible to supply Special BATRA® rings either with only one bonded lower armature or “all rubber”.  
For special cases of shock, there are Special BATRA® rings with overlapping, non-bonded, armatures.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# DIMENSIONS



Reference	Ø A (mm)	B (mm)	Ø C (mm)	G (mm)	H (mm)	J (mm)	R1 (mm)	R2 (mm)	Weight (g)
541050	50	11	14	32	4	5	2,5	1,5	45
541083	80	27	41,5	61	4	6	3	3	220
541082	86	27,5	32	65	5	7	4	2	300
541100	100	28,5	32	65	5	7	4	2	415
541112	115	30	50	85	10	10	5	3	540
541145	140	35	55	100,5	10	10	5	3	890
541146	146	20	55	100,5	10	10	5	3	750
541144	146	35	55	100,5	10	10	5	3	980
541175	170	35	60	115	10	10	5	3	1 360
541174	170	50	60	115	10	10	5	3	1 680
541185	185	40	95	140	10	10	5	3	1 510
541249	250	50	70	160	10	10	5	3	2 600
541250	250	59	70	160	10	10	5	3	4 400

See current price list for availability of items.

# OPERATING CHARACTERISTICS

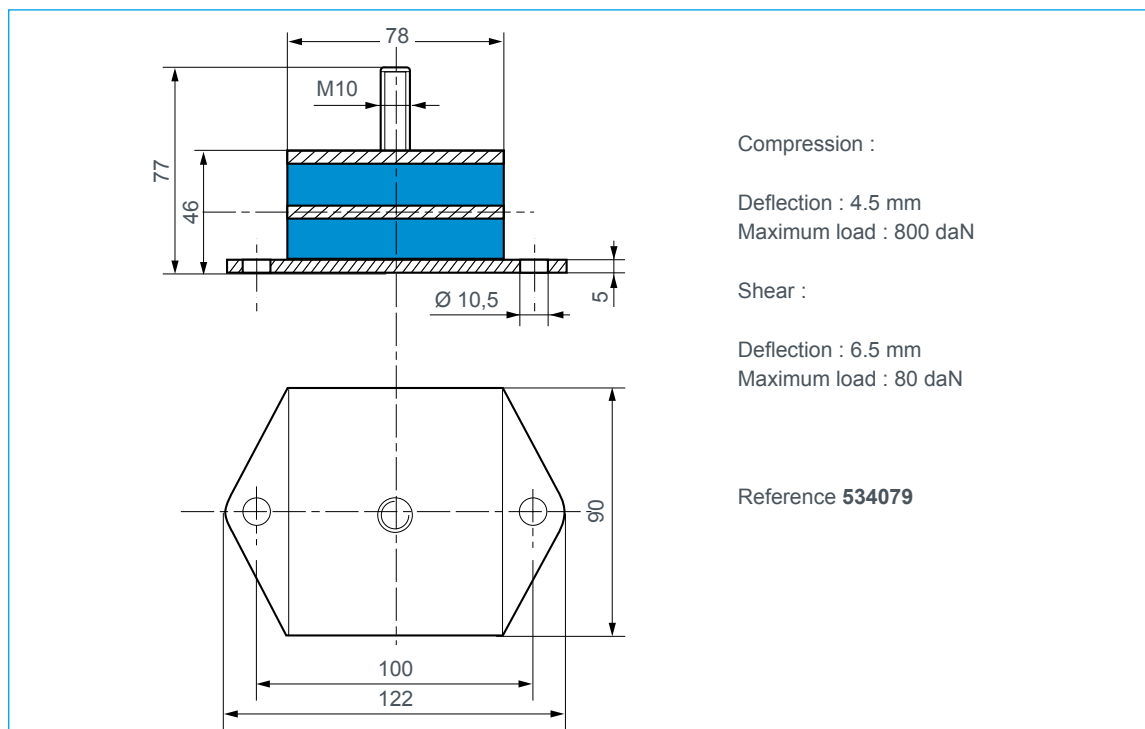
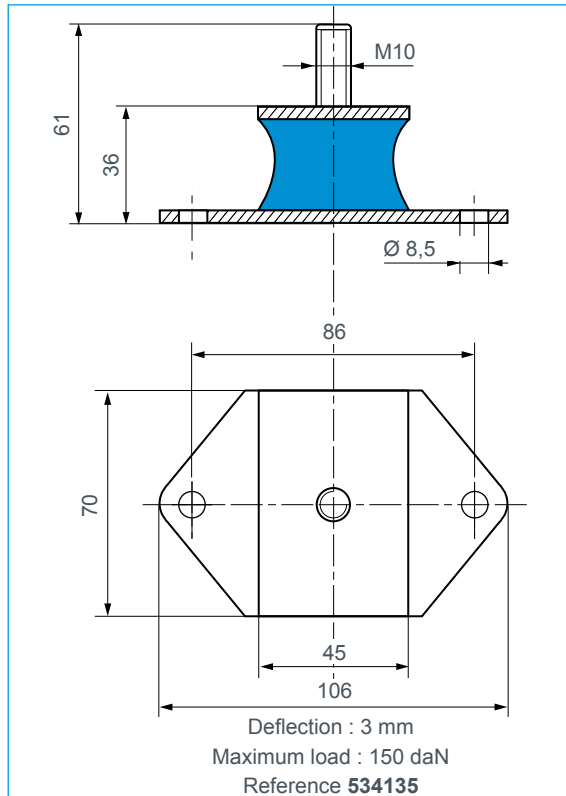
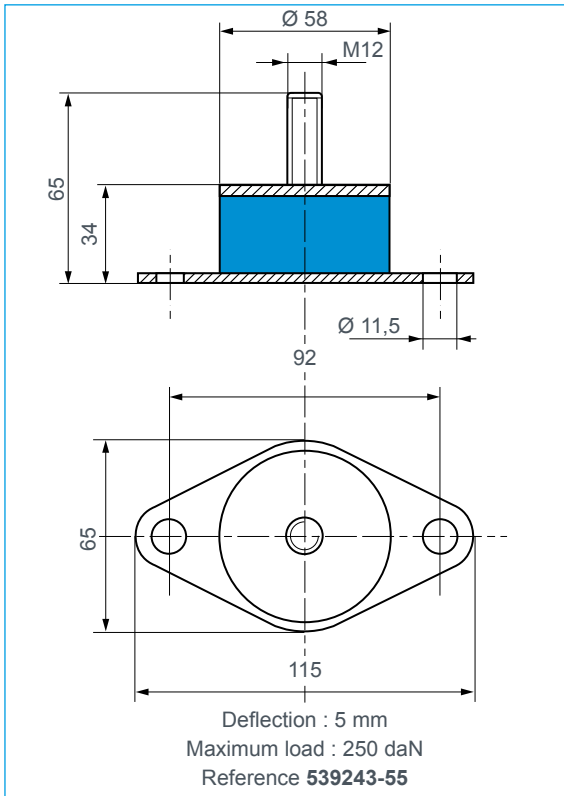
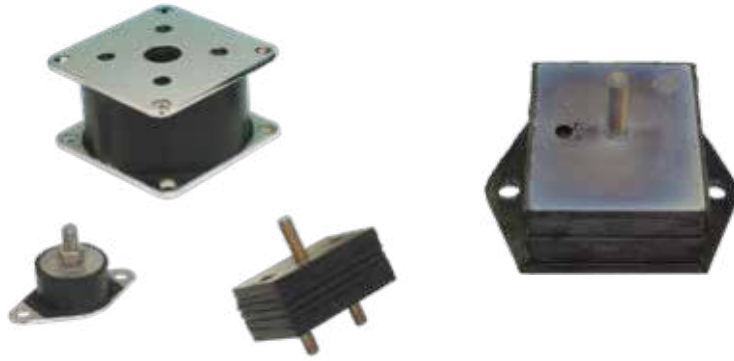
Static compression		Dynamic compression			Reference	Static compression		Dynamic compression			Reference
Nominal load (daN)	Deflect. (mm)	Load (daN)	Deflect. (mm) (1)	Ø A max.		Nominal load (daN)	Deflect. (mm)	Load (daN)	Deflect. (mm) (1)	Ø A max.	
50 - 200	0,8	600	3,5	57	541050	475 - 1 900	1,1	5 700	2,5	158	541146
90 - 360	3	1 100	7	90	541083	500 - 2 000	3	6 000	9,5	190	541175
125 - 500	3	1 500	7	100	541082	500 - 2 000	5,3	6 000	14	190	541174
175 - 700	3	2 100	7	115	541100	500 - 2 000	4,5	6 000	12	205	541185
210 - 850	3	2 500	7	130	541112	1 125 - 4 500	4,5	13 500	12	282	541249
325 - 1 300	3,5	4 000	9,5	150	541145	1 125 - 4 500	5,5	13 500	13	282	541250
375 - 1 500	3	4 500	7	158	541144						

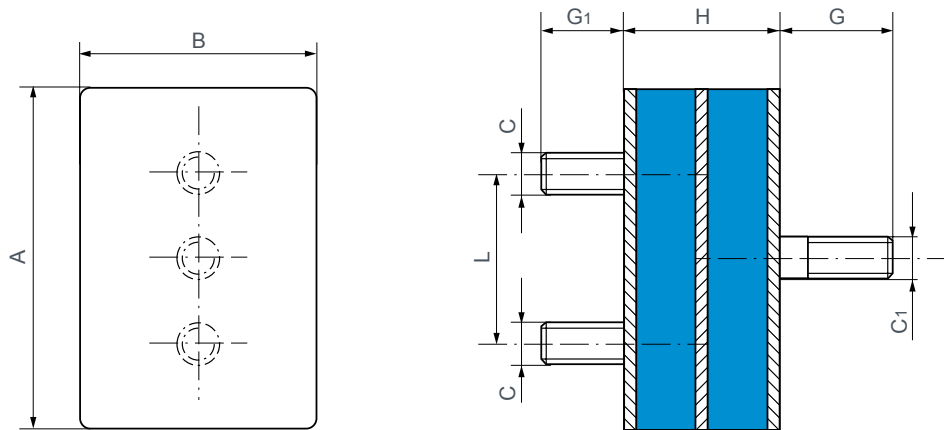
(1) The instantaneous deflection indicated in this table is approximate as it depends on the impact speed. It is possible to use a metallic cushion for this application.

# ASSEMBLY

The rings are centred using the grooves and ridges. To avoid play under no-load conditions, the stack should be pre-compressed by 3 to 10% of its height. It is also necessary to leave sufficient room around the stack for the sideways expansion under load.

# OTHER MOUNTING SYSTEMS





## DIMENSIONS

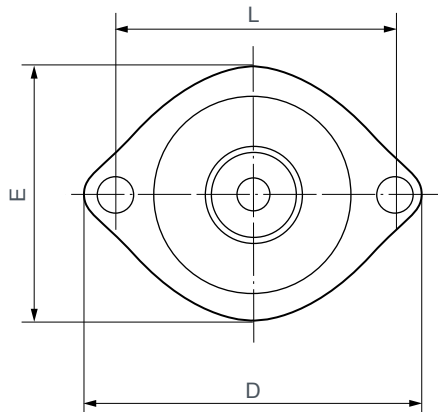
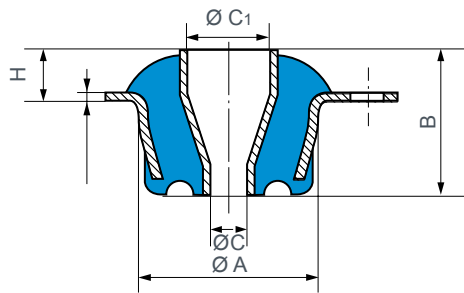
Reference	A (mm)	B (mm)	H (mm)	C	C1	G (mm)	G1 (mm)	L (mm)	Number intermed plates
538076	100	70	46	M10	M12	34	23	50	-
539214	100	70	46	M10	M12	31	23	50	2
539377*	100	70	46	M10	M12	33	23	50	1

\* This reference has 4 screws.

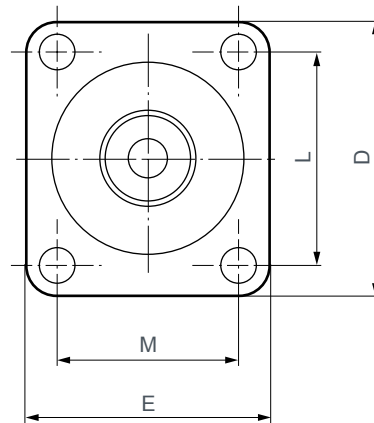
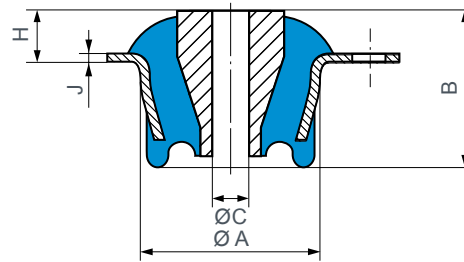
## OPERATING CHARACTERISTICS

Reference	Hardness	Static load (daN)	Deflection (mm)
538076	45	300	5
539214	40	300	1
539377*	60	300	0,7

\* This reference has 4 screws.



Reference 539004



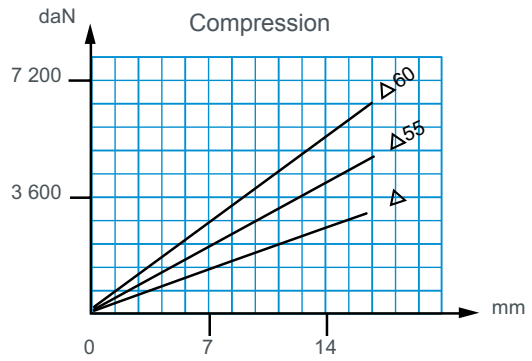
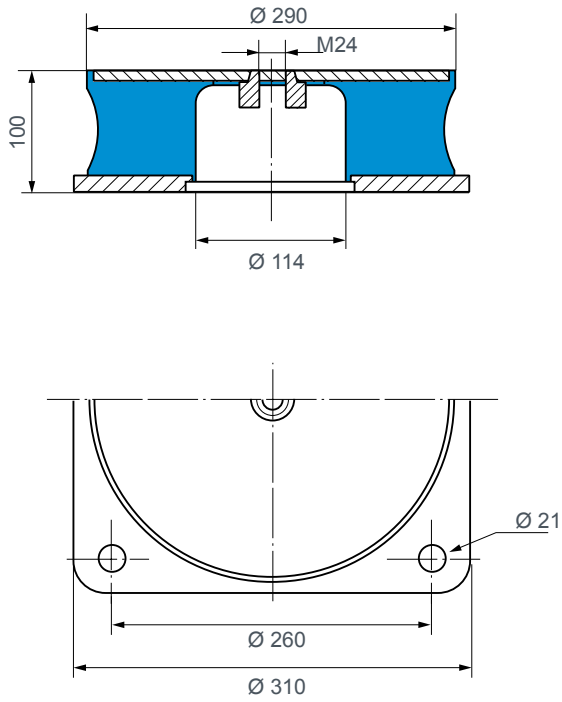
Reference 539743

## DIMENSIONS

Reference	Ø A (mm)	B (mm)	Ø C (mm)	Ø C <sub>1</sub> (mm)	D (mm)	E (mm)	H (mm)	J (mm)	L (mm)	M (mm)
539004	54	52	15,8	25,4	102	76	13,5	3	82,5	-
539743	74,6	71	16,25	-	105	92	33,5	3	82,5	69,5

## OPERATING CHARACTERISTICS

Reference	Hardness	Axial stiffness	
		Load (daN)	Deflection (mm)
539004	50	150	2
	60	230	2
539743	45	200	4,5



Reference 539972

Also exists with anti-rebound stop - reference 539971



We make it **possible**

## NAVY SHOCK MOUNTING SYSTEMS



# NAVY SHOCK MOUNTING SYSTEMS

## INTRODUCTION

A shock mounting system must fulfil the following functions :

- supporting the suspended mass when there is no shock while providing isolation from vibration and structure borne noise;
- in case of shock: limit the force and/or movement to acceptable values;
- after shock : return the suspended mass to its initial position.

Schematically, there are two types of shock :

- an energy shock resulting from a falling mass for which the parameters taken into consideration are the incident kinetic energy and that restituted, the impact speed and the maximum forces and deflections.
- a shock resulting from a movement of the suspended mass. The parameters taken into consideration are the speed or acceleration of the assembly in time and also the forces relating to the maximum deflection.

## STANDARDS APPLICABLE TO THE MARINE MOUNTS

Reference*	Applications
<b>BR 3021</b>	Shock for onboard equipment
<b>BR 8470</b>	
<b>BV 043</b>	Shock for surface ships and submarines
<b>DIN 95365</b>	Marine mounts geometry and characteristics
<b>GAM-EG-13C</b>	Vibration and shock onboard ship
<b>MIL-S-901D</b>	Shock for onboard equipment
<b>MIL-STD-167</b>	Marine equipment vibrations
<b>STANAG 4142</b>	Shock resistance analysis of equipment for surface ships
<b>STANAG 4549</b>	Testing of surface ship equipment on shock testing machines
<b>STI-MM-305</b>	Vibration and shock testing for onboard equipment

\* For compliance with these standards according to the applications, ask our Technical Department.

## ADVANTAGES

- The mountings described below are intrinsically stable under shock, that is to say, they enable the mass to return to its initial position; the system retains no plastic deformation nor residual buckling when the shock stresses are removed.
- The suspended mass may therefore undergo successive shocks with impunity. Nevertheless, the stability of the assembly in relation to the relative positions of the mountings and the centre of gravity of the suspended mass should be checked.
- PAULSTRA shock mounting systems are also exceptionally effective against vibration.

# VIB LD 03

## DECOUPLING WASHERS



### DESCRIPTION

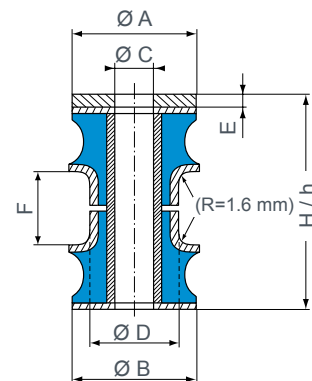
Elastomer rings for linking and positioning of equipment while maintaining acoustic discretion and protection from shocks.

A decoupling washer is composed of :

- Two bonded elastomer washers;
- One stainless steel anti-shock washer;
- One stainless steel preload spacer.

### CHARACTERISTICS

- Natural frequencies (vertical and axial) 15 to 20 Hz depending on load.
- Maximum deflection under shock:
  - axial : 8 mm;
  - radial : 5 mm.
- Mechanical strength corresponding to 30 times the nominal load.



Nominal load (daN)	Reference	Ø A (mm)	Ø B (mm)	Ø C (mm)	Ø D (mm)	E (mm)	F (mm)	H unloaded (mm)	h under load (mm)
14	E1RP-3804-51	Square 28x28	28	8,2	20	2,5	10	42,5	35,5 approx
18	E1RP-3804-52	Square 28x28	28	8,2	20	2,5	10	42,5	35,5 approx
27	E1RP-3805-51	Square 28x28	28	8,2	20	2,5	10	42,5	35,5 approx
40	E1RP-3806-51	42,5	42,5	14,2	29	5	15	50	44 approx
60	E1RP-3806-52	42,5	42,5	14,2	29	5	15	50	44 approx
85	E1RP-3806-53	42,5	42,5	14,2	29	5	15	50	44 approx
125	E1RP-3807-51	56	56	18,2	35	8	15	53	47 approx
140	E1RP-3807-52	56	56	18,2	35	8	15	53	47 approx
185	E1RP-3807-53	56	56	18,2	35	8	15	53	47 approx
260	E1RP-3808-51	78	80	24,5	50	12	25	67	60,5 approx
320	E1RP-3808-52	78	80	24,5	50	12	25	67	60,5 approx
380	E1RP-3808-53	78	80	24,5	50	12	25	67	60,5 approx
520	E1RP-3809-51	88	90	27,5	53	16	25	71	64,5 approx
1000	E1RP-3809-53	88	90	27,5	53	16	25	71	64,5 approx
2000	E4353F-51	220	220	60	125	35	48,9	120,9	112,9 approx
3500	E4353F-52	200	200	60	125	35	48,9	121,9	113,9 approx

# LOW DEFLECTION MOUNTS LOW LOADS



## DESCRIPTION

The main role of these mounts is to isolate vibration. A snubber system limits the movement of the suspended mass (10 mm), however the loads developed in this case, are high.

A wide load range from 0,5 to 32 daN depending upon the application.

In case of shock protection, the structural resistance of the mount can accept acceleration of up to 150 g. These mounts are mainly suited for vibration, hence the loads generated in case of shock are very high.

Fixation on the inside or on the outside.

## CHARACTERISTICS

- Natural frequencies (vertical and lateral) under a nominal load of 5 to 8 Hz.
- B = unloaded.
- B - 6 mm height under nominal load (deformation under load . 6 mm).
- Maximum deflection from loaded position  $\pm 10$  mm in all directions (vertical and lateral).
- Stop at 10 mm deflection, maximum acceptable loads = 150 x nominal static load.

Nominal static load (daN)	Reference	Ø A (mm)	B (mm)	C (mm)	Ø D (mm)	E (mm)	Ø F (mm)	G	H (mm)	I (mm)	J max. (mm)	K	L max. (mm)
0,5	552320 50 14	66	30	25,5	48	2,5	56	M6	12	8 10	15	3	20
1	552320 50 04	66	30	25,5	48	2,5	56	M6	12	8 10	15	3	20
2	552321 50 04	66	30	25,5	48	2,5	56	M6	12	8 10	15	3	20
4	539966 50 04	82	31,5	34,5	63	5	71	M8	13,5	6,5 11	20	3	20
8	539967 50 04	82	31,5	35,5	63	6	71	M8	13,5	6,5 11	20	3	20
16	539985 50 24	82	51	32	63	8	71	M12	33	10 15	20	4	40
24	539985 50 04	82	51	32	63	8	71	M12	33	10 15	20	4	40
32	539985 50 14	82	51	32	63	8	71	M12	33	10 15	20	4	40

# VIBMAR

Natural frequency : (1)  
5 to 12 Hz



## DESCRIPTION

The VIBMAR series has a base plate with two or four mounting holes and a tapped steel core. The elastomer is bonded to the steel.

E1N104 and E1N106 versions have a conical spring embedded in the rubber.

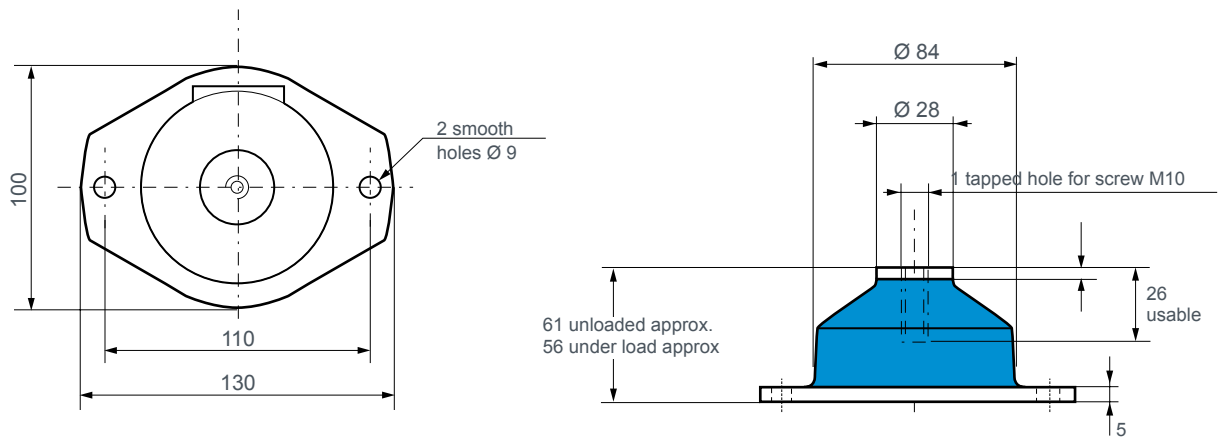
Environmental protection is provided by painting the metal parts and by coating the elastomer with an ozone resistant compound.

## APPLICATIONS

These multi-axis low frequency dampers have been specially designed to protect electrical or electronic racks and marine or road transport generator sets (on board or not). They are cone-shaped to absorb considerable displacement and shocks.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

## DIMENSIONS



## OPERATING CHARACTERISTICS

Natural frequency :

- axial : 8 to 12 Hz;
- radial : 6 to 10 Hz.

Maximum permitted excitation at the natural frequency of suspension :  $\pm 1.25$  mm.

Maximum axial travel available for shocks : 30 mm.

Amplification factor at resonance :  $< 6$  and  $< 4$  for silicone rubber versions.

Structural strength corresponding to a continuous acceleration of 3 g with maximum load.

When suspending an enclosure, the same type of damper should be used as a stabiliser.

Operating temperature :      - 30°C to + 100°C;  
    - 54°C to + 150°C for silicone rubber versions.

Weight : 0.6 kg.

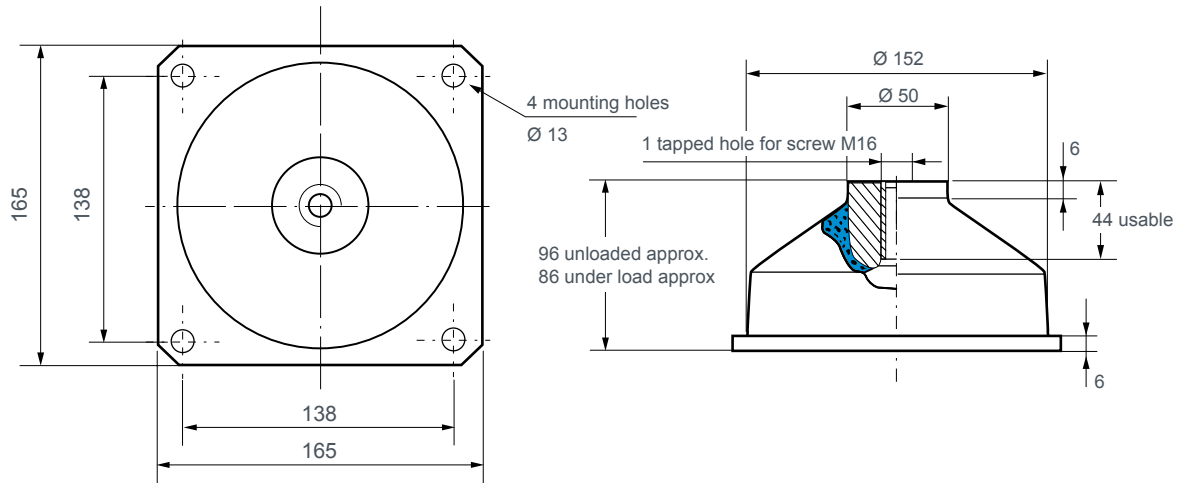
### SILICONE RUBBER

Reference	Static load (daN)
<b>E1N2296-01</b>	17-30
<b>E1N2296-02</b>	35-55
<b>E1N2296-03</b>	55-70

Reference	Static load (daN)
<b>E1N2296 S01</b>	10-18
<b>E1N2296 S02</b>	17-25
<b>E1N2296 S03</b>	20-30

**Note :** Product available with stainless steel plates and/or alternative elastomers.  
 Please consult us

## DIMENSIONS



## OPERATING CHARACTERISTICS

Natural frequency :

- axial : 5 to 6 Hz;
- radial : 4 to 6 Hz.

Maximum permitted excitation at natural frequency of suspension :  $\pm 1.5$  mm.

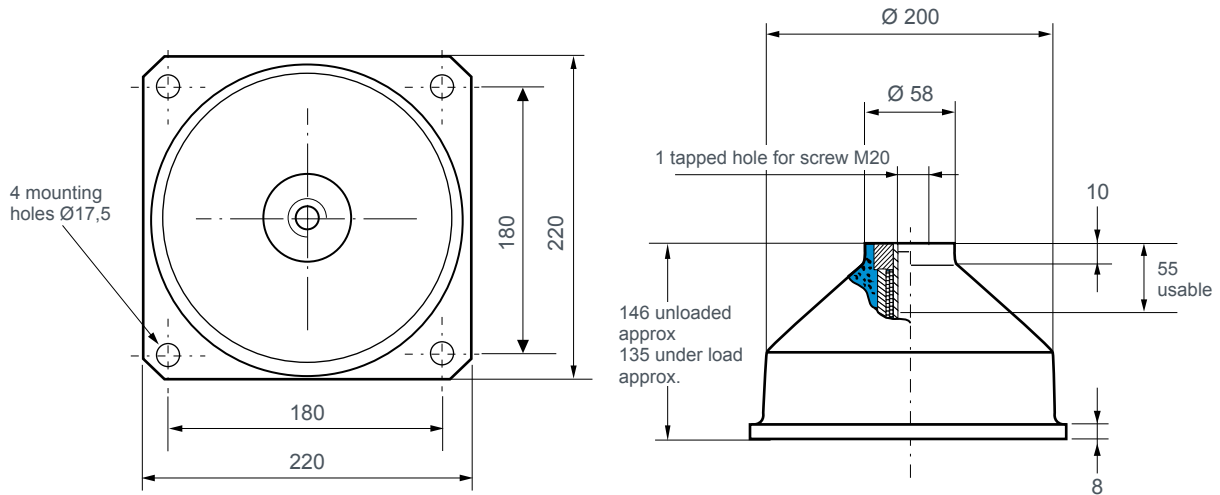
Maximum travel available under shocks : 30 mm in all directions

Weight : 2 kg.

Reference	Axial static load (daN)
<b>E1N101-01</b>	50 - 85
<b>E1N101-02</b>	85 - 120
<b>E1N101-04</b>	130 - 210
<b>E1N101-05</b>	210 - 310
<b>E1N101-06</b>	310 - 530

**Note :** Product available with stainless steel plates and/or alternative elastomers on special request.  
Please consult us.

## DIMENSIONS



## OPERATING CHARACTERISTICS

Natural frequency :

- axial : 5 to 7 Hz;
- radial : 6 to 8 Hz.

Maximum permitted excitation at the natural frequency of suspension :  $\pm 1.5$  mm.

Amplification factor at resonance :  $4 < Q < 10$ .

Maximum axial travel available under shocks :

- axial  $\pm 45$  mm;
- radial  $\pm 25$  mm.

Structural strength corresponding to a continuous acceleration of 10 g with maximum load.

Weight : 2 kg.

Reference	Axial static load (daN)
<b>E1N104C45AS</b>	200 - 360
<b>E1N104C60AS</b>	360 - 600
<b>E1N104C75AS</b>	500 - 800
<b>E1N106C60AS</b>	700 - 1000
<b>E1N106C75AS</b>	900 - 1300

# VIB HD 50

## MEDIUM DEFLECTION MOUNTS

LOW LOADS



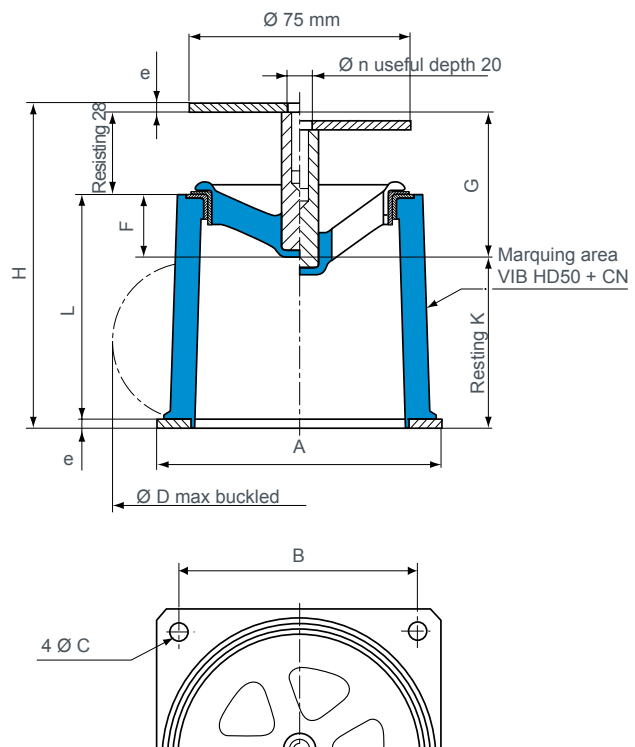
## DESCRIPTION

The permitted deflection (40 to 50 mm) of the suspended mass in relation to the mounting base limits reaction under shock. No efficient vibration protection is offered during shock.

## CHARACTERISTICS

- Natural frequency (vertical and lateral) under load of 5 to 8 Hz.
- Maximum deflection under load :
  - vertical :  $\pm 50 \text{ mm}^*$ ;
  - lateral :  $\pm 45 \text{ mm}^*$ .
- H in rest position.
- H - 6 mm under nominal load (deflection under load = 6 mm).

\* maximum forces corresponding to 10 times the load.



Nominal static load (daN)	Reference	□A (mm)	H (mm)	□B (mm)	e (mm)	Ø C (mm)	Ø n (mm)	F (mm)	G (mm)	Ø D (mm)	L (mm)	K (mm)
1	552301 50	90	109	75	2	5,5	8	19	47	105	77	60
2	552302 50	90	109	75	2	5,5	8	19	47	110	77	60
4	552303 50	95	110	80	3	5,5	8	21	49	120	76	58
8	552304 50	95	110	80	3	5,5	8	21	49	120	76	58
16	552305 50	105	129,5	90	5	6,5	12	39,5	67,5	125	91,5	57
24	552306 50	105	129,5	90	5	6,5	12	39,5	67,5	130	91,5	57
32	552307 50	105	129,5	90	5	6,5	12	39,5	67,5	135	91,5	57



# VIB HD 45

## HIGH DEFLECTION SHOCK MOUNTS



### DESCRIPTION

Range of omnidirectional high deflection shock mounts made with a square base plate and a threaded core on the upper side.

The elastomer, in natural rubber, is developed especially for navy applications (other materials on demand).

### ADVANTAGES

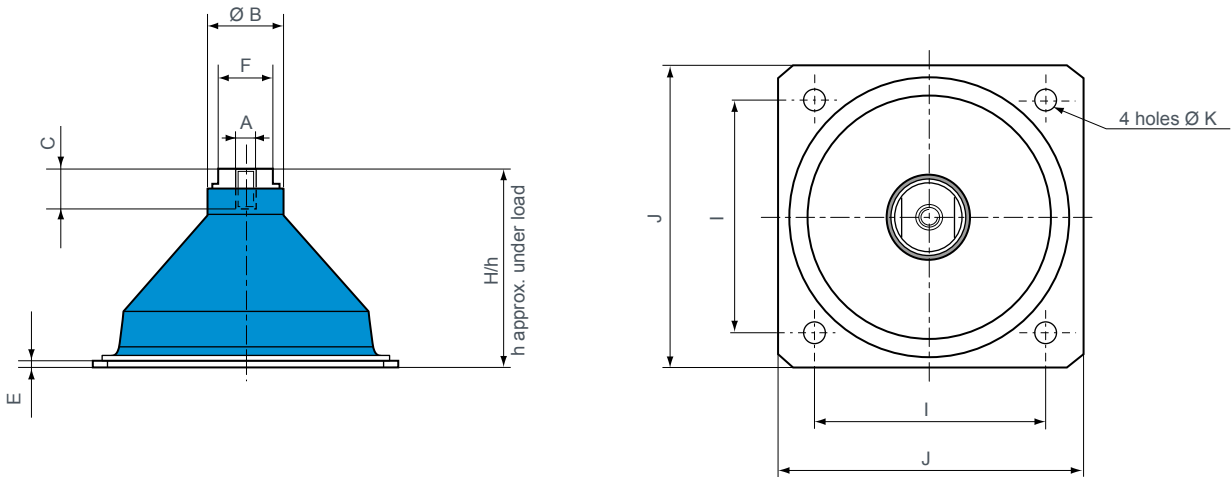
These mounts provide both high level of vibration isolation and shock protection. Its high structural strength corresponds to a continuous acceleration of 10 g under maximum load.

The range includes 17 different mounts covering a wide load range from 15 kg up to 1670 kg per mount.

This mount meets the latest US and European shock standards in use in the naval forces across the globe.

The metalworks are protected against corrosion (ie. : salt spray).

# DIMENSIONS



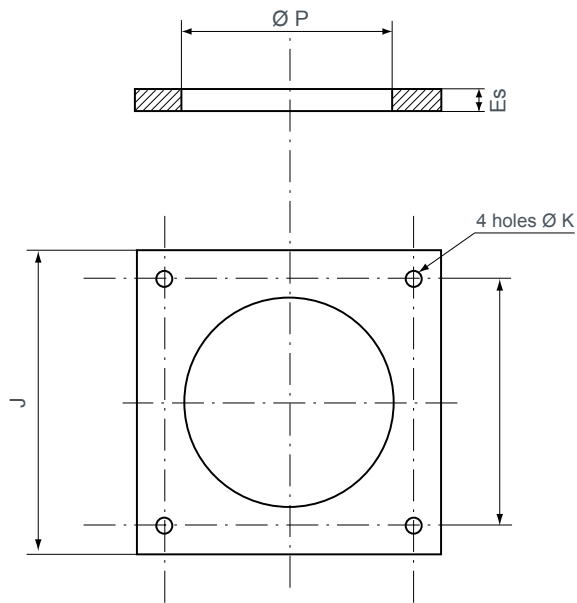
# OPERATING CHARACTERISTICS

Nominal load (daN)	Load range (daN)	Part number	A	Ø B (mm)	C useful lenght (mm)	H unloaded (mm)	h /s under load (mm)	E (mm)	F (mm)	I (mm)	J (mm)	Ø K screw hole (mm)
30	15 to 35	E1N-3628-52	M10	37	20	100	89	5	27	114	150	9
45	23 to 52	E1N-3628-51	M10	37	20	100	89	5	27	114	150	9
60	30 to 69	E1N-3454-54	M10	37	20	100	89	5	27	114	150	9
85	43 to 98	E1N-3454-53	M10	37	20	100	89	5	27	114	150	9
110	55 to 126	E1N-3454-52	M10	37	20	100	89	5	27	114	150	9
130	65 to 150	E1N-3454-51	M10	37	20	100	89	5	27	114	150	9
165	83 to 190	E1N-3454-56	M10	37	20	100	89	5	27	114	150	9
170	85 to 196	E1N-3455-54	M20	54	40	126	115	10	41	140	165	13
230	115 to 265	E1N-3455-53	M20	54	40	126	115	10	41	140	165	13
320	160 to 370	E1N-3455-52	M20	54	40	126	115	10	41	140	165	13
425	213 to 490	E1N-3455-51	M20	54	40	126	115	10	41	140	165	13
560	280 to 645	E1N-3455-56	M20	54	40	126	115	10	41	140	165	13
500	250 to 575	E1N-3456-54	M24	116	48	154	141	15	41	210	250	18
625	313 to 720	E1N-3456-53	M24	116	48	154	141	15	41	210	250	18
800	400 to 920	E1N-3456-52	M24	116	48	154	141	15	41	210	250	18
1080	540 to 1212	E1N-3456-51	M24	116	48	154	141	15	41	210	250	18
1450	725 to 1670	E1N-3456-55	M24	116	48	154	141	15	41	210	250	18

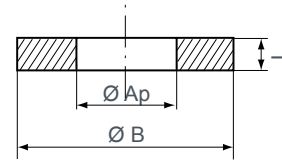
- Vertical nominal static load : from 15 kg to 1670 daN per mount.
- Axial and radial natural frequencies : 4 to 8 Hz, depending on the load (see chart).
- Maximum axial shock displacement : 45 mm (can be increased up to 63 mm with the addition of washers).
- Maximum radial shock displacement : 45 mm.
- Structural strength : 10 g under maximum load.
- Operating temperature : - 30°C to + 80°C.

# ADDITIONAL SPACERS

Washer for the mounting plate \*



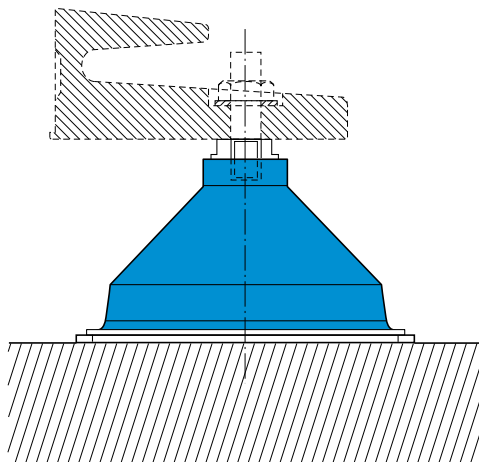
Washer for the threaded core \*



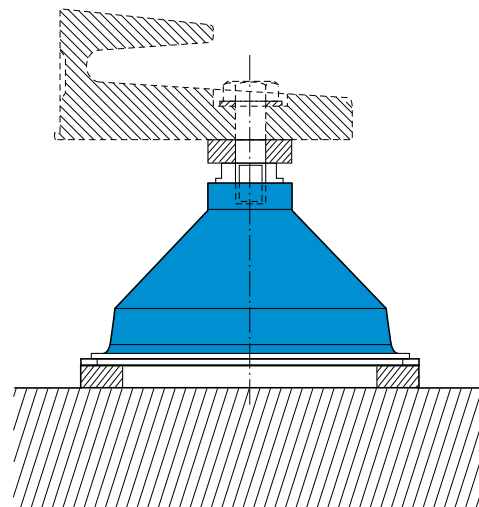
\* Not supplied

For the part number	Max. axial displacem. (mm)	Washer for the mounting plate					Washer for the threaded core		
		Thickness Es(mm)	Ø P (mm)	J (mm)	l (mm)	Ø K (mm)	Ø B (mm)	Ø Ap (mm)	Height L (mm)
E1N-3628-XX	63	8	88	150	114	9	37	11	10
E1N-3454-XX	63	8	88	150	114	9	37	11	10
E1N-3455-XX	67	5	105	165	140	13	54	22	10
E1N-3456-XX	69	5	130	250	210	18	116	26	10

Installation without washer



Installation with washers



# ASSEMBLY

These parts are designed to be loaded in compression. they have to be installed on a flat surface covering the entire surface of the base plate. The supported structure is then secured to the central core using a high tensile screw M20.

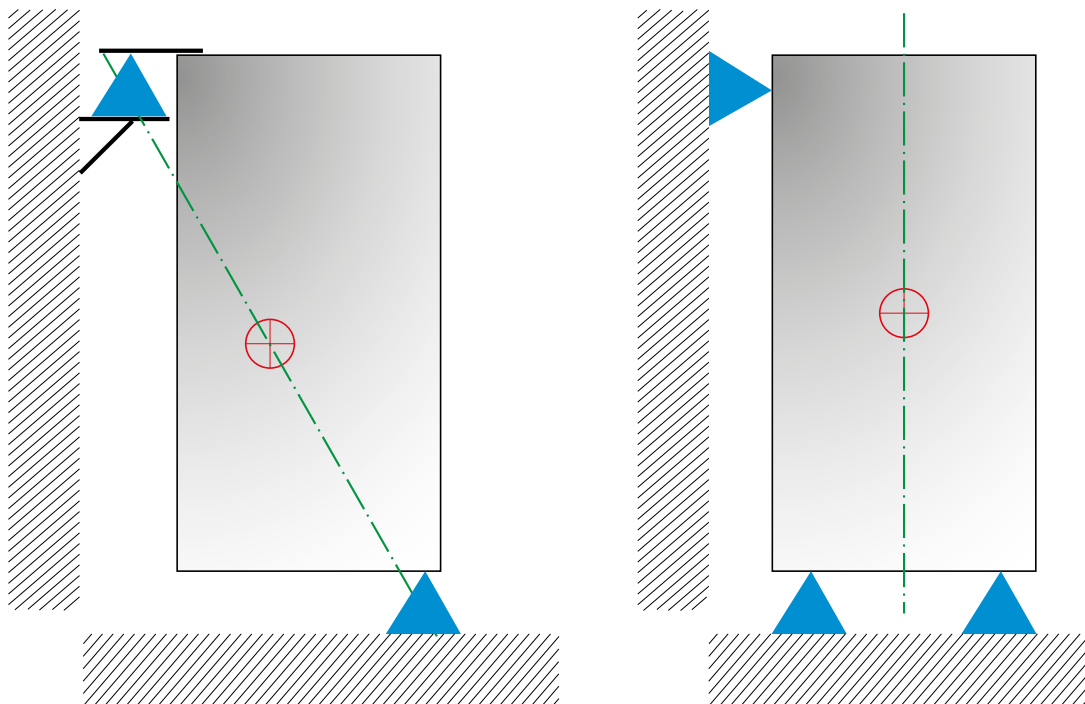
For a better result, the load per mount should be evenly distributed. In the case of a tall suspended equipment, these mounts can be used as stabilizing devices. They will be secured to the equipment only after stabilization of the base mount.

These mounts are not designed to carry a permanent load in shear or in tension.

All connections with the suspended equipment must be flexible and capable to accept high displacement allowing the suspensions to work properly.

We strongly recommend to have your installation approved by our technical department before ordering the mounts.

## Assembly drawings



# VIB HD 56

## MEDIUM DEFLECTION MOUNTS

HIGH LOADS



## DESCRIPTION

A complete range of high deflection omnidirectional mounts. They are made of two cast iron inserts, a threaded steel plate holding the fixing interfaces is added to one end. The elastomer is a specially developed natural rubber to meet the navy requirements (Other materials can be delivered on request).

## ADVANTAGES

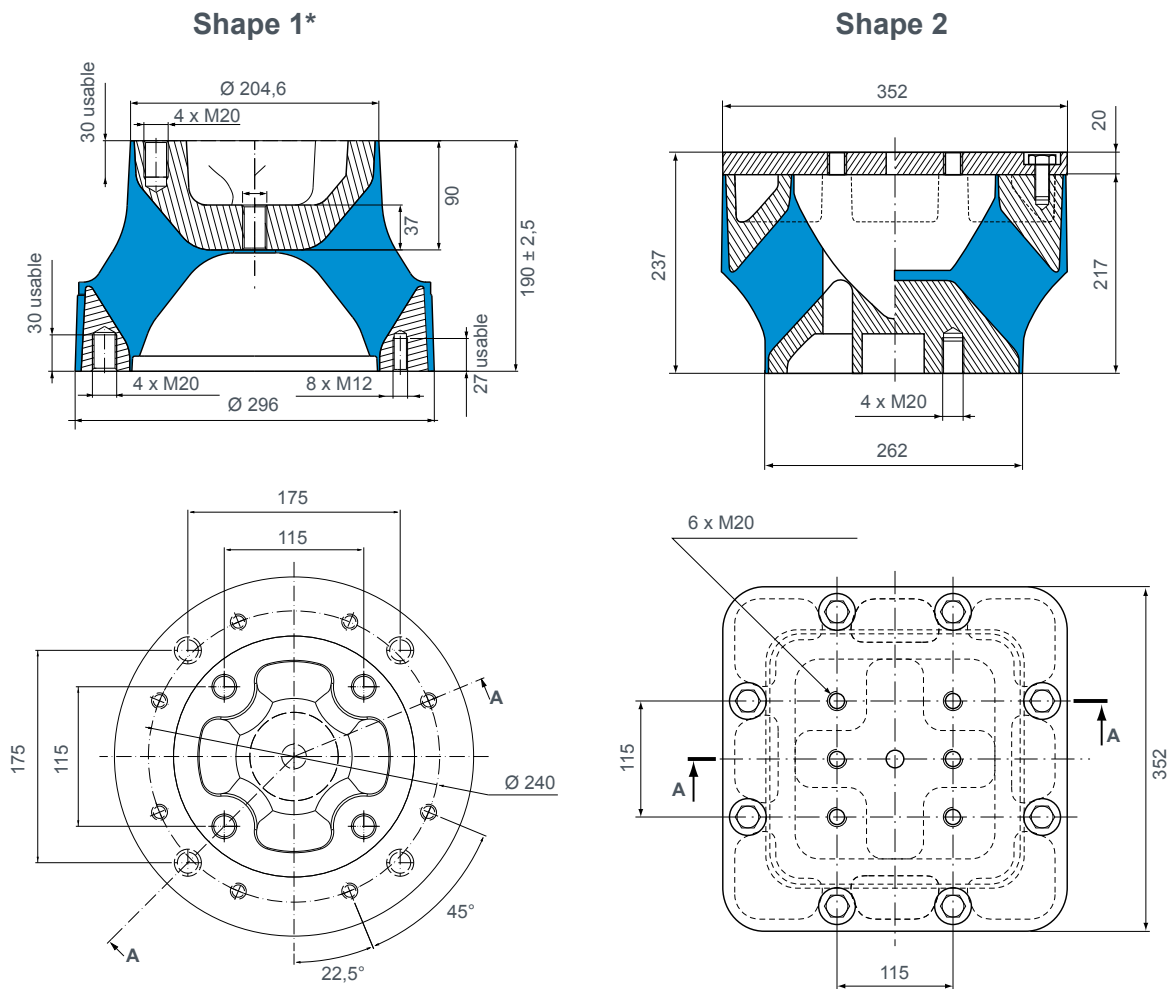
These mounts will provide both a very high level of vibration attenuation and a high shock capacity to reduce the transmitted acceleration. It's structural resistance correspond to a continuous acceleration of 10 g at the maximum load.

The range is made of several references with a load range ranging from 1125 daN up to 7000 daN per mount.

These mounts meet both the European and North American shock standards.

The metalwork are treated against corrosion.

## DIMENSIONS IN mm (for Shapes 1 & 2)



## OPERATING CHARACTERISTICS (for Shapes 1 & 2)

Load range (daN)	Reference	Shape	Height under max. load (mm)
850 to 1955 1050 to 2415 1250 to 2875 1600 to 3680	E1N-4001-54 E1N-4001-52 E1N-4001-53 E1N-4001-51	1	177 ± 2
3000 to 5000 4200 to 7000	E1N-4066-52 E1N-4066-51	2	220 ± 2

- Static nominal load : 1125 to 7000 daN per mount.
- Axial and radial natural frequency : 4 to 7 Hz depending on load.
- Displacement under shock : 56 to 60 mm depending on the axis.  
For the E1N-4001 mount, it can be increased to 63 mm using spacers.
- Structural strength : 10 g at maximum load.
- Temperature range : - 30°C up to + 80°C.

\* Geometry evolution. Please consult us.

# ASSEMBLY

These mounts are designed to carry load in compression and should be installed on a smooth surface. The equipment in Men second using 4 M20 bolts (shapes 1 and 2).

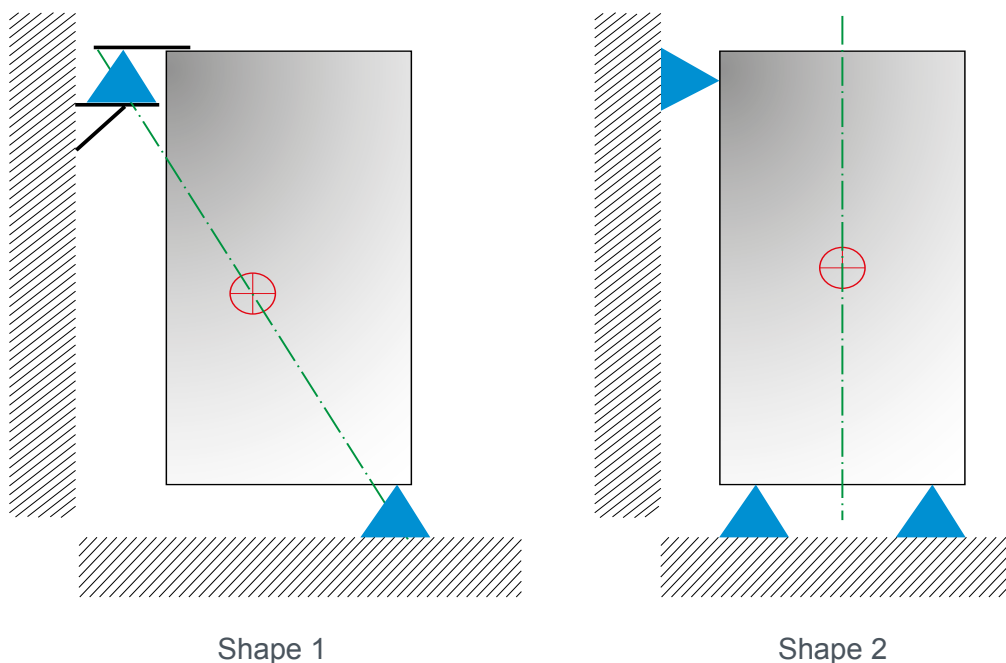
For a better result, the load per mount should be evenly distributed. In the case of a tall suspended equipment, these mounts can be used as stabilizing devices. They will be secured to the equipment only after stabilization of the base mount.

These mounts are not designed to carry a permanent load in shear or in tension.

All connections with the suspended equipment must be flexible and capable to accept high displacement allowing the suspensions to work properly.

We strongly recommend to have your installation approved by our technical department before ordering the mounts.

## Assembly drawings



# GB 530 MOUNTS

Natural frequency : (1)  
5 Hz



## DESCRIPTION

The GB530 comprises of one part in elastomer bonded to a base plate and a tapped steel core (a non magnetic version is also available).

### Advantages

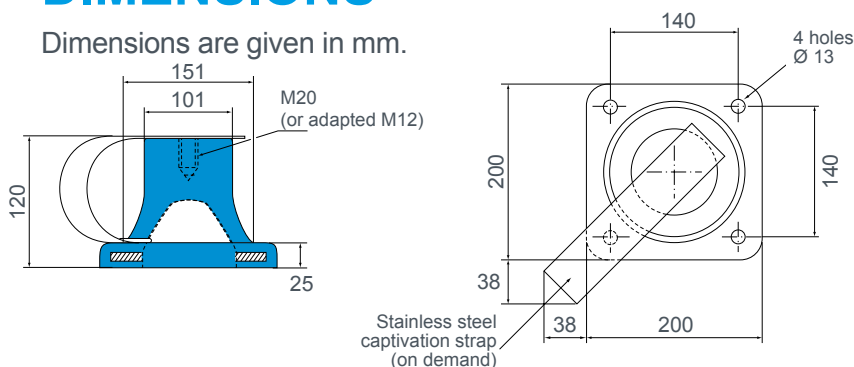
- Can provide high deflection under shocks.
- Long life.
- Low natural frequency (5 Hz in axial).
- Low amplification at resonance.(8 at 10)

## APPLICATIONS

These are specific mounts created for the naval industry : on board electronics, radars, special weapons equipment.

## DIMENSIONS

Dimensions are given in mm.



## OPERATING CHARACTERISTICS

Paulstra reference	Barry Controls * reference	Load range (daN)
530901 21 00	GB530-NR1	7,5 - 75
530901 21 10	GB530-NR2	15 - 150
530901 21 20	GB530-NR3	25 - 250
530901 21 30	GB530-NR4	40 - 400
530901 21 40	GB530-NR5	60 - 600

Temperature range :  
-30° C to + 70° C  
Weight : 3 - 4 kg

\* Barry Controls part numbers are given as a reference.

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.



# “X” TYPE FLEXIBLE MOUNTS

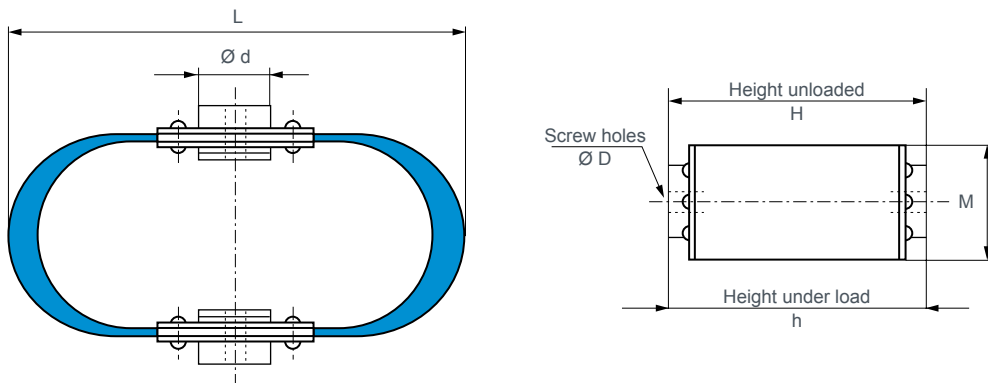
Natural frequency : (1)  
4 to 10 Hz



## DESCRIPTION

Steel mounting with excellent shock absorption capacity, highly resistant to fatigue. It is made of a stainless steel and epoxy resin sandwich which limits the amplification.

## DIMENSIONS



Reference	Nominal load (daN)	H (mm)	h (mm)	L (mm)	M (mm)	Ø d (mm)	Ø D (mm)
E1M-3950-01	10	114,3	106,9	203,2	50,8	31,8	8
E1M-3951-01	20	114,3	106,9	203,2	50,8	31,8	8
E1M-3952-01	45	133,3	123,2	215,9	50,8	31,8	12
E1M-3953-01	70	133,3	123,6	215,9	50,8	31,8	12
E1M-3954-01	110	133,3	124,2	215,9	50,8	31,8	12
E1M-3955-01	180	190,5	185,4	297,2	101,6	63,5	20
E1M-3956-01	320	190,5	183,4	297,2	101,6	63,5	20
E1M-3957-01	450	190,5	184,4	297,2	101,6	63,5	20
E1M-3958-01	450	209,6	199,3	365,0	50,8	34,9	20

1) the indicated natural frequency, are valid for the maxi loads of the ranges of use quoted in the paragraph : TECHNICAL CHARACTERISTICS.

# VIB VHD 75

## VERY HIGH DEFLECTION

### LOW LOADS



## DESCRIPTION

A range of multi directional mounts with very large deflection manufacture with elastomer and metal parts.

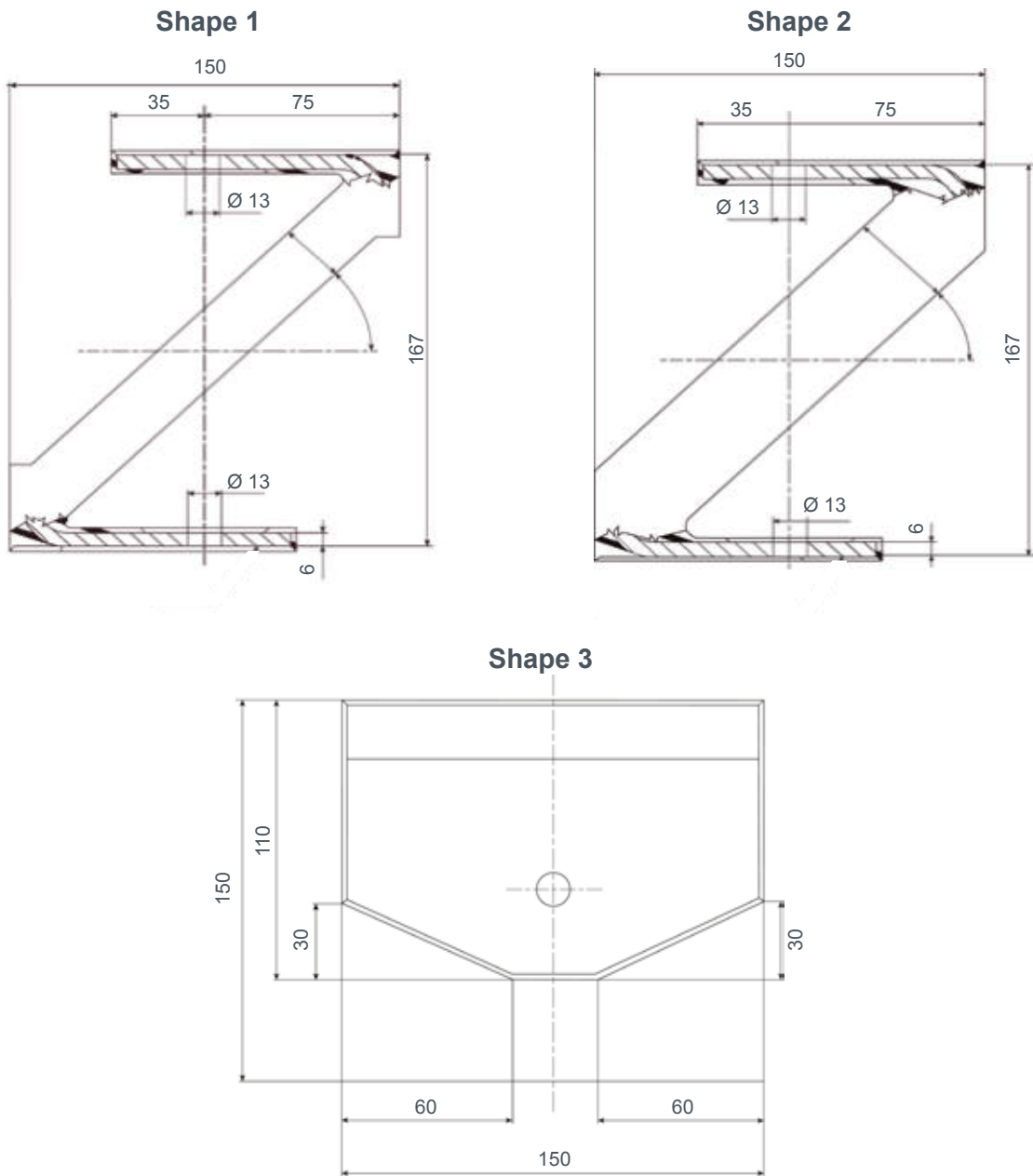
The elastomer is based on natural rubber which has been specially developed for marine applications.

## ADVANTAGES

The mounts provide a high level of vibration isolation and shock attenuation. Their strenght is equal to a continuous acceleration of 10g at the maximum load. The range includes 5 references with load ranging from 11 to 94 daN.

The mounts meet the shock requirements for European and North American specifications. The metalwork is covered with elastomer to protect it against corrosion (ex. : salt fog).

# DIMENSIONS

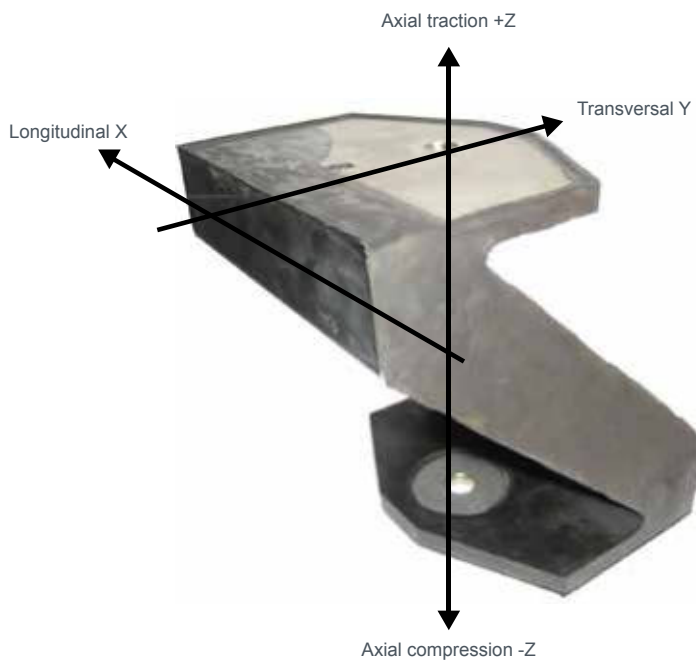


## Static loads

Part numbers	Axial Z compression (daN)			Axial Z traction (daN)		Transversal Y (daN)	
	nominal	mini	maxi	nominal	maxi	nominal	maxi
552450	15	11,3	18,8	7,5	9,4	7,5	9,4
552451	25	18,8	31,3	12,5	15,6	12,5	15,6
552452	35	26,3	43,8	17,5	21,9	17,5	21,9
552453	50	37,5	62,5	25	31,3	25	31,3
552454	75	56,3	93,8	37,5	46,9	37,5	46,9

Longitudinal X : No permanent loads should be applied in this direction.

# TECHNICAL CHARACTERISTICS



- Resonance frequency axial and radial : 5 to 7 Hz depending on load.
- Deflection during shock : 75 mm in all directions.
- Mechanical strength : 10 g with maximum load.
- Operating temperature : - 30 °C to + 80 °C.
- Metallic parts are covered with elastomer provide good corrosion resistance when used in a sea water environment.

## ASSEMBLY

In the case of a large cabinet, the mounts can also be used as stabilisers. They should be fixed after the load has been supported by main mountings.

To ensure the mounting system operates correctly all connections should be capable of large displacements. We recommend that installation design should be approved by our technical department.

# VIB VHD 75

## HIGH DEFLECTION MOUNTINGS

HIGH LOADS



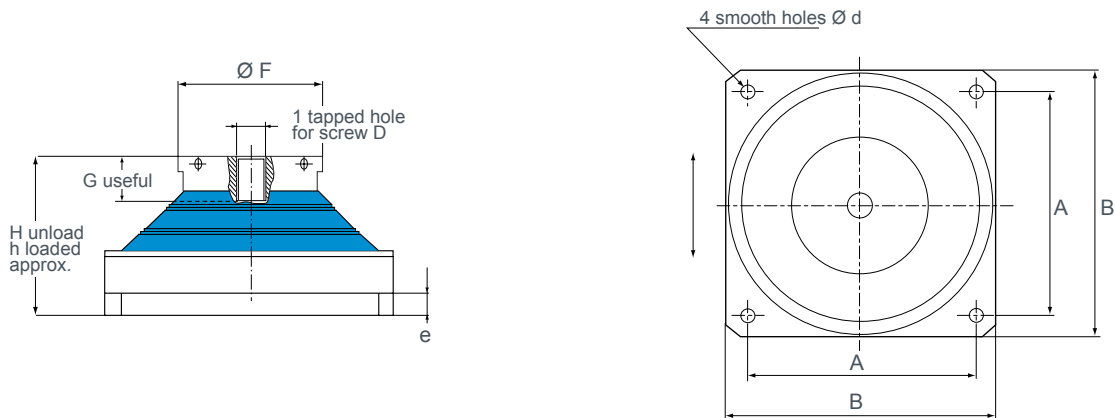
## DESCRIPTION

Elastomer isolators designed for acoustic isolation and shock protection.

## CHARACTERISTICS

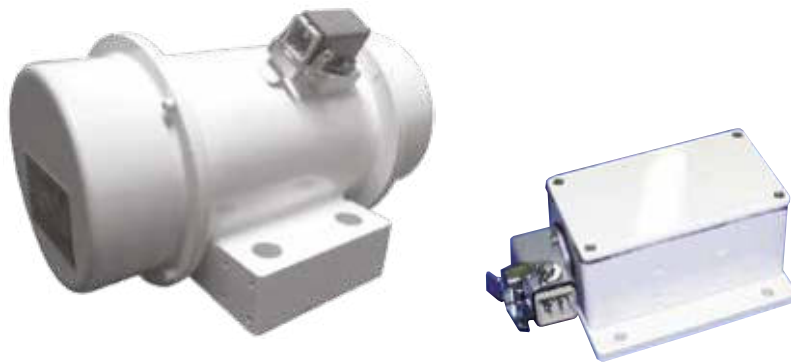
- Natural frequency (vertical and lateral) under nominal load : 4 to 5.5 Hz.
- Maximum displacement under shock: 75 mm\* all in directions.

\* maximum forces corresponding to 15 times the nominal load



Nominal load (daN)	Reference	D	Ø F (mm)	G lenght useful (mm)	e (mm)	H unloaded (mm)	h under load (mm)	A (mm)	B (mm)	Ø d screw hole (mm)
120	E1N-3392-50	M30	92	45	15	211	197 approx.	200	236	18
200	E1N-3392-59	M30	92	45	15	211	197 approx.	200	236	18
250	E1N-3392-58	M30	108	45	15	211	197 approx.	234	270	18
380	E1N-3392-57	M30	112	45	15	211	197 approx.	234	270	18
630	E1N-3392-56	M56	199	84	40	255	238 approx.	360	446,5	30
900	E1N-3392-55	M56	199	84	40	255	238 approx.	360	446,5	30
1200	E1N-3392-54	M56	240	84	40	255	238 approx.	360	446,5	30
2000	E1N-3392-53	M56	240	84	40	255	238 approx.	360	446,5	30
3000	E1N-3392-52	M56	240	84	40	255	238 approx.	360	446,5	30
4000	E1N-3392-51	M56	280	84	40	305	289 approx.	460	546,5	30

# Active control systems of noise and vibrations



## INTRODUCTION

Active isolators cancel the incoming vibration by generating a dynamic force of same magnitude in opposite phase through the use of electrodynamic actuators, thus improving the low frequency performance of the suspension.

The objective is to improve the insulation of vibration in the range 10 to 1000 Hz even more – according to the needs of the application.

The applications of STRACTIVE are endless : reactive silencer, electric motor, transformers, internal combustion engines, structures, pumps,...

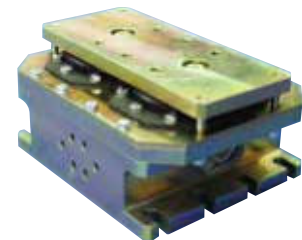
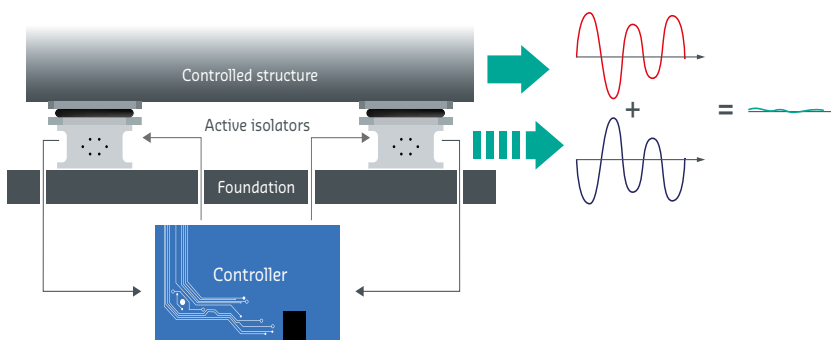
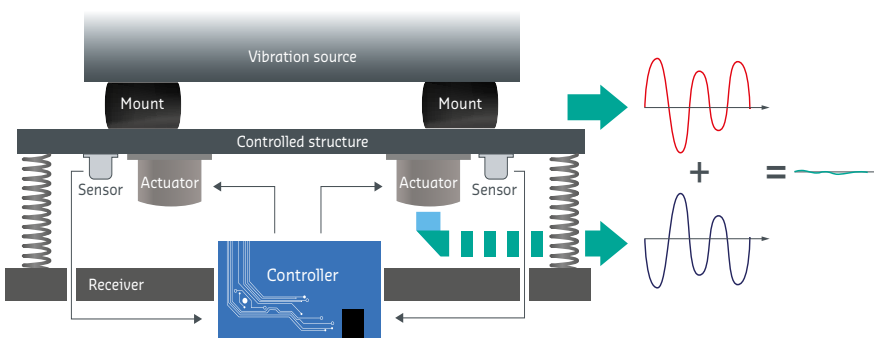
## EXAMPLES OF APPLICATIONS

- Oceanographic research vessel : improves the threshold of sonar detection.
- Extends crew shift.
- Submarines : reduce noises.
- Diesel engines / ventilation systems : reduction of air noises by active silencers.
- Machine tools : improvement of precision and life cycle of manufacturing tools.

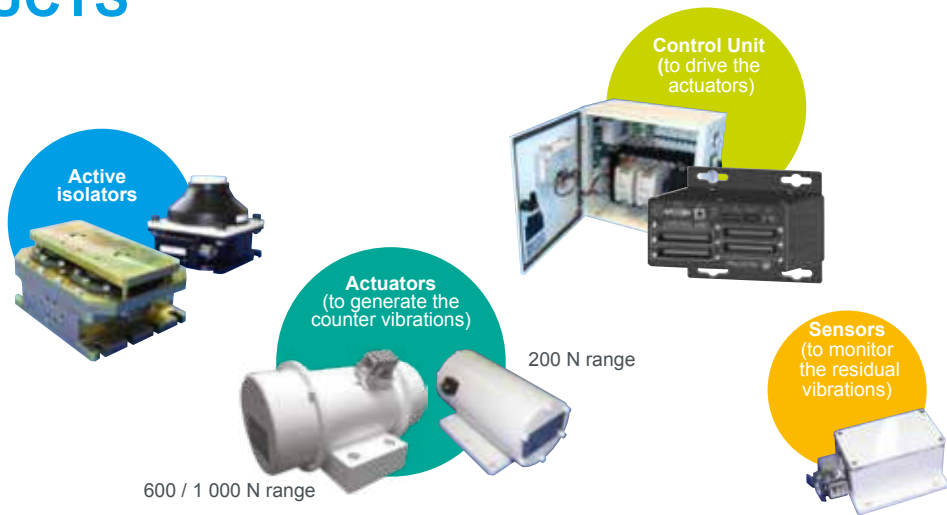
# ADVANTAGES

- To improve dynamic isolation offered by passive suspensions of the same stiffness.
- To improve uncoupling between structures.
- To simplify the installation of the equipment by reducing or eliminating inertia blocks.
- To reduce structural stress and increase life.
- To reduce noise.
- To reduce movement of connections to equipment
- Excellent vibration reduction : 12 to 36 dB of additional filtering compared to the passive solution only.
- Total suppression of the most annoying harmonic.
- Performance upgrade of existing machines with minimum impact (Add-on kit).
- Space & weight saving.
- Improve the professional environment in term of noises and vibrations exhibition.
- Reduce submarines noises.

# PRINCIPLE

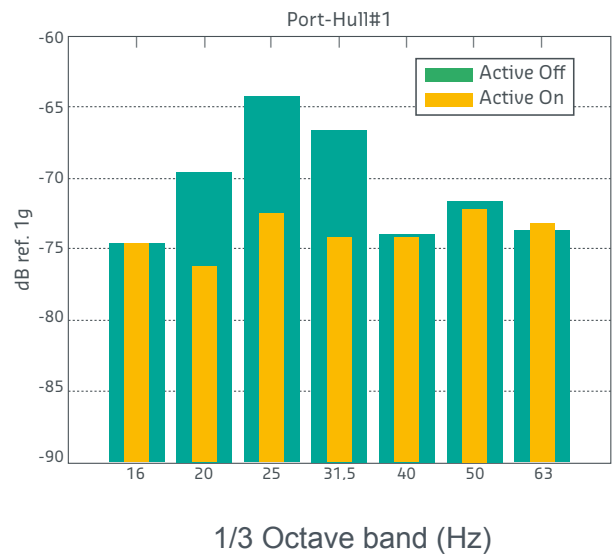
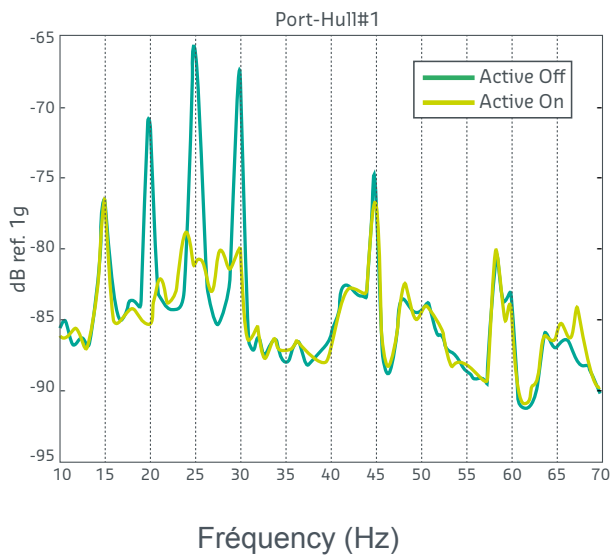


# PRODUCTS



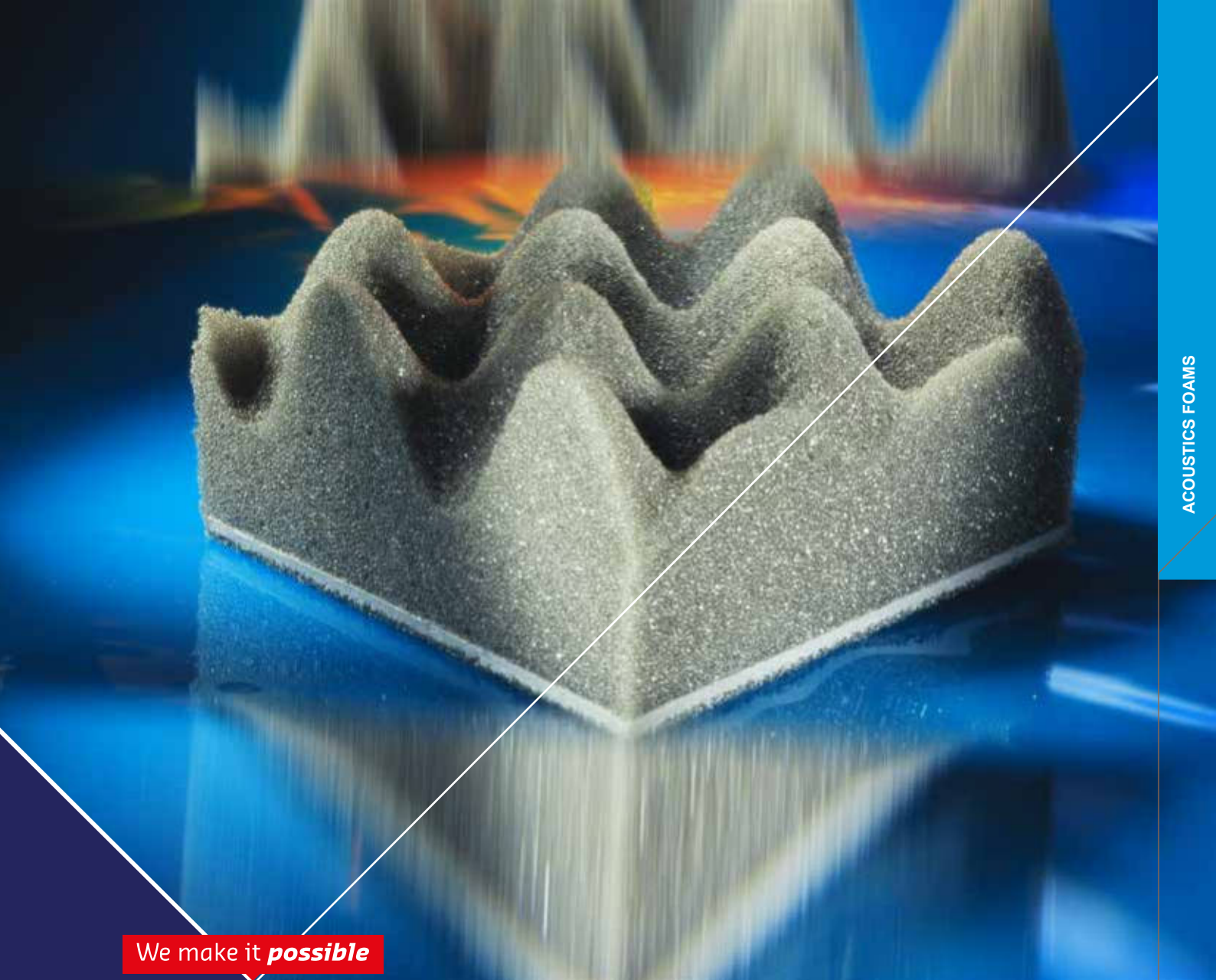
# EXAMPLES OF RESULTS

## Active Vibration Control Test Results









We make it **possible**

# ACOUSTICS FOAMS



# ACOUSTICS FOAMS

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**See current price list for availability of items.**

**We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.**

**The pictures and schemas of the products are supplied for information only.**



# STRASONIC® ACOUSTIC FOAM



## DESCRIPTION

STRASONIC® is a range of complex materials designed to provide the best acoustic isolation. Their structure is based on polyurethane foams or cellular rubber.

Their main function is to reduce airborne noise (Isolation, Absorption and Damping) in partial or complete enclosures of machinery.

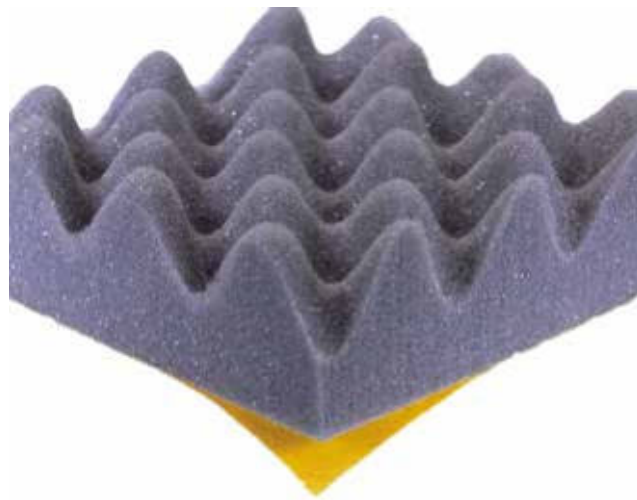
## APPLICATIONS

The STRASONIC® material can be used in a range of applications such as : air conditioning, pumps, presses, compressors, electric motors, diesel engines, generator sets, gearboxes, turbines, agricultural or construction equipment and other machinery.

Due to their design, they are light, easy to handle and a self adhesive side simplifies the installation (depending on the type of foam).

# POLYURETHANE FOAM

CORRUGATED, WITH SELF  
ADHESIVE LAYER



## DESCRIPTION

**50 mm** of corrugated PU Ether absorption foam. **Self adhesive layer on one side.**  
Temperature range : from - 25°C to + 110°C.  
Fire resistance : M4.

## APPLICATIONS

- Air conditioning
- Fans
- Ventilation shaft
- Pumps
- Presses
- Air compressors

## DIMENSIONS

Reference	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841000	700	500	50	0,43
841010	2000	1400	50	3,44

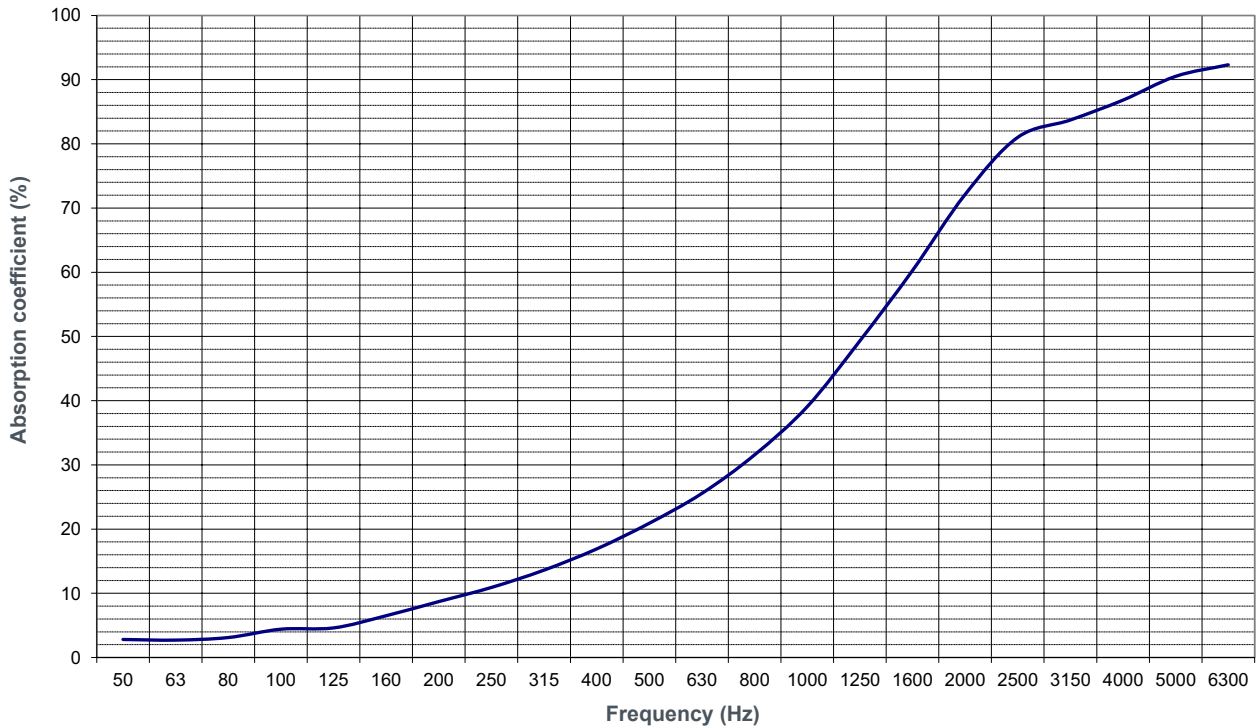
Tolerance :  $\pm 6$  mm

# ACOUSTIC PERFORMANCES

Average absorption factor K 65%.

Approximate gain on a 2 mm steel sheet : - 10 dB (A).

The corrugations increase the absorption surface by 40%.

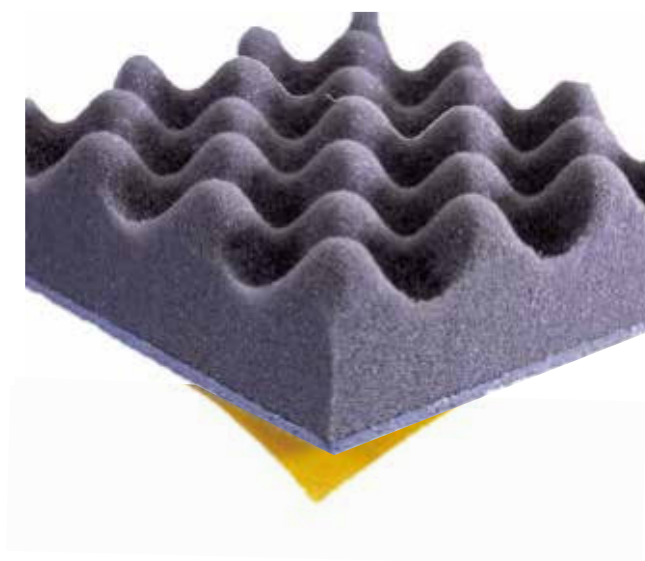


## — 841000 and 841010

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# POLYURETHANE FOAM

CORRUGATED, WITH SELF ADHESIVE  
LAYER AND HEAVY WEIGHT



## DESCRIPTION

**50 mm** of heavy weight 5 kg/m<sup>2</sup>, corrugated PU Ether absorption foam bonded to **3 mm** of spring foam.

Temperature range : from - 25°C to + 110°C.

Fire resistance : M4.

## APPLICATIONS

- Air compressors
- Compressors
- Gearboxes
- Electric motors
- Presses

## DIMENSIONS

Reference	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841001	700	500	50	2,13
841001-50*	700	500	50	2,05

\*Self adhesive layer on one side.

Tolerance : ± 6 mm



# IMPLEMENTATION

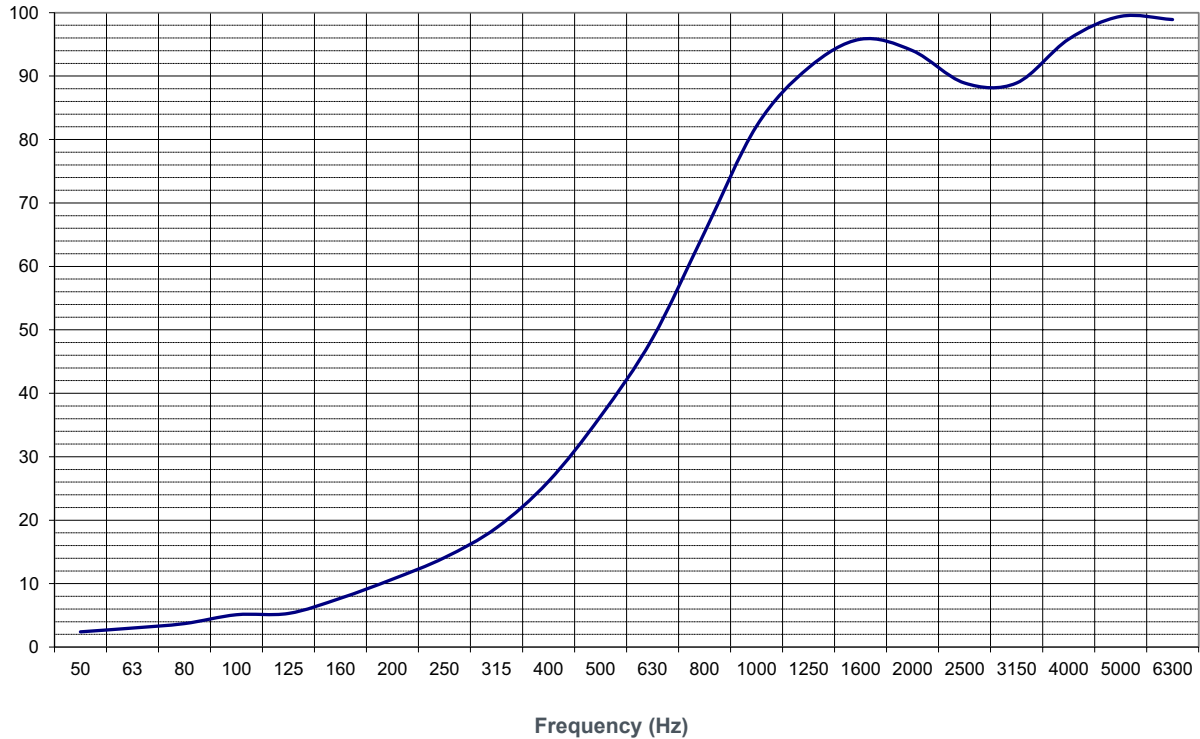
In order to glue foam 841001, we advise you to use a neoprene based adhesive.

## ACOUSTIC PERFORMANCES

Average absorption factor K 68%.

Approximate gain on a 2 mm steel sheet : - 25 dB (A).

Very good performance from 500 to 5 000 Hz.



### — 841001

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# POLYURETHANE FOAM

HEAVY WEIGHT AND PU FILM



## DESCRIPTION

**100% waterproof black PU film** bonded to 25 mm of heavy weight 5 kg/m<sup>2</sup> corrugated PU Ether absorption foam bonded to **3 mm** of spring foam.

Temperature range : from - 25°C to + 110°C.

Fire resistance : M4.

## APPLICATIONS

- Generator sets
- Agricultural and Construction, equipment machines
- Electric and Diesel engines
- Compressors, Pumps
- Turbines
- Test benches

## DIMENSIONS

Reference	Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841002	700	500	25	1,1
841012	2000	1400	25	8,5

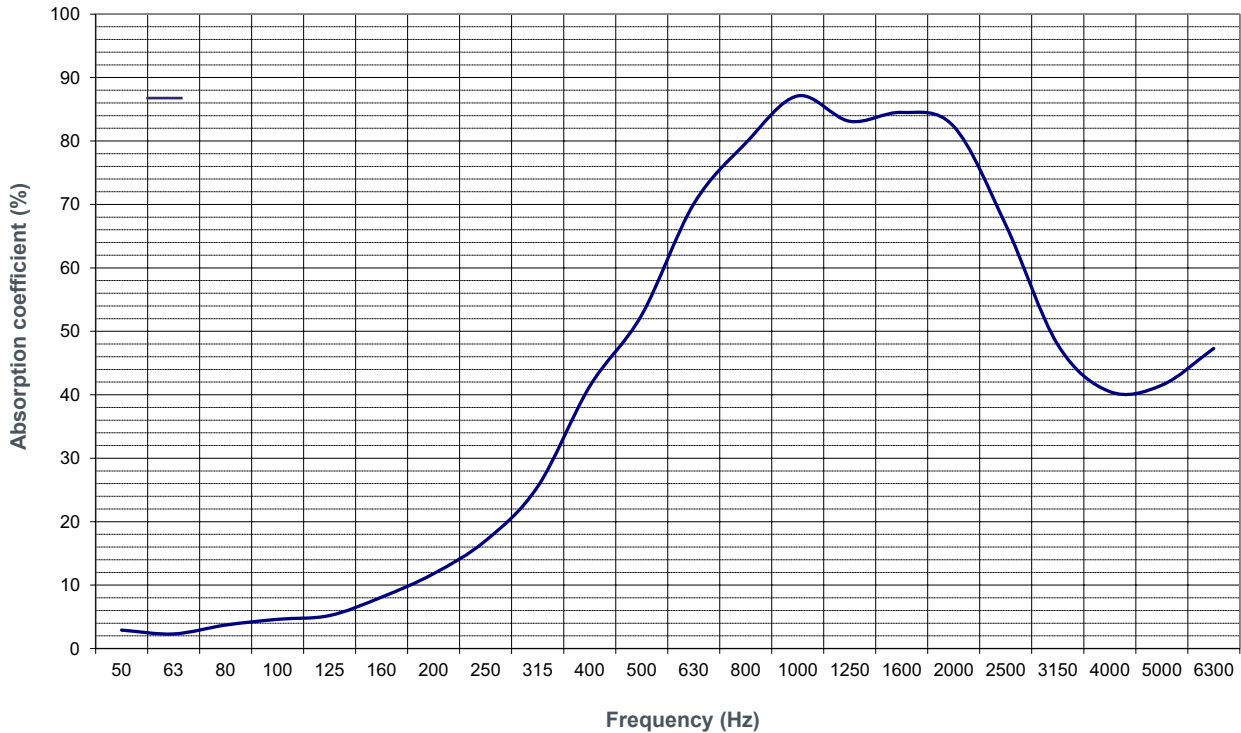
Tolerance : ± 6 mm

# IMPLEMENTATION

In order to glue foam **841002** and **841012**, we advise you to use a neoprene based adhesive.

## ACOUSTIC PERFORMANCES

Approximate gain on a 2 mm steel sheet : - 20 dB (A).  
Very good performance from 125 Hz to 4000 Hz.



### — 841002 and 841012

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# FOAM

MEETING WITH FIRE STANDARD M1



## DESCRIPTION

Melamine Resin based soundproofing foam, thickness 30 mm, self adhesive layer on one side.  
Temperature range : up to +150°C.  
Fire resistance : M1/UL94 - B1/DIN 4102.  
Classified 0/BS476 6/7.

## APPLICATIONS

- Acoustic and thermal isolation,

Building applications :

- Air conditioning;
- Fans;
- Ventilation shaft;
- Recording studios.

Industrial applications :

- Air compressors, Air exhausts;
- Vacuum pump;
- Injection presses;
- Gearboxes.

## DIMENSIONS

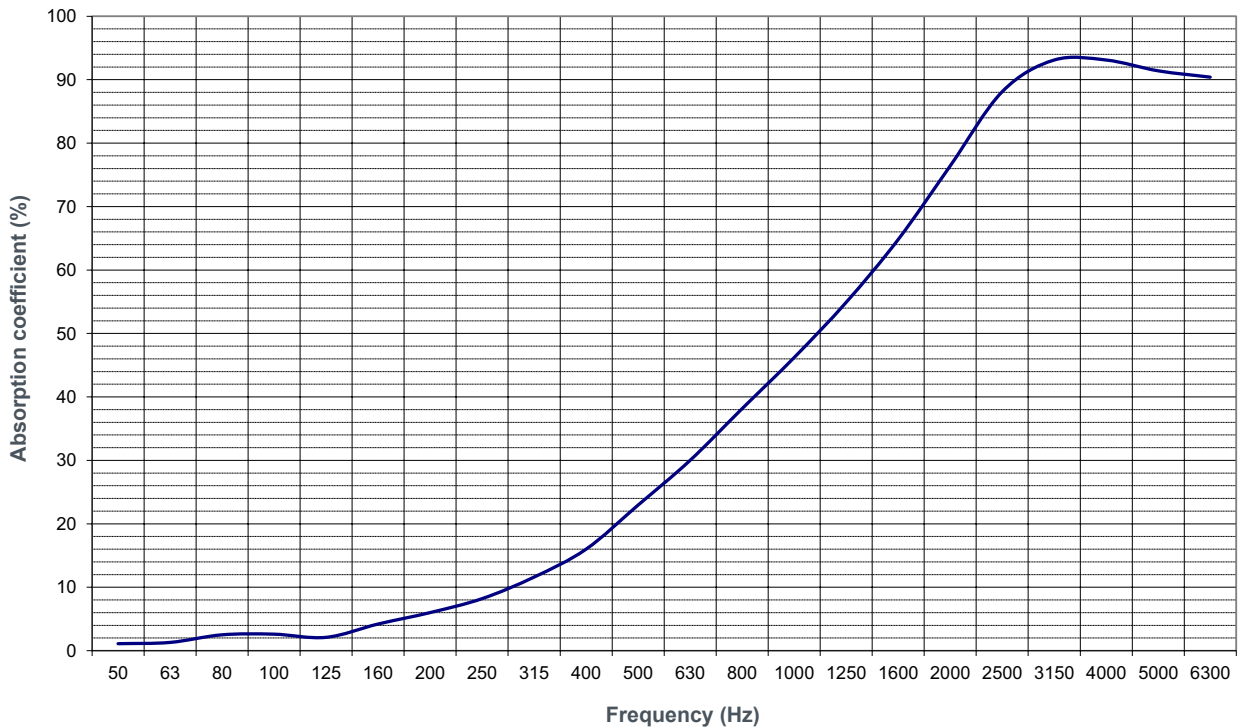
Reference	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841006	500	500	30	0,14

Tolerance : + 5 to -20 mm

# ACOUSTIC PERFORMANCES

Average absorption factor K : 85% at 2000 Hz.

Very good acoustic performance in high frequencies above 1250 Hz.



## — 841006

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# RUBBER CELLULAR FOAM

MEETING WITH FIRE STANDARD  
M1/F3



## DESCRIPTION

NBR-PVC based waterproof cellular rubber thickness 30 mm ( $\pm 3$  mm) self adhesive layer on one side.

Temperature range : - 40 °C up to + 90 °C continuous.

Very good resistance to oil. Good fire properties with very few smoke released.

Self extinguishable

Rated : **M1/F3** (NFP 92507).

## APPLICATIONS

- Acoustic and thermal isolation,

Building applications :

- Air conditioning,
- Fans,
- Ventilation shaft,
- Recording studios, ...

Industrial applications :

- Air compressors, Air exhausts,
- Vacuum pump,
- Injection presses,
- Gearboxes,...

## DIMENSIONS

Reference	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841007	500	500	30	0,46

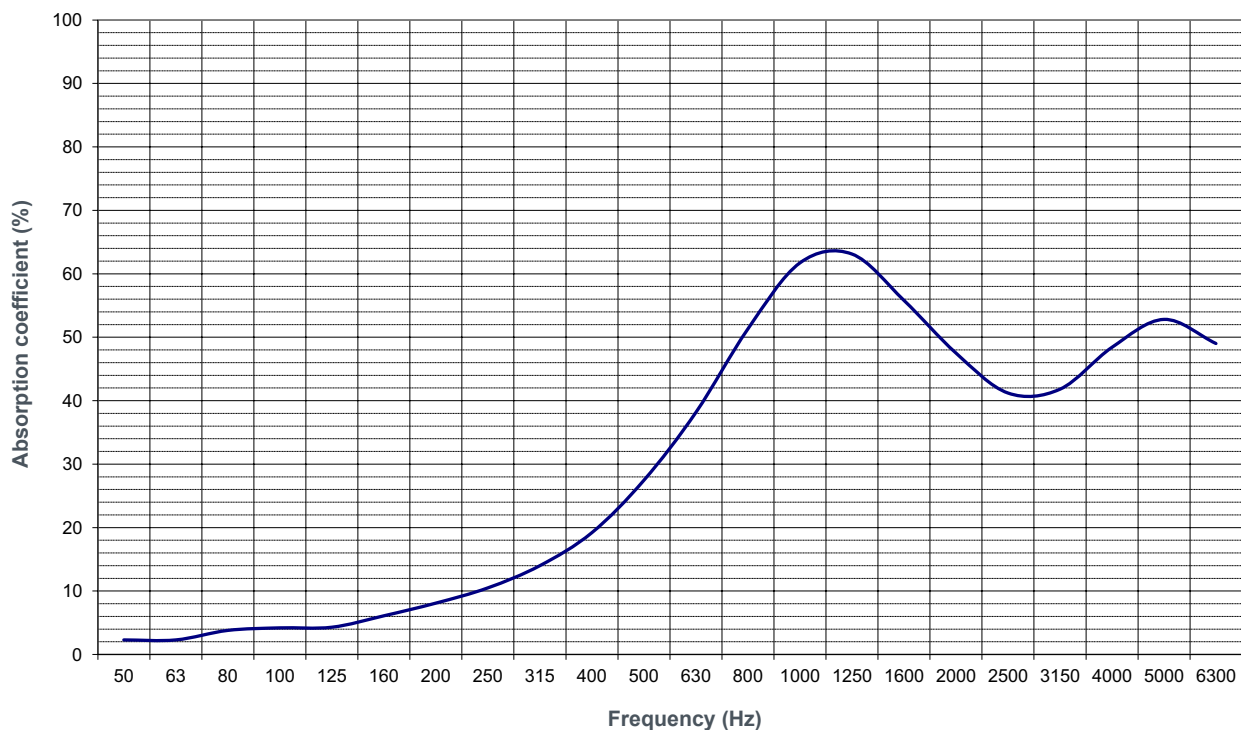
Tolerance : + 5 to -20 mm

# ACOUSTIC PERFORMANCES

Average absorption factor K :  $\geq 20\%$  from 600 Hz (increase with frequency).

Very good acoustic performance in high frequencies above 2000 Hz.

Approx. gain on a 2 mm steel sheet : - 10 dB (A) at 2500 Hz / - 20 dB (A) at 5000 Hz.



## — 841007

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# CELLULAR RUBBER

NBR BASED



## DESCRIPTION

NBR based waterproof cellular rubber, thickness **33 mm**. **Self adhesive layer on one side**.  
Temperature range static from - 40°C to +105°C continuous.  
Very good resistance to oil, ozone, air and UV.  
Fire resistance : M4/FMVSS 302.

## APPLICATIONS

- Sand blasting systems, Saws
- High speed drills
- Vacuum pumps
- Injection presses
- Gearboxes

## DIMENSIONS

Reference	Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841003	500	500	33	0,53

Tolerance : + 0 to -30 mm



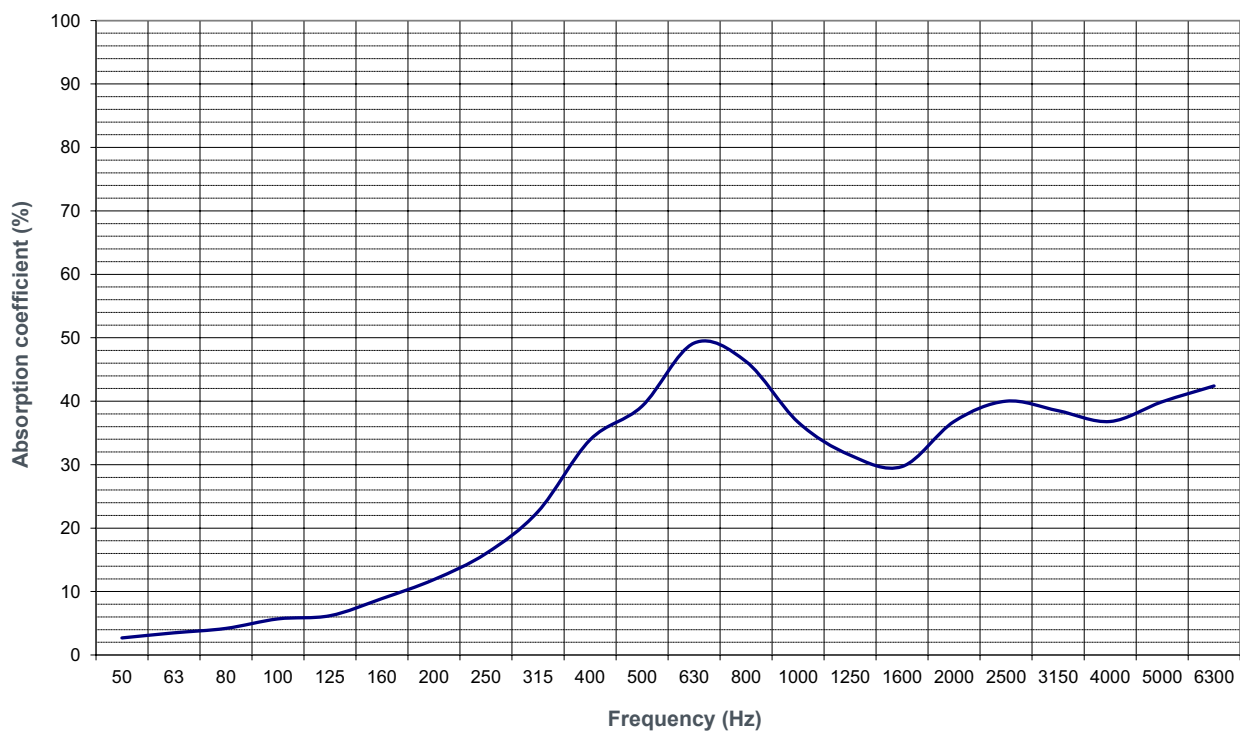
# ACOUSTIC PERFORMANCES

Average absorption factor  $K \geq 30\%$  from 500 Hz.

Very good acoustic performance in high frequencies above 2500 Hz.

Approximate gain on a 2 mm steel sheet :

- 10 dB (A) at 2500 Hz;
- 20 dB (A) at 5000 Hz.



## — 841003

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# CELLULAR RUBBER

## EPDM BASED



### DESCRIPTION

EPDM based cellular rubber with half closed cells.  
Thickness **15 mm**.

**Self adhesive layer on one side.**

Temperature range continuous from - 40°C to + 130°C.

Very good resistance to air, ozone and UV.

Very flexible. Good ageing resistance.

Waterproof if slightly compressed.

Fire resistance : FMVSS 302.

### APPLICATIONS

- Air jet positioning
- Sound blasting systems, Saws
- High speed drills
- Vacuum pumps
- Injection presses
- Gearboxes

### DIMENSIONS

Reference	Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841004	500	500	15	0,51

Tolerance : + 0 to -30 mm

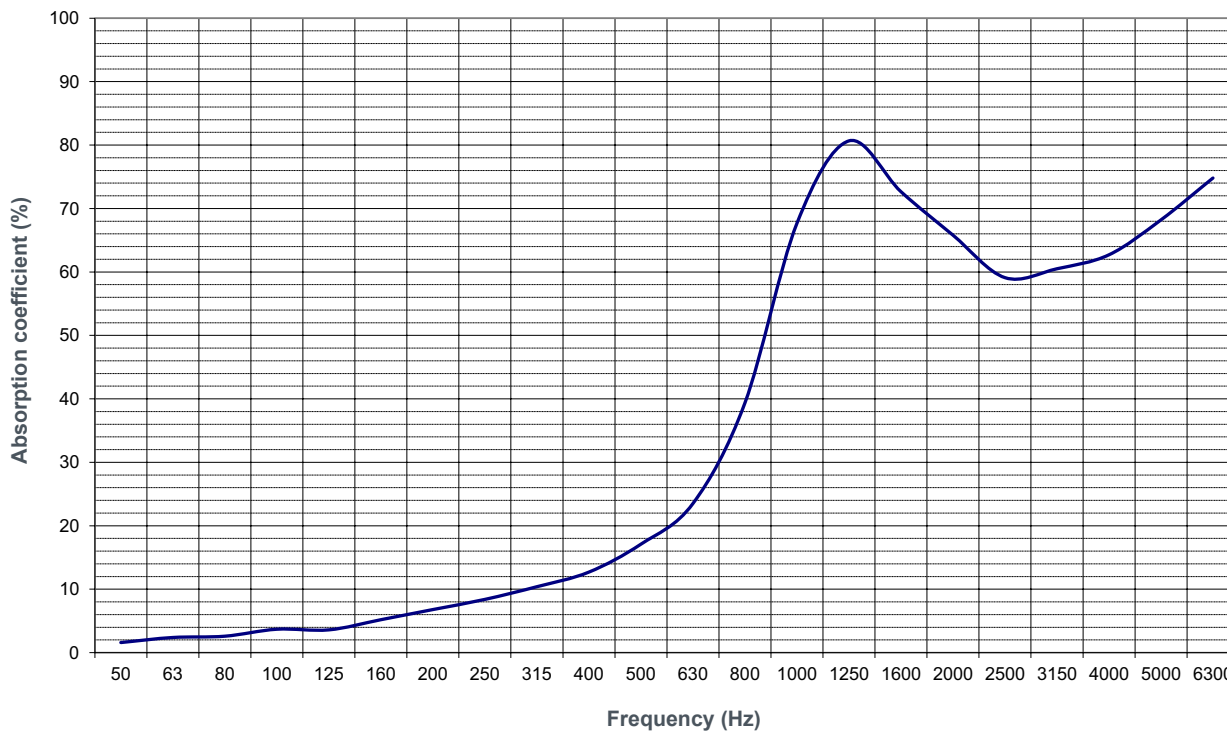
# ACOUSTIC PERFORMANCES

Average absorption factor  $K \geq 30\%$  from 600 Hz.

Very good acoustic performance in high frequencies above 2000 Hz.

Approximate gain on a 2 mm steel sheet:

- 8 dB (A) at 2500 Hz;
- 20 dB (A) at 5000 Hz.



## — 841004

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# CELLULAR RUBBER

## EPDM BASED



## DESCRIPTION

EPDM based cellular rubber half closed cells.  
Thickness **22.5 mm. Self adhesive layer on one side.**  
Temperature range continuous from - 40°C to + 130°C.  
Very good resistance to air, ozone and UV.  
Very flexible. Good ageing resistance.  
Waterproof if slightly compressed.  
Fire resistance : FMVSS 302.

## APPLICATION

- Air jet positioning
- Sound blasting systems, Saws
- High speed drills
- Vacuum pumps
- Injection presses
- Gearboxes

## DIMENSIONS

Reference	Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)
841005	500	500	22,5	0,94

Tolerance : + 0 to -30 mm

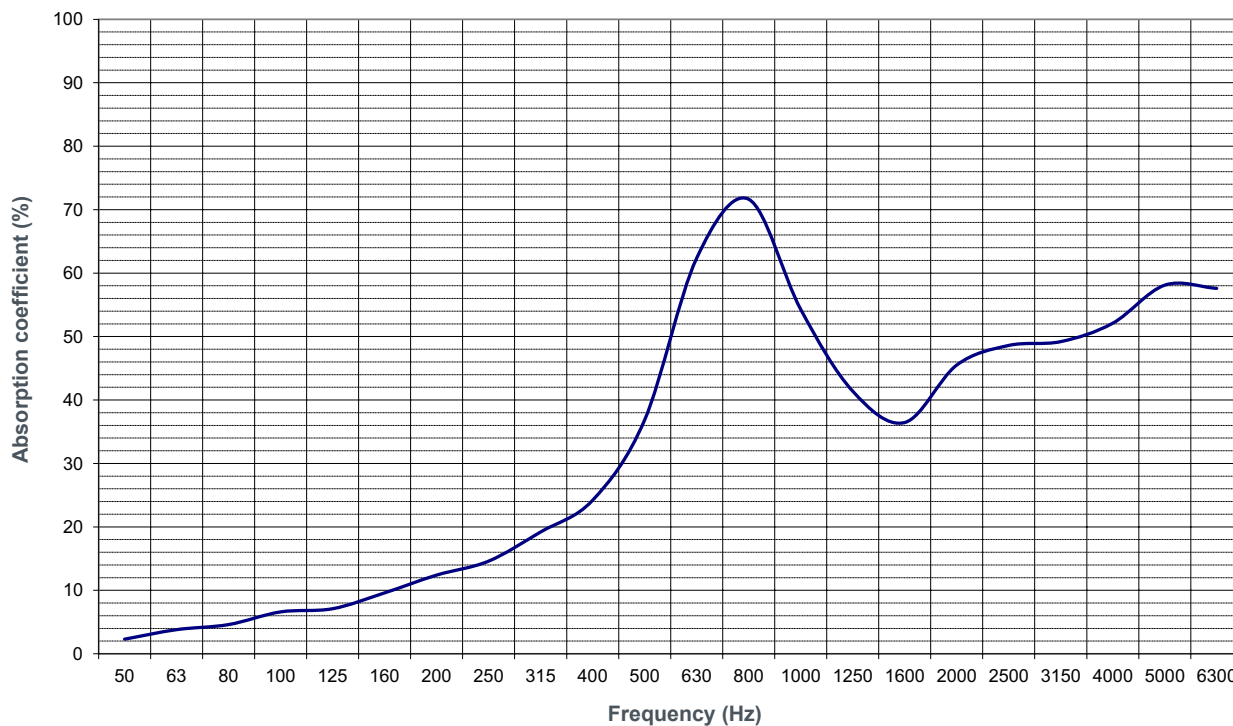
# ACOUSTIC PERFORMANCES

Average absorption factor  $K \geq 30\%$  from 500 Hz.

Very good acoustic performance in high frequencies above 2000 Hz.

Approximate gain on a 2 mm steel sheet :

- 10 dB (A) at 2500 Hz;
- 27 dB (A) at 5000 Hz.



## — 841005

The measures are made with 3 Kundt's tubes of different diametres to adapt the ranges of frequencies. This experiments are made according to the NF EN ISO 10534-2 standards.

# ACOUSTIC AND THERMIC SILICONE FOAM PAULSTRANE®



## DESCRIPTION

PAULSTRANE® is a mass heavy silicone foam which can be used in all sectors : industry, railway, marine and offshore for phonic protection, thermal and fire in a wide range of temperatures of use.

This solution both well resisting to natural ageing and common main chemical agents. It can be integrated into the side dish of walls, partitions, ceilings, floors and seat (in boats, trains, planes, cars, bus, industrial vehicles / trucks, but also theaters and every noisy places).

## BENEFITS

- Soundproofing.
- Fire protection FAR 25 853 (a) 1) ii) ; FAR 25 856 (a).
- Density and opacity of very low smokes.
- Good resistance in natural ageing (UV, ozone).
- Good resistance in the environment (corrosion, molds, usual chemical agents).
- Range of use : of - 60 in + 200 °C.
- Exist in self-adhesive version (PAULSTRANE SA).

# DIMENSIONS

Type	Reference	Dimensions (mm)	Thickness (mm)	Weight/Surface (kg/m <sup>2</sup> )
PAULSTRANE / 1,2	820340 00 10	1400 x 975	2,5	1,2
PAULSTRANE SA / 1,3	820349 00 10			1,3
PAULSTRANE / 1,6	820316 00 10		3,2	1,6
PAULSTRANE SA / 1,7	820295 00 10			1,7
PAULSTRANE / 2,7	820319 00 10		5,5	2,7
PAULSTRANE SA / 2,8	820318 00 10			2,8
PAULSTRANE / 3,5	820353 00 10	1400 x 600	7	3,5
PAULSTRANE SA / 3,6	820369 00 10			3,6
PAULSTRANE / 5	820341 00 10		10	5
PAULSTRANE SA / 5,1	820350 00 10			5,1

## TECHNICAL CHARACTERISTICS (according to testing method A.S.T.M.)

### PROPERTIES

- Density  
500 kg/m<sup>3</sup>
- Weight  
from 1,25 to 5 kg/m<sup>2</sup>
- Temperatures of use  
of -60 °C in +200 °C
- Thermal conductivity  
at 50°C : < 0,15 W/m.K  
at 100°C : < 0,15 W/m.K  
at 200°C : < 0,15 W/m.K
- Fire resistance  
Vertical burn : FAR 25 853(a)(1)(ii)  
Radiant Panel : FAR 25 856(a) appendix F leave VI
- Environment resistance  
to oil and solvents : excellente  
to the corrosion : excellente  
to the mold : excellente
- Storage conditions  
max 30°C, 50% RH (for PAULSTRANE SA)



Test at 890 °C

# STRUCTURAL DAMPING SYSTEMS



## DESCRIPTION

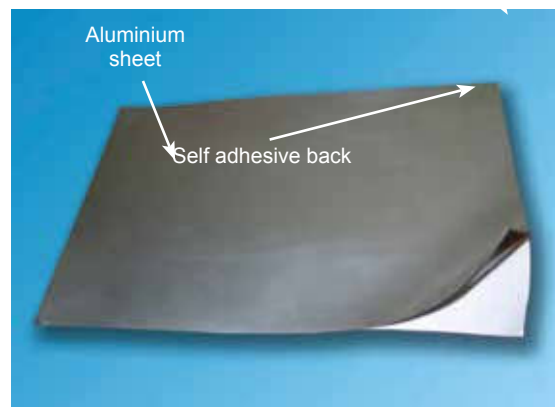
This damper is made of an high damping material bonded on an aluminium plate. A self adhesive layer on the elastomer to ease the installation. This product will reduce vibrations and noise. The damping is due to the shearing of the high damping layer.

## APPLICATIONS

This damper is designed to face structure borne noise (engine compartments, cabs, bodysells,...). Its limited thickness ease it's installation in confined areas.

## CHARACTERISTICS

- Part number : **820248 (300 x 200 mm)**.
- Total thickness : 1.5 mm.
- Weight : 0.2 kg by sheet.
- Temperature range : - 30°C to + 80°C with maximal damping at ambient.



## INSTALLATION

The surfaces must be clean and dry. An acetone type solvant or equivalent can be used for cleaning. Cut the sheet to the appropriate size. Remove the adhesive protection and lay the sheet on the surface avoiding any air bubble.

In case of an installation on a curved surface, or with an edge, we recommend you to give the right shape to the sheet with the adhesive protection in place.







We make it **possible**

METAL MOUNTINGS

# METAL MOUNTINGS



# METAL MOUNTINGS

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See current price list for availability of items.

We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures and schemas of the products are supplied for information only.

# VIBRACHOC RANGE

## 1 - METAL MOUNTING SYSTEMS

VIBRACHOC have a range of all steel mountings whose essential element is the “**steel cushion**” made from compressed woven or knitted stainless steel wire mesh.

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

### Advantages

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



# 2 - GENERAL INFORMATION ON VIBRATION AND SHOCK

## 2.1 Purpose of an elastic suspension

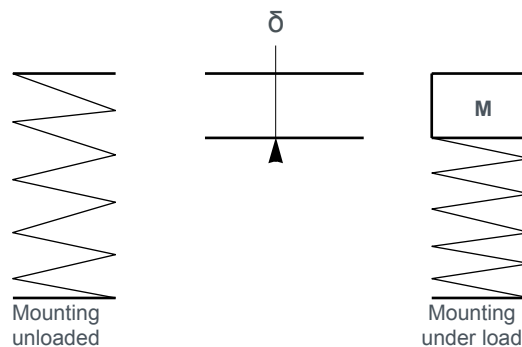
An appropriate elastic mount placed between the support and the equipment usually fulfils two functions :

- 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.

## 2.2 Theory

### 2.2.1 Natural frequency

An elastic mount characterised by its load-deflection curve. The load produced by a mass  $M$  causes a static deflection  $\delta$  (difference between the unloaded height and the height under load) and a subtangent  $\Delta$ .



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

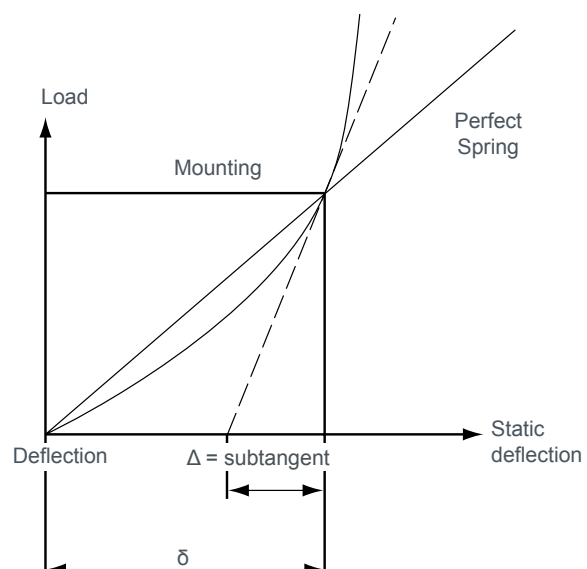
$$f \text{ in Hz } f = \frac{1}{2\pi} \sqrt{\frac{K}{M}}$$

$K$  = stiffness of the mounting in N/m

$$M \text{ in kg } f = \frac{15,8}{\sqrt{\delta}}$$

$\Delta$  = 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.



### 2.2.2 Natural frequency

The purpose of a mount 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 mount or, more exactly, on the ratio of  $f_e$  (excitation frequency) to  $f_0$  (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

$$f_0 = \frac{1}{2\pi} \sqrt{\frac{K}{M}}$$

$f_0$  = Hz

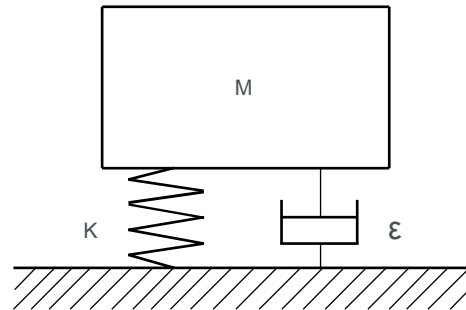
$K$  = Stiffness of isolator in N.m

$M$  = Kg

Model of an elastic mount

$K$  = stiffness

$e$  = damping

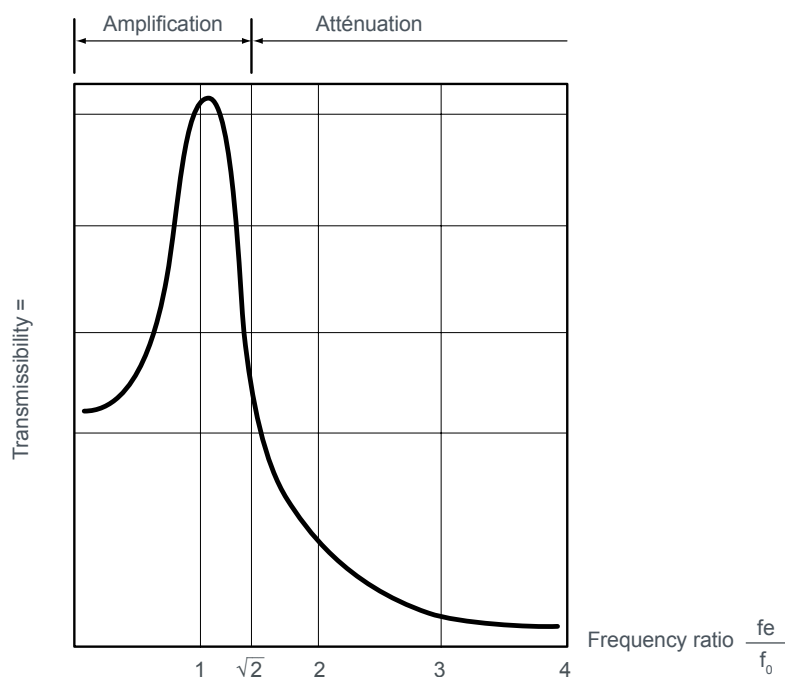


Transmissibility is the ratio of the transmitted force  $f_p$  to the excitation force  $f_e$ . Examination of the curve opposite shows that :

- for  $f_e/f_0 < \sqrt{2}$  and in particular when the natural frequency of the mount is greater than the excitation frequency, there is amplification of vibration rather than attenuation.

This illustrates the fact that the selection of unsuitable resilient mount makes the problem worse rather than solving it.

- for  $f_e/f_0 > \sqrt{2}$ , the excitation is attenuated. This shows the advantages of using a mount with a natural frequency ( $f_0$ ) as low as possible in relation to the excitation frequency ( $f_e$ ). The greater the difference, the higher the degree of attenuation.



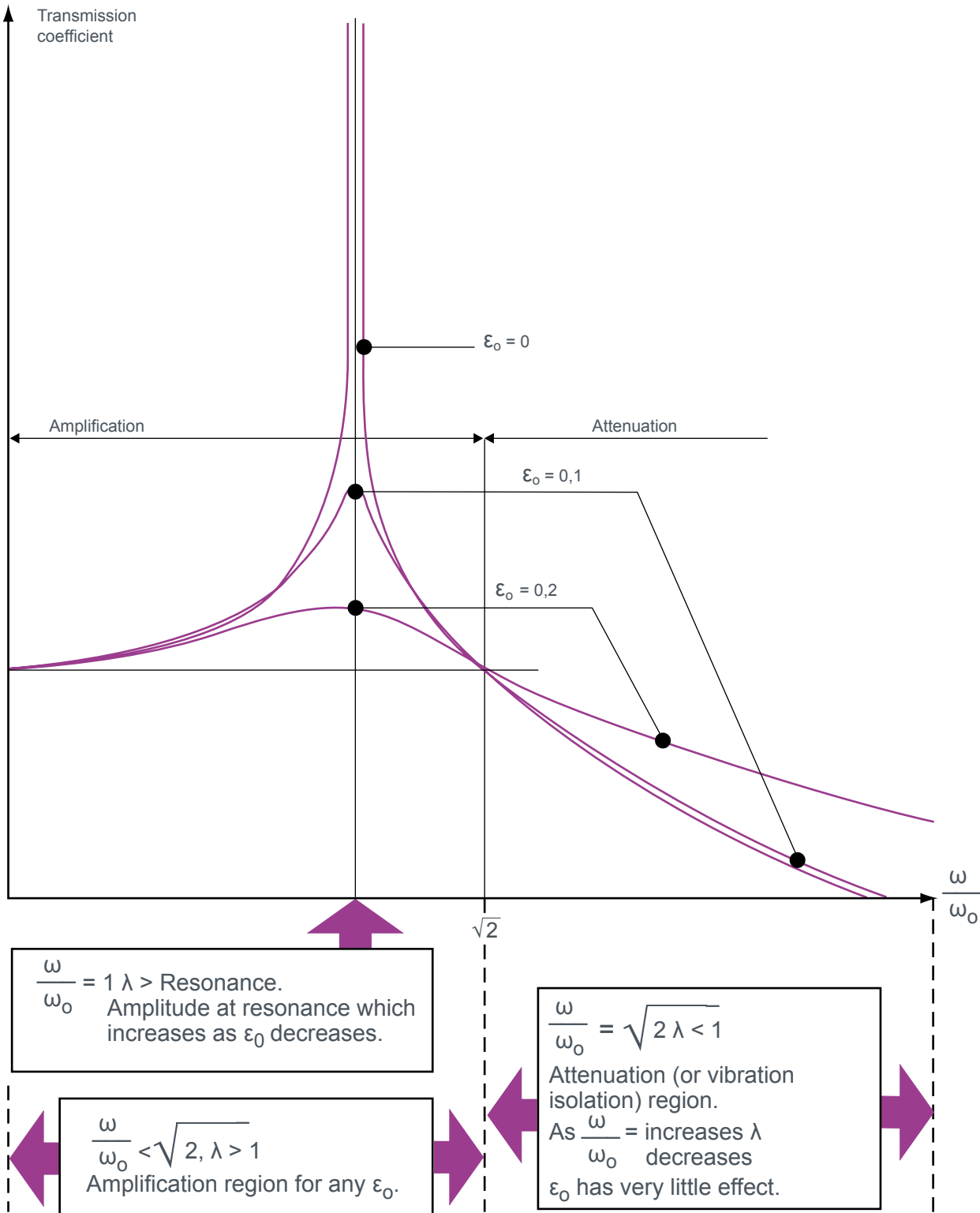
### 2.2.3 Damping

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  $f_e/f_0 < \sqrt{2}$ , the amplification decreases with higher damping, particularly when close to resonance;

- for  $\omega/\omega_0 > \sqrt{2}$ , 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 :

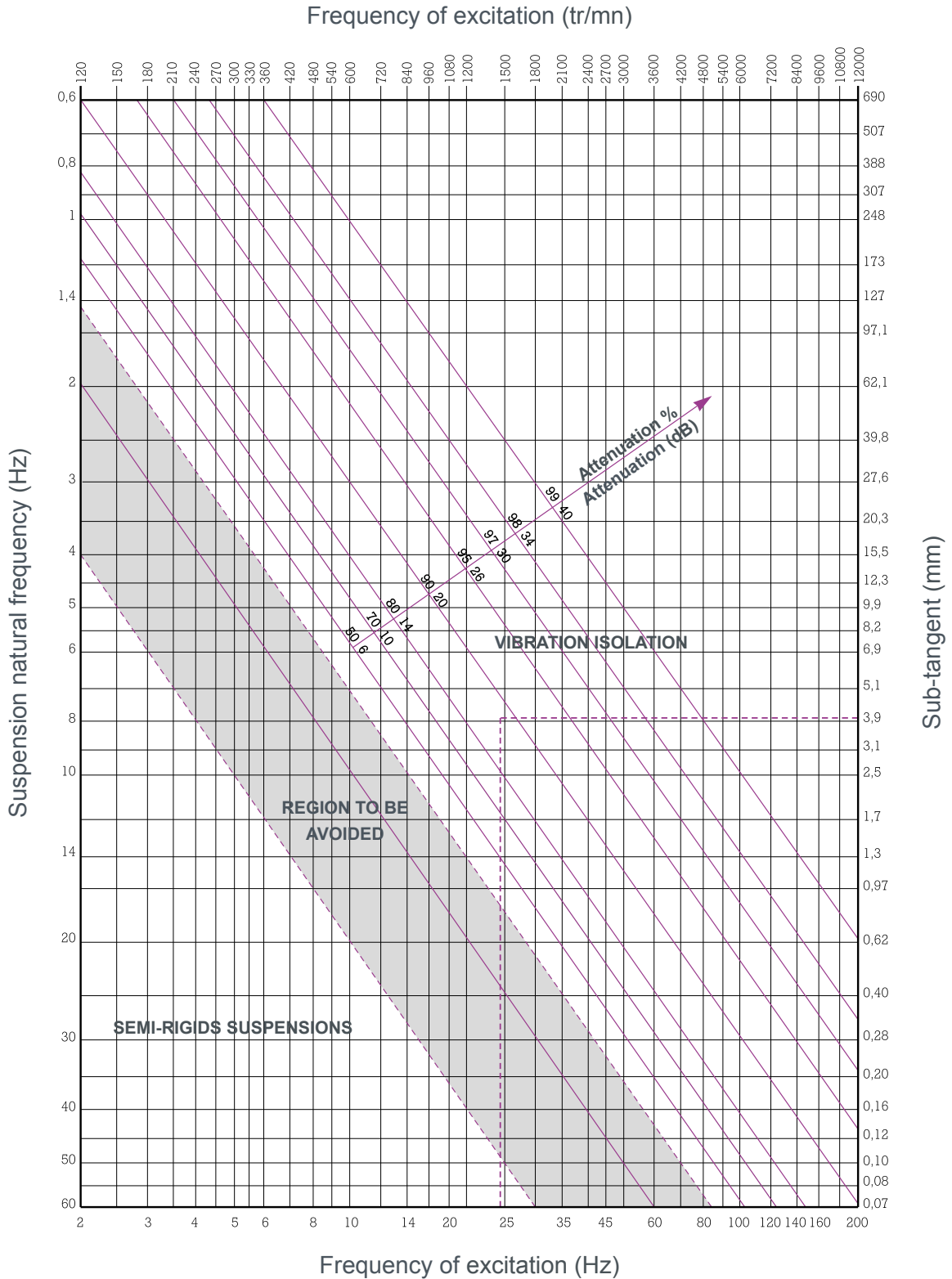
a high value of  $\frac{\omega}{\omega_0}$   $\longrightarrow$  low value of  $\omega_0$   $\longrightarrow$  low value of  $\lambda$

a high value of  $\epsilon_0$   $\longrightarrow$  - limited amplification in the resonant region;  
 - minor effect in the attenuation region.



## ABAQUE

**Attenuation as a function of natural frequency and frequency of excitation  
(A theoretical graph for a mounting system without damping)**



- Select the running speed (rpm) or frequency of excitation (Hz) of the equipment to be mounted, on the horizontal axis.
- Project a vertical line to intersect with a horizontal line which passes through the natural frequency of the mounting system selected.
- Where the two lines intersect, follow a diagonal line to find the level of isolation for the mounting system chosen.

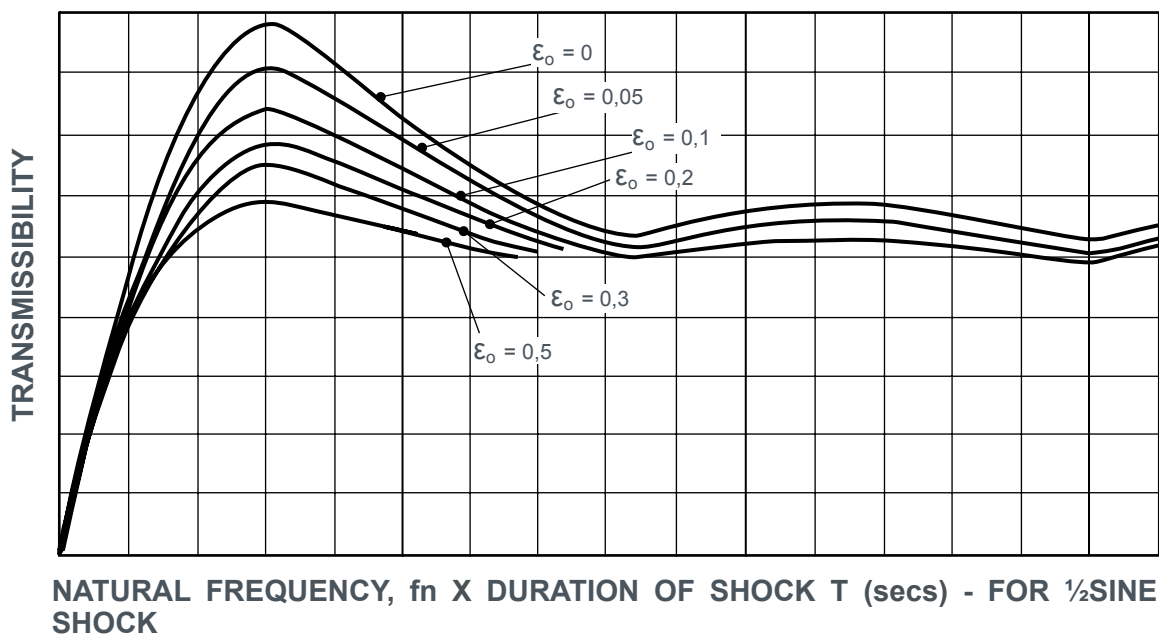
## 2.2.4 Shock

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  $f_e$  to  $f_n$  is paramount in determining the attenuation provided, here it is the  $f_n/f_s$  relationship ( $f_0$  : natural frequency of the mounting -  $f_s$  : shock frequency) which has to be considered.

We can deduce from these curves that :

- to obtain attenuation of a  $\frac{1}{2}$  sine shock ( $T < 1$ ) the  $f_n/f_s$  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 than 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  $f_0/f_s < 0.3$ .

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.



# 3 - VIBRACHOC RANGE APPLICATIONS

## Industry

- Isolation of rotating machinery
- Isolation of machine tools
- Protection of works of art

## Defence

- Protection of vehicle mounted electronics (tanks,shelters, off-road vehicles)
- Protection of inertial platforms, guidance systems, fire control and command and control electronics
- Protection of missiles, their associated equipment and components

## Marine and naval

- Suspension of motors, engines, sructures, and exhaust systems
- Protection of electronic cabinets
- Discrete acoustics

## Aerospace

- Protection of electronics
- Helicopter lead lag dampers and laminated bearings
- Mounting for onboard avionics
- Engine and APU Mounting Systems

## Rail

- Protection of train mounted electronics
- Suspension of train mounted equipment (forms, air conditioners, transformers)
- Improved acoustics (suspension of bay front panel, floors ...)

## Civil engineering

- Suspension of fans and air conditioning systems
- Suspension of floors
- Suspension of pipes and ducting

# 4 - INDUSTRIAL APPLICATIONS OF THE VIBRACHOC RANGE

## 4.1 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 maintaining the stability of the machine, particularly 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.).

## 4.2 Rotating and vibrating machinery

- Engines, generator 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.

## **4.3 Vehicles**

- Civil engineering plants
- Handling equipment
- Trucks
- 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 stiffness);
- considerable low frequency damping and as low as possible above 100 Hz.

## 4.4 Marine - offshore

The vibration and noise on board ships is generated by :

- the system of propulsion: the alternating hydro-dynamic forces generated by the propellers 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 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.

## 4.5 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.







We make it *possible*

# APPLICATIONS GUIDE

# VIBRACHOC METAL RANGE

	AXIAL FLEXIBILITY		AXIAL & RADIAL FLEXIBILITY + ANTI-REBOUND			
<b>Product range</b> 	Metal cushions (p.214) & V1B5984 (p.263)	V4* (p.225) VIBSOL (p.218) PDM-1000 (p.229) PDM-2000 (p.229) SP55*W (p.230) SP56*W (p.230) V120 & V125 (p.235)	V118-DG (p.233) V118-MG (p.233) V318 (p.233) V318-D (p.233) V402MG (p.239)	V164 (p.237) V168 (p.237)	V1H-6000 (p.245) V1H-6100 (p.245)	V1H751 (p.241) V1H752 (p.241)
<b>APPLICATIONS</b>						
AIR CONDITIONERS / FANS						
CEILINGS / PIPELINES / PIPING						
CIVIL ENGINEERING						
CONTROL AND MEASURE EQUIPMENT						
CRANES						
ELECTRICAL CABINETS						
ELEVATORS						
FLOATING FLOORS						
FRAGILE EQUIPMENT TRANSPORTATION						
GENSET						
HOPPERS						
LABORATORY EQUIPMENT, COMPUTER						
MACHINES TOOLS						
MOTO-COMPRESSORS						
MOTO-PUMPS						
ONBOARD ELECTRONIC EQUIPMENT						
POWER PRESS						
SHREDDERS						
SIVES						
SPEED BOX / REDUCERS						
THERMAL MOTORS						
TRANSFORMERS						
VEHICLE CABIN						





## Antivibration suspension Survey

Date : .....

Company : ..... Address : .....

Tel : ..... Mail : .....

Contact : ..... Function : .....

### Technical informations

#### 1. Application :

Type of machine : .....

Stationary application

Embedded application

The supports will work in

- compression (straight)
- shear (lateral)
- traction (suspended from the ceiling)

#### 2. Weight of the machine :

Total weight : ..... Kg      Number of mounting points : .....

Is the gravity center centered?      Yes       No

If no, position of the gravity center : .....

#### 3. Vibration and / or shock of the equipment :

Machine rotation speed :

Minimum : ..... tr/min    Normal : ..... tr/min    Maximum : ..... tr/min

For shock machines, indicate the rate : ..... knock/min

#### 4. Environment :

Outdoor mounting  or indoor mounting

Ambient temperature : ..... °C

Presence of liquid :    Yes       No

If Yes precise : .....

# METALLIC CUSHIONS

Natural frequency : (1)  
12 to 25 Hz



## DESCRIPTION

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

The Vibrachoc range has more than 1000 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.

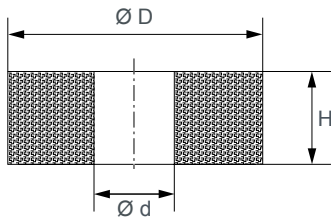
The static stiffness of the metallic cushion ensures progressive stiffening and maintains a constant natural frequency for a very wide range of loads within a small space.

Their natural frequency of between 12 and 25 Hz and damping of 15 to 20% make them suitable for mounting rotating machines with a rotation speed over 2000 rpm.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

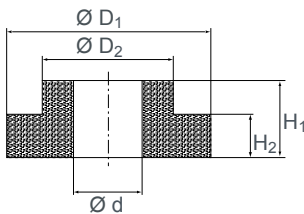
# DIMENSIONS

## SIMPLE CYLINDRICAL SHAPE



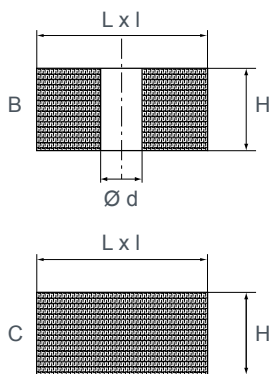
Reference	Ø Ext. D (mm)	Ø Int. d (mm)	Height H (mm)	Load range (daN)	Dynam. force (daN)	Natural frequency (Hz)
V3CNVI653-A02	33	14	19	75 to 300	900	15 to 22
CH440-A02	72	50	21	50 to 350	1 000	15 to 20
CH438-A02	72	51	10	50 to 350	1 000	15 to 25
VI168-B	53	16,5	14	20 to 250	1 250	15 to 22
VI771-A02	40	15	20	150 to 550	1 700	15 to 20
MC345-A02	72	34	21	300 to 1 300	5 000	15 to 20
CH265-A02	70	34	10,5	300 to 1 300	5 000	15 to 25
CH264-A02	116	36	11	700 to 2 700	8 000	15 to 25
VI771-B02	40	15	11,5	750 to 3 000	9 000	15 to 25
CH281-A02	119	34	21,5	700 to 2 700	12 500	15 to 20
CH472-A02	156	72	10,5	2 000 to 7 000	21 000	15 to 25
CH283-A02	159	70	21,5	250 to 7 000	22 500	15 to 20
VI996-A02	203	121	21	250 to 7 000	22 500	15 to 20

## CYLINDRICAL SHOULDERED SHAPE



Reference	Ø D1 (mm)	Ø D2 (mm)	Ø int. d (mm)	H <sub>1</sub> (mm)	H <sub>2</sub> (mm)	Load range (daN)	Dynam. force (daN)	Natural frequency (Hz)
VJ148-A05	72	48	33	25	21	50 to 350	1 050	15 to 20
V3CNCH682-A05	69,5	52	34	30	23,5	50 to 300	900	15 to 20
V3CNVJ044-A05	52,6	26,5	16	21,5	14	25 to 200	600	15 to 22
V3CNVJ102-A05	49	27,5	18	30	24,5	20 to 100	300	15 to 20
VJ164-A05	34,5	20,5	12,5	14	10	15 à 100	300	20 to 25

## RECTANGULAR SHAPE

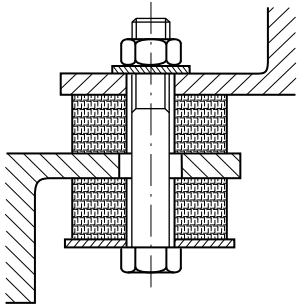


Reference	Shape	Dim. L x l (mm)	Ø int. d (mm)	H (mm)	Load range (daN)	Dynam. force (daN)	Natural frequency (Hz)
VI786-A06*	B	53 x 49	8	25	30 to 200	800	12 to 18
VI830-B06	C	28 x 28	-	15	50 to 300	1 000	17 to 22
VI700-A06*	C	50 x 47	-	25	75 to 400	1 200	12 to 18
VI700-B06*	C	50 x 47	-	16	75 to 400	1 600	17 to 22
CH422-A06	C	45 x 36	-	16	400 to 1 500	5 000	20 to 25
V3CNVJ034-A06	B	100 x 100	20	34	2 000 to 7 000	20 000	12 to 18
VJ149-A06	B	28 x 28	10,5	10	25 to 150	450	20 to 25
V3CNVJ006-A06	B	157 x 157	30	25	500 to 5 000	15 000	13 to 18

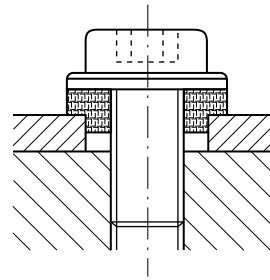
\* : References detailed in the following pages



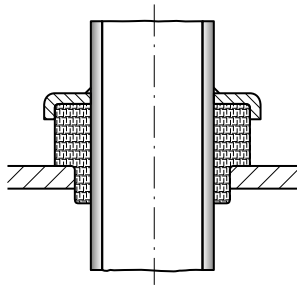
# ASSEMBLY EXAMPLES



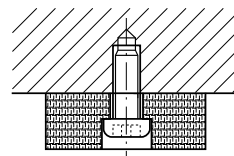
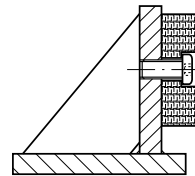
Suspension of gearboxes, motors, fans, pumps, axial load only.  
A gap is necessary around the fixing screw



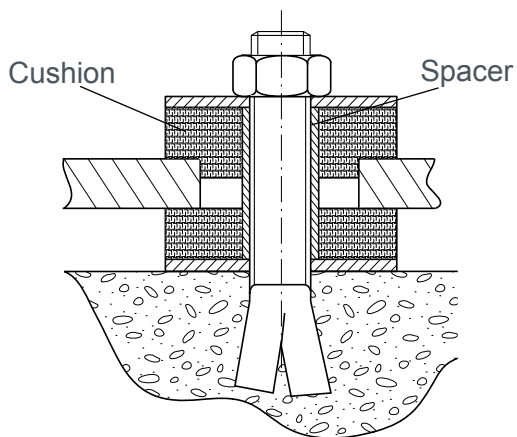
Absorbs expansion and isolates screws under dynamic load.



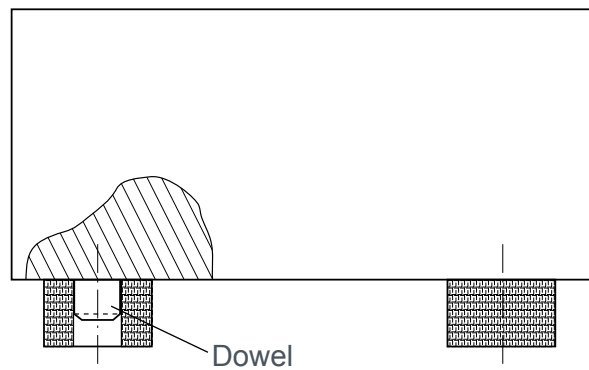
Pipe isolation



Suspension of motors, fans, etc



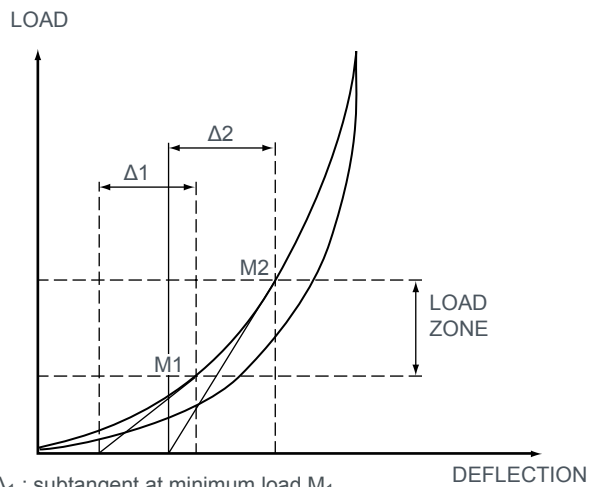
Scheme showing a cushion mounting with uplift snubber



Machine mounted on cushions located on dowels

# OPERATING CHARACTERISTICS

## TYPICAL STIFFNESS CURVE FOR A METALLIC CUSHION



$\Delta_1$  : subtangent at minimum load  $M_1$ .  
 $\Delta_2$  : subtangent at maximum load  $M_2$ .  
 $\Delta_1 = \Delta_2$

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 - Withstands temperatures from - 70°C to + 300°C and in certain applications - 150°C to + 400°C.
- 3 - Highly resistant to ageing : characteristics are stable.
- 4 - High damping from 15 to 20%, i.e.  $\tan \delta$  from 0.3 to 0.4 corresponding to an amplification factor at resonance  $< 4$ .
- 5 - Loading up to 150 kg/cm<sup>2</sup> under compression and 500 kg/cm<sup>2</sup> for isolating shocks.
- 6 - Natural frequency between 15 and 25 Hz.

# VIBSOL®

Natural frequency : (1)  
15 to 30 Hz



## DESCRIPTION

The VIBSOL mount is made of a round metal cushion covered with an anti-slip elastomer pad on both side.

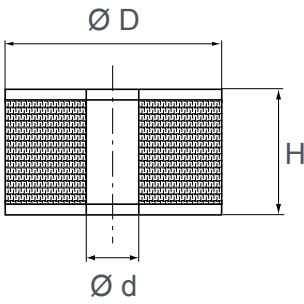
- It is available in two versions :
  - a standard version with a natural frequency of 22 to 30 Hz (machine tools);
  - a thick version (W) with lower stiffness and a natural frequency of 15 to 22 Hz (metal forming machines).

## APPLICATIONS

- The VIBSOL mount is a simple and quick solution for machine tools offering a good shock absorption, and easy to install by sliding it under the base of the machine.
- Unaffected by oils, cutting fluids, detergents, high and low temperatures with good resistance to fatigue.
- It offers good stability for the suspended machine.
- A constant natural frequency over a wide load range makes mount selection easy.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS

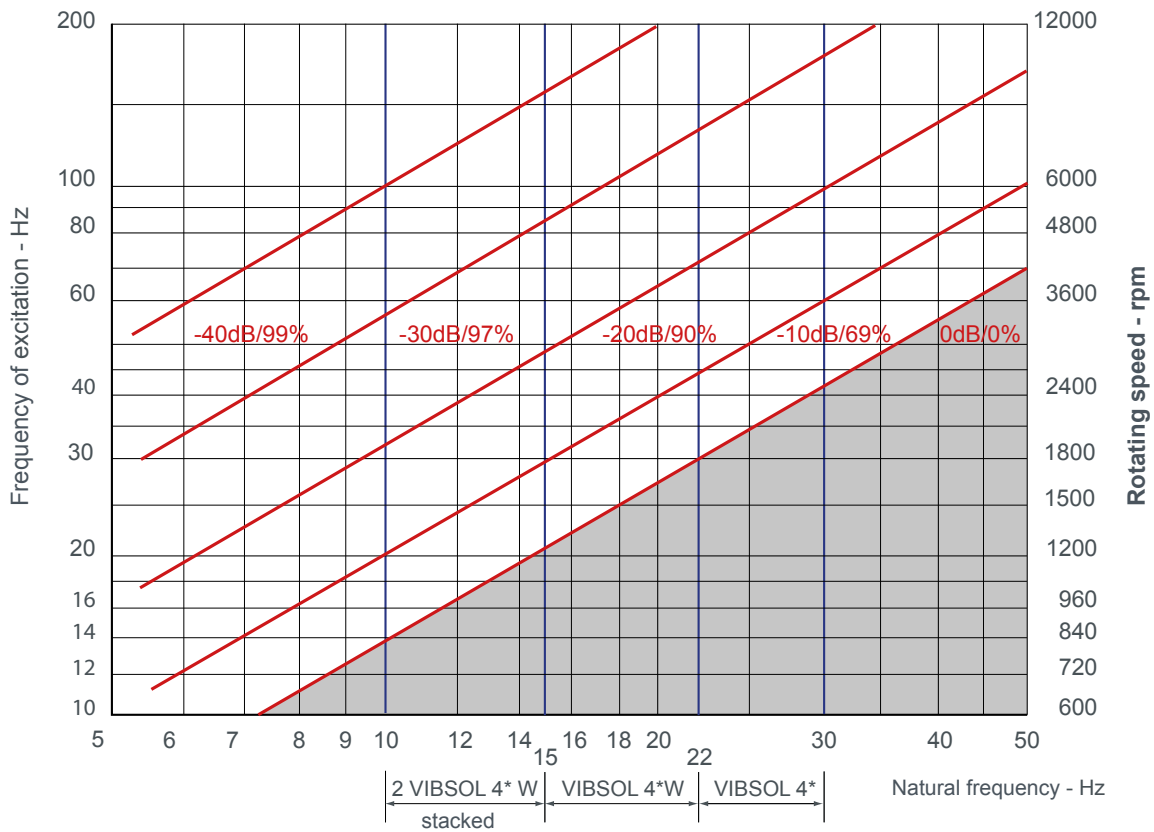


Type	Part number	$\varnothing D$ (mm)	$\varnothing d$ (mm)	Height H (mm)	Load range (daN)	Natural frequency (Hz)
VIBSOL 43	V6080 F43	72	51	12	50 to 350	22 to 30
VIBSOL 43W	V6080 F43W	72	50	23	50 to 350	15 to 22
VIBSOL 44	V6080 F44	70	34	13	300 to 1 300	22 to 30
VIBSOL 44W	V6080 F44W	70	34	23	300 to 1 300	15 to 22
VIBSOL 45	V6080 F45	116	36	13	700 to 2 700	22 to 30
VIBSOL 45W	V6080 F45W	116	34	24	700 to 2 700	15 to 22
VIBSOL 46	V6080 F46	156	72	14	2 000 to 5 000	22 to 30
VIBSOL 46W	V6080 F46W	156	70	24	2 000 to 5 000	15 to 22

The part numbers referenced are kept in stock, see current price list for availability of items.

# OPERATING CHARACTERISTICS

## VIBRATION ATTENUATION



VIBSOL® mountings

**VI786 - A06**

**VI700 - A06**

**VI700 - B06**

Natural frequency : (1)  
15 to 20 Hz



## DESCRIPTION

This suspension system consists of rectangular cushions made of woven compressed stainless steel wire. The VI786 have a  $\varnothing 9$  bored screw hole, so that they can be mounted in collars with the diameters required by the user.

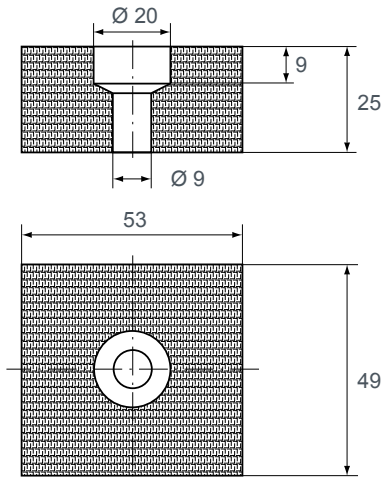
## APPLICATIONS

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  $-70^{\circ}\text{C}$  to  $+300^{\circ}\text{C}$ .

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.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

## DIMENSIONS



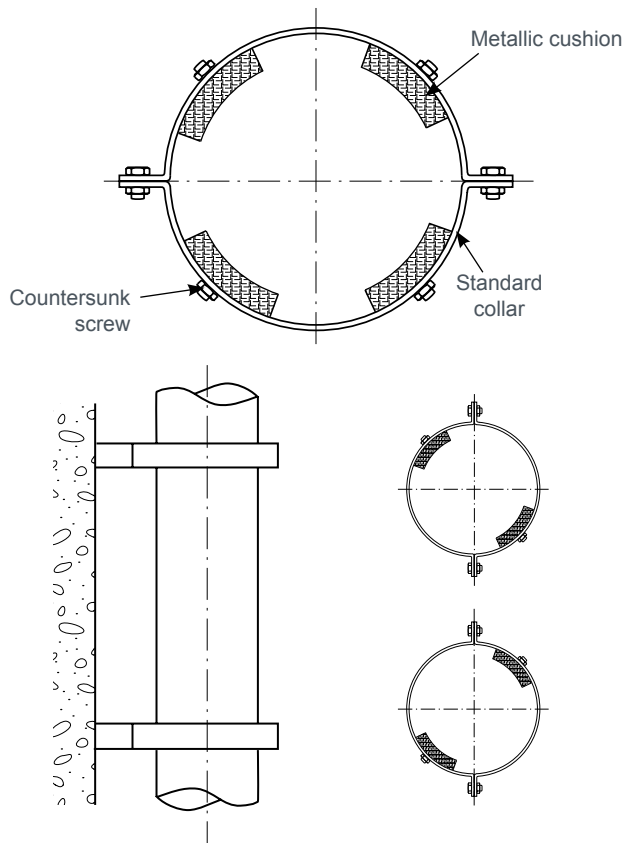
### Assembly :

Countersunk screws can be used to mount the cushions inside the collar.

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

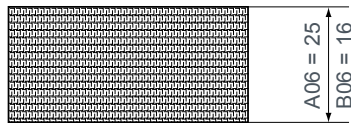
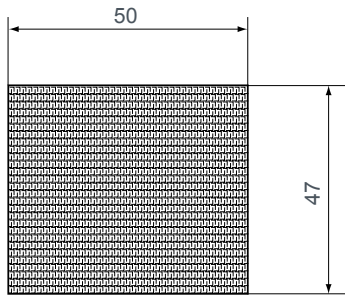


Ø of the pipe (mm)	Number of cushions
75 - 175	4
175 - 425	8
425 - 550	12
550 - 700	16
700 - 850	20
850 - 1 000	24
1 000 - 1 150	32
1 150 - 1 300	36
1 300 - 1 450	40
1 450 - 1 600	44
1 600 - 1 750	48

Max. dynamic force in compression : 800 daN.  
Static load range from 30 to 200 daN.

Collars and screws not supplied.

# DIMENSIONS



### Assembly :

Our wide range of mounts can meet many requirements. These mounts 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).

Note : 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 mounted.

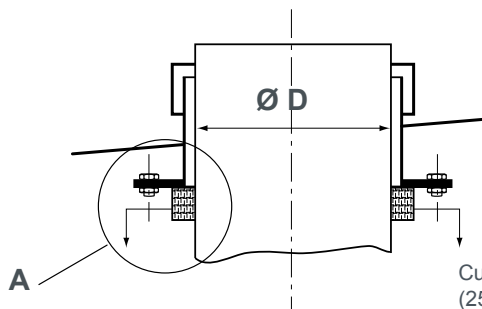
### Choice :

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

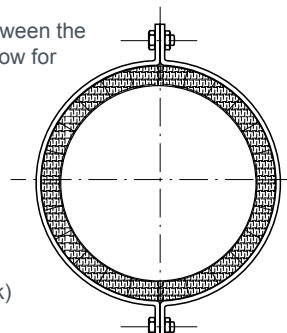
For example :

- for Ø D ext 140 pipe : use 9 VI700-b06 cushions;
- for Ø D ext 1000 pipe : use 61 VI700-A06 cushions.

# OPERATING CHARACTERISTICS

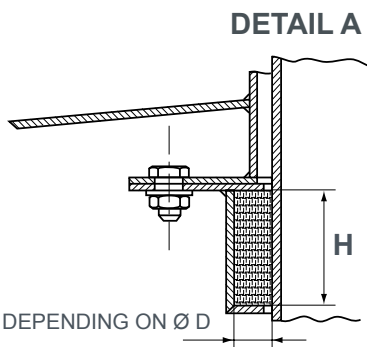


Use spacers between the half collars to allow for future tightening



Cushions VI700-A06 (25 mm thick) or VI700-B06 (16 mm thick)

Necklace and screw not supplied.



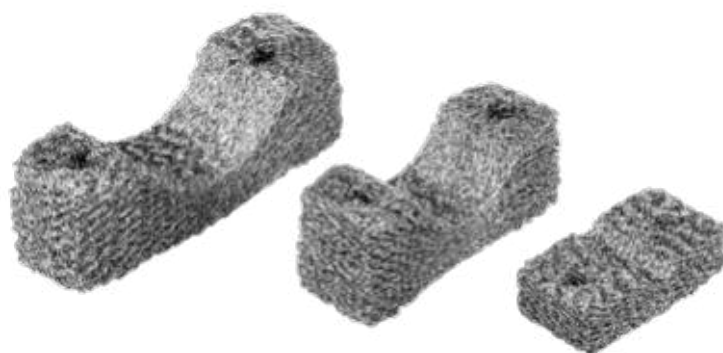
Pipe Ø D (mm)	H (mm)	Number of cushions	Pipe Ø D (mm)	H (mm)	Number of cushions
75 to 85	50	5	335 to 380	47	21
80 to 90	47	5	360 to 410	50	24
90 to 100	50	6	400 to 450	50	27
95 to 105	47	6	445 to 500	47	28
105 to 120	50	7	500 to 560	47	31
120 to 135	50	8	560 to 630	47	35
135 to 150	50	9	620 to 700	47	39
150 to 170	50	10	700 to 790	47	44
165 to 185	50	11	780 to 880	47	49
180 to 200	50	12	875 to 985	47	55
195 to 220	50	13	975 to 1 100	47	61
210 to 240	50	14	1 100 to 1 240	47	69
240 to 270	47	15	1 230 to 1 385	47	77
270 to 305	47	17	1 370 to 1550	47	86
300 to 340	50	20	1 530 to 1 725	47	96

Maximum dynamic force in compression : VI700-A06 = 1 200 daN  
VI700-B06 = 1 600 daN

Static load range from 75 to 400 daN

# METALLIC CUSHIONS FOR PIPEWORK

Natural frequency : (1)  
depending on load



## DESCRIPTION

The metal cushions for pipework are made from stainless steel wire that is work hardened, knitted, crimped and compressed to a given shape in a press.

The cushion can be supplied on its own or in a mounting kit which comprises two cushions, two spacers, a retaining zinc plated steel clamp.

## APPLICATIONS

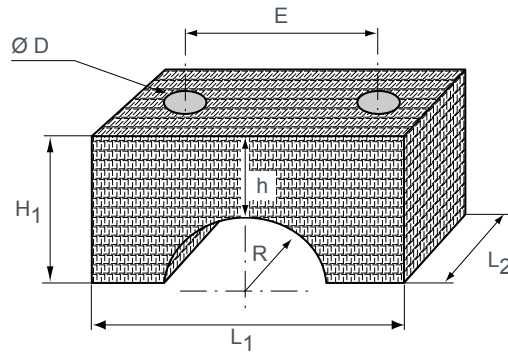
The cushions are resistant to temperatures from - 70°C to + 300°C and are used to clamp and isolate pipes against vibration.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.



# DIMENSIONS

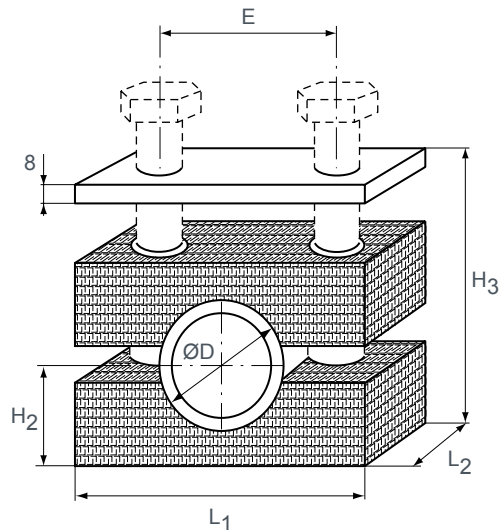
## CUSHION ONLY



Reference for cushion only	R (mm)	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)	H <sub>1</sub> (mm)	h (mm)	Ø D (mm)	E (mm)
000 51 430	5,10	60	30	15	12	7	40
000 51 431	6,75	60	30	15	12	7	40
000 51 432	8,60	70	30	20	16	7	50
000 51 433	10,65	70	30	20	14	7	50
000 51 423	16,50	87	31	30	20	9	65
000 51 422	24,00	88	32	30	15	9	65
V3CNVJ123-A06	20,00	115	35	35	15	13,5	85
V3CNVJ122-A06	25,00	115	35	35	15	13,5	85
V3CNVJ121-A06	30,00	115	35	35	15	13,5	85

Dimensions are for unloaded cushions.

## CUSHION KIT (Screws not supplied)



Kit reference	Ø D (mm)	L <sub>1</sub> (mm)	L <sub>2</sub> (mm)	H <sub>2</sub> (mm)	H <sub>3</sub> (mm)	E (mm)
V6056K01	40	115	35	32,5	73	85
V6057K01	50	115	35	37,5	83	85
V6058K01	60	115	35	42,5	93	85

Dimensions are for loaded cushions.

# V43 V44 V45 V46

Natural frequencies : (1)  
V4\* = 22 to 30 Hz  
V4\*W = 15 to 22 Hz

See also PAULSTRA  
elastomer range :  
Nivofix - Minifix



## DESCRIPTION

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

The version H includes a cup and a levelling stud. It can also be equipped with grip pads.

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

## APPLICATIONS

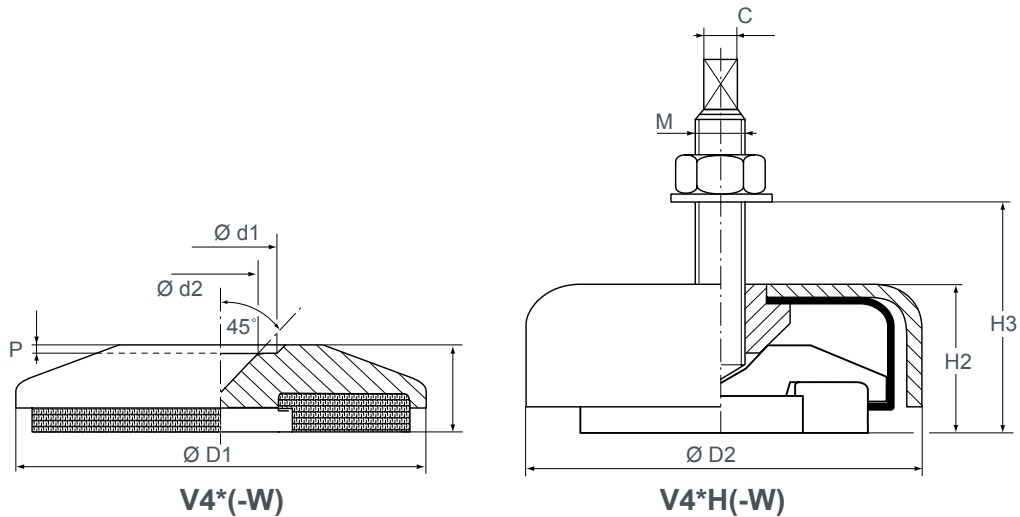
This range with a natural frequency of 15 to 30 Hz can be used for mounting machine tools in harsh industrial environments.

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) and improves the vibration isolation level.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



\* Complete part number; see table below.  
W = Low frequency cushion.

# OPERATING CHARACTERISTICS

Reference	Static load (daN)	Max. dynamic force in compression (daN)	Natural frequency (Hz)	Ø D1 (mm)	H1 (mm)	Ø D2 (mm)	H2 (mm)	M	C (mm)	H3 maxi (mm)	Ø d1 (mm)	Ø d2 (mm)	P (mm)	
V43	50 to 350	750	22 to 30	81	20	-	-	-	-	-	17	12	3	
V43-H				-	-	96	35	M12	8	115	-	-	-	
V43-W			15 to 22	81	31	-	-	-	-	-	-	17	12	3
V43-WH				-	-	96	46	M12	8	125	-	-	-	
V44	200 to 1 300	4 000	22 to 30	81	20	-	-	-	-	-	17	12	3	
V44-H				-	-	96	35	M16	10	135	-	-	-	
V44-W			15 to 22	81	31	-	-	-	-	-	-	17	12	3
V44-WH				-	-	96	46	M16	10	147	-	-	-	
V45	700 to 2 700	8 000	22 to 30	128	26	-	-	-	-	-	33	18	3	
V45-H				-	-	152	45	M20	13	155	-	-	-	
V45-W			15 to 22	128	36,5	-	-	-	-	-	-	33	18	3
V45-WH				-	-	152	56	M20	13	163	-	-	-	
V46	2 000 to 5 000	15 000	22 to 30	170	34,5	-	-	-	-	-	44	28	4	
V46-H				-	-	190	60	M24	16	160	-	-	-	
V46-W			15 to 22	170	43,5	-	-	-	-	-	-	44	28	4
V46-WH				-	-	190	71	M24	16	170	-	-	-	

Maximum excitation at resonant frequency: ± 0.2 mm (± 0.4 mm with low frequency cushion, suffix W).

# V47 V47D V47T V47Q

Natural frequency : (1)  
8 to 20 Hz



## DESCRIPTION

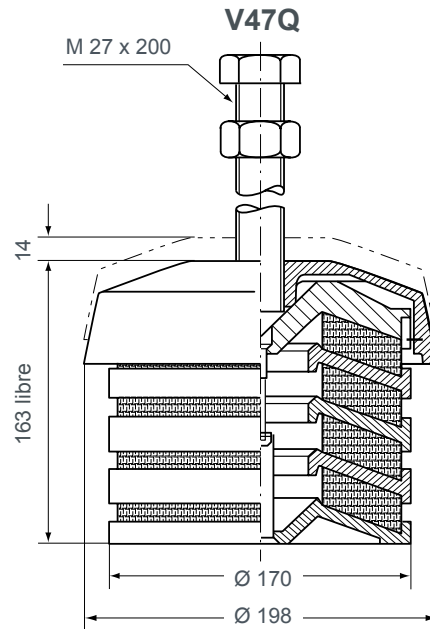
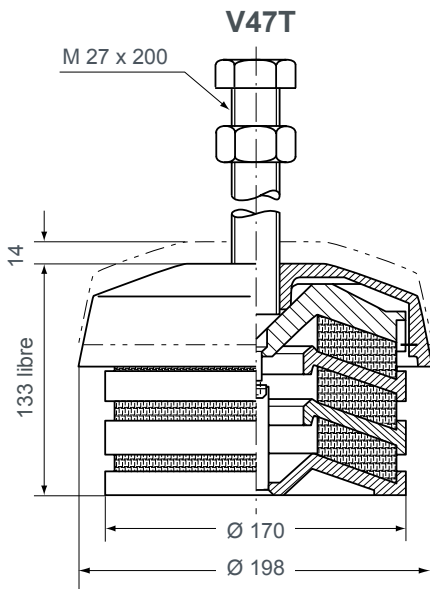
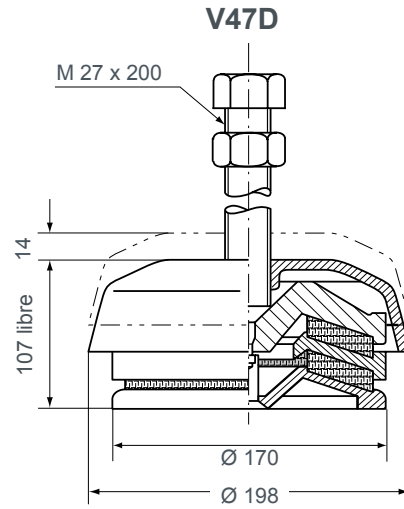
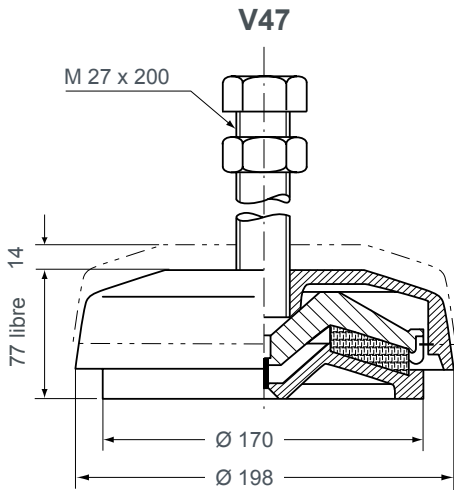
- Anti-vibration mount available with a constant natural frequency over a wide load range.
- Cast iron base and levelling device.
- Conical wire mesh cushion, capable of narrying lateral loads.
- V47D version has a stack of two cushions with a cast iron separating cup.
- V47T and V47Q have three and four metal cushions respectively.

## APPLICATIONS

This machinery mount, with adjustable height, is used for machine tools and other rotating machine. The V47 and V47D are designed for presses and printing machines.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



# OPERATING CHARACTERISTICS

Reference	Load range (daN)	Max. dynamic force (daN)	Natural frequency (Hz)	Weight of mounting (kg)
V47	250 to 7 000	21 000	15 to 20	9,1
V47D	250 to 7 000	21 000	12 to 16	12,2
V47T	250 to 7 000	21 000	10 to 13	13,1
V47Q	250 to 7 000	21 000	8 to 11	15,1

# PDM-1000-01

# PDM-2000-01

Natural frequency : (1)  
15 to 18 Hz



## DESCRIPTION

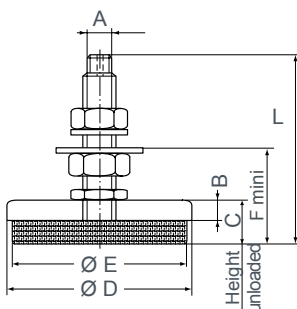
Low profile mounts with high static and dynamic load range.

- 100% 316 stainless steel.
- Natural frequency from 15 to 18 Hz.
- Dynamic load in compression : 3 g.
- Maximum sinusoidal input at resonance:  $\pm 0.4$  mm.

## APPLICATIONS

- Anti-vibration mounts for presses and machine tools without the need to fix or grout in position.
- For chemical, food industry,...

## OPERATING CHARACTERISTICS



Reference	Static load (daN)	A	B (mm)	C (mm)	Ø D (mm)	Ø E (mm)	F (mm)	L (mm)
PDM-1000-01	200 to 1 000	M12 M16	18	27	80	73	52	156
PDM-2000-01	800 to 2 000	M16 M20	15	30	128	120	62	197

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# SP55\*W SP56\*W

Natural frequency : (1)  
15 to 20 Hz



## DESCRIPTION

Machine mount available with a stud (SP55\*W) or threaded hole (SP56\*W).

- Top cup and stud are mild steel zinc plated.
- Stainless steel wire mesh cushion.
- Natural frequency between 15 to 20 Hz.

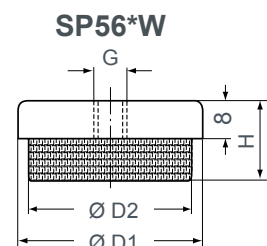
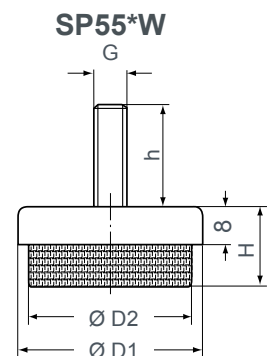
## APPLICATIONS

- Mount for low loads.
- Suitable for rotating machines (> 2500 rpm) and laboratory equipment ...

## OPERATING CHARACTERISTICS

Reference with thread. stud	Reference with tapped hole	Ø D1 (mm)	Ø D2 (mm)	H (mm)	h* (mm)	G	Static load (daN)	Deflection under load (mm)
SP550W	SP560W	28	23,6	17,5	20	M6	60	4,2
SP551W	SP561W	40	34,5	17	20	M6	100	4,8
SP552W	SP562W	45	40	22	25	M8	150	5,6
SP553W	SP563W	58	53,6	22	25	M8	225	6,3

\* SP55\*W only



(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# SP539-882 SP539-883 SP539-887 SP539-888

Natural frequency : (1)  
10 to 16 Hz



## DESCRIPTION

All metal mount comprising a stack of between two and three woven steel cushions giving a variation in natural frequency depending upon the number of cushions. This make higher levels of isolation possible.

The stainless steel cushions in conical shape are capable of carrying radial loads.

This mount ensures good stability of the suspended equipment.

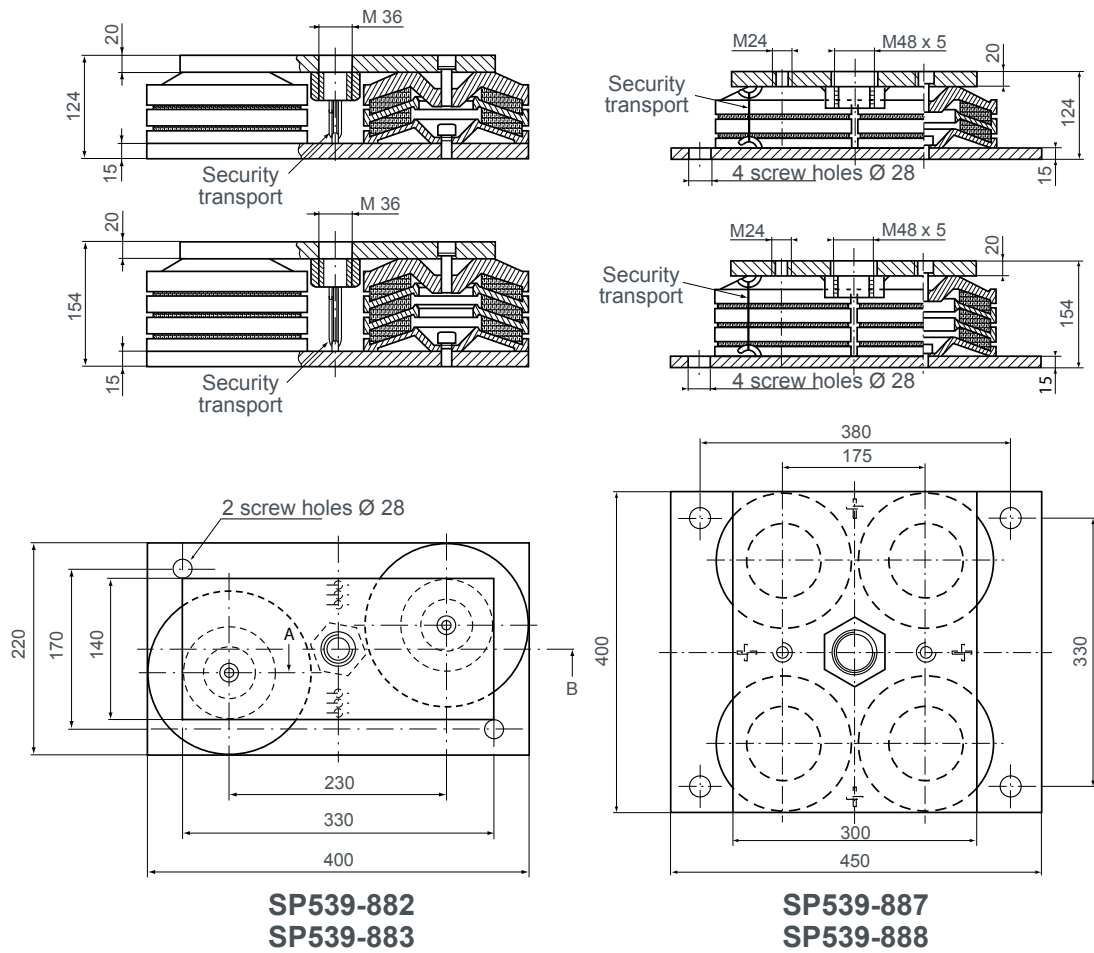
## APPLICATIONS

- Metal cutting or metal forming machines (presses, punches, ...).
- Heavy rotating machines.n Machines tournantes fortes charges.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.



# DIMENSIONS



# OPERATING CHARACTERISTICS

Reference	Height (mm)	Load range (daN)	Natural frequency (Hz)	Weight of mounting (kg)
SP539-882	124	500 to	12 to 16	37
SP539-883	154	14 000	10 to 13	41
SP539-887	124	1 000 to	12 to 16	70
SP539-888	154	28 000	10 to 13	82

# V118-MG V118-DG V318 V318-D

Natural frequency : (1)  
11 to 22 Hz



## DESCRIPTION

V118-MG and V318 mounts have cast iron cover and base with 4 mountings holes in the base and a central tapped hole in the cover.

The resilient elements are stainless steel wire mesh cushions :

- V118-MG and V318 have two cushions;
- V118-DG and V318-D have three cushions.

## APPLICATIONS

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

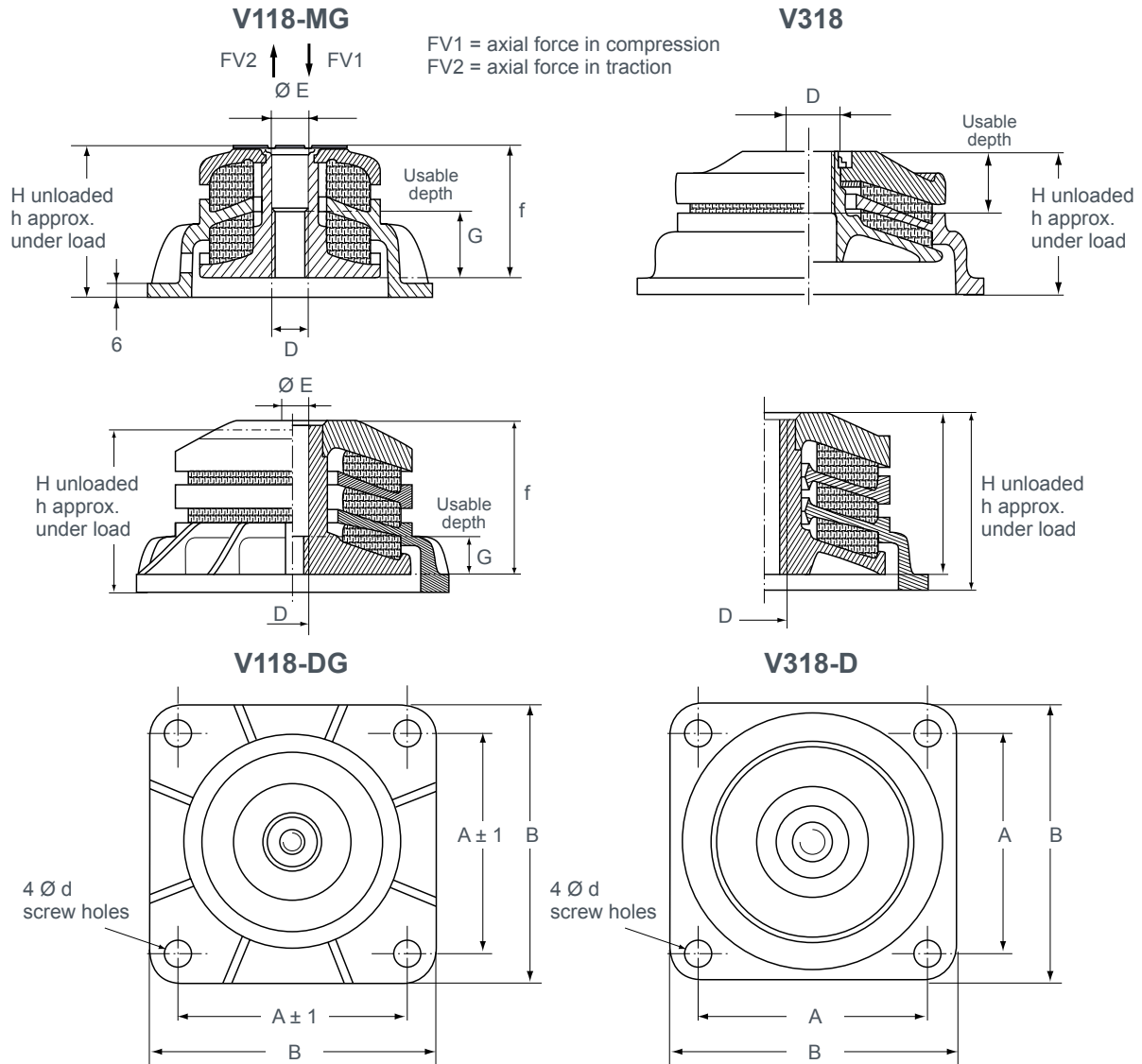
- heavy machinery (grinders, crushers, inclined presses, eccentric presses, printing presses, textile machines);
- rotating machines (motors, generator sets, pumps, etc), which rotate at more than 2000 rpm for V118-DG and V318-D and up to 2500 rpm for V118-MG and V318;
- gantry cranes (structure, cabs, equipment).

The isometric stiffness characteristics and anti-rebound metal cushions of these suspensions 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.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



Reference	A (mm)	B (mm)	D	Ø E (mm)	G (mm)	H (mm)	Ø d (mm)	f (mm)	h under FV1 app. (mm)	h under FV2 app. (mm)
V118-MG	100	130	M16	16,5	30	73	12	63	68	77
V118-DG	100	130	M16	16,5	30	98	12,5	84	-	-
V318	170	220	M27	-	59	97	17	-	93	100
V318-D	170	220	M27	-	-	125	17	112	-	-

# OPERATING CHARACTERISTICS

- Maximum permitted excitation at natural frequency of suspension :  $\pm 0.3$  mm.
- Amplification factor at resonance :  $< 4$ .

Reference	Load range (daN)	Maximum dynamic forces (daN)			Natural frequency (Hz)	Weight of mounting (kg)
		Axial compression	Axial traction	Radial		
V118-MG V118-DG	50 à 900	4 500	1 500	1 500	16 to 22 11 to 17	2 2,4
V318 V318-D	250 à 7 000	21 000	9 000	7 500	16 to 22 11 to 17	10 13

# V120 V120-D V125 V125-D

Natural frequency : (1)  
13 to 20 Hz



## DESCRIPTION

Series of all metal low profile mounts with one or two cushions, working in compression only, permitting high dynamic overloads (using a load distribution plate). Mounts can be fixed to floor.

Made of cups welded on a steel base with one or two stainless steel cushions (inox 18/8).

The steel parts are painted to protect against corrosion.

## APPLICATIONS

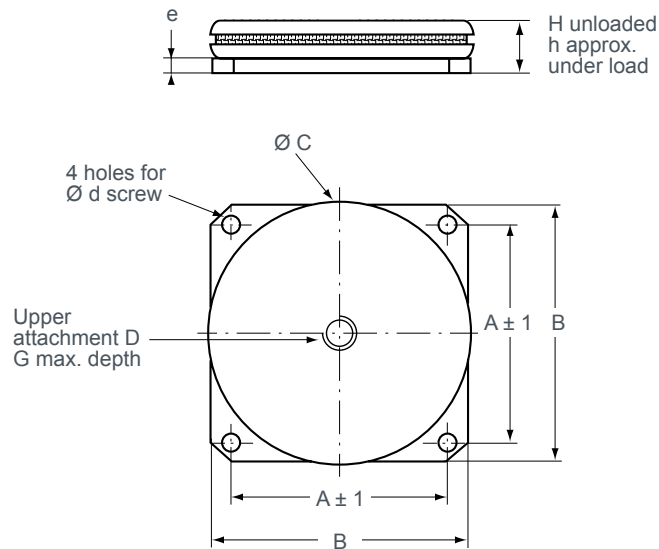
These mounts are designed for :

- suspension of presses;
- suspension of machine-tools which do not need levelling;
- suspension of transformers, diesel engines;
- suspension of rotating machines operating :
  - > 2500 rpm : V120 and V125;
  - > 2000 rpm : V120-D and V125-D.

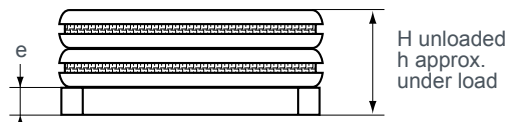
(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS

**V120  
V125**



**V120-D  
V125-D**



Reference	A (mm)	B (mm)	Ø C (mm)	D	G (mm)	H (mm)	b (mm)	Ø d (mm)	e (mm)	h (mm)
V120	114	150	126	M16	28	36	140	12	8	32
V125	138	165	165	M20	28	36	160	12	8	32
V120-D	114	150	126	M16	50	70	140	12	16	66
V125-D	138	165	165	M20	50	70.5	160	12	16	66

## OPERATING CHARACTERISTICS

- Maximum permitted excitation at natural frequency of suspension :  
 V120 and V125 :  $\pm 0.3$  mm;  
 V120-D and V125-D :  $\pm 0.4$  mm.
- Natural frequencies for this amplitude :  
 - Axial { V120 and V125 : 15 to 20 Hz;  
 V120-D and V125-D : 13 to 18 Hz.
- Amplification factor at resonance : < 5.
- Operating temperature : - 70°C to + 300°C.

Reference	Static axial load (daN)	Maximum dynamic force in compression (daN)	Weight of mounting (Kg)
V120	120 - 2 500	12 500	2,3
V125	250 - 7 000	22 500	3,5
V120-D	120 - 2 500	12 500	4,5
125-D	250 - 7 000	22 500	7

# V164 V168

Natural frequency : (1)  
8 to 22 Hz



## DESCRIPTION

The V164 and V168 dampers have a cover, an AG3 mounting plate and an AU4G shaft. The assembly is chromatised.

The upper and lower stainless steel cushions are the resilient elements of the mount. It has four Ø 8 mounting holes on the mounting plate and one M10 tapped hole on upper cover.

## APPLICATIONS

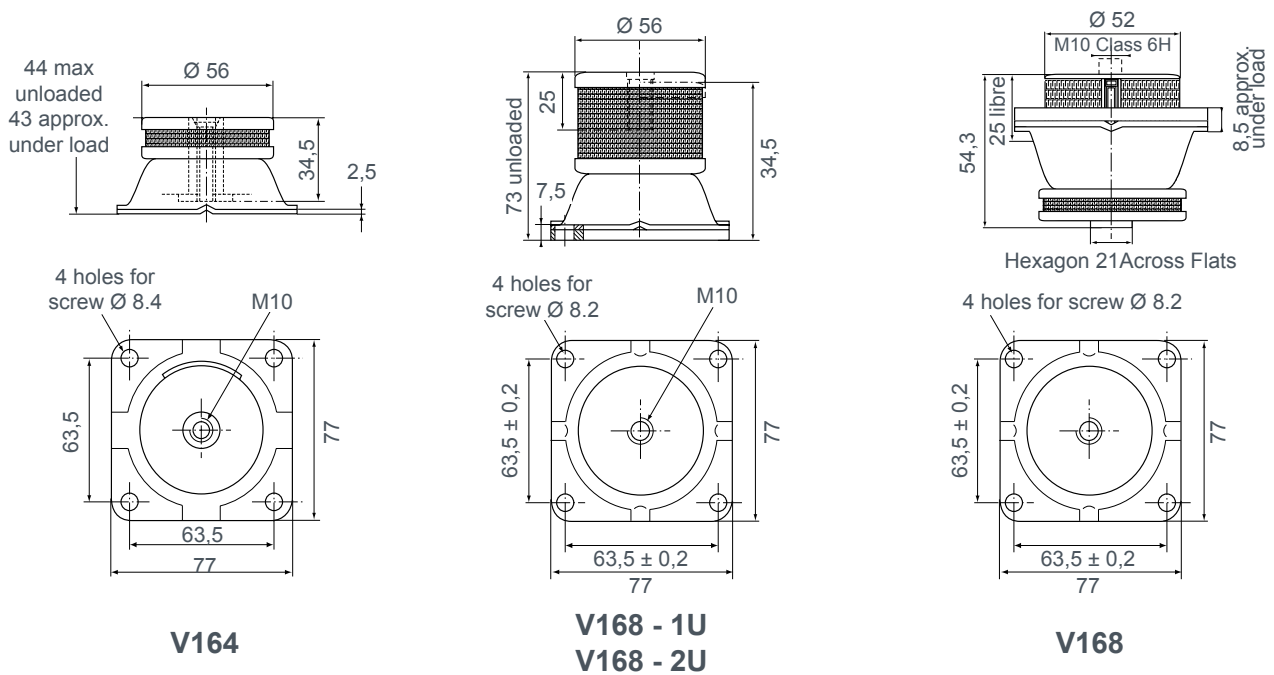
The load range of between 5 and 170 kg makes it suitable for isolating light machine tools from motors with rotational speeds of over 2500 rpm.

The V164 has an isometric natural frequency of 15 to 22 Hz and 8 to 12 Hz. Their lower cushion can withstand accidental traction forces (for example, shock rebound).

These dampers are not affected by aggressive chemicals and can be used, for example, for mounting petro-chemical pumps.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



# OPERATING CHARACTERISTICS

- Maximum permitted excitation at natural frequency of suspension :  $\pm 0.3$  mm.
- Amplification factor at resonance :  $< 4$ .
- Operating temperature :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .

Reference	Natural frequency axial and radial	Static axial load axiale (daN)	Maximum dynamic forces (daN)		Weight of mounting (kg)
			Compression	Tension	
V164-F V164-G	15 to 22 Hz	5 to 30 20 to 250	150 1 250	150 600	0,18
V168-1U V168-2U	8 to 12 Hz	25 to 60 50 to 170	150 510	75 150	0,35
V168-1 V168-2	10 à 13 Hz	25 à 60 50 à 170	75 150	180 510	0,35

## V402 - MG

Natural frequency : (1)  
15 to 22 Hz



## 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

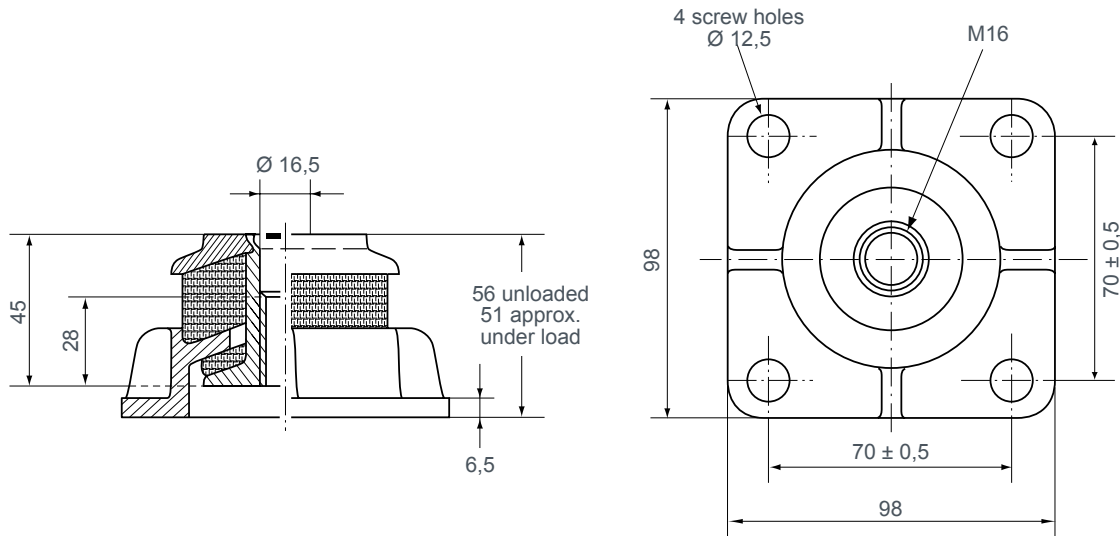
This all metal damper has a natural frequency between 15 and 22 Hz and is isometric within the defined load ranges. It is designed for compression loads but its retaining cushion makes it able to withstand high tensile forces.

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 2500 rpm).

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.



# DIMENSIONS



# OPERATING CHARACTERISTICS

- Natural frequency :
  - axial } 15 to 22 Hz.
  - radial }
- Maximum permitted excitation at natural frequency of suspension :  $\pm 0.3$  mm.
- Amplification factor at resonance :  $< 4$ .
- Operating temperature :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .
- Weight 0.75 Kg approximative.

Reference	Static load (daN)	Maximum dynamic force (daN) (compression or tension)
V402-MG	30 to 700	3 500

# V1H751 V1H752

Natural frequency : (1)  
15 to 25 Hz



## DESCRIPTION

The V1H751 and 752 range has a pressed steel casing and mounting plate and light alloy shaft. The resilient element is a stainless steel wire pad.

The steel parts are painted.

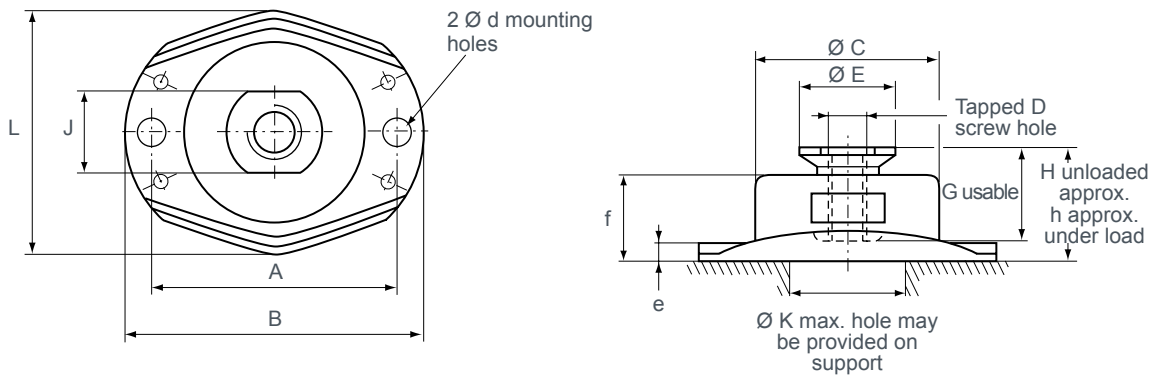
## APPLICATIONS

The V1H 751 and 752 have a natural frequency between 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.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



Reference	A (mm)	B (mm)	Ø C (mm)	D	Ø E (mm)	G (mm)	H (mm)	J (mm)	Ø K (mm)	L (mm)	Ø d (mm)	e (mm)	f (mm)	h (mm)
V1H751	92*	110	69	M12	32	47	54	27	40	90	11*	5,5	40,5	50
V1H752	126	152	96	M20	41	51	60	36	60	124	15	7	45	56

\* Oblong holes with 2 mm aperture.

# OPERATING CHARACTERISTICS

- Natural frequency :
  - axial } 15 to 25 Hz depending on load.
  - radial }
- Maximum permitted excitation at natural frequency of suspension :  $\pm 0.4$  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 :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .
- Weight :
  - V1H751 : 0.75 kg;
  - V1H752 : 1.6 kg.

Reference	Static axial load (daN)	Maximum dynamic forces (daN)			Upper mounting screws		
		Compression	Tension	Radial	Take up length (mm)		Torque (m.N)
					mini	maxi	
V1H751-01	70 - 250	900	900	300	25	45	18
V1H751-11	70 - 250	900	900	800			40
V1H751-02	150 - 500	2 000	1 800	650			18
V1H751-12	150 - 500	2 000	1 800	1 600			40
V1H752-01	300 - 1 000	4 000	3 000	1 000	35	50	50
V1H752-11	300 - 1 000	4 000	3 000	3 000			140

# V1H5023 V1H5025

Natural frequency : (1)  
15 to 25 Hz



## DESCRIPTION

The V1H5023 and V1H5025 mounts have cast iron upper housing and base. The base has four fixing holes.

The resilient elements are stainless steel wire mesh cushions. The cast iron parts are painted.

## APPLICATIONS

Isolation of machine-tools : grinding machines, crushing machines, fly-presses, printing machines, textile machinery, etc.

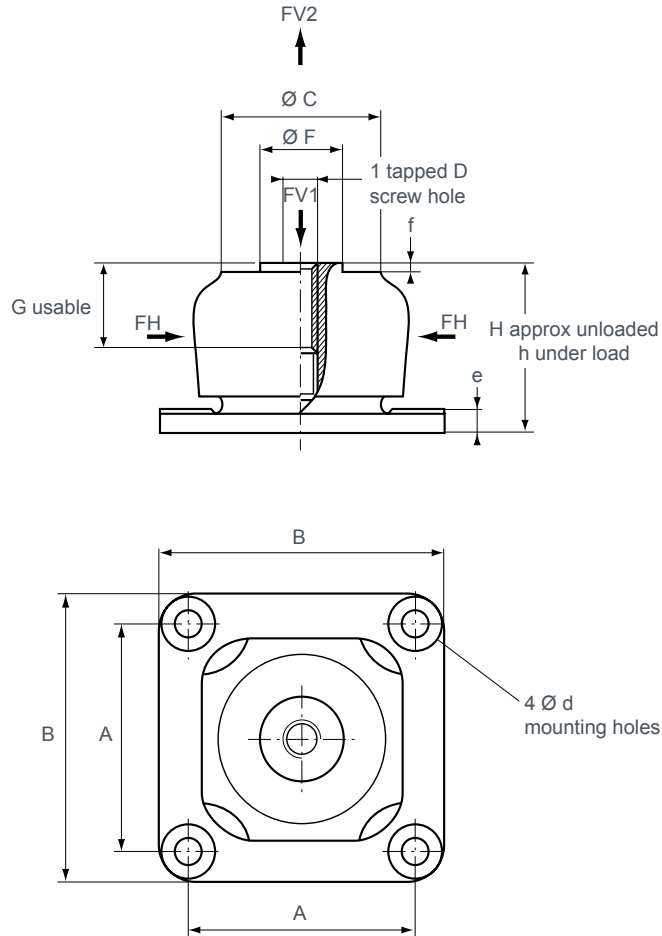
Isolation of rotating machines : engines, sets, pumps, etc. rotating over 2500 rpm.

Marine : isolation of exhaust pipes, manifold, boilers, motors, sets, pumps, etc.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS

FV1 = axial force in compression  
 FV2 = axial force in traction  
 FH = radial force



Reference	A (mm)	B (mm)	$\varnothing C$ (mm)	D	$\varnothing E$ (mm)	G (mm)	H (mm)	$\varnothing d$ (mm)	e (mm)	f (mm)	h under FV1 (mm)	h under FV2 (mm)
V1H5025*	138	172	100	M20	50	50	100	15	12	5	96	104
V1H5023*	215	260	140	M33	70	60	136	23	18	7	132	140

\* Load indice, see below.

# OPERATING CHARACTERISTICS

Maximum permitted excitation at natural frequency of suspension :  $\pm 0.3$  mm.

- Natural frequencies for this amplitude :
  - axial } 15 to 25 Hz depending on load.
  - radial }
- Amplification factor at resonance :  $< 4$ .
- Structural strength : see table.
- Operating temperature :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .

Reference	Static axial load (daN)	Maximum dynamic forces (daN)			Weight (kg)
		Axial compression	Axial tension	Radial	
V1H5025-01	350 - 900	4 500	4 500	4 500	6,7
V1H5025-02	800 - 3 000	15 000	4 500	4 500	
V1H5023-01	1 000 - 2 500	12 500	12 500	12 500	24,4
V1H5023-02	2 000 - 7 000	35 000	12 500	12 500	

# V1H-6000 V1H-6100

Natural frequency : (1)  
12 to 18 Hz



## DESCRIPTION

The V1H-6000 and V1H-6100 steel mounts have a mounting plate, a cover and a swaged steel shaft.

They are available with stainless steel or mild steel zinc plated metalwork.

The resilient parts are stainless steel wire cushions.

The steel parts are zinc plated.

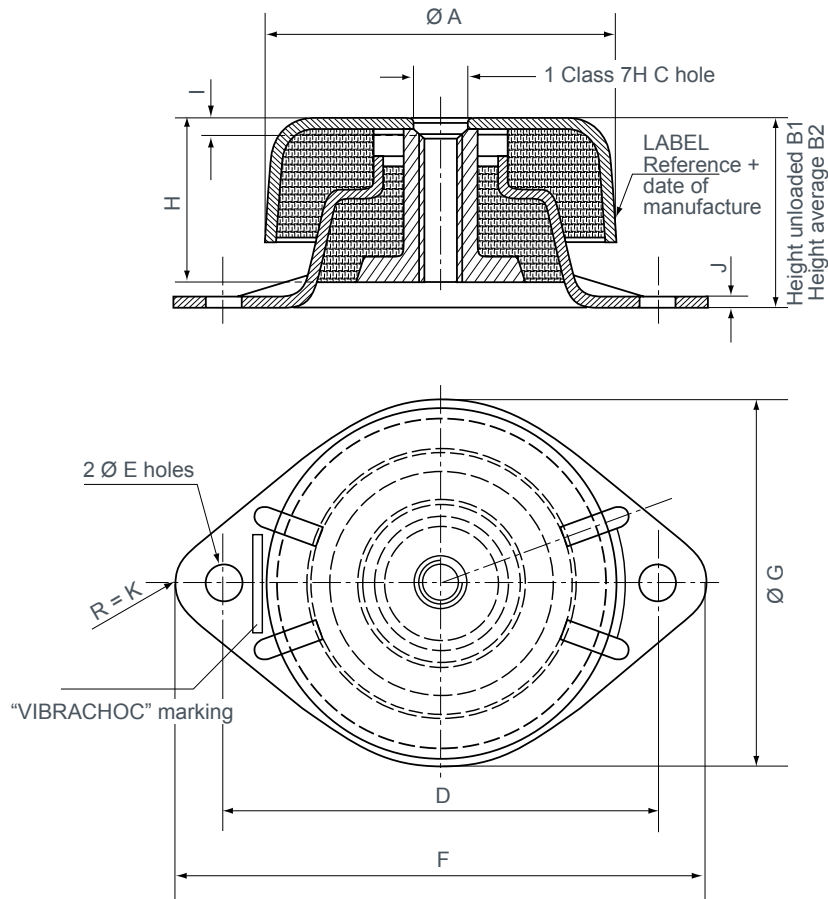
## APPLICATIONS

The V1H-6000 and V1H-6100 mounts have a natural frequency of between 12 and 18 Hz and are designed for suspending rotating machines, electronic cabinets, pipes, air conditioning systems, 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 military ground vehicles and ships.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS

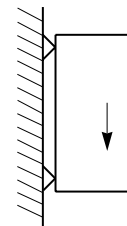


Reference	Ø A (mm)	B1 (mm)	B2 (mm)	C	D (mm)	Ø E (mm)	F (mm)	Ø G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
V1H-6000*	105	62	57	M12	130	11	160	110	50	5	3	15
V1H-6100*	82	56	51	M10	98	9	120	85	46	3	2	11

\* load indice, see below.

# OPERATING CHARACTERISTICS

- Natural frequency :
  - axial } 12 to 18 Hz depending on the load.
  - radial }
- Structural strength : 3 g.
- Complies with GAMT13-MIL.STD. 167-1.
- Operating temperature : - 70°C to + 300°C.
- Amplification factor at resonance : < 4.



Mountings with radial load  
(Consult us)

Steel reference	Inox reference	Load range (daN)	Weight (kg)	Mac dynamic effort (daN)		
				Axial Compression	Axial traction	Radial
V1H-6100-21	V1H-6100-21NX	15 to 40	0,65	120	120	120
V1H-6100-01	V1H-6100-01NX	25 to 75		225	225	225
V1H-6100-02	V1H-6100-02NX	50 to 150		450	450	450
V1H-6100-03	V1H-6100-03NX	100 to 250		750	750	750
V1H-6000-21	V1H-6000-21NX	30 to 75	1,6	225	225	225
V1H-6000-01	V1H-6000-01NX	50 to 150		450	450	450
V1H-6000-02	V1H-6000-02NX	100 to 300		900	900	900
V1H-6000-03	V1H-6000-03NX	200 to 500		1500	1500	1500

# V1B1114 V1B1134 V1B1115 V1B1135 V1B1116 V1B1136

Natural frequency : (1)  
3 to 9 Hz



## DESCRIPTION

This range of mounts 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.

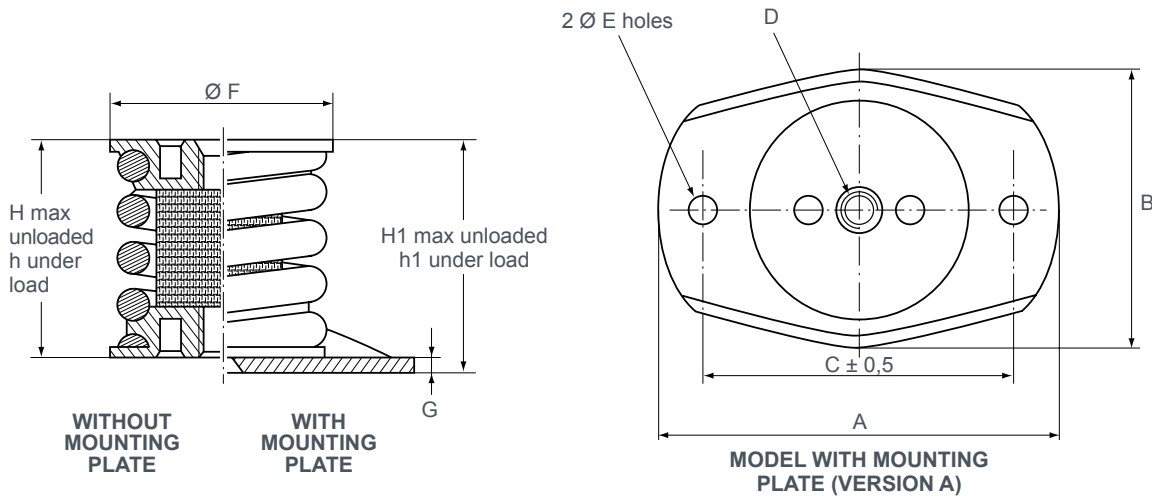
As they do not creep, their life time may be the same as that of the machine they are used to mount.

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

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.



# DIMENSIONS



Reference	A (mm)	B (mm)	C (mm)	D	Ø E (mm)	Ø F (mm)	G (mm)	H (mm)	h (mm)	H1 (mm)	h1 (mm)	Tolerance / load (mm)
V1B1114	90	60	69,6	M8	7	47	2,5	59	47,5	61,5	50	±2
V1B1115	90	60	69,6	M8	7	47	2,5	59	47,5	61,5	50	±3
V1B1116	90	60	69,6	M8	7	47	2,5	88	68	90,5	70,5	±5
V1B1134	140	100	110	M12	11	78	4	88	78	92	82	±2
V1B1135	140	100	110	M12	11	78	4	88	78	92	82	±3
V1B1136	140	100	110	M12	11	78	4	142	120	146	124	±5

# OPERATING CHARACTERISTICS

• **Vibrational and mechanical characteristics**

- Isolation of rotating machines with a minimum speed of :

Tr/mn	Series	Axial natural frequency = fz	Radial natural frequency = fr	Axial max. force	Radial max. force	Amplification factor at resonance
1 000	V1B1114 & V1B1134	7 to 9 Hz	fr = fz	4 g	1,2 g	≤ 5
650	V1B1115 & V1B1135	5 to 6 Hz	fr = fz	2 g	1,2 g	≤ 10
450	V1B1116 & V1B1136	3 to 4 Hz	fr = 0,7 fz	2 g	0,5 g	≤ 10

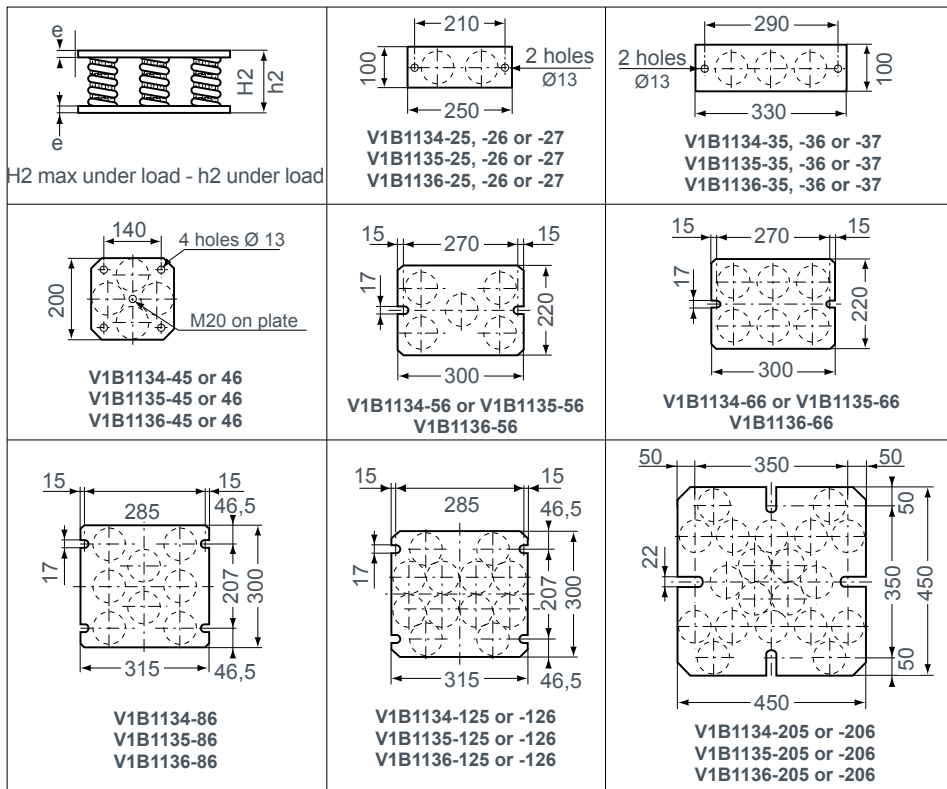
Maximum permitted excitation at natural frequency of suspension : ± 1 mm.

• **Load ranges**

Part number		Static load (daN)
without mounting plate	with mounting plate	
V1B1114-01	V1B1114-01A	6 to 10,5
V1B1114-02	V1B1114-02A	7,5 to 13,5
V1B1114-03	V1B1114-03A	12 to 20
V1B1114-04	V1B1114-04A	18 to 30
V1B1114-05	V1B1114-05A	24 to 46
V1B1114-06	V1B1114-06A	40 to 75
V1B1115-01	V1B1115-01A	5 to 7
V1B1115-02	V1B1115-02A	6 to 9
V1B1115-03	V1B1115-03A	9 to 14
V1B1115-04	V1B1115-04A	14 to 20
V1B1115-05	V1B1115-05A	20 to 30
V1B1115-06	V1B1115-06A	30 to 50
V1B1116-01	V1B1116-01A	5 to 7
V1B1116-02	V1B1116-02A	6 to 9
V1B1116-03	V1B1116-03A	9 to 14
V1B1116-04	V1B1116-04A	14 to 20
V1B1116-05	V1B1116-05A	20 to 30
V1B1116-06	V1B1116-06A	30 to 50

Reference		Static load (daN)
without mounting plate	with mounting plate	
V1B1134-01	V1B1134-01A	40 to 85
V1B1134-02	V1B1134-02A	65 to 125
V1B1134-03	V1B1134-03A	110 to 190
V1B1134-04	V1B1134-04A	175 to 270
V1B1134-05	V1B1134-05A	250 to 400
V1B1134-06	V1B1134-06A	360 to 560
V1B1134-07	V1B1134-07A	540 to 730
V1B1135-01	V1B1135-01A	30 to 48
V1B1135-02	V1B1135-02A	48 to 80
V1B1135-03	V1B1135-03A	80 to 130
V1B1135-04	V1B1135-04A	130 to 200
V1B1135-05	V1B1135-05A	200 to 310
V1B1135-06	V1B1135-06A	310 to 400
V1B1135-07	V1B1135-07A	420 to 560
V1B1136-01	V1B1136-01A	75 to 105
V1B1136-02	V1B1136-02A	95 to 130
V1B1136-03	V1B1136-03A	115 to 160
V1B1136-04	V1B1136-04A	160 to 230
V1B1136-05	V1B1136-05A	220 to 310
V1B1136-06	V1B1136-06A	300 to 415
V1B1136-07	V1B1136-07A	410 to 550

# DIMENSIONS



# OPERATING CHARACTERISTICS

- Vibrational and mechanical characteristics (see single elements)
- Load ranges

Part number	Static load (daN)	H2 unload. (mm)	h2/s under load (mm)	e (mm)	Part number	Static load (daN)	H2 unload. (mm)	h2/s under load (mm)	e (mm)
V1B1134-25	500 to 800	96	86 ±3	4	V1B1135-66	1 860 to 2 520	108	98 ±3	10
V1B1134-26	720 to 1 120	96	86 ±3	4	V1B1135-67	2 520 to 3 360	110	98 ±3	10
V1B1134-27	1 080 to 1 460	106	94 ±3	8	V1B1135-86	2 480 to 3 360	108	98 ±3	10
V1B1134-36	1 080 to 1 680	106	94 ±3	8	V1B1135-87	3 360 to 4 480	110	98 ±3	10
V1B1134-37	1 620 to 2 190	106	94 ±3	8	V1B1135-125	2 340 to 3 720	108	98 ±3	10
V1B1134-45	1 000 to 1 600	104	94 ±3	8	V1B1135-126	3 720 to 5 040	108	98 ±3	10
V1B1134-46	1 440 to 2 240	104	94 ±3	8	V1B1135-127	5 040 to 6 720	110	98 ±3	10
V1B1134-47	2 160 to 2 920	106	94 ±3	8	V1B1135-205	3 900 to 6 200	108	98 ±3	10
V1B1134-56	1 800 to 2 800	108	98 ±3	10	V1B1135-206	6 200 to 8 400	108	98 ±3	10
V1B1134-57	2 700 to 3 650	110	98 ±3	10	V1B1135-207	8 400 to 11 200	110	98 ±3	10
V1B1134-66	2 160 to 3 360	108	98 ±3	10	V1B1136-25	440 to 620	148	128 ±5	4
V1B1134-67	3 240 to 4 380	110	98 ±3	10	V1B1136-26	600 to 830	148	128 ±5	4
V1B1134-86	2 880 to 4 480	108	98 ±3	10	V1B1136-27	820 to 1 100	158	136 ±5	8
V1B1134-87	4 320 to 5840	110	98 ±3	10	V1B1136-36	900 to 1 260	158	136 ±5	8
V1B1134-125	3 000 to 4 800	108	98 ±3	10	V1B1136-37	1 230 to 1 650	158	136 ±5	8
V1B1134-126	4 300 to 6 720	108	98 ±3	10	V1B1136-45	880 to 1 280	156	136 ±5	8
V1B1134-127	6 480 to 8 760	110	98 ±3	10	V1B1136-46	1 200 to 1 660	156	136 ±5	8
V1B1134-205	5 000 to 8 000	108	98 ±3	10	V1B1136-47	1 640 to 2 200	158	136 ±5	8
V1B1134-206	7 200 to 11 200	108	98 ±3	10	V1B1136-56	1 500 to 2 075	160	140 ±5	10
V1B1134-207	10 800 to 14 600	110	98 ±3	10	V1B1136-57	2 050 to 2 750	162	140 ±5	10
V1B1135-25	390 to 620	96	86 ±3	4	V1B1136-66	1 800 to 2 490	160	140 ±5	10
V1B1135-26	620 to 840	96	86 ±3	4	V1B1136-67	2 460 to 3 300	162	140 ±5	10
V1B1135-27	840 to 1 120	106	94 ±3	8	V1B1136-86	2 400 to 3 320	160	140 ±5	10
V1B1135-36	930 to 1 260	106	94 ±3	8	V1B1136-87	3 280 to 4 400	162	140 ±5	10
V1B1135-37	1 260 to 1 680	106	94 ±3	8	V1B1136-125	2 640 to 3 720	160	140 ±5	10
V1B1135-45	780 to 1 240	104	94 ±3	8	V1B1136-126	3 600 to 4 980	160	140 ±5	10
V1B1135-46	1 240 to 1 680	104	94 ±3	8	V1B1136-127	4 920 to 6 600	162	140 ±5	10
V1B1135-47	1 680 to 2 240	106	94 ±3	8	V1B1136-205	4 400 to 6 200	160	140 ±5	10
V1B1135-56	1 550 to 2 100	108	98 ±3	10	V1B1136-206	6 000 to 8 300	160	140 ±5	10
V1B1135-57	2 100 to 2 800	110	98 ±3	10	V1B1136-207	8 200 to 11 000	162	140 ±5	10

# 7002

Natural frequency : (1)  
• axial 7 to 10 Hz  
• radial 4,5 to 6 Hz



## 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 four  $\varnothing 5.2$  mounting holes in the base and a tapped hole in the centre axis.

## APPLICATIONS

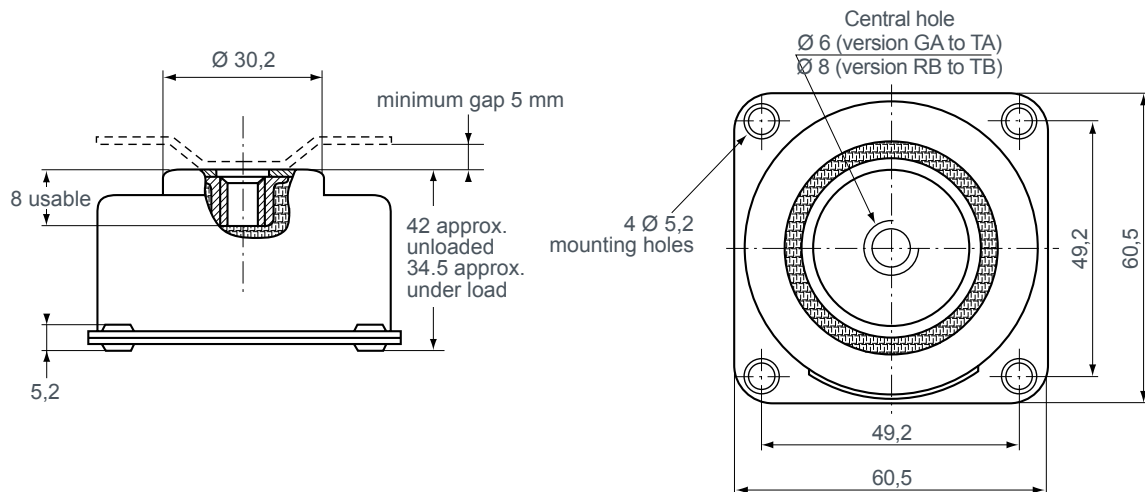
Its axial natural frequency of between 7 and 10 Hz and its integral travel limiter enable 7002 dampers to be used for mounting electronic or computer equipment, navigation equipment and on board measurement instruments.

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.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



# OPERATING CHARACTERISTICS

- Natural frequency :
  - 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 :  $\pm 0.75$  mm.
- Amplification factor at resonance :  $< 4$ .
- Operating temperature :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .
- Structural strength corresponds to continuous acceleration of 10 g with maximum load.
- Travel available under shock :
  - axial :  $\pm 6$  mm;
  - radial :  $\pm 5$  mm.
- Weight : 100 to 200 (depending on version).

Reference	Axial static load (daN)	Central hole	Max load (mm)
7002 GA	0,70 - 1,25	M6	6
7002 HA	1,15 - 2,30		
7002 JA	2,00 - 4,50		
7002 KA	2,80 - 5,60		
7002 LA	4,50 - 9,00		
7002 UA	7,00 - 14,00		
7002 MA	8,00 - 18,00		
7002 PA	16,00 - 22,00		
7002 RB	20,00 - 33,00	M8	8
7002 SB	28,00 - 45,00		
7002 TB	40,00 - 60,00		

# MV70 MV71 MV72 MV73



Natural frequency : (1)  
axial and radial 15 to 25 Hz

## DESCRIPTION

All metal mount design to carry load in compression or tension and which includes an internal limit stop.

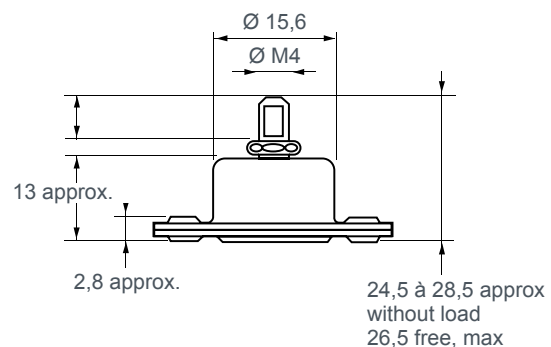
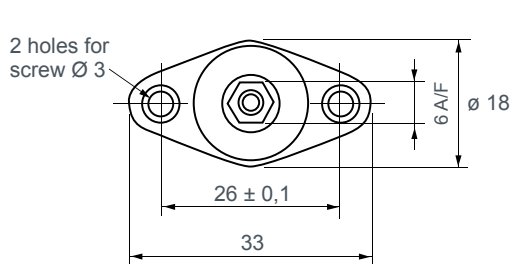
## APPLICATIONS

Protection of components, assemblies and electronic equipment mounted in aircraft, road vehicles and trains including navigation equipment, control consoles, measuring instruments.

## TECHNICAL CHARACTERISTICS

- Max permitted excitation at natural frequency :  
MV70 :  $\pm 0,3$  mm.  
MV71 :  $\pm 0,4$  mm.  
MV72 :  $\pm 0,45$  mm.  
MV73 :  $\pm 0,45$  mm.
- Amplification factor at resonance :  $< 4$ .
- Operating temperature :  $- 70$  °C to  $+ 300$  °C.
- Structural strength corresponds to continuous acceleration of 10g with maximum load
- Internal snubber design for equivalent performance during continuous acceleration at maximum load.

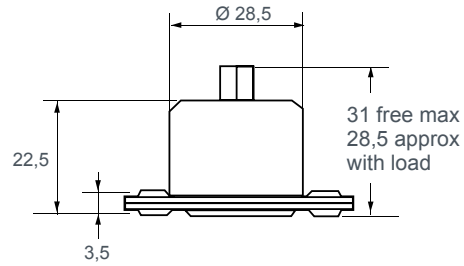
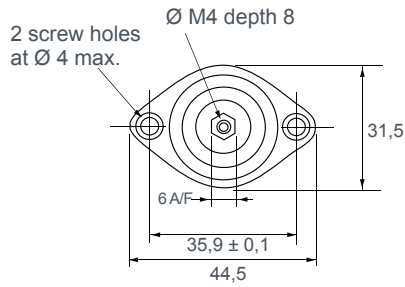
## MV70



Reference	Static axial load (daN)	Natural frequency
MV70-01	0,05 - 0,20	20 to 25 Hz
MV70-02	0,15 - 0,35	
MV70-03	0,30 - 0,65	
MV70-04	0,50 - 0,85	
MV70-05	0,75 - 1,00	

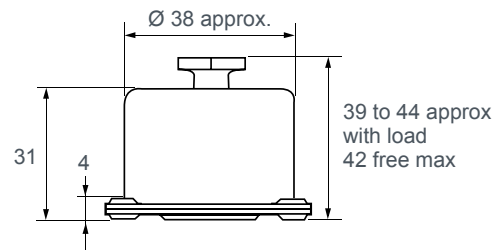
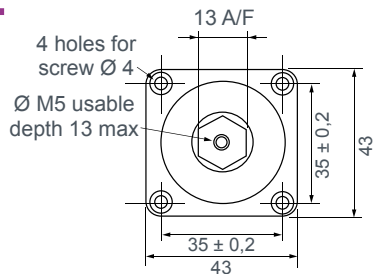
(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

## MV71



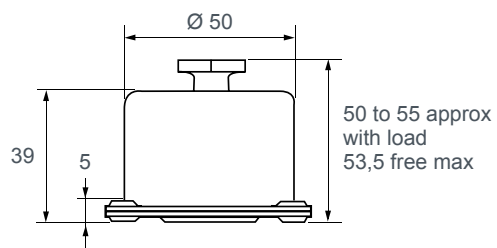
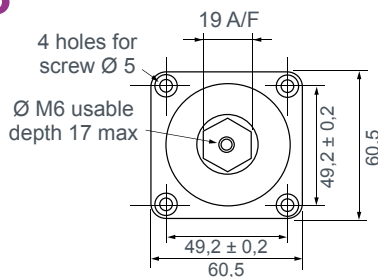
Reference	Static axial load (daN)	Natural frequency
MV71-01	0,18 - 0,50	15 to 20 Hz
MV71-02	0,30 - 0,70	
MV71-03	0,45 - 0,90	
MV71-04	0,65 - 1,30	
MV71-05	0,90 - 1,80	
MV71-06	1,35 - 2,40	
MV71-07	1,80 - 3,00	

## MV72



Reference	Static axial load (daN)	Natural frequency
MV72-P03	0,30 - 0,55	15 to 20 Hz
MV72-P04	0,50 - 0,90	
MV72-P05	0,75 - 1,40	
MV72-P06	1,20 - 2,10	
MV72-P07	1,90 - 3,40	
MV72-P08	3,00 - 5,90	
MV72-P09	4,20 - 8,20	
MV72-P10	5,90 - 11,50	

## MV73



Reference	Static axial load (daN)	Natural frequency
MV73-P02	2,50 - 5,20	15 to 20 Hz
MV73-P03	3,50 - 8,00	
MV73-P04	4,50 - 10,00	
MV73-P05	5,50 - 12,00	
MV73-P06	7,00 - 14,00	
MV73-P07	9,00 - 16,00	
MV73-P08	10,50 - 19,00	
MV73-P09	12,00 - 22,00	
MV73-P10	15,00 - 27,00	

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# VE101 VE111 VE112 VE113

Natural frequency : (1)  
3,5 to 6 Hz

See also  
**PAULSTRA**  
elastomer range :  
**Traxiflex**



## DESCRIPTION

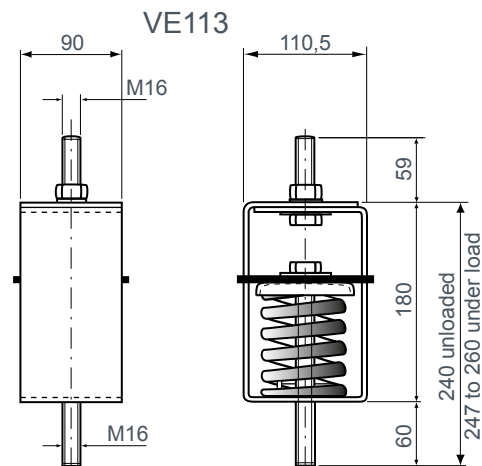
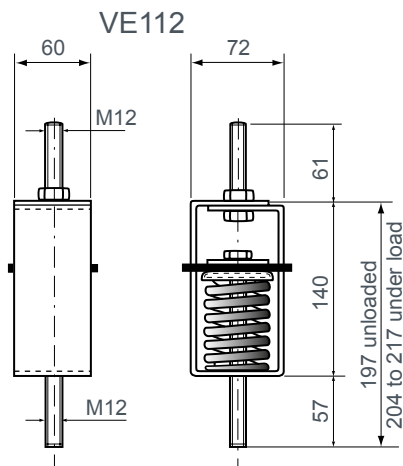
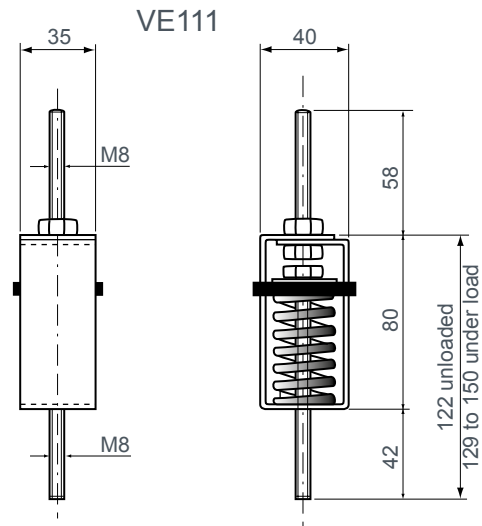
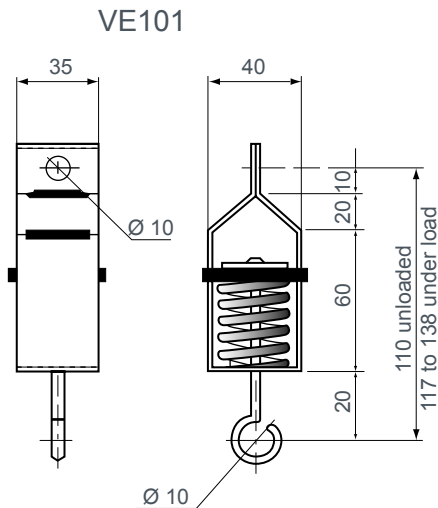
VE isolators have a cylindrical stainless steel spring, a galvanised body, an elastomer noise reduction guide and steel rings or studs depending on the model. The VE112 series has a steel cushion inside the spring.

## APPLICATIONS

These isolators with a natural frequency of between 3.5 and 6 Hz are specially designed for suspending false ceilings, air conditioning equipment and pipework and significantly reduces noise in buildings.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

# DIMENSIONS



# OPERATING CHARACTERISTICS

Reference	Load range (daN)
VE101 - 01	1 à 5
VE101 - 02	4 à 13
VE101 - 03	7 à 20
VE101 - 04	12 à 33
VE101 - 05	19 à 43

Reference	Load range (daN)
VE111 - 01	1 à 5
VE111 - 02	4 à 13
VE111 - 03	7 à 20
VE111 - 04	12 à 33
VE111 - 05	19 à 43

Reference	Load range (daN)
VE112 - 01	25 à 70
VE112 - 02	45 à 130
VE112 - 03	85 à 230

Reference	Load range (daN)
VE113	150 à 420

## Vibration characteristics

- Natural frequency: 3.5 to 6 Hz.



# VIBCABLE

Natural frequency : (1)  
5 to 25 Hz



## DESCRIPTION

This range of mounts 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 two or four mounting holes, per bar, smooth, counter sunk or tapped.

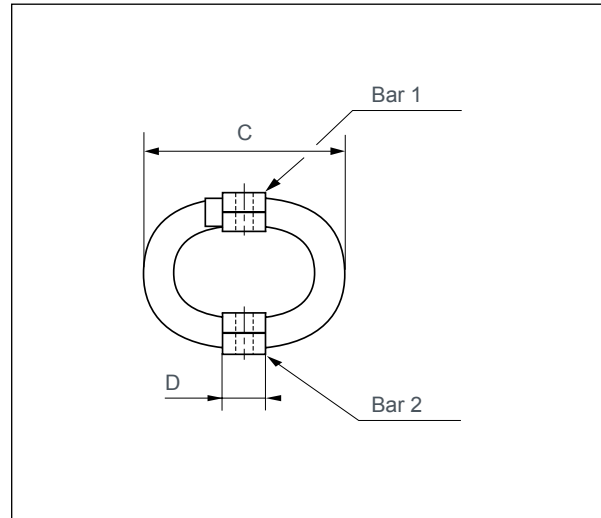
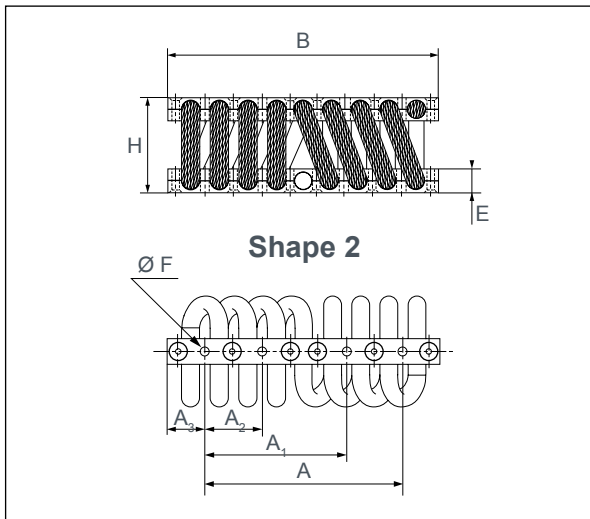
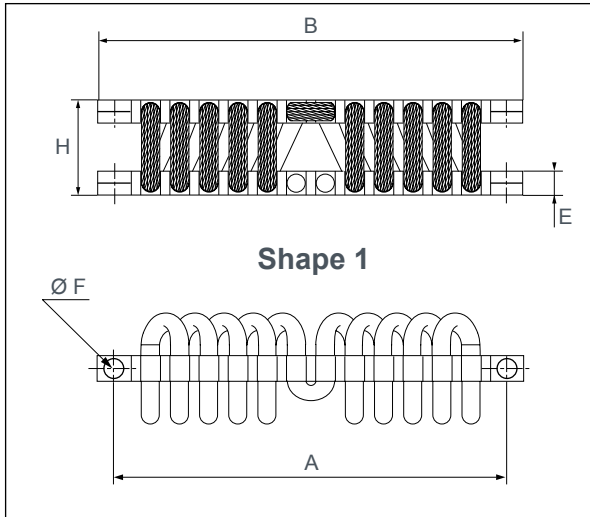
## APPLICATIONS

With a natural frequency between 5 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.

(1) Natural frequencies with max/min loads, see : OPERATING CHARACTERISTICS.

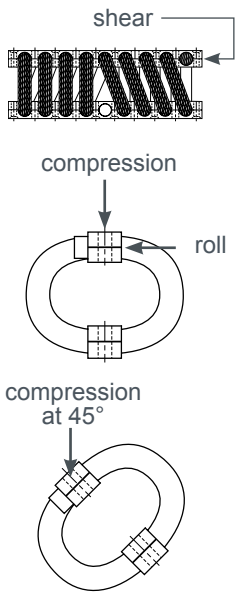
# DIMENSIONS



Reference	Shape	A (mm)	B (mm)	C (mm) depending on version		D (mm)	E (mm)	F (mm) (2 fixing holes)		H (mm) depending on version					
				min.	max.			tapped	threaded	01	02	03	04	05	06
V3CA8010-01 à -06	1	68	82	25	38	10	5	4,8	M4	18	26	20	28	30	33
V3CA8020-01 à -06	1	100	112	29	43	12,5	6	5,8	M5	21	31	35	25	28	38
V3CA8030-01 à -06	1	114	127	37	49	14	8	6,5	M6	28	30	33	36	38	41
V3CA8040-01 à -06	1	114	127	37	44	14	8	6,5	M6	28	33	38	-	-	-
V3CA8060-01 à -06	1	114	127	37	95	14	10	6,5	M6	38	43	87	43	31	34
V3CA8080-01 à -06	2	131	146	57	102	16	13	6,5	M6	48	54	60	64	80	90

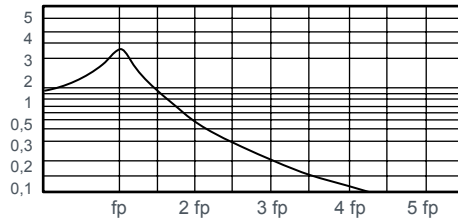
Reference	Shape	A (mm)	A1 (mm)	A2 (mm)	A3 (mm)	B (mm)	C (mm) depending on version		D (mm)	E (mm)	F (mm) (4 fixing holes)		H (mm) depending on version					
							min.	max.			tapped	threaded	01	02	03	04	05	06
V3CA8090-01 à -06	2	155,75	111,25	44,5	30	215,75	80	135	25	16	9	M8	70	74	89	110	68	77
V3CA8100-01 à -06	2	155,75	111,25	44,5	30	215,75	92	150	25	20	9	M8	75	89	95	110	83	108
V3CA8110-01 à -06	2	191	136,5	54,5	38,1	267	102	170	25	25	11	M10	90	95	100	100	110	150
V3CA8120-01 à -04	2	266,5	190,5	76	50,5	370	145	195	40	40	13	M12	135	105	160	160	-	-
V3CA8140-01 à -02	2	378	270	108	70,8	520	224	248	50	50	20	M18	180	218	-	-	-	-

# 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
V3CA8010	7	3	5	5	4	4	6	3	4	4	3	3	4	2	3	2	2	2
V3CA8020	11	20	19	15	17	26	8	14	14	11	13	19	6	10	10	7	9	13
V3CA8030	17	18	17	13	11	10	13	13	13	10	8	8	9	9	9	7	6	5
V3CA8040	86	62	40	-	-	-	66	48	31	-	-	-	42	31	20	-	-	-
V3CA8060	63	58	19	53	82	100	46	44	15	40	62	75	32	29	10	27	41	50
V3CA8080	88	62	51	47	25	26	66	47	39	36	19	19	44	31	26	24	13	13
V3CA8090	194	162	120	82	188	134	147	122	91	62	142	101	97	81	60	41	94	67
V3CA8100	439	414	481	215	442	290	330	312	363	162	332	218	220	207	240	108	221	145
V3CA8110	848	682	712	529	486	315	639	532	556	406	366	246	424	342	357	265	243	157
V3CA8120	1 658	1 396	878	651	-	-	1 272	1 055	664	492	-	-	331	698	441	320	-	-
V3CA8140	2 229	2 031	-	-	-	-	1 687	1 527	-	-	-	-	-	-	-	-	-	-

- **Operating temperature**  
- 180 °C to + 300 °C.
- **Electrical resistance**  
with conducting coating < 210° Ω.
- **Environment**  
The material used are unaffected by harsh environments.
- **Vibration transmission coefficient curves**  
For perfectly free system.



The bars can be supplied with smooth, threaded or countersunk holes. Several combinations are possible :

		Bar 1		
		Smooth holes : L	Threaded holes : N	Countersunk holes : F
Bar 2	Smooth holes : L	LL	NL	FL
	Threaded holes : N	LN	NN	FN
	Countersunk holes : F	LF	NF	FF

- **Codification example : V3CA8010-01 LL**

# OTHER METAL SUSPENSIONS MV801 MV803



## DESCRIPTION

MV801 and MV803 has a stainless steel wire mesh cushion and spring attached to aluminum alloy upper and lower cup with threaded centre holes.

## APPLICATIONS

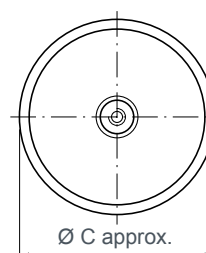
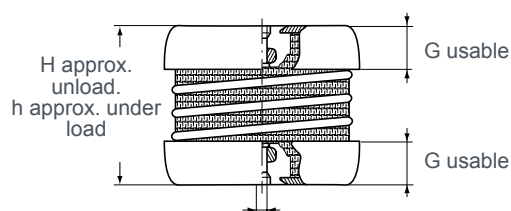
Isolation of low speed stationary rotating machines (fans, electric motors, pumps ...) sensitive equipments (measuring instruments, laboratory equipment ...).

## OPERATING CHARACTERISTICS

Reference	Axial static load (daN)
MV801-1CC	0,15 - 0,20
MV801-2CC	0,20 - 0,25
MV801-3CC	0,25 - 0,30
MV801-4CC	0,30 - 0,40
MV801-5CC	0,40 - 0,50
MV801-6CC	0,50 - 0,65
MV801-7CC	0,60 - 0,80
MV801-8CC	0,75 - 1,00
MV801-9CC	0,95 - 1,20
MV801-10CC	1,20 - 1,65
MV801-11CC	1,50 - 2,00
MV801-12CC	1,80 - 2,50
MV801-13CC	2,40 - 3,20
MV803-1CC	1,20 - 1,65
MV803-2CC	1,50 - 2,00
MV803-3CC	1,80 - 2,50
MV803-4CC	2,40 - 3,20
MV803-5CC	3,00 - 4,00
MV803-6CC	3,70 - 5,00
MV803-7CC	4,80 - 6,50
MV803-8CC	6,00 - 8,00
MV803-9CC	7,50 - 10,00
MV803-10CC	9,50 - 13,00
MV803-11CC	12,00 - 16,50
MV803-12CC	15,00 - 20,00
MV803-13CC	18,00 - 25,00

Reference	H (mm)	Ø C (mm)	D	G (mm)	h (mm)
MV801	42	26	M4	6	25
MV803	55	40,2	M5	8	34

- Natural frequencies :
  - axial } 5 to 10 Hz. depending on load.
  - radial }
- Amplification factor at resonance <5.
- Structural strength corresponds to continuous acceleration of 2 g with maximum load.
- Operating temperature : - 70°C to + 300°C.
- Maximum permitted excitation at natural frequency of suspension :
  - MV801 : ± 0.7 mm.
  - MV803 : ± 1 mm.



# V1N303 V1N304 V1N305 V1N306 V1N308



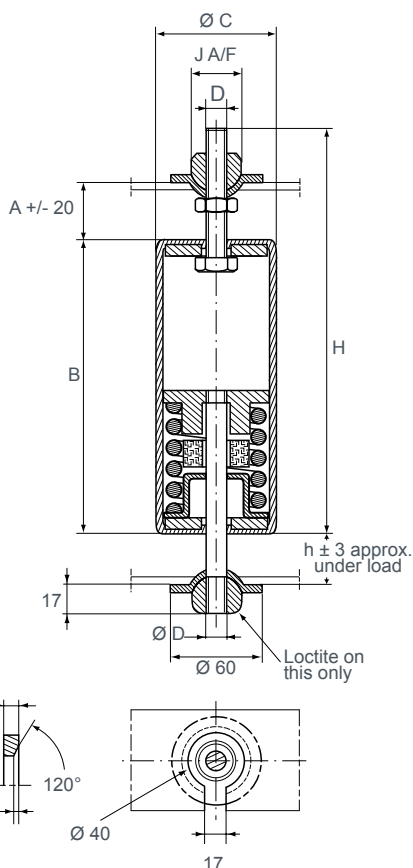
## DESCRIPTION

A single acting telescopic anti-vibration manufactured with a helicoil spring and stainless steel woven cushion.  
Protection, paint.

## APPLICATIONS

Isolation of exhaust sticking and pipework.

## OPERATING CHARACTERISTICS



- Maximum permitted excitation at natural frequency of suspension :  $\pm 1$  mm.
- Natural frequency 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 :  $- 70^{\circ}\text{C}$  to  $+ 150^{\circ}\text{C}$ .
- Displacement in all directions :  $\pm 40$  mm.
- Adjustment between attachment points :  $\pm 20$  mm.

Reference	Static load in traction (daN)	Ø of pipes 3 m long (for information only)
V1N303	45 - 85	150 - 300
V1N304	75 - 140	300 - 500
V1N305	120 - 230	500 - 800
V1N306	200 - 380	800 - 1 000
V1N308	270 - 500	1 000 - 1 200

Reference	A (mm)	B (mm)	Ø C (mm)	D	H (mm)	J (mm)	K (mm)	h (mm)
V1N303	40	135	63	M12	210	30	6	35
V1N304	40	155	63	M12	230	30	6	35
V1N305	45	175	82	M16	257	30	8	40
V1N306	45	200	82	M16	282	30	8	40
V1N308	45	220	82	M16	302	30	8	40

# V1209



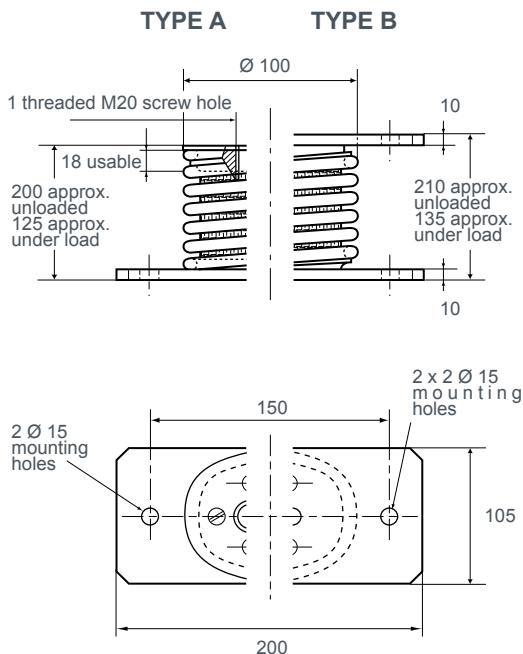
## DESCRIPTION

Part of a series of very low frequency isolators working in compression only, giving very efficient isolation for rotating machines running at 250 rpm and above.

## APPLICATIONS

Rotating machinery, hoppers and sensitive equipment with or without the use of inertia blocks.

## OPERATING CHARACTERISTICS



- Maximum permitted excitation at natural frequency of suspension :  $\pm 3$  mm.
- Natural frequencies for this amplitude :
  - axial : 1,8 to 2,2 Hz depending on load
  - radial : 3 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 :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .

With lower mounting plate	With lower and upper mounting plate	Static axial load (daN)
V1209-01A	V1209-01B	60 - 95
V1209-03A	V1209-03B	95 - 150
V1209-05A	V1209-05B	150 - 230
V1209-07A	V1209-07B	210 - 330
V1209-09A	V1209-09B	300 - 460

# V1210



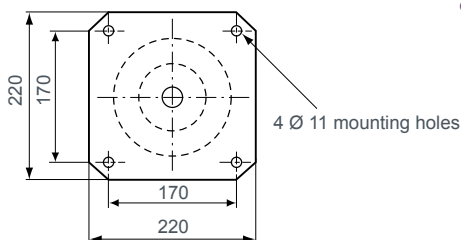
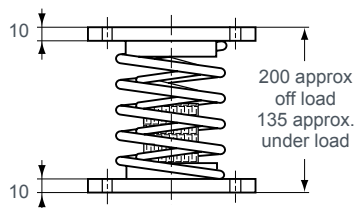
## DESCRIPTION

Part of a series of very low frequency isolators working in compression only, giving very efficient isolation for rotating machines running at 250 rpm and above.

## APPLICATIONS

Rotating machinery, hoppers and sensitive equipment with or without the use of inertia blocks.

## OPERATING CHARACTERISTICS



- Maximum permitted excitation at natural frequency of suspension :  $\pm 3$  mm.
- Natural frequency for this amplitude :
  - axial : 1,8 to 2,2 Hz depending on load
  - radial : 3 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 :  $- 70^{\circ}\text{C}$  to  $+ 300^{\circ}\text{C}$ .

Reference	Static axial load (daN)
V1210-51	460 - 740
V1210-52	550 - 870
V1210-53	700 - 1 100
V1210-54	1 000 - 1 600
V1210-55	1 300 - 1 960

# V1B-5984-01 V1B-5984-11



## DESCRIPTION

The assembly comprises :

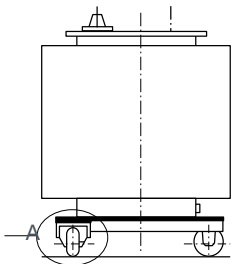
- two metal cushions.
- a nut.
- two Belleville washers.
- a threaded centre axis.
- two flat washers.

## APPLICATIONS

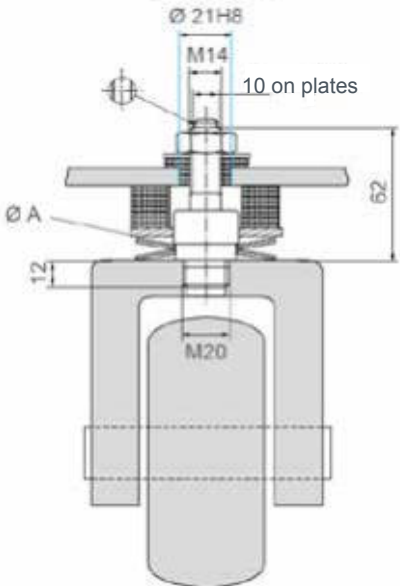
Mountings for transformers with a locking system for use in transit.

## OPERATING CHARACTERISTICS

- Natural frequency :
  - axial
  - radial } 10 to 15 Hz depending on load.
- Attenuation 100 Hz > 90%.
- Good resistance to oil.
- Electrically conductive.



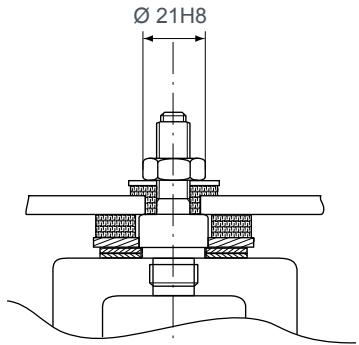
### ENLARGEMENT POINT A



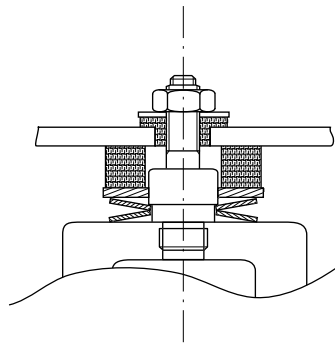
Not supplied

Reference	Static load (daN)	Locking torque (N.m) (for use when transformer in transit)	Ø A (mm)
V1B-5984-01	930	90	65
V1B-5984-11	1 800	100	75

Torque when transformer in use for both types = 70 N.m.



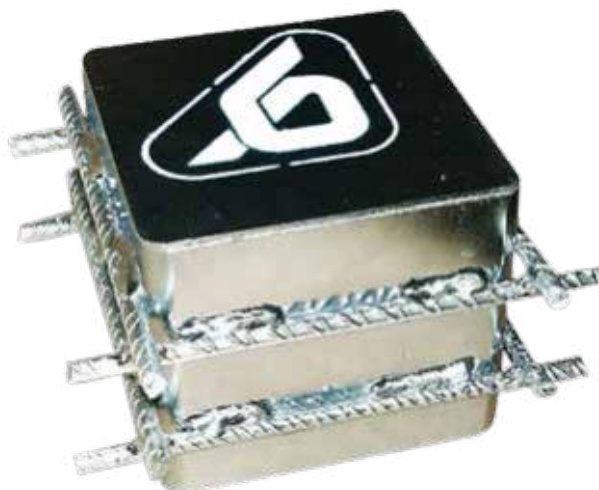
Locked position during transit



Unlock position transformer in use



# VIBRAFLOT® 357-961



## DESCRIPTION

VIBRAFLOT® is an antivibration system consisting of the following elements :

- metallic box containing a low frequency spring;
- elastomer sheet to isolate high frequencies;
- system to fift the floating floor and set its height.

## APPLICATIONS

Typical applications for floating floor in buildings :

- Theatres
- Ground floor shops
- Concert theatres
- Hospital
- Laboratories
- Sports & dance halls
- Cinemas
- Thalasso, Spas
- Discotechs
- Technical areas
- Hotels
- Auditoriums, Conference halls
- Recording studios
- Railway lines
- Luxury appartments
- Alleys

## ADVANTAGES

Low natural frequency.

- High level of vibration attenuation.
- Improved stability of the suspension and reduced vibration amplitude.
- Improved operational life for suspended machinery.
- Integrated system controlling the height of the floor.
- Mounts are accessible if modifications are required.

## FUNCTION

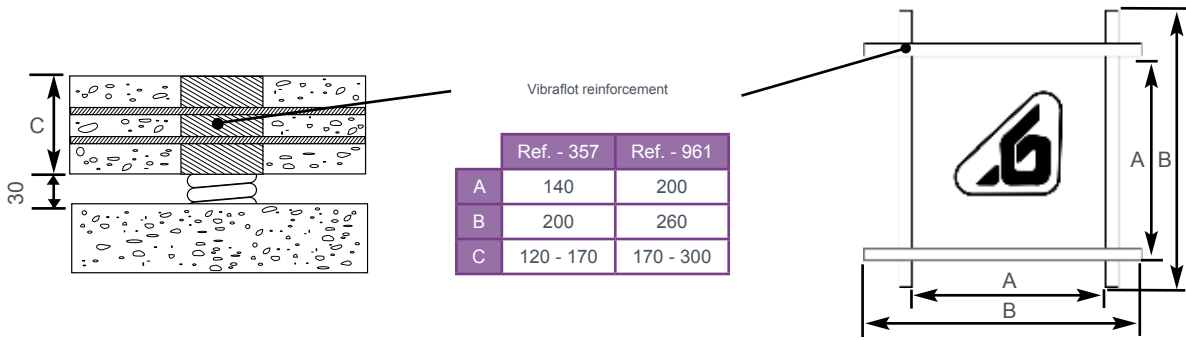
Low natural frequency.

- High level of vibration attenuation.
- Improved stability of the suspension and reduced vibration amplitude.
- Improved operational life for suspended machinery.
- Integrated system controlling the height of the floor.
- Mounts are accessible if modifications are required.

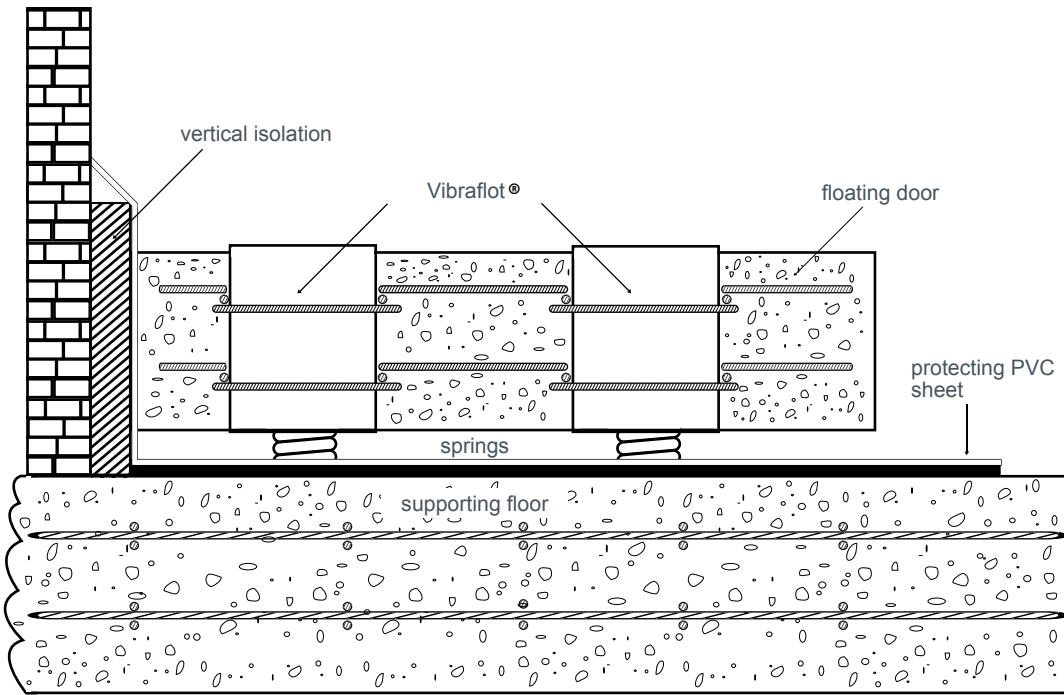
## TECHNICAL CHARACTERISTICS

Static load	From 300 daN to 2.000 daN by box
Natural frequency	3 to 6 Hz
Elastic limit	2 - 4 g in vertical 1,2 g in horizontal
Concrete thickness	From 120 to 300 mm

# DIMENSIONS



# TYPICAL MOUNTING ARRANGEMENT









We make it *possible*

# FLEXIBLE BUSHES



# FLEXIBLE BUSHES

## CONTENT

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See current price list for availability of items.

We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures and schemas of the products are supplied for information only.



# 1 - GENERAL

## 1.1 - The operation of a flexible bush

A flexible bush has an elastomeric element enclosed between an outer sleeve and a centre axis intended to replace a greased bush.

The improvements achieved in industry due to the use of elastic bushes have been justly compared to the progress achieved in the past by the use of ball joints. In fact, the improvements achieved by the latter by reducing friction and play considerably and reducing wear and noise, have been taken even further by elastomeric rubber bushes which eliminate play completely and isolate high frequency vibrations.



## 1.2 - Static characteristics

### 1.2.1 - Radial characteristics

The application of a radial force  $F_R$  causes an elastic eccentricity  $X$  by compression of the elastomer on one side and stretching of the other side.

The bush is characterised by the permissible radial static force and by the corresponding eccentricity.

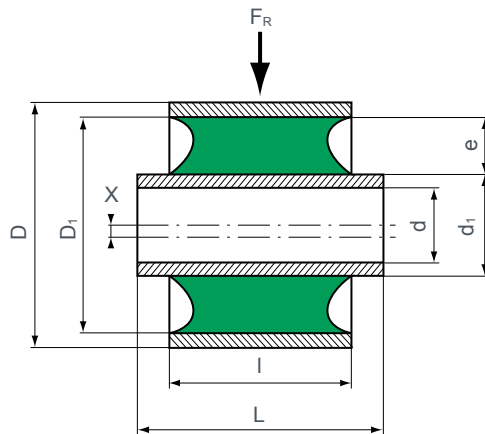
In practice, the permissible radial static forces are estimated by taking the stress rate on the surface area  $S$  of the rectangle which represents the projection of part of the elastomer which is in contact with the internal tube.

$$\text{Stress rate} = t = \frac{F_R}{S} = \frac{F_R}{d_1 \times l} \quad \begin{array}{l} F_R \text{ in N} \\ d_1 \text{ and } l \text{ in m} \\ t \text{ in N/m}^2 \end{array}$$

The permissible stress is a function  $\frac{1}{D}$  of the bush and of the specific properties of the elastomer.

It is clear that the permissible deformation for a given radial force will be linked in practice to the thickness of the elastomer.

$$e = \frac{D_1 - d_1}{2}$$



### 1.2.2 - Torsional characteristics

The application of a torque to the centre axis of revolution of a bush causes an angular displacement. This displacement produces a torsional reaction expressed in N.m.

The bush is characterised by its maximum torsion angle  $\alpha$  and by the corresponding compensating torque.

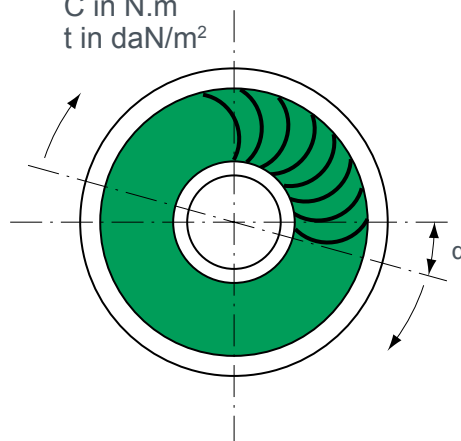
In practice, the permissible torsion angles are of the order of  $20^\circ$  to  $30^\circ$ . The maximum permissible static torque can be calculated on the basis of the stress rate at the point of contact between the internal tube and the elastomer.

$$C = t \times \pi \frac{d_1^2 l}{2}$$

ou

$$C = \pi \frac{F_R d_1}{2}$$

$d_1$  and  $l$  in m  
 $C$  in N.m  
 $t$  in daN/m<sup>2</sup>



### 1.2.3 - Axial characteristics

When the external tube is fixed, the application of an axial force  $F_a$  on the internal tube will cause an elastic displacement “ $y$ ” parallel to the axis of the bush, by shearing of the elastomer. The bush is characterised by the permissible axial load and by the corresponding elastic displacement.

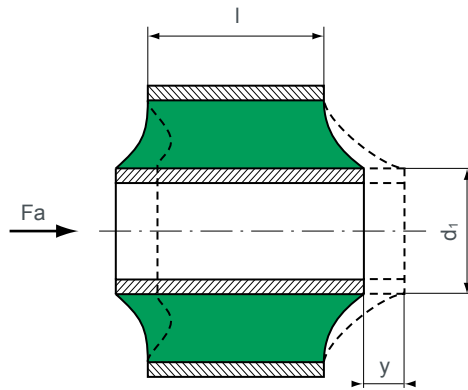
In practice, the permissible static axial loads are estimated by taking the stress rate at the internal tube.

$F_a = \pi \times d_1 \times l \times t$  where  $d_1$  and  $l$  are in cm and  $F_a$  in daN and  $t$  is in daN/cm<sup>2</sup>

The permissible static deflection is a function of the radial thickness of the elastomer.

$$y = k \cdot \frac{D_1 - d_1}{2}$$

The axial breaking load of a bonded part is of the order of 10 times the permissible static load.



**Note :**

A Prestressed bush which is not fully bonded must not be subjected to a static axial load.

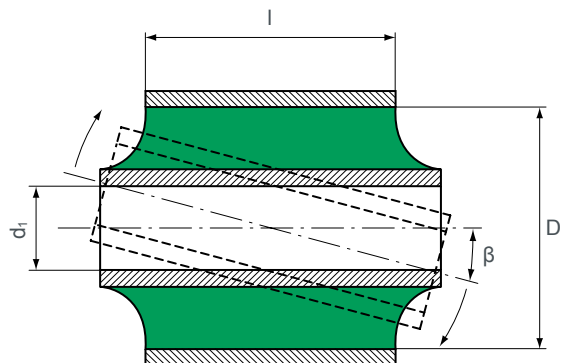
### 1.2.4 - Conical characteristics

The application of a torque whose axis is perpendicular to the axis of rotation of the bush will cause an angular deformation  $\beta$ .

This deformation will in turn produce a compensating elastic torque expressed in N.m.

The bush is characterised by the permissible conical angle and by the corresponding compensating torque.

In practice, the permissible conical angles are of the order of a few degrees. They vary greatly with the slenderness ratio  $\frac{l}{D}$  of the part.

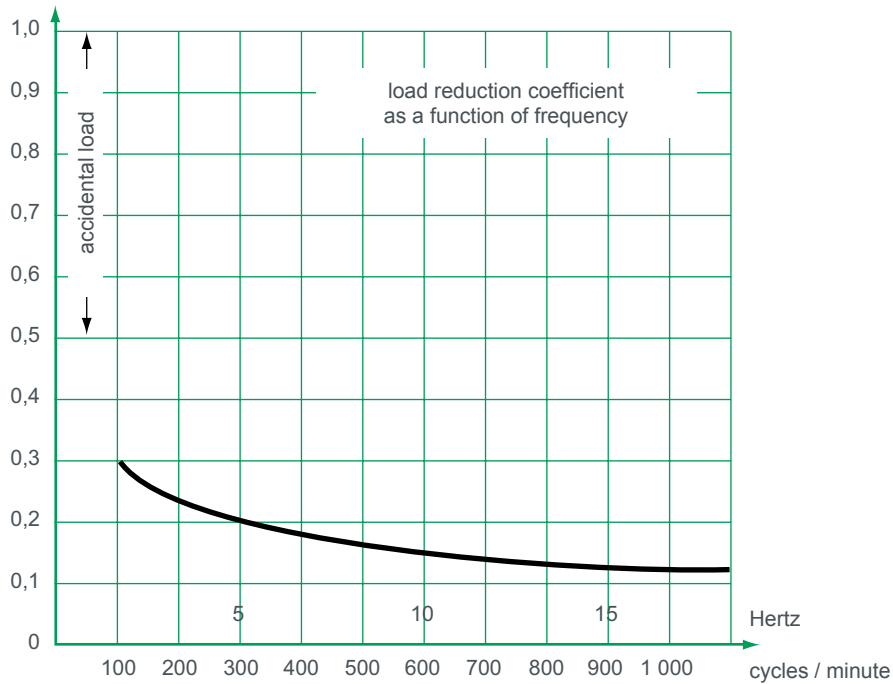


# 1.3 - DYNAMIC CHARACTERISTICS

## 1.3.1 - Dynamic loads

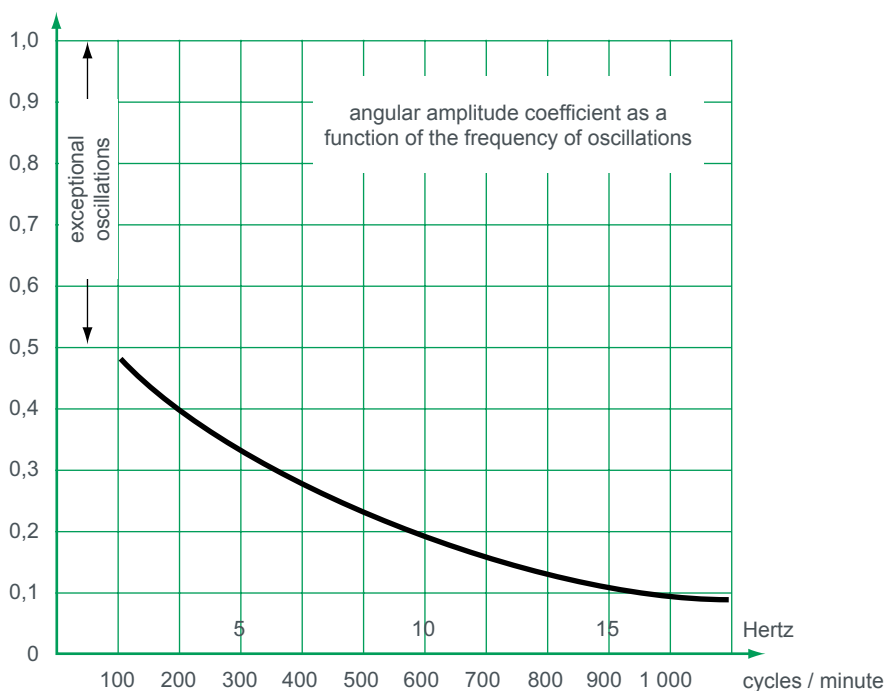
For dynamic loads, the following corrections must be added to the static loads provided in the catalogue :

- for infrequent forces of very short duration (shocks), the loads can be doubled;
- in the case of continuing periodic forces, the loads must be multiplied by a reduction coefficient  $\lambda$  which is a function of the frequency of the forces.



## 1.3.2 - Torsional amplitudes

The torsion amplitudes provided in the catalogue must be multiplied by a reduction coefficient  $\mu$  which is a function of the frequency of the oscillations.



## 2 - PRINCIPAL TYPES OF FLEXIBLE BUSHES

### 2.1 - Simple bushes

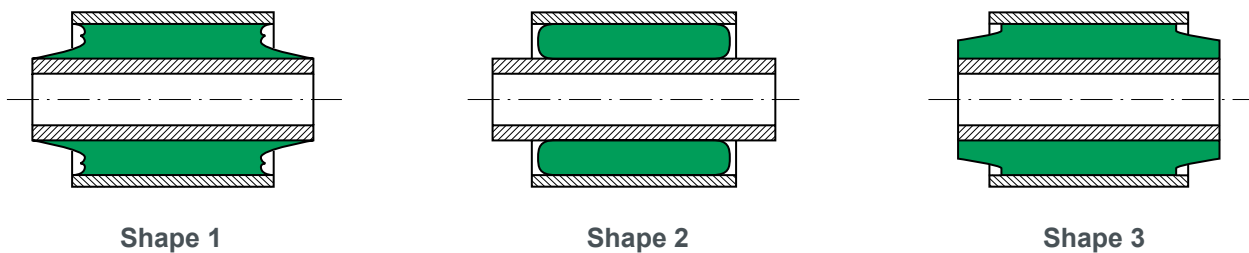
#### FLEXIBLOC (fig. 1) - FULLY BONDED

This is a bush made up of 2 concentric tubes between which of elastomer is bonded. Under the effect of external forces or torques, the relative movement of the tubes will cause an elastic deformation of the elastomer. By consulting the service conditions, a bush should be chosen which will remain within its elastic operational limits.

#### SILENTBLOC (fig. 2) - PRESTRESSED

This is a bush made up of 2 concentric tubes between which a ring of “adhérite®” elastomer is inserted by force. Under the effect of external forces or torques, the relative movement of the tubes will cause an elastic deformation of the elastomer. Above a certain value the adhereite will slide in the tubes.

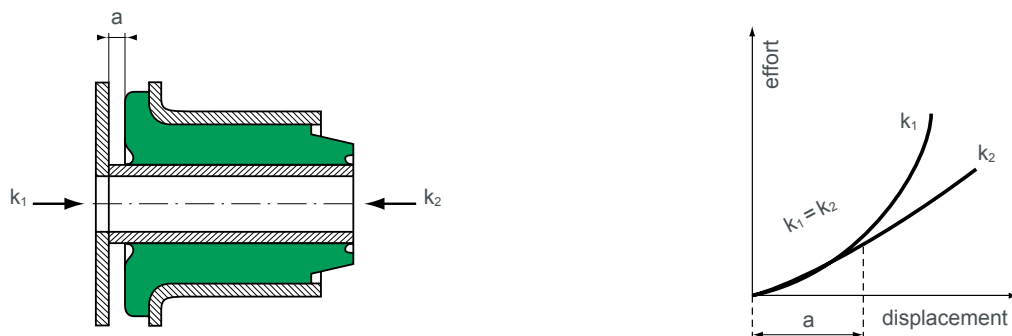
These simple bushes are considered to have lateral stops (shape. 3) when the elastomer protrudes from the external tube in the form of a support surface with various profiles.



The lateral stop only comes into operation when the bush is forced off centre by a radial load. This causes the stop to protrude, thus ensuring an “anti-noise” role at the limit of axial movement.

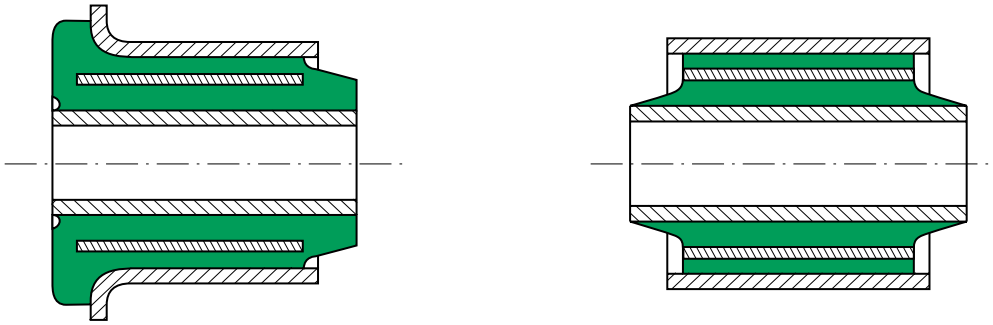
### 2.2 - Flanged bushes

In this type of bush, one of the tubes is flanged.



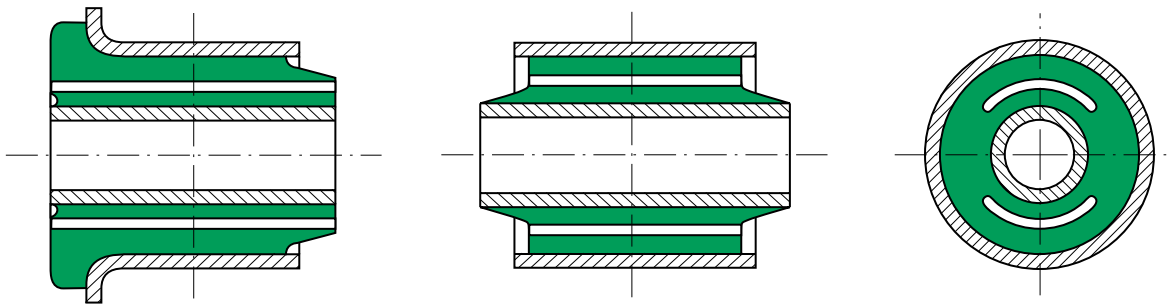
The rigidity  $k_1$  is equal to  $k_2$  if the travel is less than “a”, and it becomes greater than  $k_2$  when the travel is greater than “a”.

## 2.3 - Laminated bushes



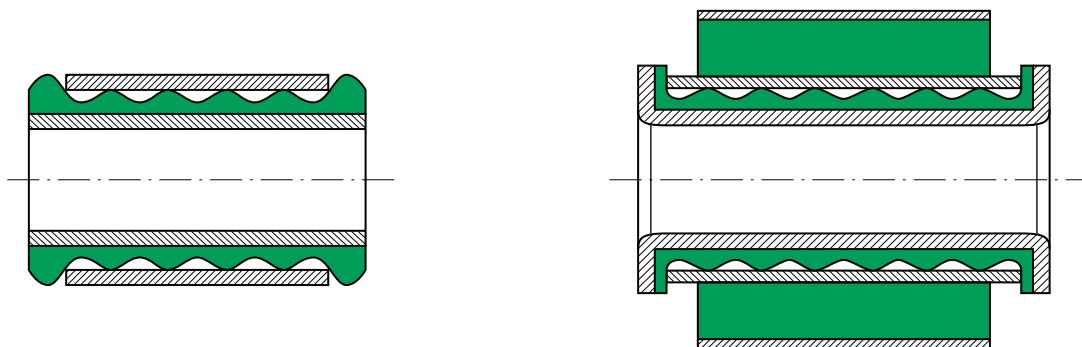
This type of bush has a thin metallic tube between the internal tube and the external tube. The object is to have a higher stiffness radially while keeping practically the same stiffness in torsion. The lamination of a bush also helps to decrease the work rate of the elastomer under high radial loads.

## 2.4 - Void bushes



A void bush is designed to have radial stiffness which are very different at 90° to each other. The difference in rigidity is governed by the size of the voids, which may or may not run the whole length of the bush.

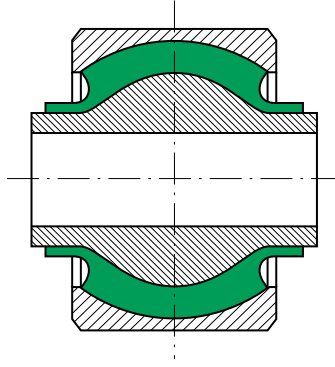
## 2.5 - Pivot bushes



### FLUIDBLOC :

This type of bush is intended to offer minimum resistance to torsion. The elastomer is bonded to only one of the armatures, and a suitable permanent lubricant ensures the lubrication between the elastomer and the second armature ensures a very low torsional resistance. Seals are provided at each end to prevent the lubricant from coming out and stop impurities from getting in. Resistance to axial force is provided by a flange in the elastomer which bears against the side of the outer sleeve, the force being transmitted by a lateral washer.

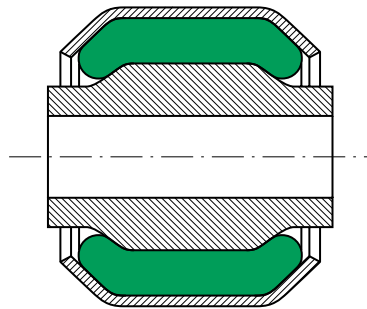
## 2.6 - Spherical bushes



### **SPHERIFLEX :**

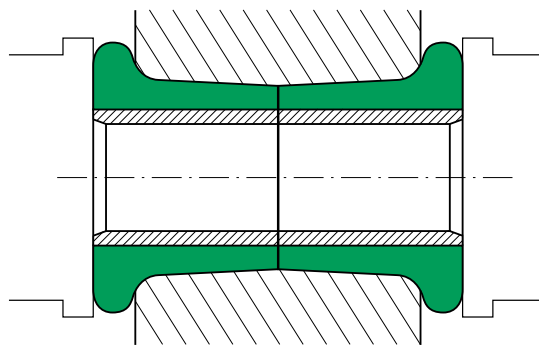
In this bush, the outer sleeve and centre axis are spherical, which enables the bush to resist relatively high radial and axial loads and to obtain a circular rigidity which is independent of the axis of rotation.

## 2.7 - Other bushes



### **“SILENTBLOC®” with turned down sides :**

For the same dimensions, this type of bush provides a radial load capacity which is superior to that of the classic “silentbloc®”. In addition, versions of relatively short length permit conical movement more easily (reduced torque and increased angle).



### **CONICAL BUSH :**

This takes the form of a rubber sleeve whose external surface is a truncated cone, and which surrounds a cylindrical internal part to which it adheres strongly by high radial expansion. Assembly in pair, in a housing made up of two truncated cones placed small end to small end. By axial pressure, a high compression is created which ensures the external adherence of the rubber and causes lateral cushions to form at each end of the housing. These cushions ensure resistance to axial forces.

# 3 - OUTER SLEEVE AND CENTRE AXIS

## 3.1 - Materials used

In general, the outer sleeve and centre axis of flexible bushes are made of :

- Mild steel or polyamide for the external outer sleeve.
- Medium carbon steel for the centre axis.

The reason for the difference has to do with the method of fixation onto the internal armature, which is usually done by forcing from one end. The armature must therefore be both strong and not too thin, to avoid buckling.

## 3.2 - Protection during storage

To avoid corrosion of the steel parts, the parts are protected by a layer of phosphate which gives them a grey appearance, the whole being protected by a layer of oil.

To ease removal of fixing bolts, the internal tubes are also protected on the interior by a layer of phosphate. This protection is good for storage, but it does not constitute a “tropicalised” protection, nor is it intended to resist saline mist.

## 3.3 - Length tolerances

- Length L (internal tube) : ± 0.1mm
- Length l (external tube) : JS 15, according to NF E02 100-1 and NF E02 100-2

- Longitudinal overhang :  $\frac{L - l}{2} \pm 0,4 \text{ mm}$

## 3.4 - Diameter tolerances

On the internal diameter d : H10

d (mm)	3 to 6	6 to 10	10 to 18	18 to 30	30 to 50
H10	+ 0,048 + 0	+ 0,058 + 0	+ 0,070 + 0	+ 0,084 + 0	+ 0,1 + 0

On the external diameter D :

D ≤ 25 (mm)	25 < D ≤ 40 (mm)	D > 40 (mm)
+ 0,05 + 0	+ 0,1 + 0	+ 0,15 + 0

Recommended tolerance for fitting into a bored hole : boring D : N9 :

D (mm)	10 to 18	18 to 30	30 to 50	50 to 80	80 to 120
N9	- 0 - 0,043	- 0 - 0,052	- 0 - 0,062	- 0 - 0,074	- 0 - 0,087



## 4 - THE SELECTION OF A FLEXIBLE BUSH

In order to specify a bush correctly for a given application, the following criteria must be determined :

### Basic data

For each of the 4 characteristics of the part (axial, radial, torsion or conical), the following values must be taken into account :

- the maximum static values (of force and/or of deflection) to which the part is subjected;
- the maximum dynamic values and their frequencies.

### Fundamental parameters

Depending on the application, determine from the basic data the major fundamental parameter(s) which govern the choice of the bush to be used.

### Dimensions

The fundamental parameters enable you to consult the catalogue for the range of dimensions of various bushes.

### Stiffness

The final selection of the bush will depend on the required stiffness for the application. In particular, length, diameter and the thickness of the elastomer required for the desired bush will be determined.

### Environmental conditions

Most of our standard bushes are in natural rubber. This has been chosen because of its good dynamic qualities.

In normal conditions of use, the types of rubber used guarantee a good life and limit creep in particular.

The following conditions of use are considered abnormal :

- temperatures above 70° C;
- prolonged contact with aggressive fluids;
- aggressive environments, such as oil or petrol;
- prolonged contact with acids or alkalis;
- aggressive atmospheres (e.g. ozone, chlorine).

Use in this conditions can accelerated ageing of the bushes, and cause the degradation or even the destruction of the rubber. An abnormally aggressive environment can, in particular, increase the deformation of the bush (by creep).

Flexible bushes can be made with special elastomers which are capable of surviving the abnormal conditions mentioned above and enabling the bushes to perform well.

**Our technical services are at your disposal to reply to your questions about the properties of our various elastomers.**

## 5 - AN EXAMPLE OF A SELECTION

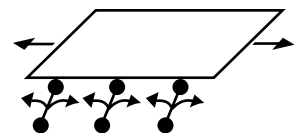
For the bushes of a vibrating carpet.

Weight : 120 daN. Number of fixing points : 6

Angle of movement :  $\pm 2^\circ$ . Frequency: 600 cycles/mn = 10 Hz

Radial load per bush :  $\pm 20$  daN (evenly loaded).

Amplitude reduction coefficient at 10 Hz :  $m = 0.18$ . Torsion angle :  $\frac{2^\circ}{0.18} = 11^\circ$



In this case, the axial and conical parameters are not of major importance in the selection of the bushes. Since the fixing diameter of the connecting rods is 10 mm, we would select reference 561 205 from the bush catalogue.

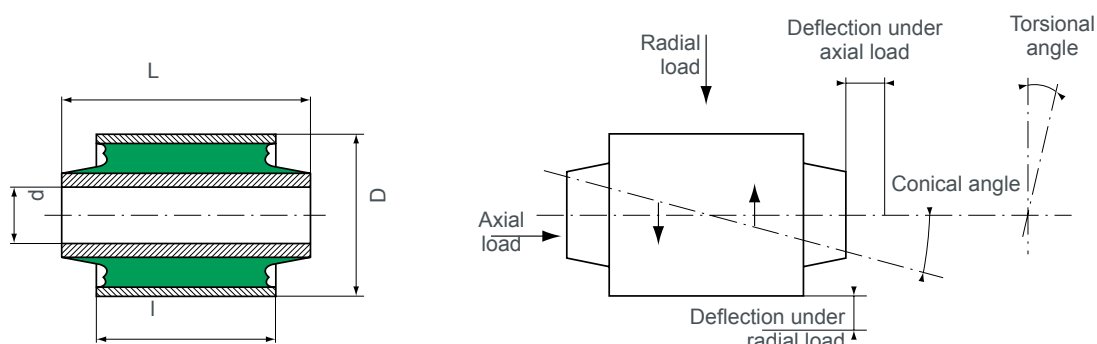
$d = 10$  mm     $D = 22$  mm     $L = 17$  mm     $l = 15$  mm    Radial load = 40 daN  
Maximum torsion angle =  $25^\circ$

**Therefore, for the given application we would use : 12 Flexibloc 561205 bushes.**

# 6 - CATALOGUE OF FLEXIBLE BUSHES

## SIMPLE BUSHES

### FLEXIBLOC® AND SILENTBLOC®



**FLEXIBLOC® - Fully Bonded** : The elastomer is bonded to the 2 concentric tubes, Parts Number 560..., 561...

**SILENTBLOC® - Prestressed Elastomer** : The ring of "adherite" is inserted by force between the 2 concentric tubes, Parts Number 861..., 862..., 864...

**BL** : Bushes with a lateral stop.

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
6	16	14	12		10	0,1	25°	10	0,6	5°	561101
	16	14	12		10	0,07	30°	5	0,3	7°	<b>861601</b>
	16	24	20		20	0,05	30°	15	0,4	3°	861602
	20	22	16		25	0,4	30°	20	2,2	6°	561239
8	16	17	15		30	0,1	15°	15	1,3	3°	<b>561102</b>
	16	24	20		50	0,1	10°	15	1	1°	561104
	16	25	22		55	0,03	20°	35	0,2	1°	861104
	16	28	25		65	0,03	20°	45	0,2	1°	<b>861103</b>
	20	17	15		15	0,1	30°	10	0,3	7°	<b>861603</b>
	20	19	15		20	0,1	30°	10	0,3	7°	<b>861783</b>
	32	23,2	18		30	0,5	35°	20	1,5	6°	<b>561418</b>
9	21	21	17	BL	40	0,2	30°	15	0,8	5°	561258
10	22	17	15		40	0,3	25°	15	0,8	6°	<b>561205</b>

The references kept in stock are written in bold.

1 kg ≈ 1 daN

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
10	22	19	15		40	0,3	25°	15	0,8	6°	561206
	22	23	20		55	0,03	20°	35	0,4	1°	<b>861112</b>
	22	24	18		90	0,2	20°	15	0,4	2°	561112
	22	30	25		100	0,2	20°	40	1,5	3°	<b>561207</b>
	22	33	30		110	0,03	20°	70	0,6	1°	<b>861114</b>
	22	34	30		55	0,1	30°	35	0,3	3°	<b>861607</b>
	24	22	18		50	0,4	25°	25	0,2	5°	561209
	24	24	18	BL	70	1,3	30°	25	0,8	3°	561445
	27	22	17		65	0,5	30°	25	1,5	3°	<b>561613</b>
	28	26	20	BL	80	0,6	30°	25	1,5	3°	561150
28	27	20	BL	80	0,5	20°	30	1	5°	<b>561424</b>	
28	32	26	BL	110	0,4	30°	40	0,8	2°	561518	
11,3	19,85	30,2	25,4		45	0,05	10°	35	0,3	2°	561103
12	25	23	20		55	0,04	20°	25	0,2	3°	<b>861118</b>
	25	28	25		100	0,2	20°	40	1	4°	<b>561212</b>
	25	34	30		120	0,2	20°	50	0,8	3°	<b>561213</b>
	25	38	35	BL	145	0,04	20°	95	0,4	1°	<b>864105</b>
	25	44	35		145	0,04	20°	95	0,4	1°	<b>861197</b>
	25	54	50		550	0,3	15°	45	0,6	1°	<b>561250</b>
	26	24	20		35	0,06	30°	20	0,4	7°	<b>861611</b>
	26	34	32		80	0,07	30°	50	0,4	3°	<b>861613</b>
	28	28	25		50	0,07	30°	25	0,4	7°	861614
	28	38	32		120	0,25	20°	60	1,5	3°	<b>561446</b>
	28	49	45		130	0,2	30°	60	1,6	4°	561224
	30	30	24		110	0,5	35°	40	1,5	6°	<b>561302</b>
	30	30	24	BL	110	0,5	25°	40	1,5	3°	<b>561341</b>
	30	30	24	BL	70	0,1	5°	25	0,6	4°	864801
30	42	36	BL	210	0,55	30°	35	1,1	2°	<b>561395</b>	
32	40	24		190	0,55	20°	30	1	2°	560034	
53	46,5	34		140	1,5	50°	50	2	6°	<b>561122</b>	
12,04	41,27	76,03	52		100	1	40°	50	2	4°	561677
14	27	25	17		60	0,2	20°	30	1,1	3°	561120
	27	28	25		120	0,2	20°	50	1,8	4°	<b>561227</b>
	27	28	25		90	0,04	20°	45	0,4	3°	<b>861128</b>
	27	33	25		150	0,15	20°	40	1	3°	561747
	27	45	40	BL	120	0,2	25°	80	1,5	2°	<b>561269</b>
	27	49	45		250	0,04	20°	165	0,7	1°	<b>861132</b>
	27	54	50	BL	280	0,04	20°	185	0,5	1°	<b>864109</b>
	27	58	50		350	0,1	20°	80	1	1°	561748
	28	44	40		250	0,1	15°	80	0,7	1°	<b>561458</b>
	28	54	50	BL	250	0,1	15°	70	0,7	1°	<b>561617</b>
	29	44	32		120	0,2	20°	50	2,5	2°	561594
	30	28	25		120	0,7	30°	45	1,1	5°	561303
	30	28	25		50	0,08	30°	25	0,4	7°	<b>861618</b>
	30	30	25	BL	80	0,2	25°	50	1,2	5°	561377
	30	30	25		120	0,3	25°	55	1,2	5°	561304
	30	30	25		50	0,08	30°	25	0,4	7°	<b>861619</b>
	30	42	38		150	0,2	30°	70	1,9	3°	<b>561305</b>
	30	42	38		100	0,08	30°	65	0,4	3°	<b>861620</b>
	32	33	30		130	0,4	25°	60	2	4°	<b>561307</b>
	32	46	38	BL	170	0,3	25°	80	2	2°	561492
32	48	40	BL	250	0,1	15°	100	0,5	2°	561340	
32	54	46	BL	190	0,08	25°	125	0,6	2°	<b>864403</b>	
32	70	65		300	0,2	30°	200	1,1	1°	<b>561309</b>	
14,3	30,2	69,8	63,5		370	0,1	20°	190	0,9	1°	861251
16	28,1	34	25		30	0,05	20°	15	0,4	1°	861834
	30	30	25		200	0,2	5°	35	0,5	1°	561348
	32	26	20		70	0,05	20°	35	0,3	2°	<b>861136</b>
	32	28	22		120	0,2	20°	50	2	5°	561313
	32	28	25		140	0,2	20°	50	1,6	5°	<b>561312</b>

The references kept in stock are written in bold.

1 kg ≈ 1 daN

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
16	32	32	28	BL	130	0,05	20°	65	0,4	3°	<b>861141</b>
	32	54	50		330	0,05	20°	220	0,4	1°	<b>861143</b>
	32	54	50		330	0,05	20°	220	0,4	1°	<b>864108</b>
	32	59	55		400	0,05	20°	260	0,4	1°	<b>861145</b>
	32	66	60		450	0,05	20°	300	0,4	1°	<b>861146</b>
	32	76	70		500	0,1	20°	180	1,5	1°	561358
	36	38	35		90	0,1	30°	45	0,5	7°	<b>861624</b>
	36	43	35		90	0,1	30°	45	0,5	7°	861756
	40	40	32		200	0,8	30°	45	1,5	2°	561401
	40	40	32		95	0,6	5°	-	-	4°	<b>861810</b>
	40	50	32		135	0,6	5°	-	-	4°	861931
	40	54	50		250	0,5	35°	120	3	3°	561402
	52	34	30		70	1	40°	30	3,5	7°	561511
	52	48	40		90	1	40°	50	4	7°	<b>561520</b>
18	34	33	30	BL	120	0,1	20°	60	1,1	4°	561328
	34	33	30		150	0,05	20°	75	0,4	3°	<b>861151</b>
	34	36	32		160	0,05	20°	80	0,4	3°	<b>861152</b>
	34	54	50		600	0,3	12°	100	1	1°	561455
	34	66	60		490	0,05	20°	320	1,5	1°	<b>861153</b>
	34	71	65		540	0,05	20°	360	1,5	1°	<b>861154</b>
	36	46	40		220	0,04	20°	145	0,4	1°	<b>861156</b>
	42	38	35		100	0,1	30°	50	0,5	7°	<b>861627</b>
	70	58	45		225	2,5	50°	100	4	5°	561543
20	38	42	38	BL	230	0,2	25°	75	1	3°	<b>561384</b>
	38	59	55		300	0,15	20°	50	1	2°	<b>561335</b>
	38	59	55		410	0,04	20°	270	1,5	1°	<b>861160</b>
	38	76	70		400	0,2	15°	200	1	1°	561337
	38	76	70		630	0,04	20°	420	1,5	1°	<b>861162</b>
	38	81	75		700	0,04	20°	465	1,5	1°	<b>861163</b>
	38	90	84		600	0,1	15°	200	1	1°	561382
	40	45	38		70	0,15	25°	35	0,6	2°	861830
	42	42	38		300	0,3	25°	90	1,5	4°	<b>561404</b>
	42	42	38		165	0,08	20°	80	0,5	3°	861165
	44	45	38		210	0,5	25°	90	3	4°	561440
	45,15	42	38		300	0,8	25°	60	1,6	2°	561451
	48	46	33		65	0,2	5°	-	-	4°	861934
	50	50	40		155	0,5	5°	25	0,7	4°	<b>861817</b>
	52	66	60		300	1	25°	150	3	5°	561521
22	40	45	40	BL	250	0,05	20°	130	0,4	3°	<b>861166</b>
	40	86	80		850	0,06	20°	560	1,5	1°	<b>861167</b>
24	42	50	45	BL	340	0,06	20°	170	0,4	3°	<b>861169</b>
	42	55	50		400	0,05	20°	200	0,4	3°	<b>861170</b>
	42	96	90		1 100	0,02	20°	730	1	1°	<b>861171</b>
	44	58	48		125	0,08	20°	60	0,8	3°	861831
	48	44	40		160	0,3	20°	110	1,5	2°	<b>561411</b>
	48	58	50		350	0,3	20°	120	2	2°	<b>561400</b>
	48	93	85		560	0,15	30°	370	0,7	3°	861634
	58	58	48		215	1	5°	-	-	4°	<b>861818</b>
26	44	66	60	BL	500	0,2	15°	160	1	1°	561454
28	48	36	34	BL	315	0,05	20°	160	0,5	3°	<b>861173</b>
	48	55	50		420	0,05	20°	210	0,5	3°	861174
	48	66	60		400	0,15	20°	190	1,1	2°	<b>561409</b>
	48	66	60		540	0,06	20°	270	0,5	3°	<b>861175</b>
	48	118	110		1 500	0,07	20°	900	2	1°	861177
	52	108	100		800	0,1	30°	500	0,7	3°	<b>861637</b>
	66	66	56		500	1,5	40°	140	3,5	7°	<b>561601</b>
	66	66	56		350	1	5°	100	3	4°	<b>861819</b>
	66	76	70		850	1	30°	320	3	6°	561660
30	50	128	120	BL	1 900	0,07	20°	1 000	2,5	1°	<b>861178</b>
32	52	66	60	BL	600	0,15	10°	260	2,2	1°	<b>561503</b>
	52	66	60		600	0,06	20°	300	0,3	3°	<b>861180</b>

The references kept in stock are written in bold.

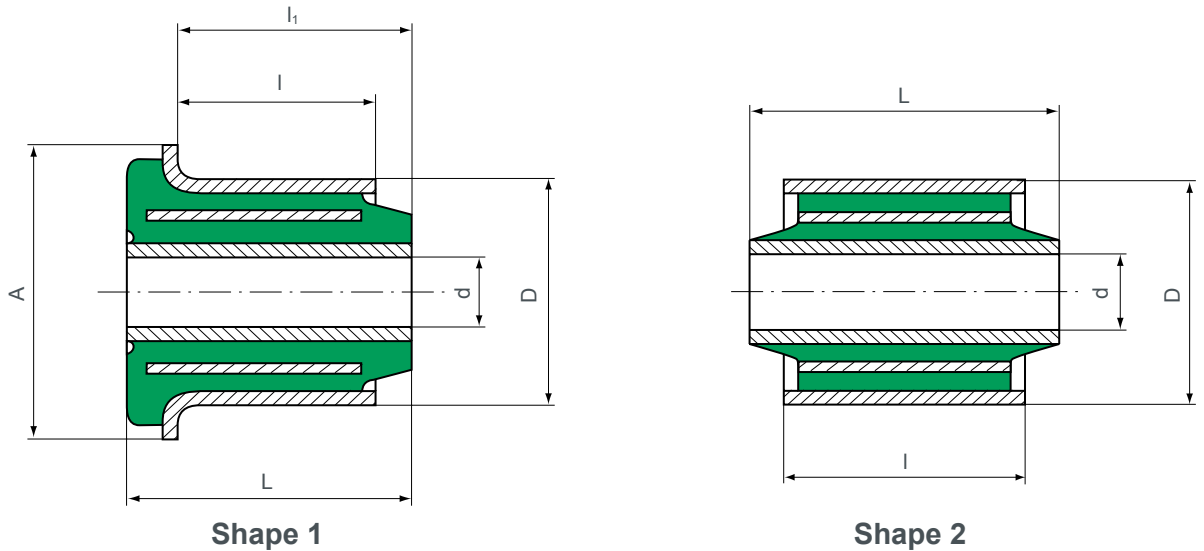
1 kg ≈ 1 daN

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
32	56	55	50	SP	310	0,08	30°	150	0,7	7°	<b>861638</b>
	56	116	108		1 000	0,1	30°	650	0,7	3°	<b>861639</b>
	70	76	70		1100	1,1	25°	190	2,3	2°	561703
34	50	45	39,5	SP	200	0,2	6°	100	2,5	1°	561141
36	58	130	120		1 900	0,08	20°	1 000	1	1°	<b>861182</b>
	60	60	55		400	0,15	30°	200	0,7	7°	861640
38	64	76	70	900	0,07	20°	450	0,5	3°	<b>861183</b>	
	64	135	125	2 400	0,1	20°	1 300	1,5	1°	<b>861184</b>	
	66	60	55	450	0,1	30°	220	0,7	7°	<b>861642</b>	
42	78	66	60	680	0,07	30°	340	1	7°	<b>862601</b>	
	78	86	80	1 000	0,5	10°	200	1,6	1°	<b>561701</b>	
	78	86	80	1270	0,08	20°	630	0,8	3°	<b>862101</b>	
	78	140	130	2 000	0,6	20°	400	2	1°	<b>561702</b>	
	78	140	130	2 800	0,1	20°	1 500	2	1°	862102	
44,45	76,2	63	60	SP	1 400	0,1	15°	-	-	3°	862111
					700	0,1	30°	100	0,2	3°	862140
46	80	86	80	1 500	0,1	15°	-	-	3°	862137	
	86	110	100	1 400	0,15	20°	700	1,5	1°	862422	
50	80	83	79	1 500	0,2	15°	150	0,7	1°	862614	
56	93	250	170	2 600	0,6	15°	1 400	3	0,3°	561901	
58	93	132	117	2 000	0,2	15°	200	1,2	2°	862444	
	95	90	83	1 600	0,3	15°	-	-	3°	862646	
60	105	87	90	2 000	0,2	15°	200	1,2	2°	862435	
	110	182	170	4 000	0,2	15°	400	0,8	1°	862510	
	140	182	170	5 400	0,3	15°	360	2	1°	862512	
62	105	120	110	2 500	0,2	15°	250	0,8	1°	862421	
68	105	120	110	2 500	0,2	15°	250	0,8	1°	561657	
70	115	120	115	3 000	0,3	15°	300	0,9	1°	862434	
	120	182	170	4 500	0,2	15°	450	0,8	1°	862480	
80	120	120	110	3 000	0,2	15°	300	0,8	1°	561658	
	140	98	98	3 000	0,6	10°	1 800	2	2°	561009	
	140	98	98	3 000	0,3	8°	-	-	2°	561043	
	140	98	98	2 300	0,2	10°	-	-	1°	862481	
	140	182	170	5 400	0,1	15°	540	0,8	1°	862414	
90	145	170	145	5 500	0,25	15°	550	0,8	1°	862627	
95	170	105	105	1 500	2,3	10°	-	-	5°	561956	
110	175	205	190	7 500	0,15	12°	750	0,9	1°	862513	
	160	190	170	6 000	0,1	12°	600	0,7	1°	561928	
120	160	190	170	4 000	0,1	12°	400	0,6	1°	561938	
125	160	185	184	4 300	0,1	12°	430	0,4	1°	561913	
138	192	130	124	5 500	1	10°	-	-	3°	862810	
150	185	210	209	5 500	0,1	10°	550	0,4	1°	561916	
	185	240	239	6 500	0,1	10°	650	0,5	1°	561925	
170	210	270	269	8 000	0,1	10°	800	0,4	1°	561184	
190	230	270	258	8 500	0,1	10°	850	0,4	1°	561003	
210	260	300	290	10 500	0,1	10°	1 000	0,4	1°	561989	

The references kept in stock are written in bold.

1 kg ≈ 1 daN

# LAMINATED BUSHES



## DIMENSIONS

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l <sub>1</sub> (mm)	Shape	Reference
12	34	-	48	30	-	2	560033
14	35	-	58,3	43	-	2	561040
14	40	55	27,4	16,3	17	1	531427
16	40	-	46	32	-	2	560062
20	38	-	60	59	-	2	579071

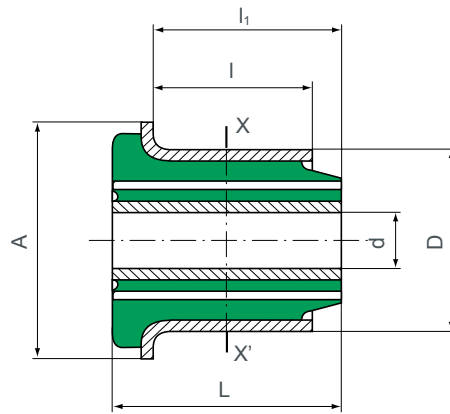
## TECHNICAL CHARACTERISTICS

Reference	Maximum Radial Load		Axial static load (daN)	Torsion	
	Static (daN)	Dynamic (daN)		Max Angle	Approx. torque N.m.
531427*	400	-	130	20°	80
560062	900	-	40	15°	20
560033	750	-	40	20°	10
561040	850	-	50	20°	50
579071	10 500	15 000	-	6°	54

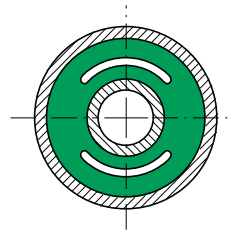
\* The axial load is measured on the side of the lateral stop.

1 kg ≈ 1 daN

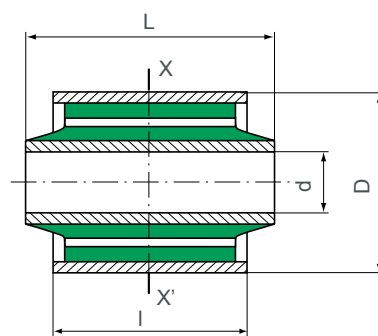
# VOID BUSHES



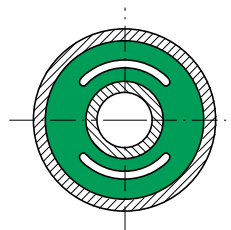
Section XX'



Shape 1



Section XX'

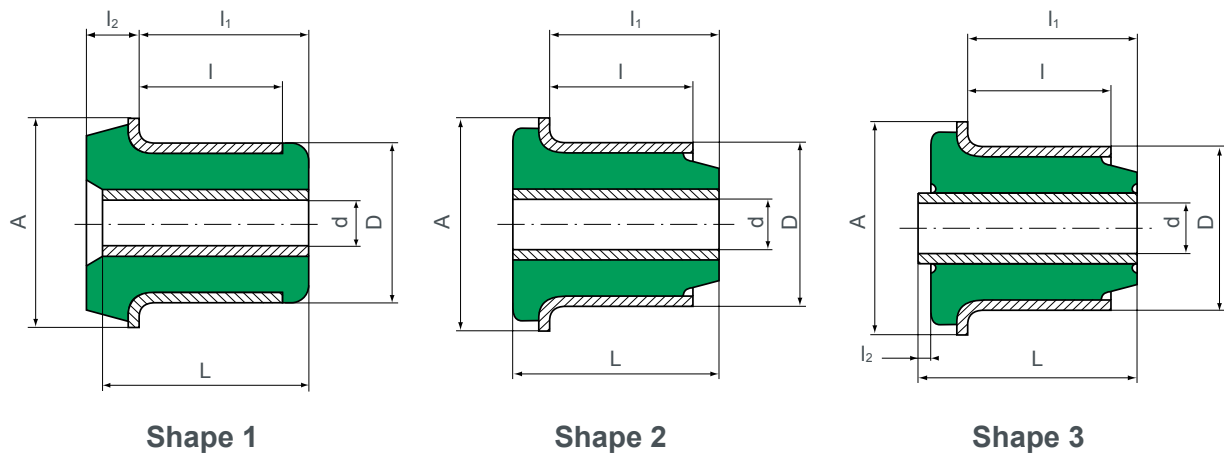


Shape 2

## DIMENSIONS

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l <sub>1</sub> (mm)	Shape	Reference
10,2	37	-	44,8	36	-	2	560218
10,2	37	-	54,3	36	-	2	560217
12	40	-	60	40	-	2	560065
12	43	60	41	26,5	32,5	1	531413
12,25	30	41	34,1	25,2	26,6	1	531363
12,25	30	41	34,1	25,2	26,6	1	531431

# FLANGED BUSHES



Shape 1

Shape 2

Shape 3

## FLANBLOC®

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l <sub>1</sub> (mm)	l <sub>2</sub> (mm)	Maximum Radial Load		Dynamic axial load (daN)	Torsion		Shape	Ref.
							Static (daN)	Dynamic (daN)		Max angle	Approx. torque N.m.		
16	32	47	62	48	56,5	-	250	Overload coefficient : 3	430	30°	45	2	866016
-	32	47	89	48	83,5	-	250		430	30°	45	2	866012
-	36	46	41	28,8	34,7	9,5	60		56	30°	90	1	867001

1 kg ≈ 1 daN

## SPECIAL S.C.

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l <sub>1</sub> (mm)	l <sub>2</sub> (mm)	Maximum Radial Load		Dynamic axial load (daN)	Torsion		Shape	Ref.
							Static (daN)	Dynamic (daN)		Max angle	Approx. torque N.m.		
12	32	43	50	34	40	3	50	Overload coefficient : 3	160	35°	16	3	531300
16	40	50	50	32	40	-	150		120	20°	-	2	531411
-	40	51	83	52	76	1	200		-	20°	-	3	531417

1 kg ≈ 1 daN



# PIVOT BUSHES

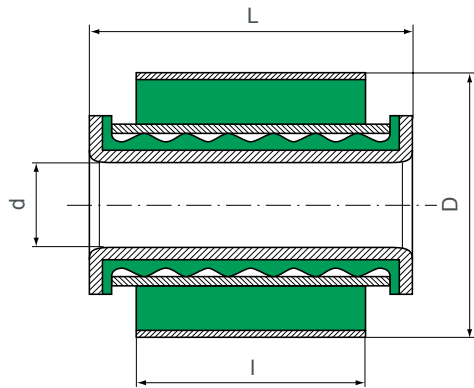


Fig. 1

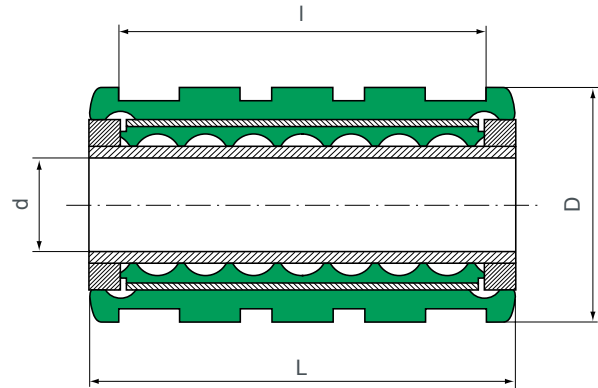


Fig. 2

## FLUIDBLOC® AND TOURIFLEX®

These are high precision bushes; they are made of injected polyurethane and can resist oil, water, ozone, etc.

These “pivoting” bushes are characterised by their very low torsional resistance (0.1 to 0.2 N.m). They can ensure a complete rotation (360°), and have no requirements for maintenance because they have a permanent lubricant.

They don't need a high precision housing, and the load to remove the bushes is between 1500 and 1800 daN.

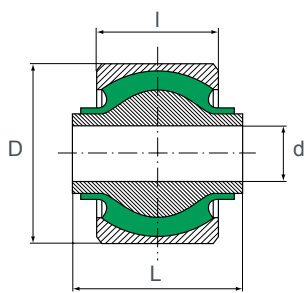
There are many applications, such as : leaf spring bushes for vehicles not exceeding 5 tons.

d (mm)	D (mm)	l (mm)	L (mm)	Maximum radial load static (daN)	Shape	Reference
16	36	60	70	900	2	566050
16	45	60	70	1 100	2	566051
AXE	140	214	304	7 000	-	568256
CARRÉ	70	60	76	1 000	1	568247
27	88	70	86	1 000	1	568248

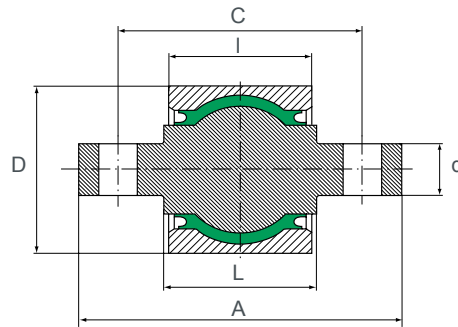
1 kg ≈ 1 daN

# SPHERICAL BUSHES

**SPHERIFLEX®**



**Shape 1**



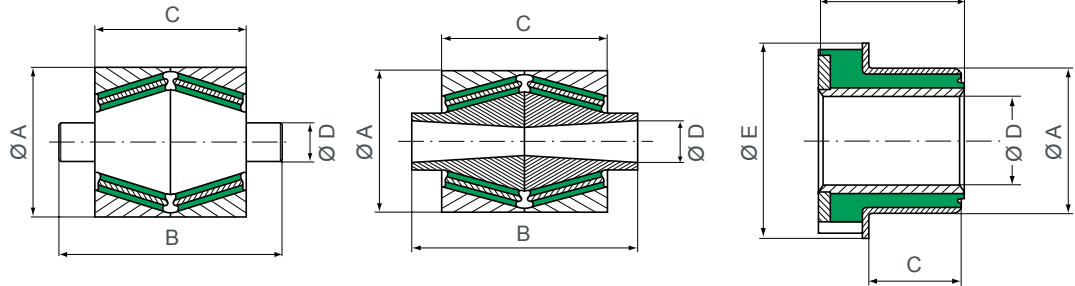
**Shape 2**

d (mm)	D (mm)	L (mm)	A (mm)	l (mm)	C (mm)	Radial Load		Torsion		Conical		Ref.
						Max (daN)	Stiffness daN/mm	Max (degrees)	Stiffness daN/mm	Max (degrees)	Stiffness daN/mm	
35	62	36	-	36	-	1 000	16 000	12	1 000	8	680	563075
24	64	58	-	30	-	800	22 000	12	220	10	220	563489
35	67	35(b)	-	36	-	1 000	16 000	12	1 000	8	680	563559
26	80	72(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563353
26	80	78(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563343
40(a)	80	49(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563354
36	85	80	-	66,5	-	3 800	30 000	12	2 150	6	1 650	563317
Axe	85	100	180	71	140	3 800	30 000	12	2 150	6	1 650	563425
Axe	88	75	144	66	-	3 800	30 000	12	2 150	6	1 650	563253
36	90	-	80	71	-	4 400	53 800	12	2 300	8	3 050	563316
Axe	90	90	170	68	130	4 000	50 000	12	2 150	10	2 800	563345
Axe	90	80	172	77	130	4 400	53 800	12	2 300	8	3 050	563300
Axe	90	90	170	77	130	4 400	53 800	12	2 300	8	3 050	563555
Axe	90	100	180	77	140	4 400	53 800	12	2 300	8	3 050	563426
44	100	114	-	87,5	-	7 000	60 000	12	1 500	8	2 000	563571
44	100,2	116	-	72,5	-	7 000	60 000	12	1 500	8	2 000	563605

(a) The internal diameter is shouldered (b) Length L not centered

1 kg ≈ 1 daN

# SPECIAL BUSHES



Shape 1

Shape 2

Shape 3

Reference	Shape	Ø A (mm)	B (mm)	C (mm)	Ø D (mm)	Ø E (mm)	Radial Stiffness KN/mm	Axial Stiffness KN/mm
563468	2	180	200	140	Ø 68	-	85	10
562908	1	140	254	160	50 x 56	-	85	17
562912	1	140	273	145	Ø 63	-	20	5
563533	2	185	190	150	Ø 70 cône	-	57,5	16,75
563550	2	185	190	150	Ø 68	-	57,5	16,75
563443	2	132	154	136	Ø 70	-	140	5
531293	3	110	55	42	Ø 50	86	17	8
531367	3	110	95	33	Ø 52	150	10	50
531330	3	122	72	54	Ø 70	162	40	30
563352	1	122	254	120	Ø 50	-	4	5

563264

Max radial load : 100 kN

561958

862624

Max radial load : 70 kN

Radial load / Movement







We make it *possible*

## FLEXIBLE COUPLINGS



# FLEXIBLE COUPLINGS

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See current price list for availability of items.

We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures and schemas of the products are supplied for information only.



# 1 - GENERAL

## 1.1 - Function of a flexible coupling

When transmitting torque from a drive shaft to a driven shaft, flexible couplings :

- absorb and dampen **irregularities** in the **torque**;
- distribute peak loads;
- allow misalignments and offsets between the shafts;
- permit some distortions in the mounting beds;
- avoid the unwelcome constraints that may occur if a rigid coupling were fitted in the same conditions;
- allow a lighter construction, with wider tolerances, and lower cost.

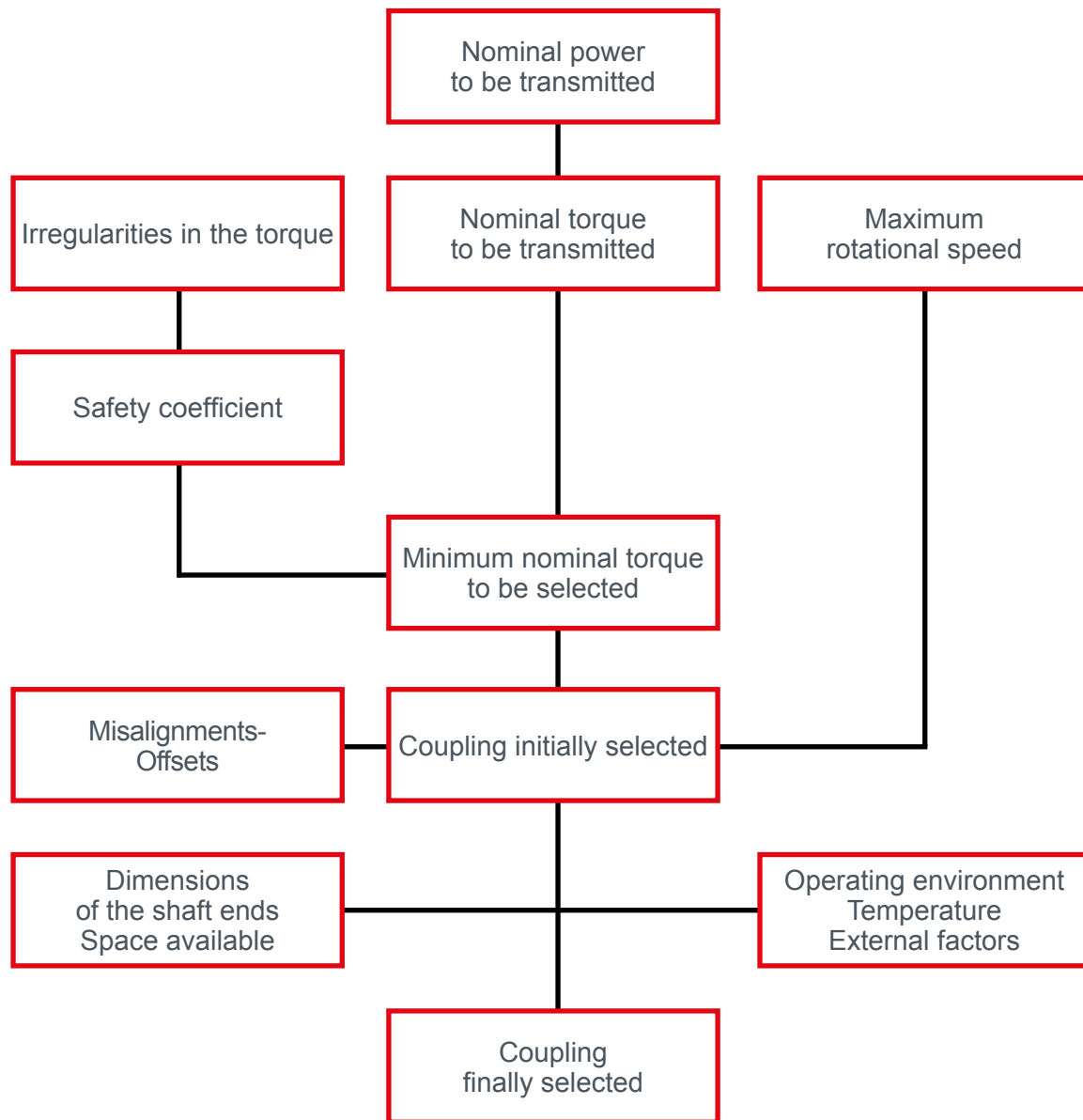
In particular, a flexible coupling is absolutely essential if the machines that are coupled are on **flexible mountings**.

Moreover, there is **no play** in a flexible coupling, and it therefore **runs silently, without friction and does not need to be greased**.



## 1.2 - Selection parameters

The procedure for selecting a coupling is set out below :



In order to select a flexible coupling, therefore, the following parameters should be known :

- **nominal torque to be transmitted;**
- **safety coefficient - Nominal torque of the coupling;**
- **stiffness - Misalignments - Offset;**
- **dimensions - Space available;**
- **operating environment - Temperature - External factors;**

### 1.2.1 - Nominal torque to be transmitted

The nominal torque is the main factor which determines the dimensions of the coupling between the shafts of the machines that are connected directly to it.

The nominal torque to be transmitted is a function of the nominal power to be transmitted and the rotational speed.

$$T \text{ (N.m)} = \frac{7\,024 \times P \text{ (bhp)}}{N \text{ (rpm)}}$$

$$T \text{ (N.m)} = \frac{9\,550 \times P \text{ (Kw)}}{N \text{ (rpm)}}$$

**The nominal power** to be transmitted is that of the driving machine expressed in kilowatts (Kw) or brake horsepower (bhp). The couplings in PAULSTRA's standard range can transmit power from 1 Kw to more than 2,000 Kw.

**The rotational speed** expressed in revolutions per minute is that of the driving machine and must be less than the maximum speed accepted by the coupling.

The couplings in PAULSTRA's standard range allow high speeds (up to 10,000 rpm), which is greater than electric motor speeds. The maximum speeds indicated can be achieved only if great care is taken during assembly.

In addition to its elastic properties, the rubber has **viscous damping** characteristics which dampen the oscillations and in particular the oscillations which might become excessive during transient periods of peak load.

The dampening effect is produced by irreversibly absorbing the energy which is thus converted into heat. In order to prevent the rubber being damaged by the resultant increase in temperature, especially if running at high speed, it is important to ensure the best possible alignment.

Once the coupling has been chosen, if difficult **peak load conditions** become evident, it would be advisable to choose a flexible coupling with different characteristics.

### 1.2.2 - Safety coefficient

The following factors should be taken into consideration when selecting the nominal torque of the coupling :

- irregularities in the torque characteristic of the driving and the driven machines ( $K_1$ );
- frequency of start-ups ( $K_2$ );
- number of hours in operation per day ( $K_3$ ).

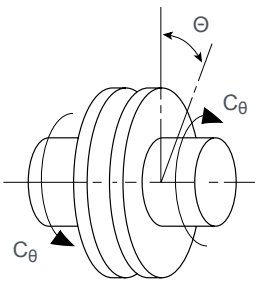
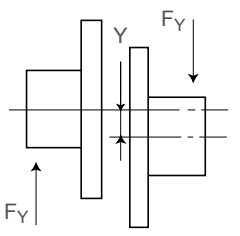
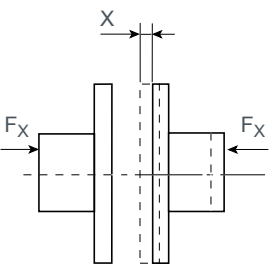
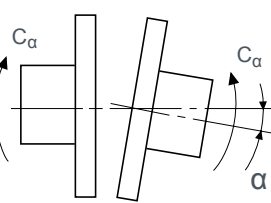
The product K of these three coefficients  $K_1$ ,  $K_2$ ,  $K_3$ , is called the safety coefficient or the load factor.

**Nominal torque of the coupling = Nominal torque to be transmitted x safety coefficient.**

**An excessive safety coefficient should be avoided as this tends to lead to the selection of a coupling that is oversize and too stiff.**

### 1.2.3 - Stiffness - misalignments - offsets

A flexible coupling always allows, to varying degrees depending on type, structure and dimensions, displacements in four ways : axial, radial, conical and torsional. A stiffness defined for each of these cases. The stiffness affects the way in which the coupling reacts when subjected to each of the various possible displacements.

Torsional or polar stiffness	Radial stiffness	Axial stiffness	Conical stiffness
			
$K_{\theta} = \frac{\text{Torque}}{\text{Angular}} = \frac{C_{\theta}}{\Theta}$ expressed in m.kN/radian	$K_y = \frac{\text{Radial force}}{\text{Corresponding radial displacement}} = \frac{F_y}{Y}$ expressed in m.kN/radian	$K_x = \frac{\text{Axial force}}{\text{Corresponding axial displacement}} = \frac{F_x}{X}$ expressed in daN/mm	$K_{\alpha} = \frac{\text{Misalignment torque}}{\text{Angular misalignment}} = \frac{C_{\alpha}}{\alpha}$ expressed in m.kN/radian

It can be seen that a coupling can absorb misalignment more easily if it is very flexible (ie it is less stiff). With flexible couplings «alignment» is not an arduous, high precision operation as is the case with rigid couplings.

The forces generated by flexible couplings, which are transmitted to the shafts and supports, are, of course, proportional to the magnitude of the misalignments.

### 1.2.4 - Dimensions – space occupied

When choosing the coupling, one should bear in mind :

- the dimensions (diameter and length) of the ends of the shafts to which the flanges of the coupling will be fitted;
- the space (diameter and length) available between the machines for the coupling.

### 1.2.5 - Operating conditions – temperature – external factors

The natural rubber which has been selected for most of our standard couplings on the basis of its good dynamic qualities :

- is very good for the operating environment of most machines;
- is not affected by accidental contact with oil or petrol;
- easily withstands temperatures up to 70°C.

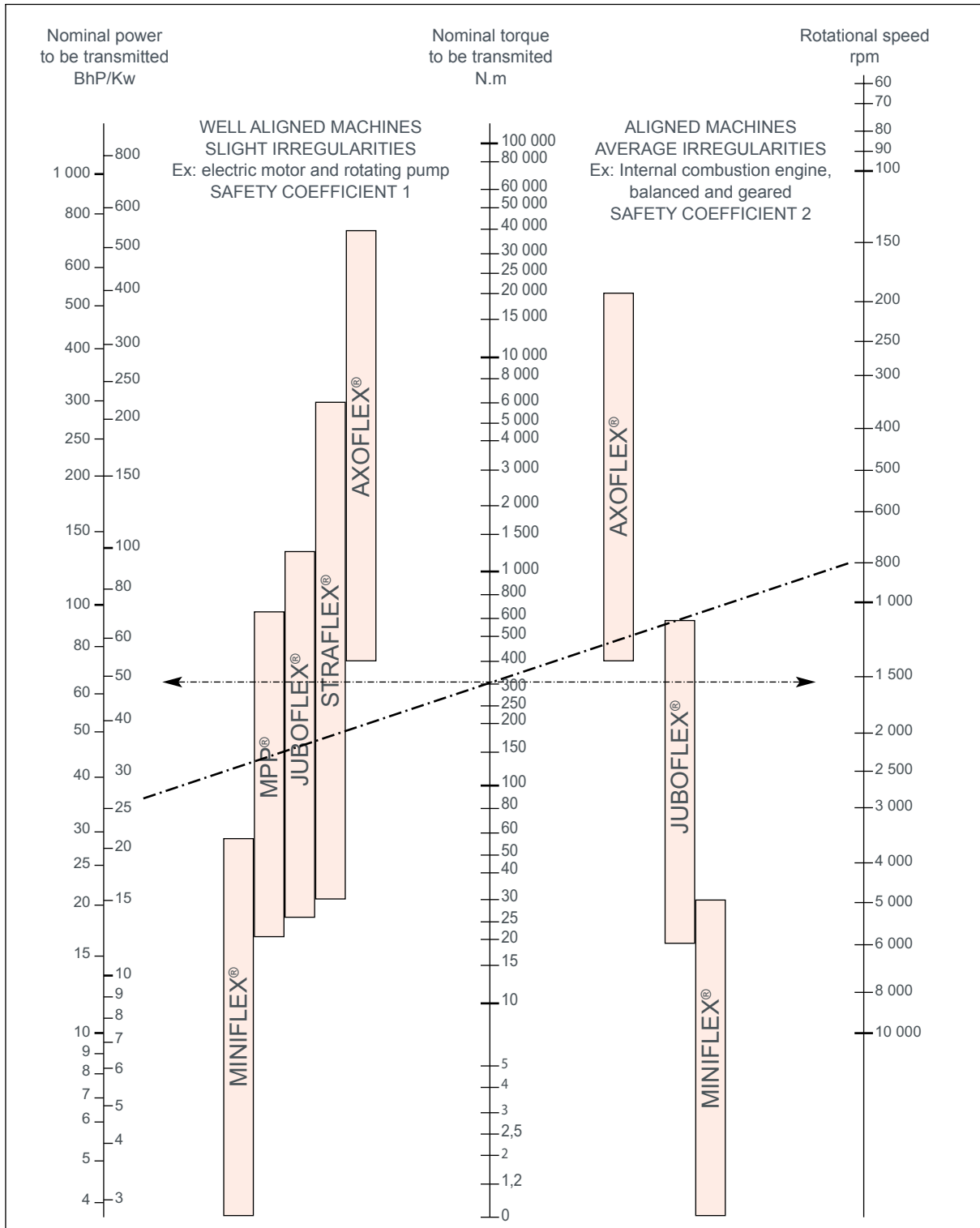
A temperature which is permanently higher will lead to progressive deterioration in the properties of the rubber and it would therefore be advisable to consider special compounds.

Most PAULSTRA flexible couplings can be made using various types of special compounds that can withstand above average temperatures and remain serviceable in unusual conditions: prolonged contact with hydrocarbons, acids, alkalis or with unusual gases (ozone, chlorine . . ).

**If operating conditions are different from those defined for our standard couplings, contact our Technical Department.**

## 2 - SELECTING A COUPLING

### 2.1 - Calculating the nominal torque to be transmitted



Example : to calculate the torque, draw a straight line between the points representing the power to be transmitted and the rotational speed of the machine. The intersection at the central scale indicates the torque value.

Ex. : 25 Kw at 800 rpm 300 N.m. Draw an horizontal line through this point.

The type of coupling will then be selected, bearing in mind the safety coefficient to be applied and the flexibility required. Refer to the selection chart, page 300.

## 2.2 - Safety coefficient

### 2.2.1 - Coefficient $k_1$ = driving machine/driven machine

Driving Machine			Driven machine	Examples of driven machines
Electr. motor or turbine	Piston Engine			
	4 to 6 cylin.	1 to 3 cylin.		
1	1,2	1,4	① Smooth operation - Very low inertia	• Lay shaft • Lighting generator • Series of shafts • Centrifugal pump • Centrifugal fan...
1,2	1,4	1,7	② Irregular operation - Low inertia	• Fluid agitator • Conveyor belt • Lift • Rotating machine tools for wood and metal • Light textile machines • Folding machines • Geared pumps • Paddle pumps • Fans...
1,4	1,7	2	③ Irregular operation - Average inertia	• Agitator for heavy liquid • Rotary compressor • Roller conveyor • Shredders • Rotary ovens • Wood machinery (planing machine, band-saw . . .) • Printing machines • Mixers • Hoists • Punch • Centrifugal pump for loaded liquid...
1,7	2	2,4	④ Irregular operation - Average inertia - Average shocks	• Concrete mixer • Bar shredder • Shot blaster • Piston compressor with fly wheel • Chain conveyor • Crane • Light rolling mill • Flour mills • Power hammer • Loom • Piston pump with fly wheel • Horizontal mills • Winches • Mine fans...
2	2,4	2,8	⑤ Irregular operation - High inertia - Hard shocks	• Hammer crushers • Calender (rubber, textiles...) • Piston compressor with low inertia fly wheel • Wood shredder • Excavator • Rolling mill • Piston pump with low inertia fly wheel • Forging press • Paper press • Vibrating sieve...
2,4	2,8	3,3	⑥ Irregular operation - Very high inertia - Very hard shocks	• Piston compressor without fly wheel • Crusher • Welding generator • Heavy rolling mill • Brick press • Piston pump without fly-wheel...

### 2.2.2 - Coefficient $k_2$ = number of start-ups

Depending on driving machine - driven machine See table K1	NUMBER OF START-UPS PER HOUR				
	1	10	30	60	120
①	1	1,2	1,3	1,5	1,6
② ③	1	1,1	1,2	1,3	1,4
④ ⑤ ⑥	1	1,05	1,1	1,2	1,2

### 2.2.3 - Coefficient $k_3$ = number of hours of daily operation

Number of operating hours per day	0 - 2	2 - 8	8 - 16	16 - 24
Coefficient $K_3$	0,9	1	1,1	1,2

## 2.2.4 - Nominal torque of the coupling

**Nominal torque of the coupling = Nominal torque to be transmitted x safety coefficient.**  
**The safety coefficient, K, is the product of the three coefficients  $K_1$ ,  $K_2$  and  $K_3$ .**

The above parameters should enable one or two types of coupling to be selected which are suitable for the application required.

The final choice will be made on the basis of the data sheets for the coupling selected, checking :

- the dimensions allowed for the shaft ends;
- the space available;
- the exact values of the misalignments, offset, stiffness;
- and any other parameter (eg : installation).

## 2.3 - Examples

### 2.3.1 - Electric motor – pump

Driving machine Standard electric motor 160 M Power : 15 Kw Speed : 3000 rpm End of shaft $\varnothing$ : 42 mm - length : 110 mm	Driven machine : Standard C2 water pump End of shaft $\varnothing$ : 32 mm - length : 80 mm 30 start-ups/hour 8 hours operation per day
---	---

Nominal torque to be transmitted : chart indicates 5 N.m.

Safety coefficient :  $K_1 = 1$        $K_2 = 1.3$        $K_3 = 1$       hence       $K = K_1 \times K_2 \times K_3 = 1.3$ .

Nominal torque of coupling :  $NT = 50 \text{ N.m} \times 1.3 = 65 \text{ N.m}$ .

For machines which have a regular cyclic operation with correct alignment, it is not essential to have a highly flexible coupling and so the following couplings would be pre-selected :

CARDAFLEX	80 N.m
PAULSTRA MPP	80 N.m
STRAFLEX	100 N.m

All these couplings can be used at a speed of 3,000 rpm.

**In this case, the PAULSTRA MPP 80 N.m coupling would be chosen as it is the only one which will fit the diameter (42 mm) of the end of the motor shaft.**

### 2.3.2 - Electric motor – compressor

Driving machine : Standard 200 L electric motor Power : 30 kW Speed : 1,500 rpm End of shaft $\varnothing$ : 55 mm - length : 110 mm	Driven machine : 2 cylinder compressor with fly wheel End of shaft $\varnothing$ : 60 mm - length : 110 mm Less than one start-up/hour 8 hours operation per day
--	--

Nominal torque to be transmitted : chart indicates 190 N.m.

Safety coefficient :  $K_1 = 1.7$        $K_2 = 1$        $K_3 = 1$       hence       $K = 1.7$ .

Nominal torque of coupling :  $NT = 190 \times 1.7 = 320 \text{ N.m}$ .

The characteristics of the driven machine mean that high torsional flexibility is essential to absorb the cyclic irregularities.

**The JUBOFLEX 350 N.m will therefore be selected, having checked that it can accommodate the shaft ends of the machines.**

**These examples are simple cases. In many instances, this method is adequate for selecting couplings. In more complex cases (cyclic vibrations, for example), it is advisable to consult our technical Department.**





# COUPLING

In order to make it easier to select the coupling required, this selection chart indicates the behaviour of PAULSTRA couplings when under stress.

This rating takes account of the possibilities of misalignments, offset and the resultant forces on the shafts and supports. Each condition is shown :

TORSION	**				**				***				*				
RADIAL	***				*				**				*				
AXIAL	Push fit				Push fit				***				**				
CONICAL	**				*				***				**				
		MINIFLEX® P303				MPP® P307				JUBOFLEX® P311				STRAFLEX® P319			
Nominal Torque (N.m)	Coupling Ref.	Nominal Torque (N.m)	Speed Max (rpm)	Max shaft Ø (mm)	Coupling Ref.	Nominal Torque (N.m)	Speed Max (rpm)	Max shaft Ø (mm)	Coupling Ref.	Nominal Torque (N.m)	Speed Max (rpm)	Max shaft Ø (mm)	Coupling Ref.	Nominal Torque (N.m)	Speed Max (rpm)	Max shaft Ø (mm)	
100 000																	
50 000																	
40 000																	
30 000																	
20 000																	
10 000													635107	6 000	2 000	145	
5 000																	
4 000																	
3 000													635106	3 200	2 400	110	
2 000																	
													635105	1 600	2 800	100	
1 000																	
													635304	800	3 500	700	
500									632025	700	2 400	80	*635308				
400					633055	650	3 000	75	632043	500	2 800	75	635303	400	4 500	50	
300					633054	380	3 000	60	632031	350	3 000	70	*635307				
200									632017	250	3 500	60					
									*632217								
100					633051	200	4 000	55	632017	160	4 500	48	635302	200	5 000	42	
									*632217				*635306				
50									632023	90	5 000	40	635301	100	5 500	32	
40	633047	60	4 000	55	633053	80	7 000	42	*632210				*635305				
30																	
20	633044	40	4 000	55					632027	40	6 000	30	635100	50	6 000	30	
									*632205								
10					633052	30	9 000	28									
5	633038	20	7 000	42													
2.5	633039	10	9 000	28													
	633041	2.5	10 000	14													

\*separate hubs

# SELECTION CHART

Very flexible  \*\*\*

Flexible  \*\*

Semi-flexible  \*

Rigid

More precise information on the values for misalignment, offset and rigidity can be found in the individual data sheets.

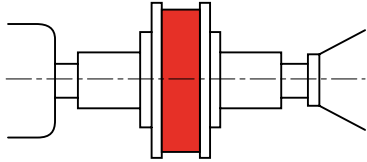
*				**			*			TORSION
*				*			*			RADIAL
**				**			see Data Sheet			AXIAL
*				**						CONICAL
AXOFLEX® P333				CARDAFLEX® P325			RADIAFLEX® RTP* P329			
Coupling Ref.	Nominal Torque (N.m)	Speed Max (rpm)	Max shaft Ø (mm)	Coupling Ref.	Nominal Torque (N.m)	Max shaft Ø (mm)	Coupling Ref.	Nominal Torque (N.m)	Max shaft Ø (mm)	Nominal Torque (N.m)
							612616	104 000		100 000
							612613	72 000		50 000
							612612	60 000		40 000
										30 000
615418	40 000	1 200	200				612608	34 000		20 000
615444	} 24 000	1 400	200				612606	} 17 500		10 000
615414			170			612416	9 700			5 000
615442	} 17 500	1 500	170				612410	6 900	1 500	4 000
615412			150			612408	4 500	1 500	4 000	
615440	} 12 000	1 500	150				612212	4 100	2 000	3 000
615410			120			612210	2 800	2 500	2 000	
615408	} 7 500	1 800	120				612406	2 500	1 500	2 000
615212			100			612208	1 800	2 500	1 000	
615406	} 5 000	2 000	100				612206	1 100	3 000	500
615210			3 600	2 500	100			612 204	630	3 000
615208	2 300	2 500	80				612203	470	3 000	300
615206	1 300	3 000	80	622406	520	4500				200
615204	800	3 000	60							100
615203	800	3 000	60	622405	160	5 500				50
				622404	120	5 500				40
				622403	80	6 000				30
				622402	50	6 500				20
				622401	30	7 000				10
										2,5

\* See current price list for items held in stock.

Braking force proportional to the speed of displacement.

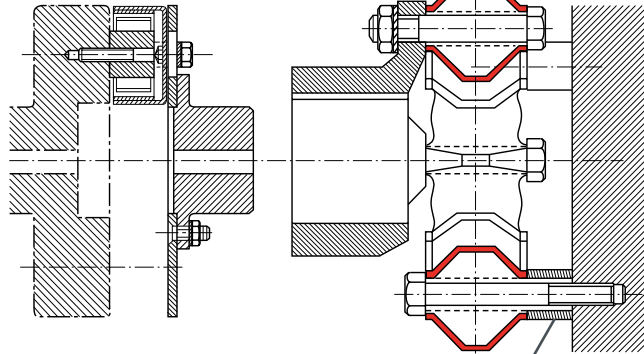
# 3 - EXAMPLES OF INSTALLATION

## III.1 Flanged shaft mounting



The most common mounting

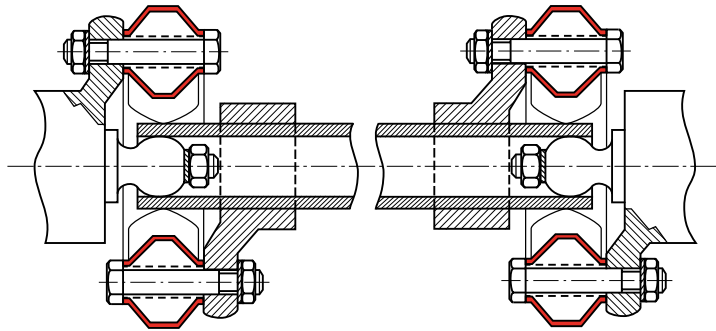
## III.2 Flywheel mounting



Mounted directly on flywheel  
Ex. : AXOFLEX®

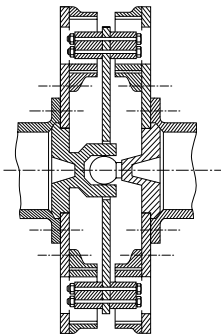
Spacer  
Mounting with spacer.  
Ex. : JUBOFLEX®

## III.3 Mounting on transmission shaft



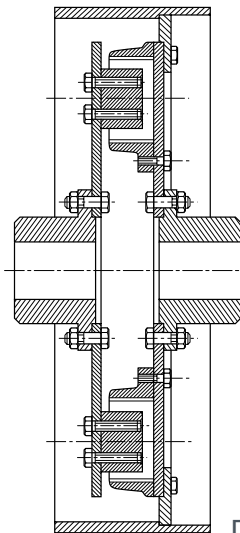
Assembly with centred transmission shaft. Ex. : JUBOFLEX®

## III.4 Mounting in series

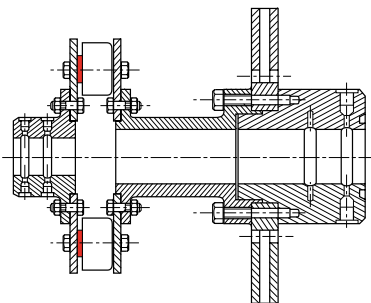


Increases the flexibility while keeping the torque constant.  
Ex.: AXOFLEX coupling with two sets of studs linked by an "anti-centrifuge" disk.

## III.5 Drum brake and disk brake mounting



Drum brake for mounting our couplings with rings : AXOFLEX®, R.T.P®.



Disk brake mounting

## 4 - DATA SHEETS

# MINIFLEX®

\*\*\* Torsional flexibility

\*\*\* Radial flexibility

Push fit Axial flexibility

\*\* Conical flexibility



## DESCRIPTION

- Flexible element
  - ① Natural rubber block bonded to;
  - ② V-shaped metal armatures.
- Flange : aluminium or cast-iron :
  - ③ DRIVE-SEGMENT

## OPERATION

The MINIFLEX coupling is designed with the following features :

- push fit assembly;
- compact, smooth cylindrical shape without protrusions;
- the flexible element is precompressed during assembly, which extends the range of operating conditions where the rubber is not subject to tension.

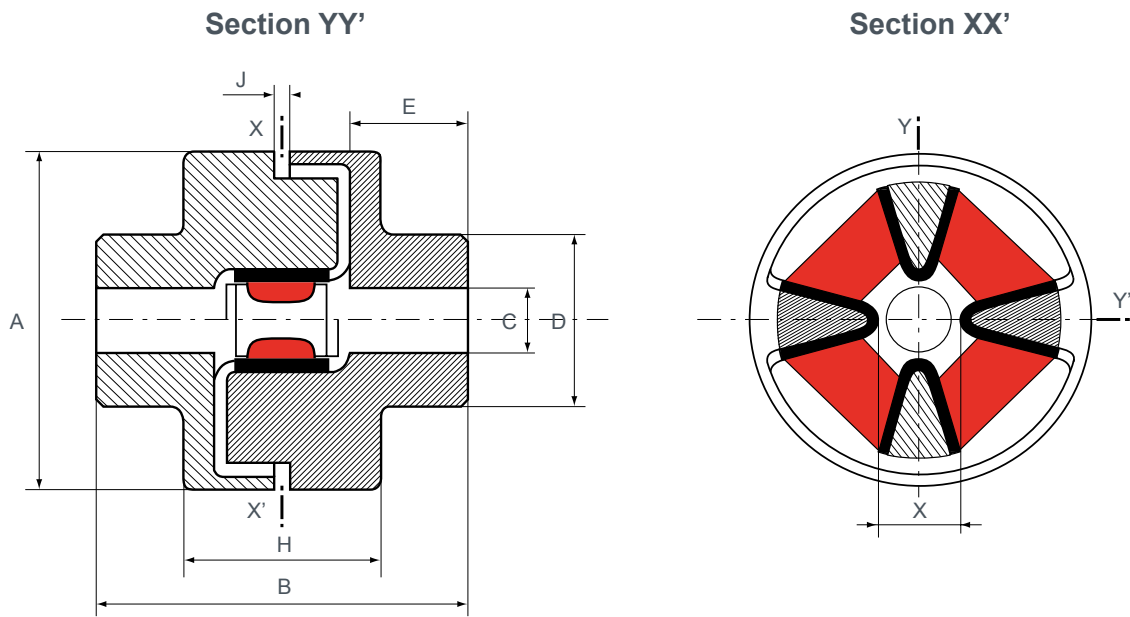
### Advantages

- Highly effective attenuation of cyclic irregularities and peaks in the torque.
- Exceptionally long-life ensured by precompressing the flexible element.
- Tolerance to large misalignment: avoids the need for precise alignment of the machines to be coupled.

### Recommendation

- It is recommended that the coupling should not be subjected to axial tension which might cause the flexible element to slip from the drive segment on the flange.

# DIMENSIONS



## Flanges supplied unbored

	Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Max hole C (mm)	A (mm)	B (mm)	D (mm)	E (mm)	H (mm)	J (mm)	X (mm)	Weight (kg)
ALUMINIUM FLANGES	633040	2,5	5	10 000	14	45	41	28	14	21	2	14	0,10
	633010	10	20	9 000	19	58	61	36	20	31	2	16	0,26
	633020	20	40	7 000	28	80	88	48	30	40	4	28	0,68
CAST IRON FLANGES	633041	2,5	5	10 000	14	45	41	28	14	21	2	14	0,25
	633039	10	20	9 000	28	58	61	42	20	31	2	16	0,6
	633038	20	40	7 000	42	84	88	63	30	40	4	28	1,8
	633044	40	80	4 000	55	118	116	82	40	51	6	38	4,5
	633047	60	120	4 000	55	118	120	82	40	55	10	38	4,5

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be infrequent, start-up torque and not periodic.

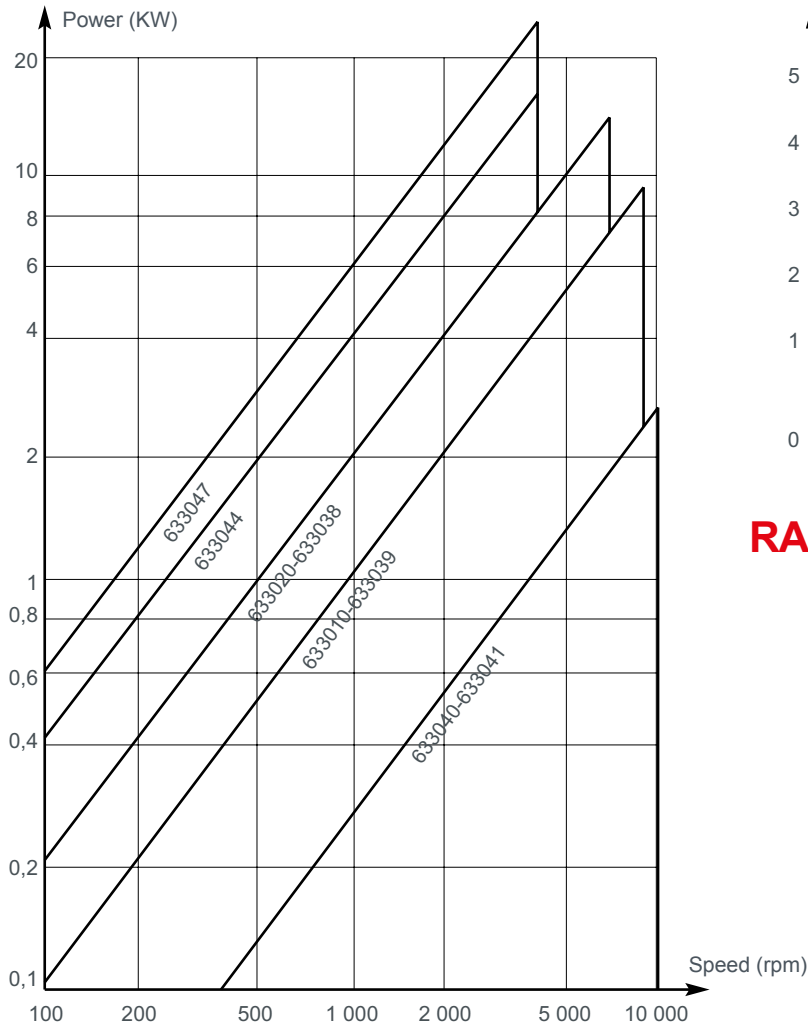
# PARTS LIST

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
633010	633510	1	321521	2
633020	633520	1	321531	2
633038	633520	1	321534	2
633039	633510	1	321503	2

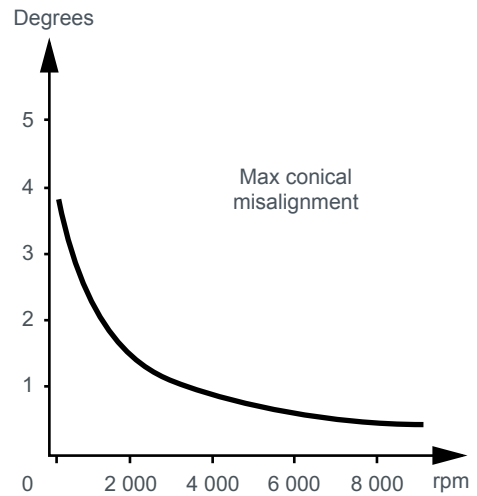
Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
633040	633501	1	321511	2
633041	633501	1	321501	2
633044	633540	1	321535	2
633047	633640	1	321535	2

# OPERATING LIMITS

## POWER RANGE



## CONICAL MISALIGNMENT



## RADIAL MISALIGNMENT

Nominal torque N.m	Radial misalignment at 1 500 tr/mn
2,5	0,15 mm
10	0,25 mm
20	0,50 mm
40	1,00 mm
60	1,00 mm

# OPERATING CHARACTERISTICS

Nominal torque N.m	Vibrat. coupling (N.m)	Torsion under NT (degrees)	Stiffness			
			Axia (Dan/Mm)	Radial (Dan/Mm)	Torsional (Dan/Mm)	Conical (Dan/Mm)
2,5	1,2	28	0,30	2	0,004	0,005
10	5	28	1,50	5	0,020	0,090
20	10	24	1,25	7	0,045	0,090
40	20	18	2,0	8	0,126	0,022
60	30	16	4,5	12	0,214	0,034

1 N.m ≈ 0,1 mkg

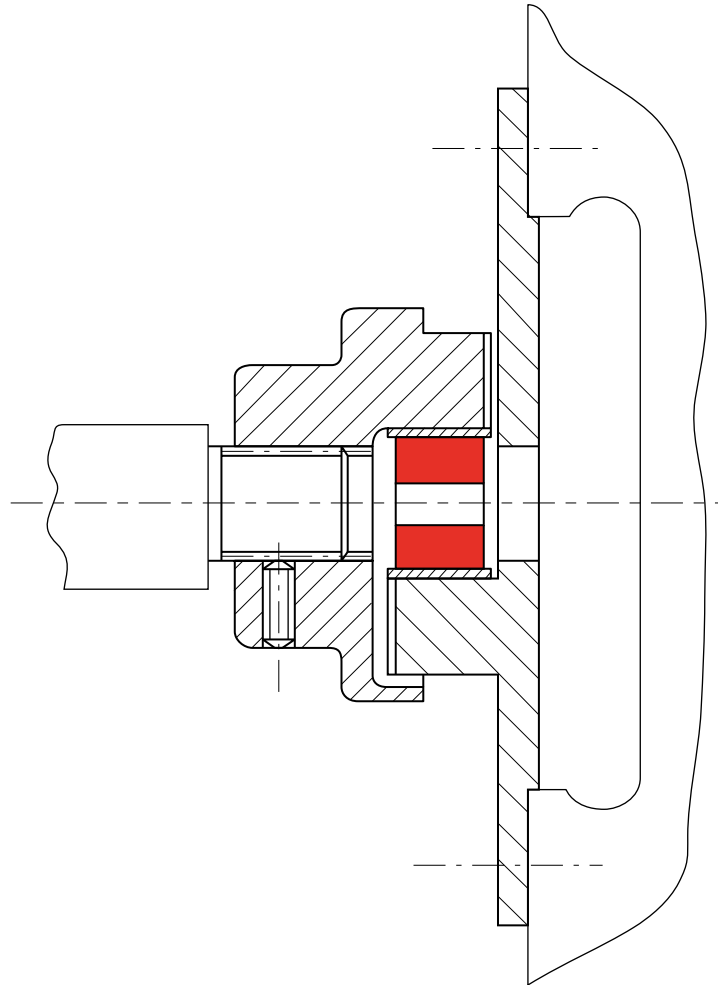
Please see current price list for availability of items.

# ASSEMBLY

The coupling is assembled and disassembled axially which entails moving one of the machines. This procedure is not difficult and can be done quickly, as at least one of the machines being coupled is not heavy.

Method :

- fit an opposing pair of armatures of the flexible element half-way onto the drive segments of one flange;
- position the second flange;
- push the two flanges together to engage the armatures of the flexible element;
- release.



**Example : electric motor/pump coupling mounted on fly wheel and grooved shaft.**

# MPP®

**\*\*** Torsional flexibility    **\*** Radial flexibility    **Push fit** Axial flexibility    **\*** Conical flexibility



## DESCRIPTION

- Flexible element **1** : polyurethane in the form of a Maltese cross.
- Flange **2** : cast iron with drive segments **3** supplied unbored (except 633054 and 633055).

## OPERATING

The MPP coupling is designed with the following features :

- push fit assembly;
- smooth, compact cylindrical shape, without protrusions;
- the flexible element operates under compression;
- safe in use;
- temperature range -30°C to + 70°C in continuous operation.

### Advantages

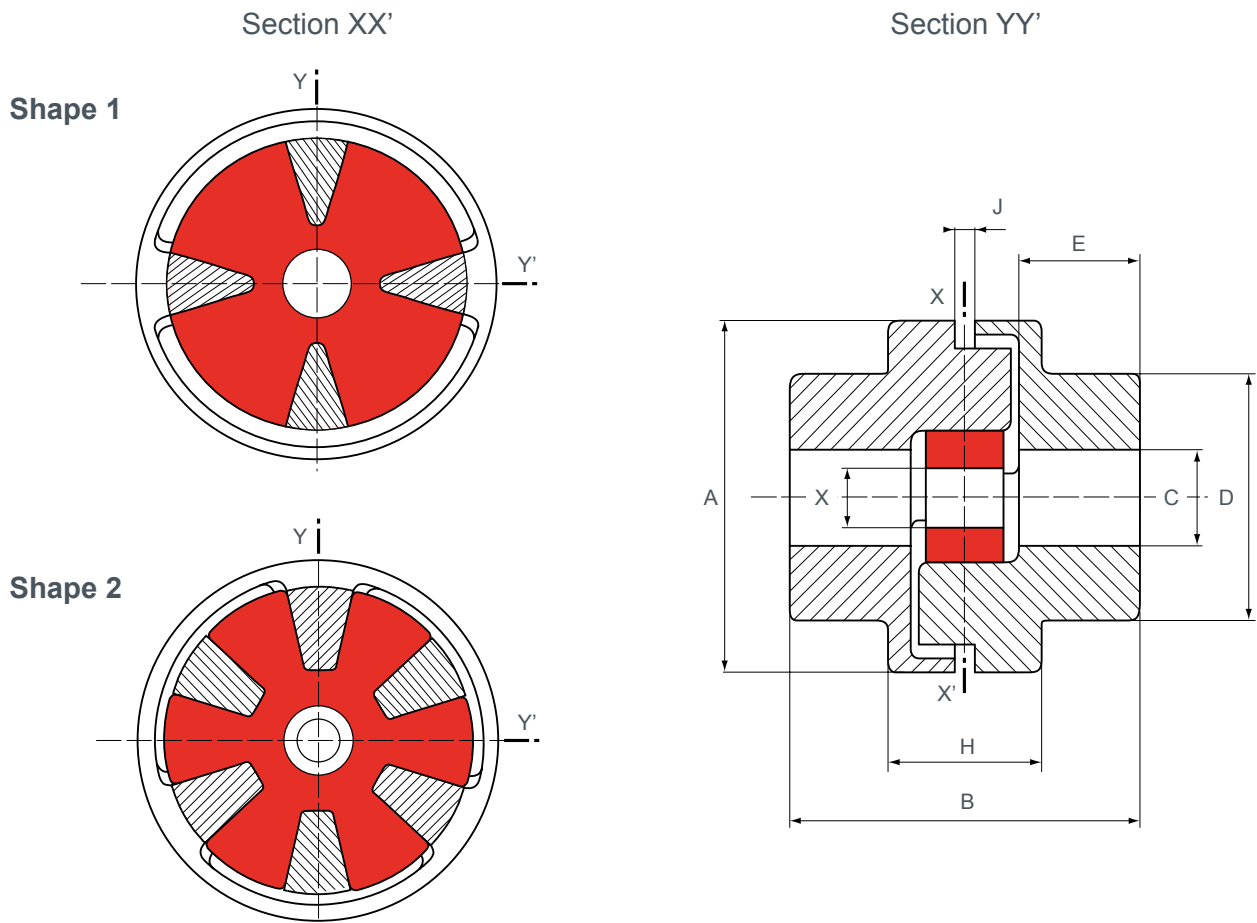
- Reduced size.
- Easy to use.

### Recommendation

- It is recommended that the coupling should not be subjected to axial tension which might cause the flexible element to slip off the drive segments on the flanges.



# DIMENSIONS



## Flanges supplied unbored

Ref.	Type	Fig.	Couple nominal TCN (N.m)	Couple maxi (N.m)	Vitesse maxi (tr/mn)	Alésage C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	H (mm)	J (mm)	X (mm)	Poids (kg)
						mini	maxi								
633052	MPP® 3	1	30	90	9 000	-	28	58	62	42	20	32	3	10	0,6
633053	MPP® 8	1	80	240	7 000	-	42	84	89	63	30	41	5	13	1,8
633051	MPP® 20	1	200	600	4 000	-	55	118	116	82	40	51	6	20	4,5
633054	MPP® 38	2	380	1 150	3 000	20	60	145	160	90	60	67	6	30	9,4
633055	MPP® 65	2	650	2 000	3 000	20	75	170	208	112	80	82	6	32	18

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and not periodic.

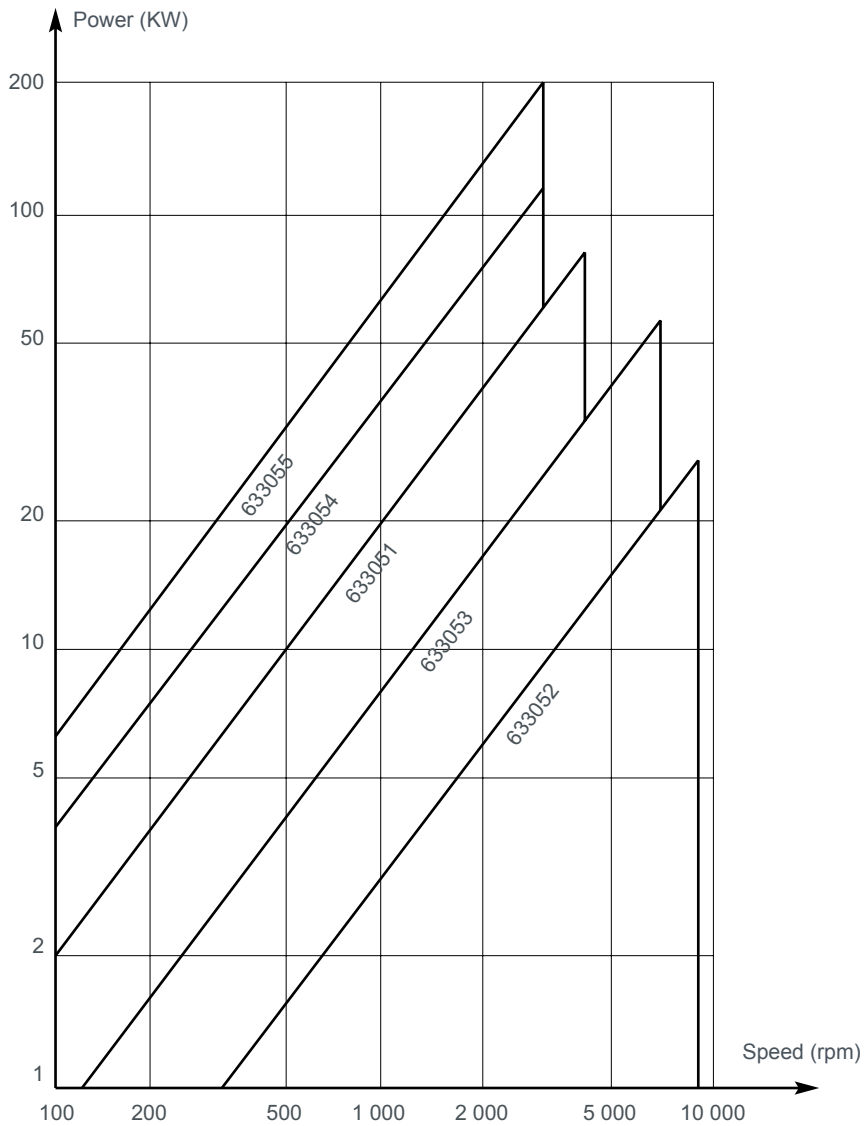
# PARTS LIST

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
633051	633551	1	321535	2
633052	633552	1	321503	2
633053	633553	1	321534	2

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
633054	633554	1	321464	2
633055	633555	1	321465	2

# OPERATING LIMITS

## POWER RANGE

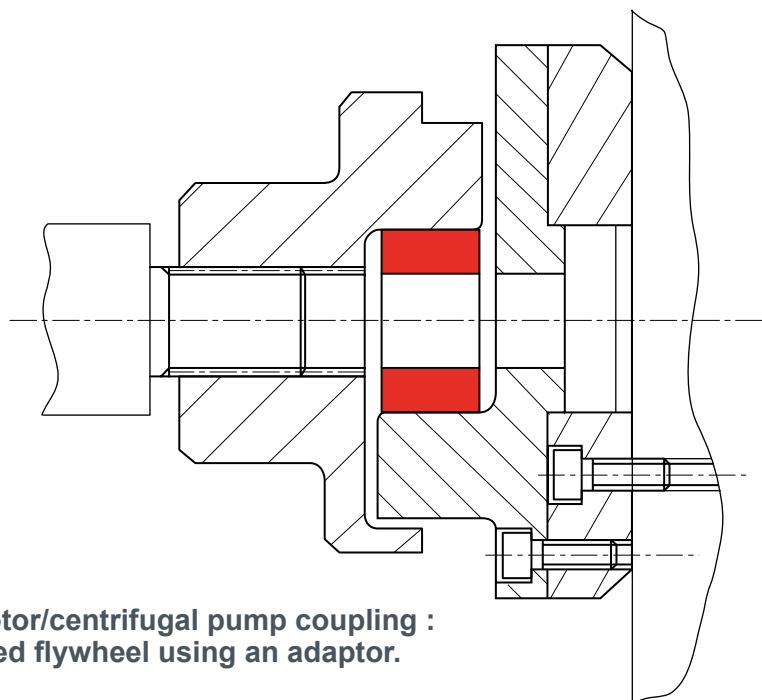


## OPERATING CHARACTERISTICS

Nominal torque (N.m)	Vibratory torque (N.m)	Torsion under NT (degrees)	Radial misalignment* (mm)	Conical misalignment* (degrees)	Axial misalignment (mm)
30	15	10°	0,2	1°	1,5
80	40	10°	0,4	1°	2,5
200	100	10°	0,9	1°	3
380	380	10°	1	1°	3
650	650	10°	1	1°	4

\* given for a speed of 3,000 rpm.

# ASSEMBLY



**Example: electric motor/centrifugal pump coupling :  
mounted on motorised flywheel using an adaptor.**

## SELECTION GUIDE

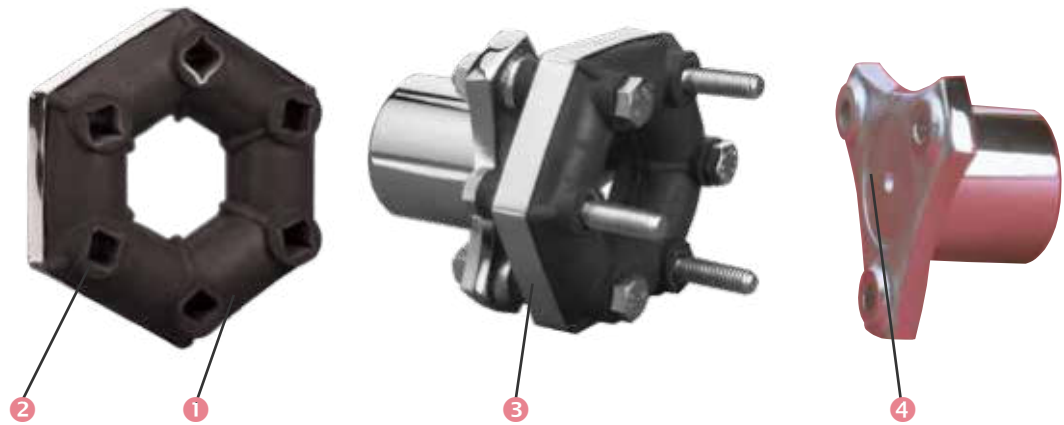
PAULSTRA MPP® / STANDARD, 50 HZ ASYNCHRONOUS THREE PHASES MOTORS

This table uses a safety coefficient of 1.3 corresponding to normal operating conditions of commonly used driven machines.

Motor type	Power 2 poles n ≈ 3000 rpm		Type of coupling	Power 4 poles n ≈ 1500 rpm		Type of coupling	Power 6 poles n ≈ 1000 rpm		Type of coupling	Power 8 poles n ≈ 750 rpm		Type of coupling	Shaft dimensions D x E	
	Kw	CV		Kw	CV		Kw	CV		Kw	CV		≈ 3 000 rpm	≈ 1 500 rpm
56	0,09 0,12	0,12 0,16	MPP 3 MPP 3	0,06 0,09	0,08 0,12	MPP 3 MPP 3	0,06 0,09	0,08 0,12	MPP 3 MPP 3				9 x 20	
63	0,18 0,25	0,25 0,34	MPP 3 MPP 3	0,12 0,18	0,16 0,25	MPP 3 MPP 3	0,12 0,18	0,16 0,25	MPP 3 MPP 3				11 x 23	
71	0,37 0,55	0,5 0,75	MPP 3 MPP 3	0,25 0,37	0,34 0,5	MPP 3 MPP 3							14 x 30	
80	0,75 1,1	1 1,5	MPP 3 MPP 3	0,55 0,75	0,75 1	MPP 3 MPP 3	0,37 0,55	0,5 0,75	MPP 3 MPP 3				19 x 40	
90 S 90 L	1,5 2,2	2 3	MPP 3 MPP 3	1,1 1,5	1,5 2	MPP 3 MPP 3	0,75 1,1	1 1,5	MPP 3 MPP 3				24 x 50	
100 L	3	4	MPP 3	2,2 3	3 4	MPP 3 MPP 3	1,5	2	MPP 3	0,75 1,1	1 1,5	MPP 3 MPP 3	28 x 60	
112 M	4	5,5	MPP 3	4	5,5	MPP 3	2,2	3	MPP 3	1,5	2	MPP 3	28 x 60	
132 S	5,5 7,5	7,5 10	MPP 8	5,5	7,5	MPP 8	3	4	MPP 8	2,2	3	MPP 8	38 x 80	
132 M				7,5	10	MPP 8	4,0 5,5	5,5 7,5	MPP 8 MPP 8	3	4	MPP 8	38 x 80	
160 M 160 L	11,0 15,0 18,5	15 20 25	MPP 8 MPP 8 MPP 8	11 15	15 20	MPP 20 MPP 20	7,5 11	10 15	MPP 20 MPP 20	4 5,5 7,5	5,5 7,5 10	MPP 8 MPP 20 MPP 20	42 x 110	
180 M 180 L	22	30	MPP 20	18,5 22	25 30	MPP 20 MPP 20	15	20	MPP 20	11	15	MPP 20	48 x 110	
200 L	30 37	40 50	MPP 20 MPP 20	30	40	MPP 38	18,5 22	25 30	MPP 38 MPP 38	15	20	MPP 38	55 x 110	
225 S 225 M	45	61	MPP 38	37 45	50 61	MPP 38 MPP 38	30	40	MPP 38	18,5 22	25 30	MPP 38 MPP 38	55x110	60x140
250 M	55	75	MPP 38	55	75	MPP 65	37	50	MPP 65	30	40	MPP 65	60x140	65x140
280 S	75	100	MPP 38	75	100	MPP 65	45	61	MPP 65	37	50	MPP 65	65x140	75x140

# JUBOFLEX®

\*\*\* Torsional flexibility    \*\* Radial flexibility    \*\*\* Axial flexibility    \*\*\* Conical flexibility



## DESCRIPTION

### Flexible element

- ① Precompressed natural rubber,
- ② Bonded metal spacers,
- ③ Precompression band (to be removed after installation).

### Flange

- ④ Die-cast steel (except 632320 which is cast-iron).

## OPERATION

The JUBOFLEX coupling is designed with the following features :

- radial disassembly without moving the machines that are coupled;
- the flexible element is precompressed during assembly, which extends the range of operating conditions where the rubber is not subject to tension.

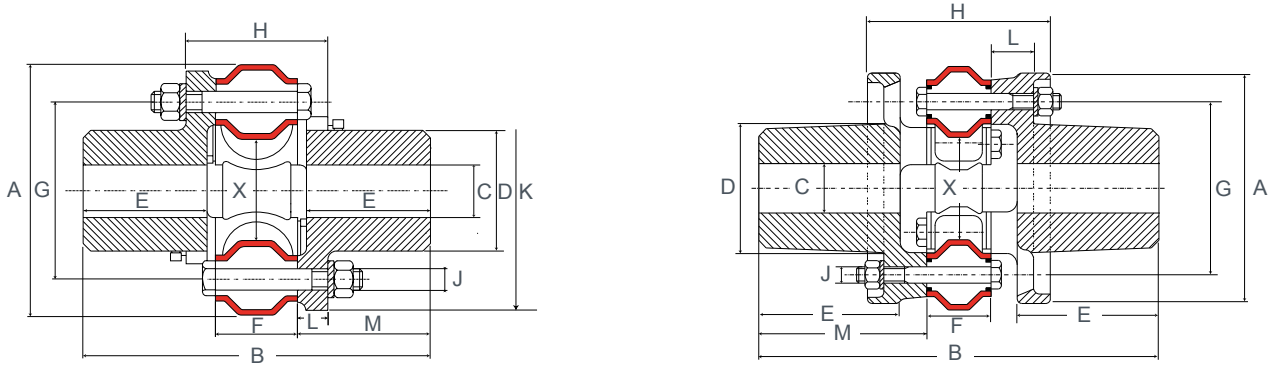
### Advantages

- Highly effective attenuation of cyclic irregularities and peaks in the torque.
- Very safe in use and the precompression ensures very high resistance to oscillation.
- Tolerance to large misalignment: avoids the need for precise alignment of the machines to be coupled.

### Recommendation

- In use, precompression is achieved by the fixing bolts, and the JUBOFLEX coupling operates without the precompression band round the flexible element.

# DIMENSIONS



Flanges supplied unbores

JUBOFLEX Steel flanges except 632320

JUBOFLEX Cast-iron flanges : ref. 632320

Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	X* (mm)	Weight (kg)
				min	max													
632027	40	120	6 000		30	91	128	42	47	28	65	50	8	87	11	50	23	2
632023	90	270	5 000		40	117	172	56	66	32	85	60	10	113	14	70	35	3
632017	160	480	4 500		48	142	196	68	70	46	100	80	12	135	17	75	40	5
632029	250	750	3 500		60	181	247	90	93	51	132	93	14	172	21	98	63	12
632031	350	1 050	3 000		70	202	284	105	109	54	150	96	18	196	21	115	68	18
632043	500	1 500	2 800		75	232	322	115	124	62	170	108	20	225	23	130	75	25
632025	700	2 100	2 400		80	263	346	122	133	68	190	116	20	246	24	139	82	32
632320	1 200	3 600	2 400	60	100	280	486	156	172	78	210	222	20	-	52	204	110	57

\* Diameter of passage in flexible element under the nominal torque.

1 N.m ≈ 0.1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and is not periodic. For higher nominal torques see «JUBOFLEX 'S'».

# PARTS LIST

The flexible elements are delivered precompressed using a precompression band which should be removed after installation.

Coupling without protector Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
632017	632505	1	321334	2
632023	632503	1	321324	2
632025	632511	1	321364	2
632027	632502	1	321314	2
632029	632507	1	321344	2
632031	632508	1	321354	2
632043	632500	1	321374	2
632320	632520*	1	321390	2

\* This element has 8 mounting holes.

# OPERATING CHARACTERISTICS

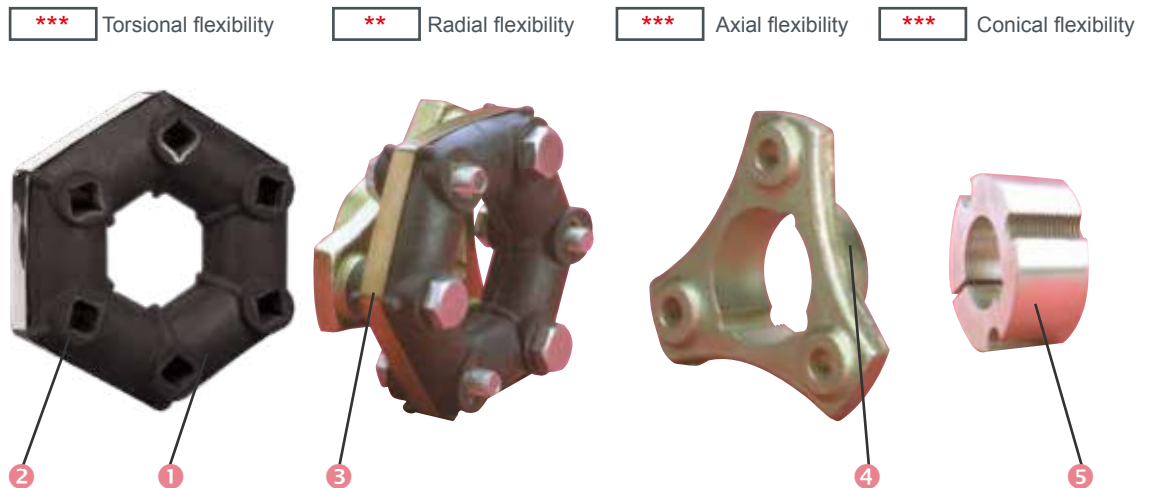
Nominal torque (N.m)	Vibratory coupling (N.m)	Torsion under NT (degrees)	Stiffness			
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)	Conical (M.kn/Rad.)
40	20	8	6	20	0,285	0,04
90	45	8	8	30	0,57	0,057
160	80	8	11	45	1,14	1,143
250	125	7	11,5	30	2,12	0,57
350	175	7	10	30	2,75	0,57
500	250	7	11	30	4,3	0,57
700	350	8	12	35	4,5	0,86
1 200	600	6,30	15	60	10,6	1,14

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

# JUBOFLEX<sup>®</sup>

## WITH SEPARATE HUB



## DESCRIPTION

Flexible element

- ① Precompressed natural rubber.
- ② Bonded metal spacers.
- ③ Precompression band (to be removed after installation).

• Flange

- ④ Die-cast steel specially bored to fit the separate hub.
- ⑤ Universal separate hub (not supplied by PAULSTRA).

## OPERATION

In addition to the characteristics described above, the separate hub used in conjunction with the JUBOFLEX coupling provides the advantage :

- Ready to assemble without machining the flanges.

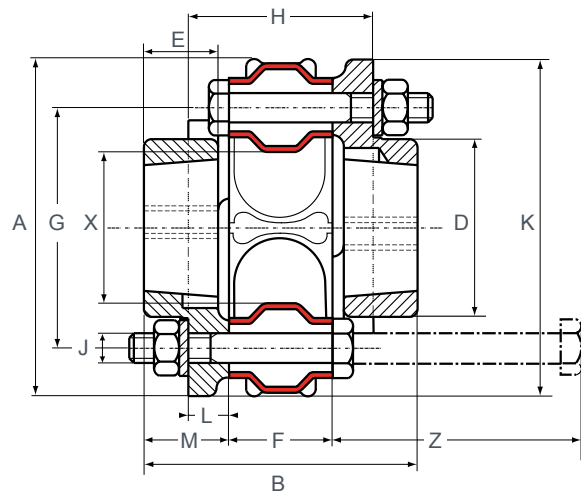
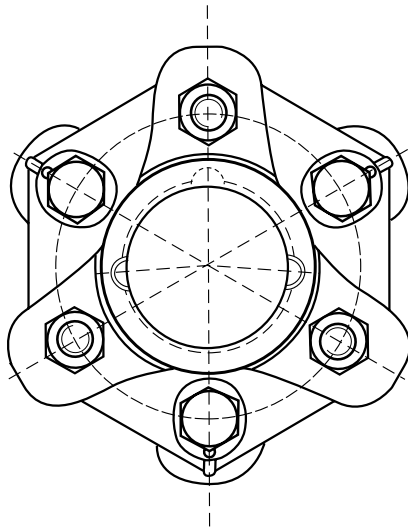
### Advantages

- Reduced size.
- Simplified axial positioning.
- Easy to assemble and disassemble.
- Reduction of costs by simplifying the machining required for the shafts and flanges.

### Recommendation

- In use, precompression is achieved by the fixing bolts and the JUBOFLEX coupling operates without the precompression band round the flexible element.

# DIMENSIONS



Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Separate hub*	A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	X (mm)	Z (mm)	Weight (kg)
632205	40	120	6 000	SEE PARTS LIST	91	74	48	20	28	65	54	8	91	11	23	23	65	0,8
632210	90	270	5 000		117	90	60	25	32	85	65	10	121	14	29	35	75	1,6
632217	160	480	4 500		142	106	70	25	46	100	81	12	140	17	30	40	90	2,7
632226	250	750	3 500		181	121	95	30	51	132	91	14	177	21	35	63	100	5

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

\* For shaft diameters, please refer to the hub manufacturers' specifications.

The maximum torque is considered to be an infrequent start-up torque and is not periodic.

For higher nominal torque see "Juboflex S".

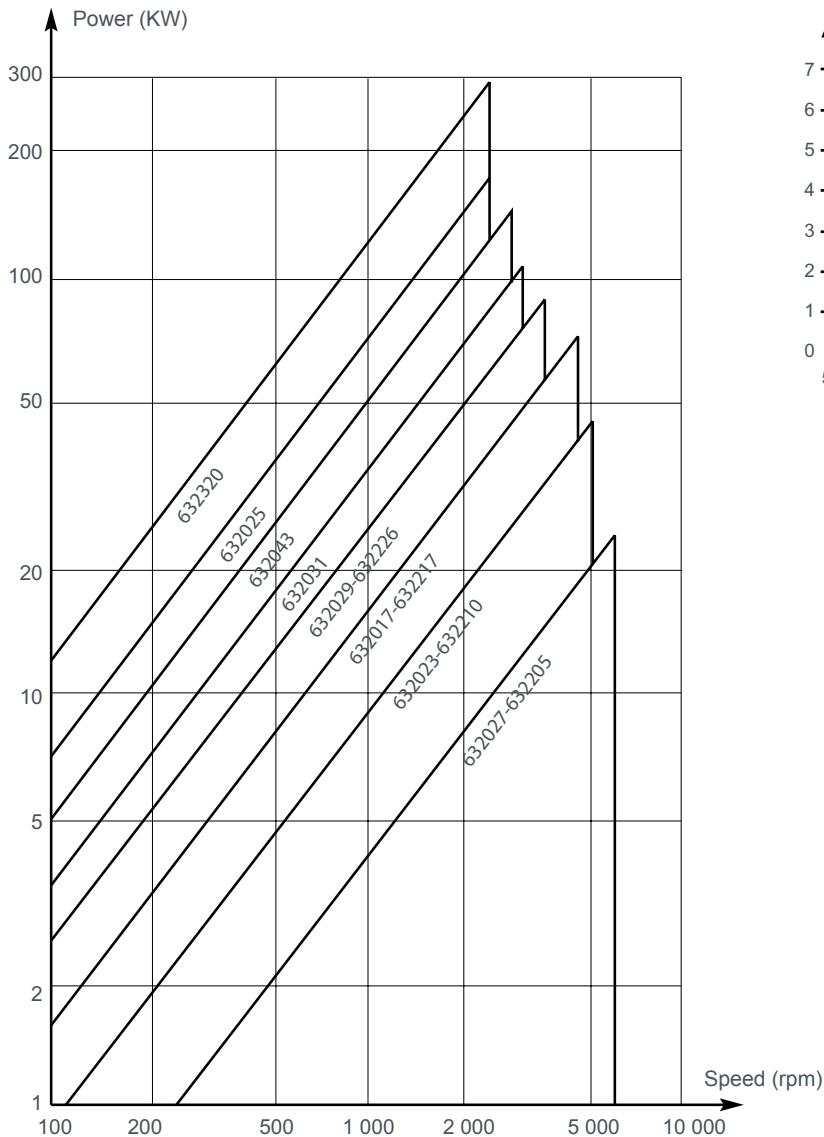
# PARTS LIST

The flexible elements are delivered precompressed using a precompression band which should be removed after installation.

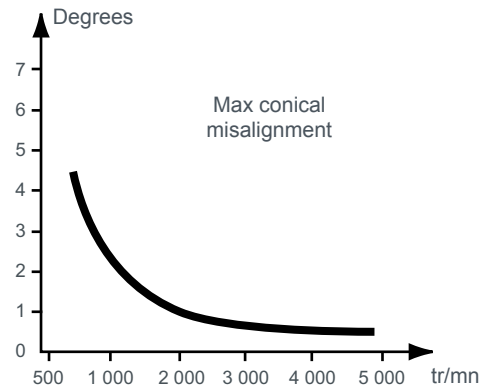
Coupling Reference	Flexible Element		Flange		Separate hub	
	Reference	Qty	Reference	Qty	Current Reference	Universal Reference
632205	632502	1	321316	2	28 - 20	11 - 08
632210	632503	1	321326	2	30 - 25	12 - 10
632217	632505	1	321336	2	40 - 25	16 - 10
632226	632507	1	321346	2	50 - 30	20 - 12

# OPERATING LIMITS

## POWER RANGE



## CONICAL MISALIGNMENT



## RADIAL DISPOSAL

Nominal torque N.m	Radial misalignment at 1,500 rpm
40	0,7 mm
90	0,9 mm
160	1,4 mm
250	1,5 mm
350	1,8 mm
500	2,0 mm
700	2,1 mm
1 200	2,4 mm

# OPERATING CHARACTERISTICS

Nominal torque (N.m)	Vibratory coupling (N.m)	Torsion under NT (degrees)	Stiffness			
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)	Conical (M.kn/Rad.)
40	20	8	6	20	0,285	0,04
90	45	8	8	30	0,57	0,057
160	80	8	11	45	1,14	1,143
250	125	7	11,5	30	2,12	0,57

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

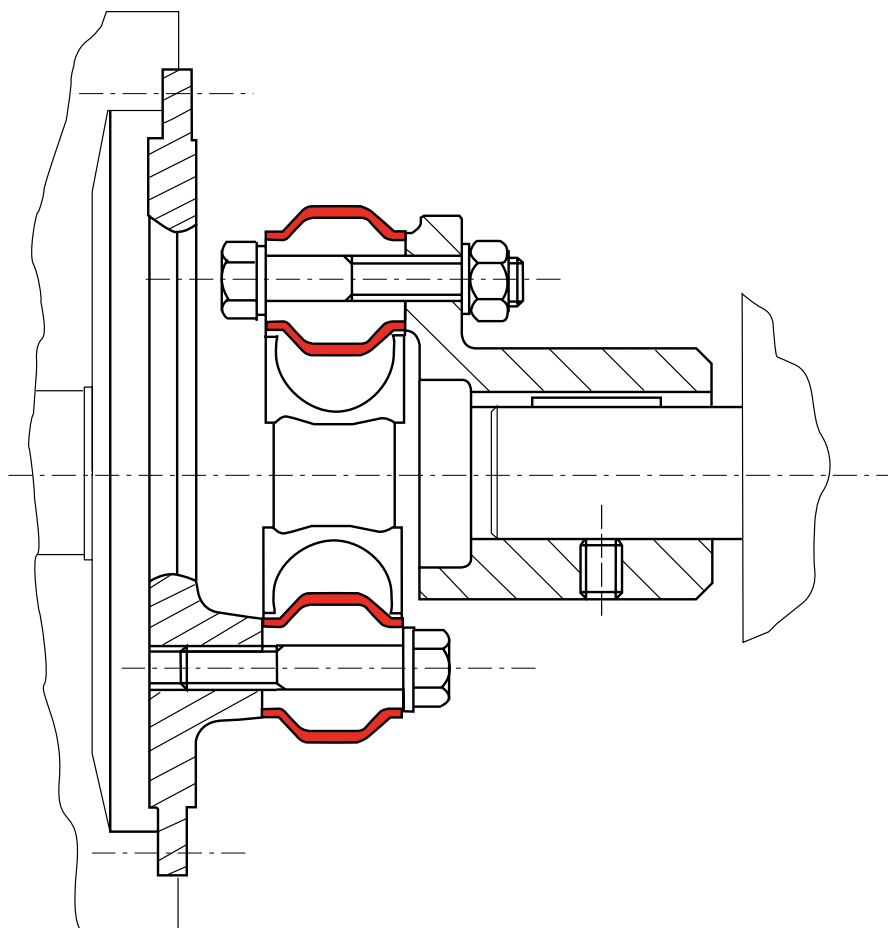


# ASSEMBLY

- Precompression for the initial installation is achieved by a band ③ placed round the outside (our flexible elements are delivered with this band).
- Position the flexible element with its band to attach three non-adjacent holes to the three arms of one flange, and then the three other holes to the other flange.
- Tighten the bolts to the following torques :

Reference	Nominal torque TCN (N.m)	Torque value (N.m)
632027/632205	40	21
632023/632210	90	41
632017/632217	160	72
632029/632226	250	113
632031	350	240
632043	500	350
632025	700	350
632320	1 200	350

- Cut the original band or remove the disassembly band.



**Example : internal combustion engine/generator coupling mounted on a ring attached to the fly wheel.**

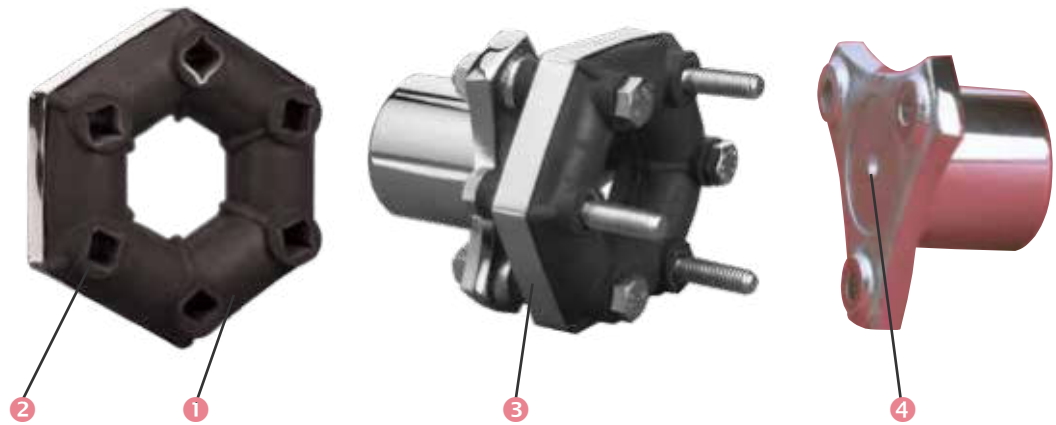
# JUBOFLEX® "S"

\*\*\* Torsional flexibility

\*\* Radial flexibility

\*\*\* Axial flexibility

\*\*\* Conical flexibility



## DESCRIPTION

- Flexible element
  - ① Precompressed natural rubber.
  - ② Bonded metal reinforcing mountings.
  - ③ Precompression band (to be removed after installation).
- Flange
  - ④ Die-cast steel (except 632267 which is cast-iron).

## OPERATION

The JUBOFLEX «S» coupling is designed with the following features :

- radial disassembly without moving the machines that are coupled;
- the flexible element is compressed during assembly, which extends the range of operating conditions where the rubber is not subject to tension.

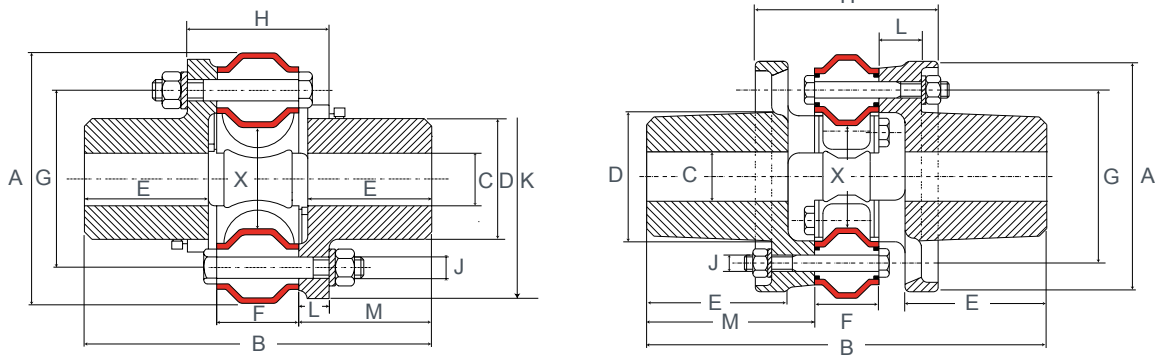
### Advantages

- JUBOFLEX «S» has a greater load capacity than the standard JUBOFLEX.
- Highly effective attenuation of cyclic irregularities and peaks in the torque.
- Due to the precompression, the JUBOFLEX «S» has very good resistance to torsional peaks.
- Tolerance to large misalignment: avoids the need for precise alignment of the machines to be coupled.

### Recommendation

- In use, precompression is achieved by the fixing bolts, and the JUBOFLEX «S» coupling operates without the precompression band round the flexible element.

# DIMENSIONS



**Flanges supplied unbored**

**JUBOFLEX Steel flanges except 632267    JUBOFLEX Cast-iron flanges : ref. 632267**

Ref.	Nominal torque (N.m)	Vibrat. torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	X* (mm)	Weight (kg)
					min	max													
632260	60	30	120	6 000		30	91	128	42	47	28	65	50	8	87	11	50	23	2
632261	130	65	270	5 000		40	117	172	56	66	32	85	60	10	113	14	70	35	3
632262	240	120	480	4 500		48	142	196	68	70	46	100	80	12	135	17	75	40	5
632263	370	185	750	3 500		60	181	247	90	93	51	132	93	14	172	21	98	63	12
632264	520	260	1 050	3 000		70	202	284	105	109	54	150	96	18	196	21	115	68	18
632265	750	375	1 500	2 800		75	232	322	115	124	62	170	108	20	225	23	130	75	25
632266	1 050	1 050	2 100	2 400		80	263	346	122	133	68	190	116	20	246	24	139	82	32
632267	1 800	1 800	3 600	2 400	60	100	280	486	156	172	78	210	222	20	-	52	204	110	57

\* Diameter of passage in flexible element under the nominal torque.

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and is not periodic.

# PARTS LIST

The flexible elements are delivered precompressed using a precompression band which should be removed after installation.

Coupling without protector	Flexible element		Flange	
	Reference	Qty	Reference	Qty
632260	632550	1	321314	2
632261	632551	1	321324	2
632262	632552	1	321334	2
632263	632553	1	321344	2

Coupling without protector	Flexible element		Flange	
	Reference	Qty	Reference	Qty
632264	632554	1	321354	2
632265	632555	1	321374	2
632266	632556	1	321364	2
632267	632557*	1	321390	2

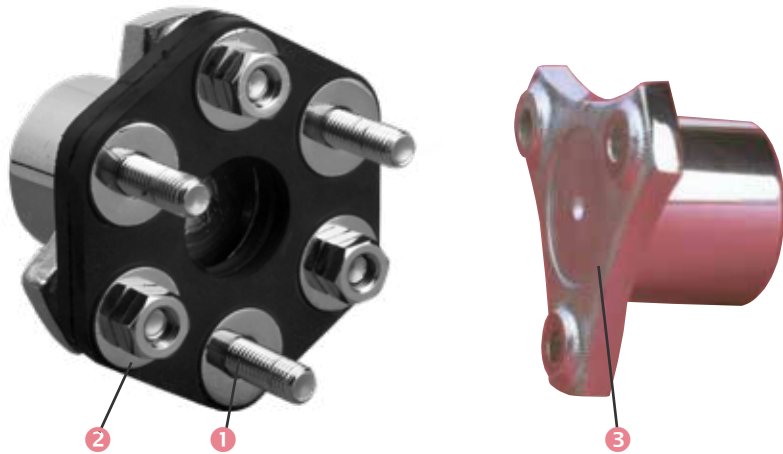
\* Cet élément a 8 trous de fixation.

# OPERATING CHARACTERISTICS

Coupling Reference	Nominal torque (N.m)	Vibratory coupling (N.m)	Torsion under NT (degrees)	Stiffness			
				Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)	Conical (M.kn/Rad.)
632260	60	30	8	9	30	0.43	0.63
632261	130	65	8	11.6	4.3	0.8	0.08
632262	240	120	8	16.5	67.5	1.72	0.22
632263	370	185	7	14.8	44.4	3.15	0.85
632264	520	260	7	14.9	44.6	4.11	-
632265	750	375	7	18	45	6.5	0.86

# STRAFLEX®

\* Torsional flexibility    \* Radial flexibility    \*\* Axial flexibility    \*\* Conical flexibility



## DESCRIPTION

- Flexible element
  - ① Metallic bobbins linked together by rayon fibres.
  - ② The whole unit ① is potted in natural rubber and is hexagonal.
- Flange
  - ③ forged steel.

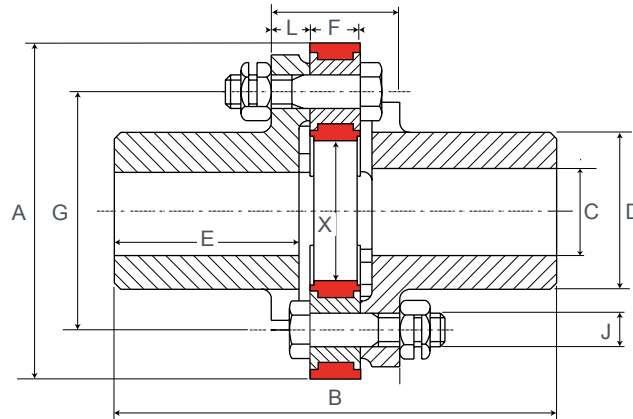
## OPERATION

- The STRAFLEX® coupling is designed with the following features :
- radial disassembly without moving the machines that are coupled;
  - reduced size;
  - used at relatively high rotational speeds.

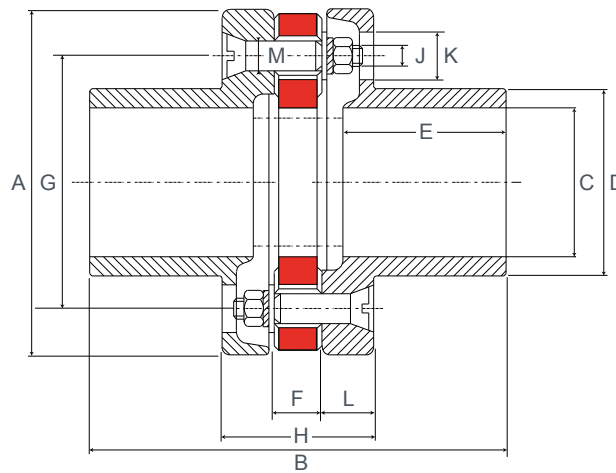
### Recommendation

- The reinforced textile structure means that it has a low tolerance to irregularities in the torque.

# DIMENSIONS



**Assembly of models ref. 635301, 635302, 635303, 635304**



**Flanges supplied unbored**

**Assembly of models ref. 635105, 635106, 635107: screws with countersunk heads**

**Warning :** the coupling ref. 635100 is equipped with melted studs instead of the standard bolts. It's assembly is done simply by pushing the elements on the flanges.

Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	X* (mm)	Weight (kg)
				min	max													
635100	50	100	6 000	-	30	78	80	43	32	12	50	32	-	-	8	7,8	20	1,3
635301	100	200	5 500	-	30	94	115	42	40	15	65	37	10	-	11	-	28	1,6
635302	200	400	5 000	-	40	120	158	56	66	18	85	46	12	-	14	-	40	3
635303	400	800	4 500	-	48	140	171	68	70	21	100	55	14	-	17	-	44	5,5
635304	800	1 600	3 500	-	60	178	222	90	93	26	132	68	16	-	21	-	66	12
635105	1 600	3 200	2 800	-	100	232	280	126	110	32	170	102	14	32	35	20	86	36
635106	3 200	6 400	2 400	-	110	268	340	142	123	42	190	130	16	37	44	24	94	50
635107	6 000	12 000	2 000	-	145	330	424	184	160	48	240	136	16	37	44	24	120	97

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and is not periodic.

# PARTS LIST

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
635100	635631	1	331100	2
635105	635636	1	321826	2
635106	635637	1	331106	2
635107	635619	1	331107	2

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
635301	635632	1	321315	2
635302	635633	1	321325	2
635303	635634	1	321335	2
635304	635635	1	321345	2

# STRAFLEX<sup>®</sup>

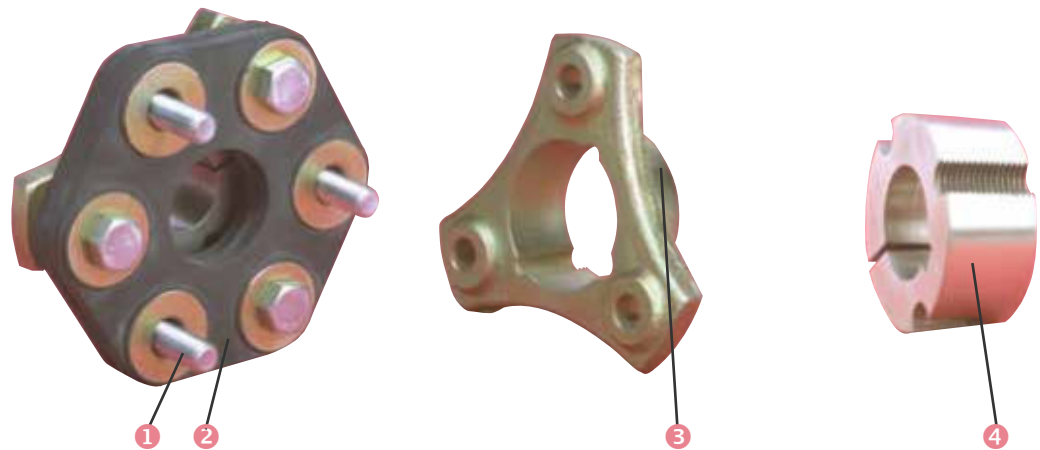
## WITH SEPARATE HUB

\* Torsional flexibility

\* Radial flexibility

\*\* Axial flexibility

\*\* Conical flexibility



## DESCRIPTION

- Flexible element
  - ① Metallic bobbins linked together by rayon fibres.
  - ② The whole unit ① is potted in natural rubber and is hexagonal.
- Flange
  - ③ Forged steel specially bored to accommodate the separate hub.
  - ④ Universal separate hub (not supplied by PAULSTRA).

## OPERATION

In addition to the characteristics described above, the separate hub used in conjunction with the STRAFLEX coupling provides the advantage: ready to assemble without machining.

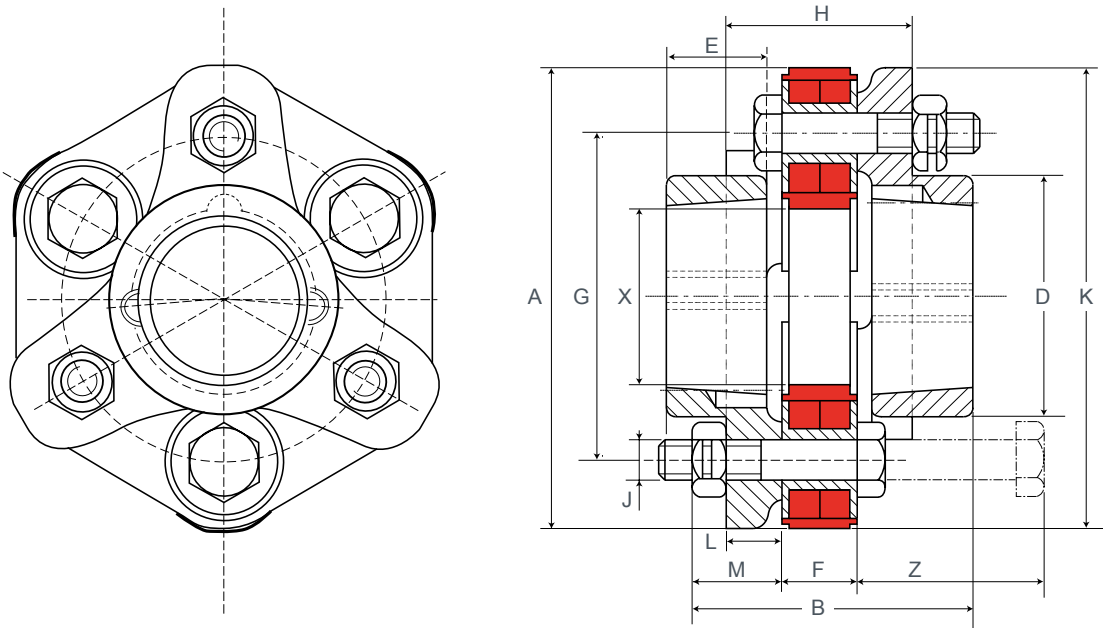
### Advantages

- Reduced size.
- Simplified axial positioning.
- Easy to assemble and disassemble.
- Reduction of costs by simplifying the machining required for the shafts and flanges.

### Recommendation

- The reinforced textile structure means that it has a low tolerance to irregularities in the torque.

# DIMENSIONS



Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Separate hub*	A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	X (mm)	Z (mm)	Weight (kg)
<b>635305</b>	100	200	5 500	SEE PARTS LIST	94	61	48	20	15	65	41	8	91	11	23	28	45	0,9
<b>635306</b>	200	400	5 000		120	76	60	25	18	85	51	12	121	14	29	40	60	1,6
<b>635307</b>	400	800	4 500		140	81	70	25	21	100	56	14	140	17	30	44	70	2,7
<b>635308</b>	800	1 600	3 500		178	96	95	30	26	132	66	16	177	21	35	66	80	5

1 N.m ≈ 0,1 mkg

\* For shaft diameters, please refer to the hub manufacturers' specifications.

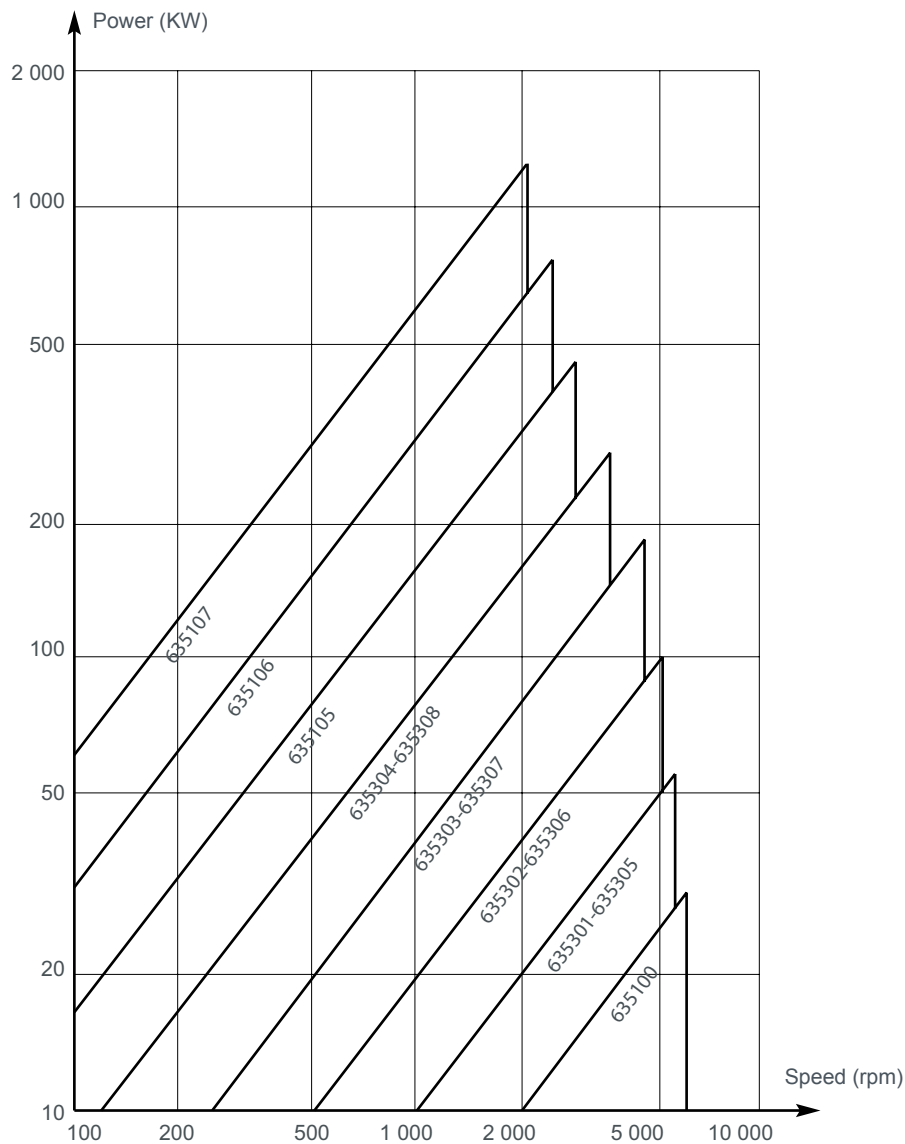
The maximum torque is considered to be an infrequent start-up torque and not periodic.

# PARTS LIST

Coupling Reference	Flexible element		Flange		SEPARATE HUB	
	Reference	Qty	Reference	Qty	Current Reference	Universal Reference
<b>635305</b>	<b>635632</b>	1	321316	2	28 - 20	11 - 08
<b>635306</b>	<b>635633</b>	1	321815	2	30 - 25	12 - 10
<b>635307</b>	<b>635634</b>	1	321819	2	40 - 25	16 - 10
<b>635308</b>	<b>635635</b>	1	321827	2	50 - 30	20 - 12

# OPERATING LIMITS

## POWER RANGE



## OPERATING CHARACTERISTICS

Nominal torque (N.m)	Vibrat. coupling (N.m)	Torsion under NT (degrees)	Stiffness			
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)	Conical (M.kn/Rad.)
50	25	6	30	150	0,46	0,08
100	50	3	20	70	1,9	0,114
200	100	1°45	25	180	6,6	0,2
400	200	2°30	60	150	9,2	0,29
800	400	1°45	30	150	26	0,57
1 600	800	2°20	50	150	40	1,43
3 200	1 600	2	120	180	73	2,3
6 000	3 000	2	75	200	172	3,44

1 N.m ≈ 0,1 mkg

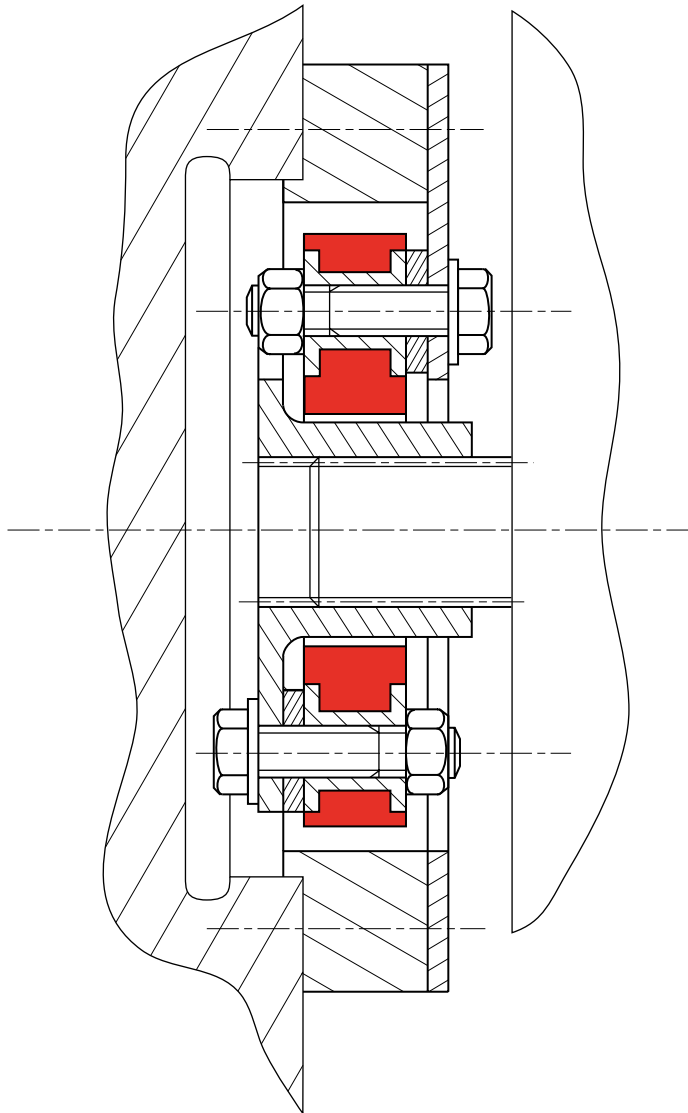


# ASSEMBLY

Method :

- mount the flanges on the shafts of the machines to be coupled;
- position the flexible element to attach three non-adjacent bobbins to one flange with bolts, then attach the three other bobbins to the second flange.

**NOTE** : For the 635100 coupling, the bolts are replaced by welded studs and so this must be assembled by pushing the flanges together.



**Example** : electric motor/volumetric pump coupling : mounted on channelled shaft and flywheel.

# CARDAFLEX®



## DESCRIPTION

There are two variations of the CARDAFLEX coupling : hollow hub and solid hub :

- Flexible element
  - ① Formed of solid natural rubber.
  - ② External steel surround, bonded to the rubber.
  - ③ Triangular hub: a hollow hub bonded to the rubber and attached to the flange ⑤ , or a solid hub which accommodates a grooved or keyed shaft.
- Steel flanges
  - ④ round.
  - ⑤ triangular.

## OPERATION

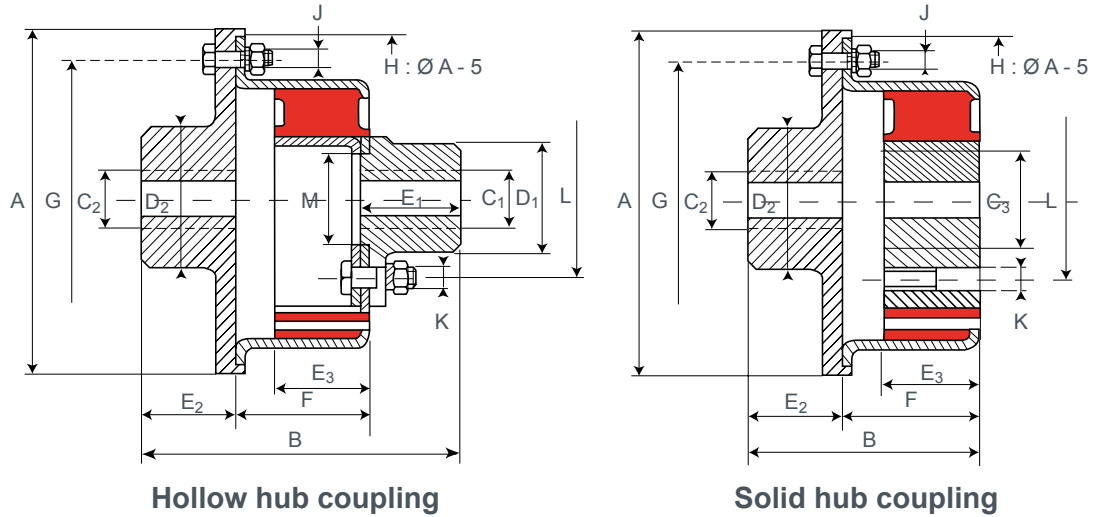
The CARDAFLEX coupling is designed with the following features :

- safe in use;
- fairly low conical stiffness;
- compact shape;
- Good performance at high speeds.

### Advantages

- Especially in the case of the CARDAFLEX solid hub coupling, the space occupied by the unit is much reduced.
- The outer surround of the flexible element can be centred directly onto the flywheel of one of the machines to be coupled.

# DIMENSIONS



## HOLLOW HUB

Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C <sub>1</sub> (mm)		Hole size C <sub>2</sub> (mm)		A (mm)	B (mm)	D <sub>1</sub> (mm)	D <sub>2</sub> (mm)	E <sub>1</sub> (mm)	E <sub>2</sub> (mm)	E <sub>3</sub> (mm)	F (mm)	G (mm)	J (mm)	K (mm)	L (mm)	M (mm)	Weight (kg)
				min	max	min	max														
622310	50	100	6 500	7	19	7	28	105	100	34	45	33	30	28	40	86	6	8	52	30	1,6
622311	80	160	6 000	9	20	9	30	120	125	32	50	44	40	35	45	100	6	8	52	30	2,3
622312	120	240	5 500	9	25	9	36	130	140	40	55	49	45	35	50	108	8	10	64	36	2,8
622315	160	320	5 500	9	32	9	42	155	155	49	60	55	50	43	55	130	10	12	76	42	4,5
622320	520	1 040	4 500	11	42	11	56	205	203	67	80	71	65	57	73	175	12	16	100	56	10,7

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

## SOLID HUB

Ref.	Couple nominal TCN (N.m)	Couple maxi (N.m)	Max speed (rpm)	Hole size C <sub>2</sub> (mm)		Hole size C <sub>3</sub> (mm)		A (mm)	B (mm)	D <sub>2</sub> (mm)	E <sub>2</sub> (mm)	E <sub>3</sub> (mm)	F (mm)	G (mm)	J (mm)	K (mm)	L (mm)	M (mm)	Weight (kg)
				mini	maxi	mini	maxi												
622401	30	60	7 000	7	24	10	21	85	60	40	28	26	32	68	6	7	42	42	0,4
622402	50	100	6 500	7	28	16	28	105	70	45	30	28	40	86	6	8	52	52	0,7
622403	80	160	6 000	9	30	17	28	120	85	50	40	35	45	100	6	8	52	52	1
622404	120	240	5 500	9	36	18	36	130	95	55	45	35	50	108	8	10	64	64	1,2
622405	160	320	5 500	9	42	22	42	155	105	60	50	43	55	130	12	12	76	76	2,3
622406	520	1 040	4 500	11	56	30	56	205	138	80	65	57	73	175	16	16	100	100	5

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and is not periodic.

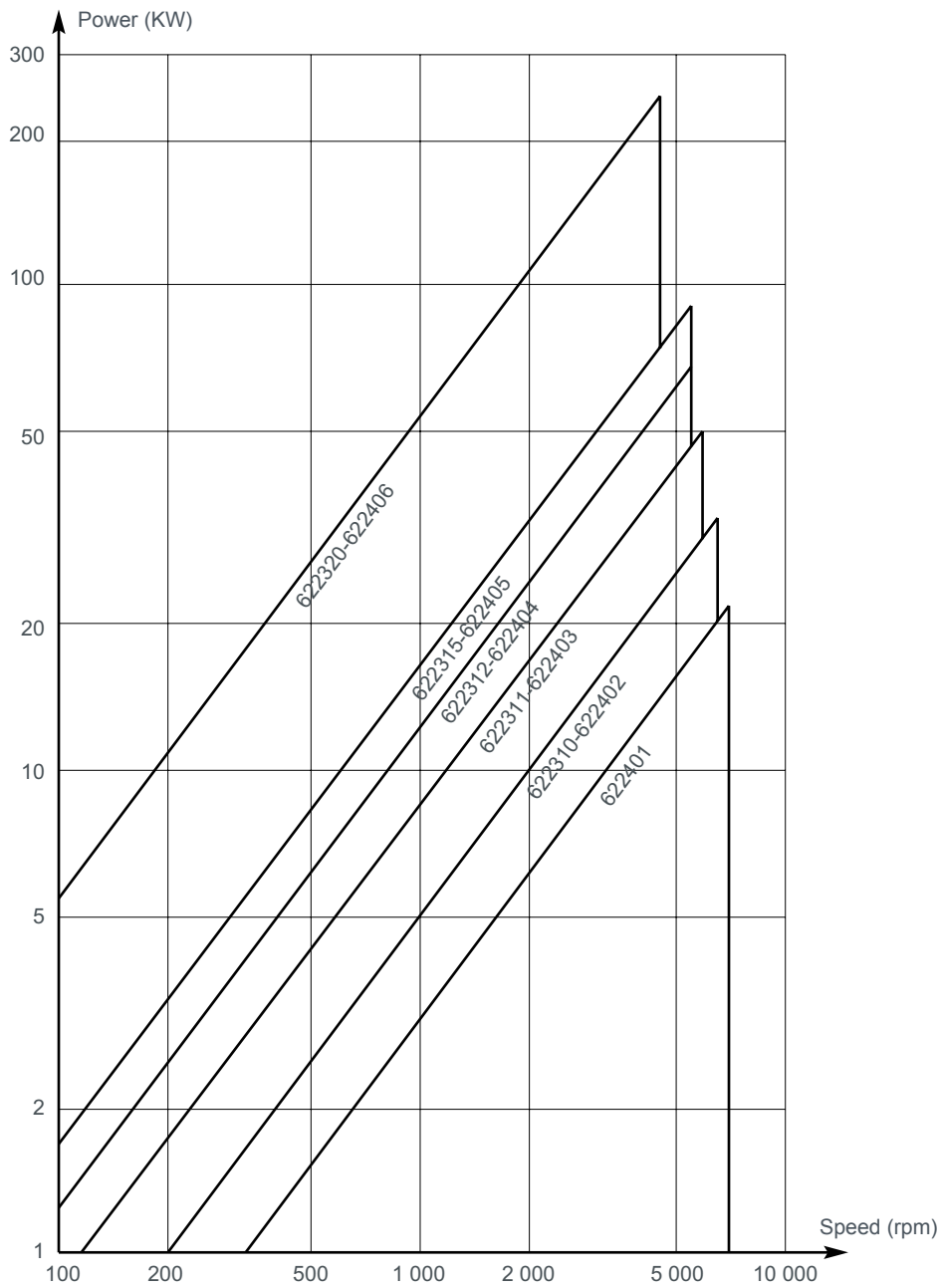
## PARTS LIST

Coupling Reference	Flexible element		Flange		Triangular flange Reference	Qty
	Reference	Qty	Reference	Qty		
622310	622210	1	321631	1	321636	1
622311	622211	1	321641	1	321646	1
622312	622212	1	321651	1	321656	1
622315	622215	1	321661	1	321666	1
622320	622220	1	321671	1	321676	1
622325	622225	1	321681	1	321686	1

Coupling Reference	Flexible element		Flange	
	Reference	Qty	Reference	Qty
622401	622108	1	321621	1
622402	622110	1	321631	1
622403	622111	1	321641	1
622404	622112	1	321651	1
622405	622115	1	321661	1
622406	622120	1	321671	1
622407	622125	1	321681	1

# OPERATING LIMITS

## POWER RANGE



## OPERATING CHARACTERISTICS

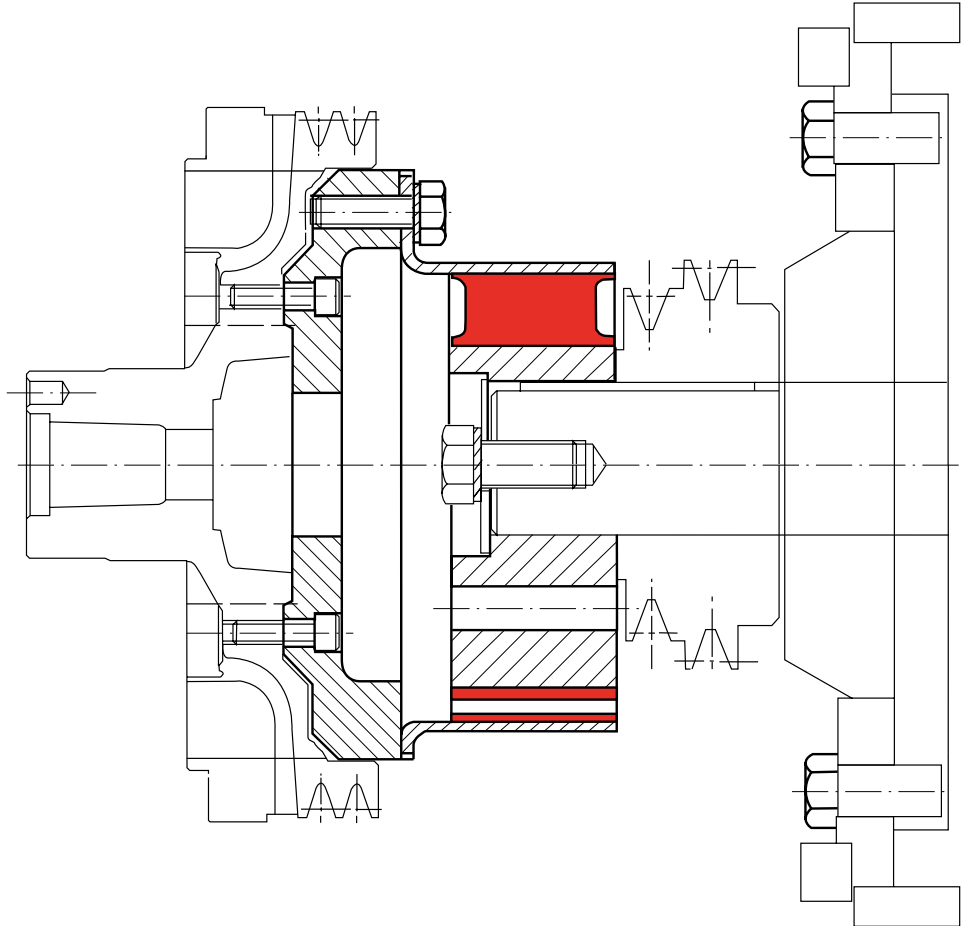
Nominal torque (N.m)	Vibrat. coupling (N.m)	Torsion under NT (degrees)	Stiffness			
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)	Conical (M.kn/Rad.)
30	15	6	30	100	0,286	0,114
50	25	7	16	65	0,400	0,114
80	40	5	30	90	0,860	0,23
120	60	8	25	80	0,860	0,23
160	80	5	32	90	1,72	0,46
520	260	7	40	150	4	1,14

1 N.m ≈ 0,1 mkg

# ASSEMBLY

Method :

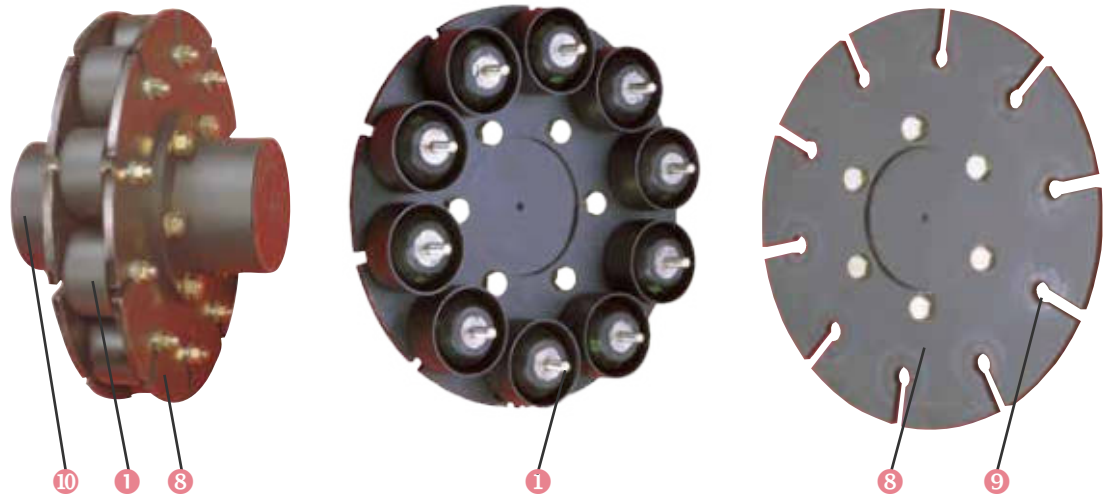
- mount the round flange onto the shaft of one machine.
- Mount :
  - the triangular flange onto the other shaft (hollow hub coupling);
  - the flexible element onto the other shaft (solid hub coupling).
- Attach the flexible element to the round flange.



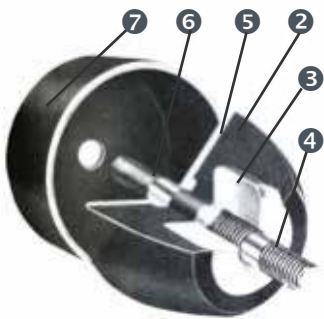
**Example : internal combustion engine/hydraulic pump coupling : mounted on keyed shaft and on pulley.**

# RADIAFLEX® RTP

\* Torsional flexibility   
 \* Radial flexibility   
 See Data Sheet Axial flexibility   
  Conical flexibility



## DESCRIPTION



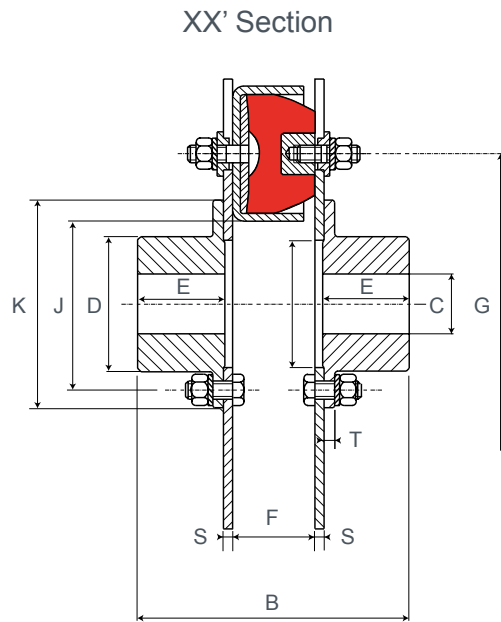
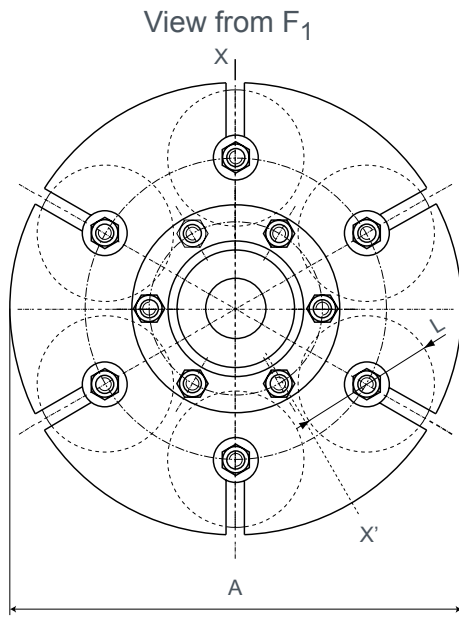
- Flexible element made up of a variable number of flexible studs
  - ① depending on the torque to be transmitted.
  - ② Solid natural rubber blocks in the form of a truncated cone.
  - ③ Internal armature bonded to the rubber.
  - ④ Threaded stud.
  - ⑤ External armature bonded to the rubber.
  - ⑥ Studding welded to armature.
  - ⑦ Cylindrical metal cover.
- Steel disks
  - ⑧ Two identical disks, bolted to the flanges ⑩ and with slits ① to house the studs ⑨.
- Flanges
  - ⑩ die-cast steel.

## OPERATION

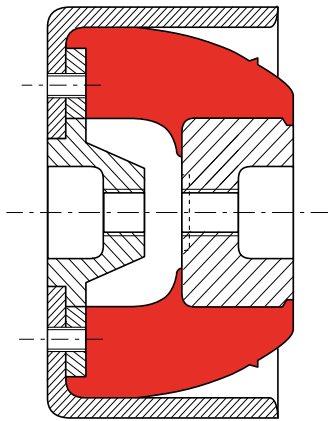
The RADIAFLEX RTP coupling is designed with the following features :

- the studs can be removed radially without moving the coupled machines;
- at low and average torque : the rubber operates under compression;
- at high torque : there is progressive thrust of the rubber against the metal cover ③;
- safe in use;
- it can absorb the effects of tension or compression axially (for example: push and pull of a helical screw).

# DIMENSIONS



## Alternative mount :



The alternative mount **526401Δ60** is softened. It's radial stiffness is equal to 2/3 of the standard mounting ref. **522131Δ60**.

**Warning :** a coupling equipped with the alternative mounts **526401** can only transmit 80% of the torque of the standard version.

Ref. 526401Δ60

Ref.	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	Type	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	S (mm)	T (mm)	Weight (kg)
				min	max														
612203	470	1 000	3 000	18	60	270	181	86	60	RTP 2.3	55	180	85	115	138	90	6	7	13
612204	630	1 250	3 000	18	60	270	181	86	60	RTP 2.4	55	180	85	115	138	90	6	7	15
612206	1 100	2 200	3 000	18	60	300	185	86	60	RTP 2.6	55	200	85	115	138	90	8	7	28
612208	1 800	3 600	2 500	23	80	364	235	115	85	RTP 2.8	55	264	115	145	168	90	8	9,5	45
612406	2 500	5 000	1 500	28	100	420	299	145	102	RTP 4.6	80	280	145	180	210	130	10	12,5	77
612210	2 800	5 600	2 500	28	100	424	274	145	102	RTP 2.10	55	324	145	180	210	90	10	12,5	72
612212	4 100	8 200	2 000	28	120	475	345	177	136	RTP 2.12	55	380	178	213	247	90	12	16	103
612408	4 500	9 000	1 500	28	120	510	370	177	136	RTP 4.8	80	370	178	213	247	130	12	16	127
612410	6 900	13 500	1 500	28	120	600	382	177	136	RTP 4.10	80	460	178	213	247	130	18	16	178
612412	9 700	20 000		32	150	680	424	210	155	RTP 4.12	80	540	178	260	290	130	20	18	253
612416	17 500	35 000		32	150	860	424	210	155	RTP 4.16	80	720	178	260	290	130	20	18	330
612606	17 500	35 000		32	155	826	687	220	250	RTP 6.6	147	580	200			246	30		590
612608	34 000	68 000		32	220	1 096	827	320	320	RTP 6.8	147	850	320			246	30		1 140
612612	60 000	120 000		32	200	1 246	827	275	320	RTP 6.12	147	1 000	250			246	30		1 200
612613	72 000	140 000		32	360	1 446	827	540	320	RTP 6.12	147	1 200	500			246	30		2 200
612616	104 000	200 000		35	360	1 546	887	540	350	RTP 6.16	147	1 300	500			246	30		2 500

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

The maximum torque is considered to be an infrequent start-up torque and is not periodic.

# OPERATING CHARACTERISTICS

Nominal torque (N.m)	Vibrat. coupling (N.m)	Torsion under NT (degrees)	Stiffness				
			Axial compr. (daN/mm)	Axial compres. (daN/mm)	Axial tension (daN/mm)	Radial (daN/mm)	Torsional (m. KN/radian)
470	235	3° 10'	375	300	105	8,6	10,3
630	315	3° 10'	500	400	140	11,4	20,6
1 100	550	2° 50'	750	600	210	21,2	86
1 800	900	2° 10'	1 000	800	280	49,3	114
2 500	1 250	2° 15'	1 500	1 200	330	65,5	86
2 800	1 400	1° 50'	1 250	1 000	350	92,6	229
4 100	2 050	1° 30'	1 500	1 200	420	160	573
4 500	2 250	1° 40'	2 000	1 600	440	152	460
6 900	3 450	1° 25'	2 500	2 000	550	292	1 030
9 700	4 850	1° 10'	3 000	2 400	660	482	
17 500	8 750	0° 50'	4 000	3 200	880	1 140	
17 500	8 750	2° 10'	3 000	1 800	550	458	
34 000	17 000	1° 30'	4 000	2 400	730	1 320	
60 000	30 000	1° 15'	6 000	3 600	1 100	2 700	
72 000	36 000	1°	6 000	3 600	1 100	3 900	
104 000	52 000	0°50'	8 000	4 800	6 100	6 100	

## PARTS LIST

### FLEXIBLE STUDS, DISK AND FLANGES

Coupling part number	Flexible element		Flange		Disk Reference	Qty
	Reference	Qty	Reference	Qty		
612203	<b>522090 Δ 60</b>	3	321138	2	351103	2
612204	<b>522090 Δ 60</b>	4	321136	2	351110	2
612206	<b>522090 Δ 60</b>	6	321138	2	351122	2
612208	<b>522090 Δ 60</b>	8	321147	2	351133	2
612210	<b>522090 Δ 60</b>	10	321154	2	351142	2
612212	<b>522090 Δ 60</b>	12	321167	2	351152	2
612406	<b>522131 Δ 60</b>	6	321154	2	351125	2
612408	<b>522131 Δ 60</b>	8	321167	2	351134	2
612410	<b>522131 Δ 60</b>	10	321167	2	351143	2
612412	<b>522131 Δ 60</b>	12	321191	2	351157	2
612416	<b>522131 Δ 60</b>	16	321191	2	351170	2
612606	522240 Δ 45 et 60	6	321189	2	351124	2
612608	522240 Δ 45 et 60	8	321193	2	351135	2
612612	522240 Δ 45 et 60	12	321182	2	351155	2
612613	522240 Δ 45 et 60	12	321195	2	351156	2
612616	522240 Δ 45 et 60	16	321197	2	351169	2

1 N.m ≈ 0,1 mkg

### FIXING FOR FLANGES AND DISCS. LOCATING SLEEVES

Coupling part number	Bolts pocket for flange - Reference	Qty	Flange		Bolts pocket for elastic elements - Reference	Qty
			Reference	Qty		
612203	337216	1	337217	1	337217	1
612204	337206	1	337207	1	337208	1
612206	337209	1	337210	3	337211	2
6122008	337206	2	337210	4	337208	2
612210	337565	1	337227	1	337208 - 337228	2 - 1
612212	337229	1	337230	1	337208	3
612406	337675	1	337226	1	337215	1
612408	337229	1	337231	1	337232	2
612410	337233	1	337234	1	337215 - 337232	1 - 1
612412	337676	1	337237	3	337232	3
612416	337676	1	337237	4	337232	4
612606			351282	12		
612608			351282	16		
612612			351282	24		
612613			351282	24		
612616			351282	32		
	Please consult our Technical Service				Please consult our Technical Service	

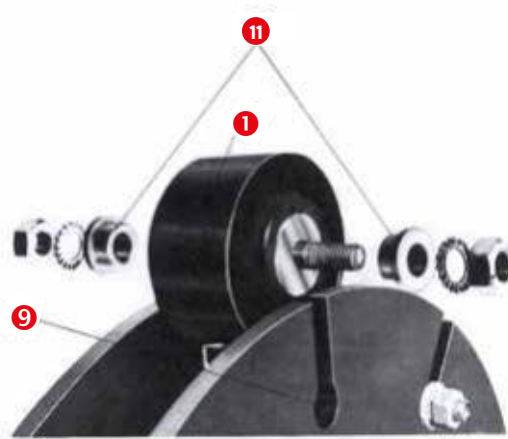
References written in bold are kept in stock.



# ASSEMBLY

Method :

- mount each of the flanges onto the ends of the corresponding shafts;
- use the specially machined recess to centre the disks onto the flanges and screw together;
- attach the external armature of the studs to the appropriate disk;
- attach the internal armature of the studs to the other disk.



**Note :**

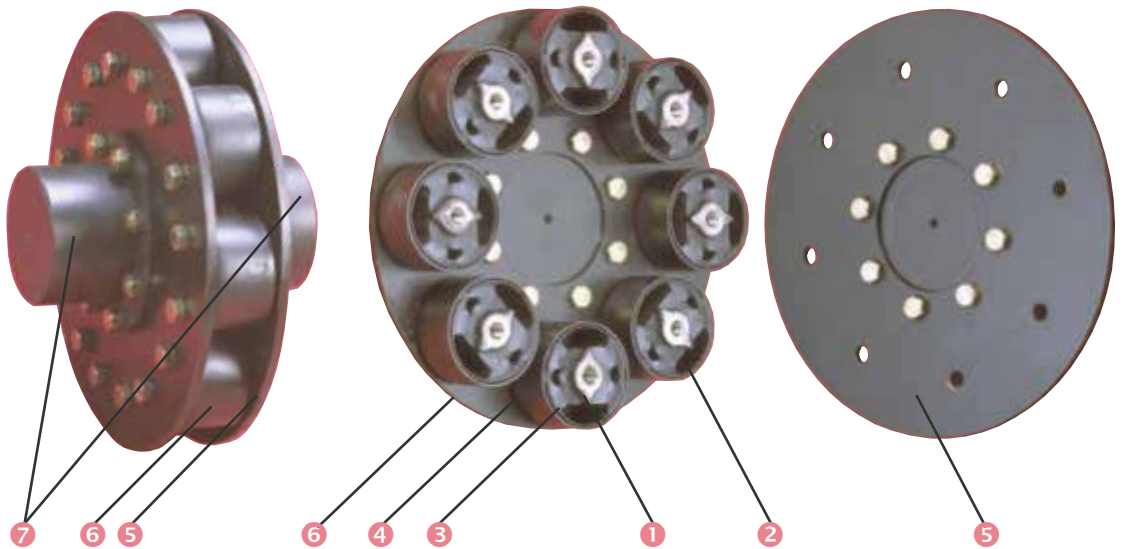
The slits ⑨ are designed to take the loose locating sleeves ⑪ to enable the individual flexible studs ① to be mounted and removed radially.

Torque to be applied to the stud fixing bolts :

- Stud RTP2 : 522090    Ø 12    →    75 N.m.
- Stud RTP4 : 522131    Ø 16    →    185 N.m.
- Stud RTP6 : 522240    Ø 24    →    640 N.m.

# AXOFLEX®

\* Torsional flexibility    \* Radial flexibility    \*\* Axial flexibility    \* Conical flexibility



## DESCRIPTION

- **Flexible element** comprising a variable number of flexible bushes, depending on the torque to be transmitted.
  - 1 Inner with tapped or smooth holes (normal mounting or on flywheel).
  - 2 Precompressed natural rubber bonded to inner 1 and to outer the half-cylinders 3.
  - 3 Half-cylinders bonded to the rubber.
  - 4 Outer housing ensuring precompression of rubber by exerting pressure on the half-cylinders 3.
- **Steel disks**
  - 5 Flange to which the inner studs are attached (normal mounting).
  - 6 Disk to which the studs are attached (flywheel mounting).
- **Die cast steel hubs**
  - 7 The two hubs are identical. They may be bolted to disks 5 or 6 depending on the mounting used.

## OPERATION

The AXOFLEX coupling is designed with the following features :

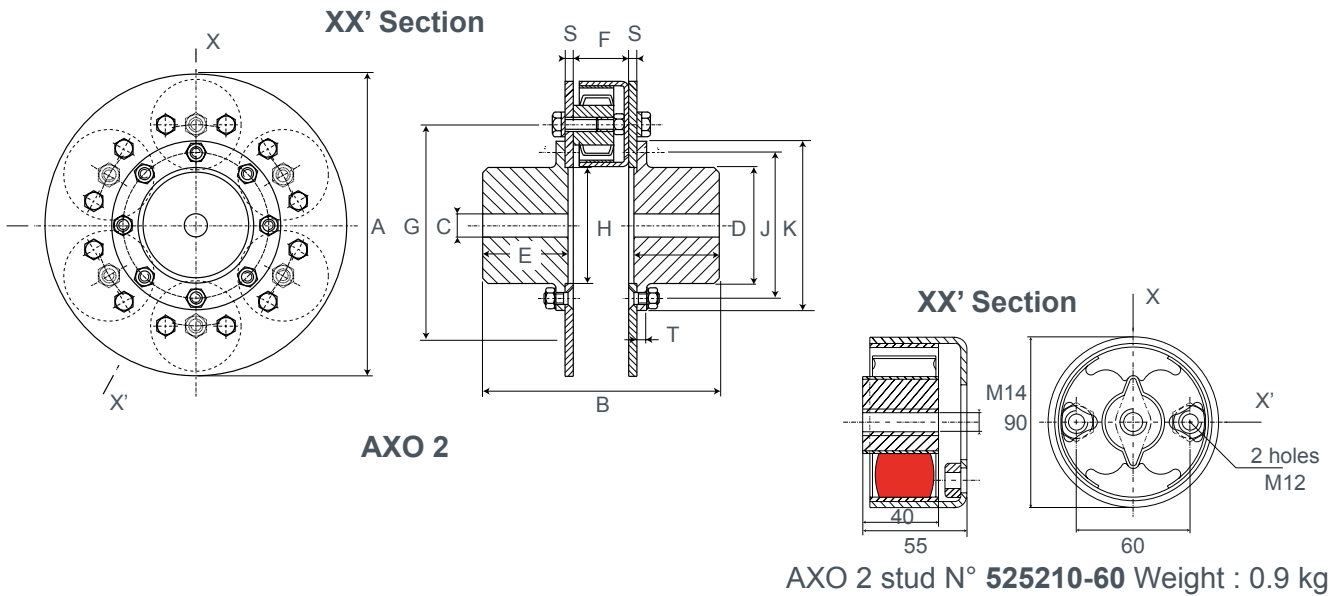
- radial disassembly without moving the machines that are coupled (usually very large machines);
- precompression of the rubber which limits operation under tension.

### Advantage

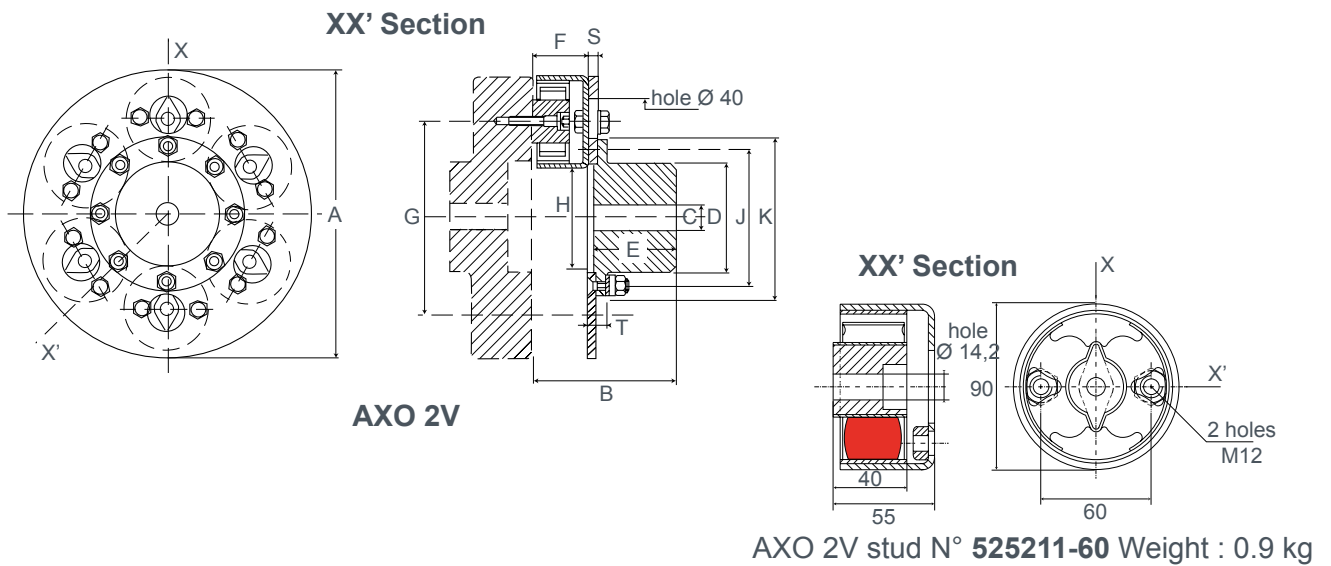
- Good axial flexibility which allows great axial displacement, for example in the case of conical rotor machines.

# DIMENSIONS AXO 2

## AXO 2 Coupling



## AXO 2V Flywheel coupling



### Flanges supplied unbores

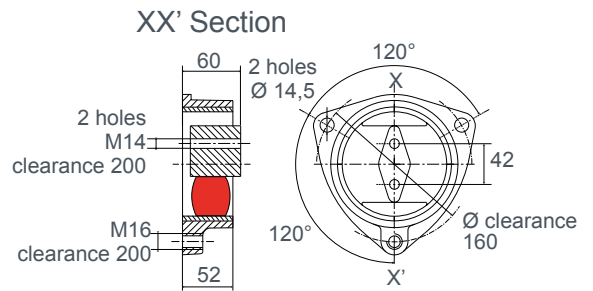
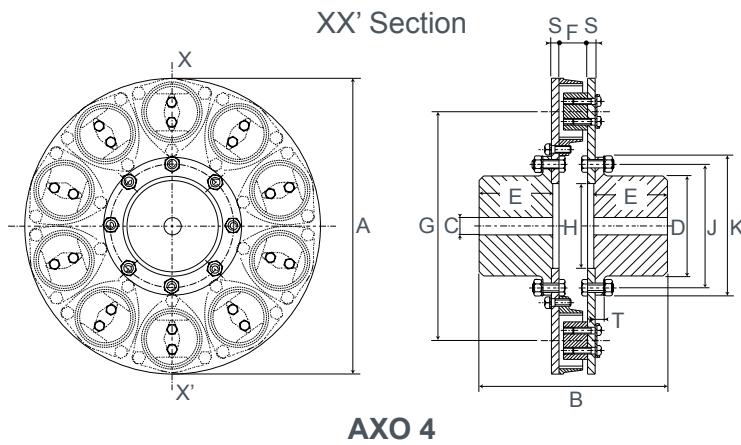
Ref. Standard coupling	Ref Flywheel coupling	Nominal torque (N.m)	Max torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)		D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	S (mm)	T (mm)	Weight stand. coupling
					min	max		stan.	flyw.										
615203	615253	600	1 200	3 000	18	60	270	181	138	86	60	55	180	85	115	138	6	7	14
615204	615254	800	1 600	3 000	18	60	270	181	138	86	60	55	180	85	115	138	6	7	15
615206	615256	1 300	2 600	3 000	23	80	300	235	145	115	85	55	200	115	145	168	8	9,5	28
615208	615258	2 300	4 600	2 500	23	80	364	235	145	115	85	55	268	115	145	168	8	9,5	45
615210	615260	3 600	7 200	2 500	28	100	424	274	164	145	102	55	324	145	180	210	10	12,5	72
615212	615262	5 000	10 000	2 000	28	120	475	345	200	177	136	55	380	178	213	247	12	16	103

1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

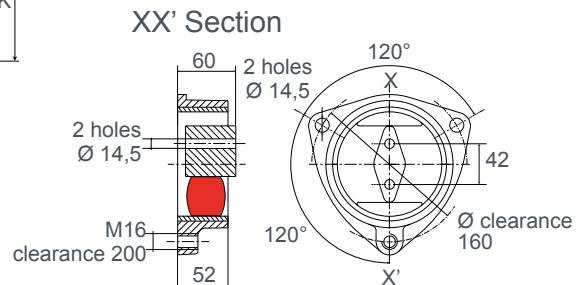
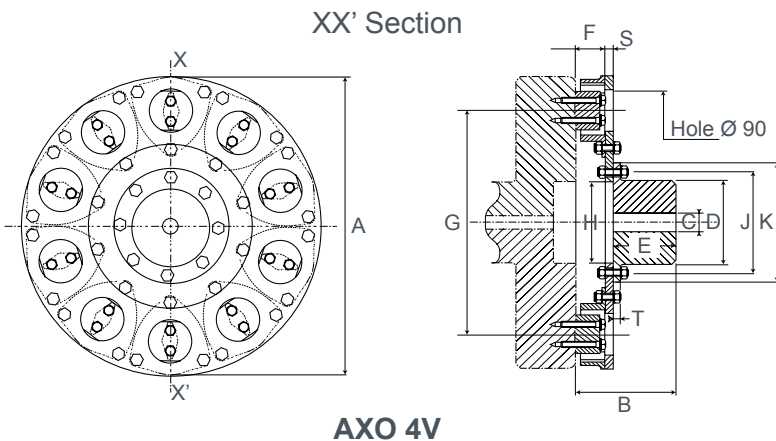
# DIMENSIONS AXO 4

## AXO 4 Coupling



AXO 4 stud N° 525400-60 Weight : 2.7 kg

## AXO 4V Flywheel coupling



AXO 4V stud N° 525403-60 Weight: 2.7 kg

### Flanges supplied unbored

Ref. Standard coupling	Ref. Flywheel coupling	Nominal torque (N.m)	Max torque N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)		D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	S (mm)	T (mm)	Weight stand. coupling
					min	max		stan.	flyw.										
615406	615456	5 000	10 000	1 800	28	100	480	279	170	145	102	60	340	145	180	210	10	12,5	80
615408	615458	7 500	15 000	1 800	28	120	513	346	203	177	136	60	373	178	213	247	10	16	115
615410	615460	12 000	24 000	1 500	28	120	622	358	209	177	136	60	482	178	213	247	16	16	178
615440	615490	12 000	24 000	1 500	32	150	622	396	228	210	155	60	482	178	260	290	16	18	200
615412	615462	17 500	35 000	1 500	32	150	720	396	228	210	155	60	580	178	260	290	16	18	240
615442	615492	17 500	35 000	1 500	36	170	720	516	288	240	215	60	580	240	290	335	16	24	300
615414	615464	24 000		1 400	36	170	840	524	292	240	215	60	700	240	290	335	20	24	400
615444	615494	24 000		1 400	36	200	840	570	315	285	240	60	700	240	335	380	20	40	500
615418	615468	40 000		1 200	36	200	1 040	590	325	285	240	60	900	240	335	380	30	40	700

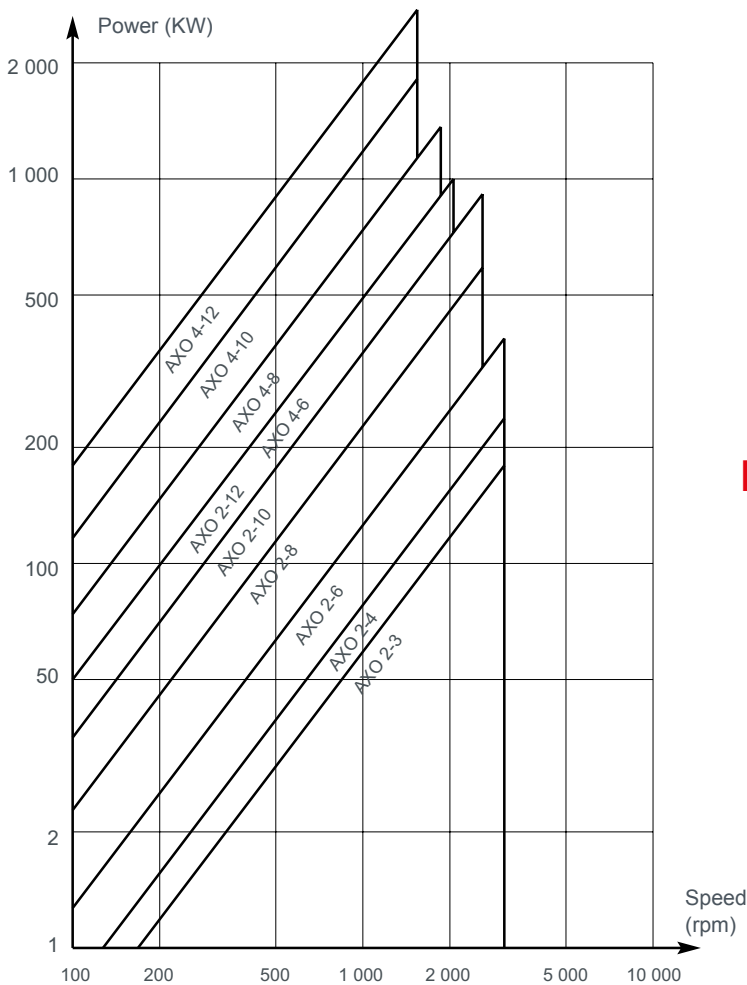
1 N.m ≈ 0,1 mkg

Please see current price list for availability of items.

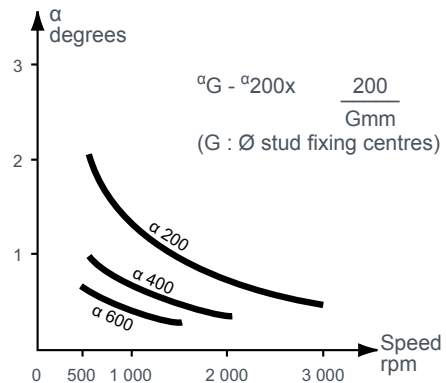
The maximum torque is considered to be an infrequent start-up torque and is not periodic.

# OPERATING LIMITS

## POWER RANGE



## CONICAL MISALIGNMENT



## RADIAL MISALIGNMENT

Nominal torque N.m	Axial displacement at 1,500 rpm
600	2 rpm
800	2 rpm
1 300	2 rpm
2 300	2 rpm
3 600	2 rpm
5 000	3 rpm
7 500	3 rpm
12 000	3 rpm
17 500	3 rpm

## OPERATING CHARACTERISTICS AXO 2

Nominal torque (N.m)	Vibrating coupling (N.m)	Torsion under NT (degrees)	Stiffness		
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)
600	300	3° 30'	22	75	10,9
800	400	3° 30'	30	100	14,3
1 300	650	3°	45	150	25,8

Nominal torque (N.m)	Vibrating coupling (N.m)	Torsion under NT (degrees)	Stiffness		
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)
2 300	1 150	2° 20'	60	210	53,3
3 600	1 800	2°	75	250	114,6
5 000	2 500	1° 50'	90	300	190

1 N.m ≈ 0,1 mkg

## OPERATING CHARACTERISTICS AXO 4

Nominal torque (N.m)	Vibrating coupling (N.m)	Torsion under NT (degrees)	Stiffness		
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)
5 000	2 500	1° 50'	100	360	157
8 000	4 000	1° 40'	130	480	252
12 000	6 000	1° 20'	170	600	528

Nominal torque (N.m)	Vibrating coupling (N.m)	Torsion under NT (degrees)	Stiffness		
			Axial (Dan/Mm)	Radial (Dan/Mm)	Torsional (M.kn/Rad.)
17 500	8 750	1°	200	720	916
24 000	12 000	0° 50'	240	850	1 550
40 000	20 000	0° 40'	300	1 100	3 300

1 N.m ≈ 0,1 mkg

# PARTS LIST

Coupling Reference	Flexible element		Flange		Disk Reference	Quantity
	Reference	Qty	Reference	Qty		
615203	525210-60	3	321138	2	351026 - 351027	1 - 1
615204	525210-60	4	321136	2	351028 - 351029	1 - 1
615206	525210-60	6	321147	2	351011 - 351012	1 - 1
615208	525210-60	8	321147	2	351013 - 351014	1 - 1
615210	525210-60	10	321154	2	351015 - 351016	1 - 1
615212	525210-60	12	321167	2	351017 - 351018	1 - 1
615253	525211-60	3	321138	1	351042	1
615254	525211-60	4	321136	1	351043	1
615256	525211-60	6	321147	1	351044	1
615258	525211-60	8	321147	1	351045	1
615260	525211-60	10	321154	1	351046	1
615262	525211-60	12	321167	1	351047	1

Coupling Reference	Flexible element		Flange		Disk Reference	Quantity
	Reference	Qty	Reference	Qty		
615406	525400-60	6	321154	2	351665 - 351666	1 - 1
615408	525400-60	8	321167	2	351667 - 351668	1 - 1
615410	525400-60	10	321167	2	351663 - 351664	1 - 1
615412	525400-60	12	321191	2	351659 - 351660	1 - 1
615414	525400-60	14	324602	2	351655 - 351656	1 - 1
615418	525400-60	18	324601	2	351651 - 351652	1 - 1
615440	525400-60	10	321191	2	351661 - 351662	1 - 1
615442	525400-60	12	324602	2	351657 - 351658	1 - 1
615444	525400-60	14	324601	2	351653 - 351654	1 - 1
615456	525403-60	6	321154	1	351669	1
615458	525403-60	8	321167	1	351670	1
615460	525403-60	10	321167	1	351671	1
615462	525403-60	12	321191	1	351672	1
615464	525403-60	14	324602	1	351675	1
615468	525403-60	18	324601	1	351677	1
615490	525403-60	10	321191	1	351673	1
615492	525403-60	12	324602	1	351676	1
615494	525403-60	14	324601	1	351674	1

## ASSEMBLY

### Method : (normal) :

- attach each of the flanges to the ends of the appropriate shafts;
- use the specially machined recess to centre the disks onto the flanges and screw together;
- attach the external armature of the studs to the appropriate disk;
- attach the internal armature of the studs to the other disk.

Torque for the bolts attaching the studs.

Ø 12 → 75 N.m

Ø 14 → 122 N.m

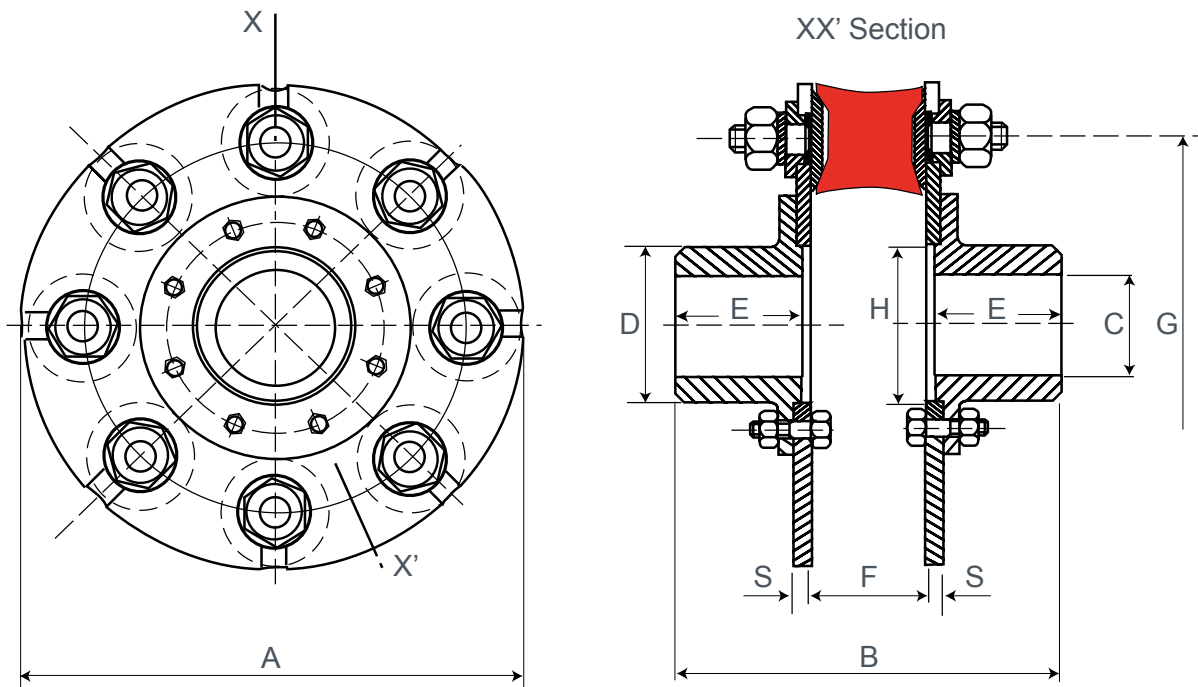
Ø 16 → 185 N.m

### Method : (flywheel) :

- mount the flange onto the shaft end;
- bolt the disk onto the flange;
- attach the external armature of the studs to the disk;
- attach the internal armature of the studs to the flywheel of the second machine.

# SPARE PARTS

## RADIAFLEX® COUPLING



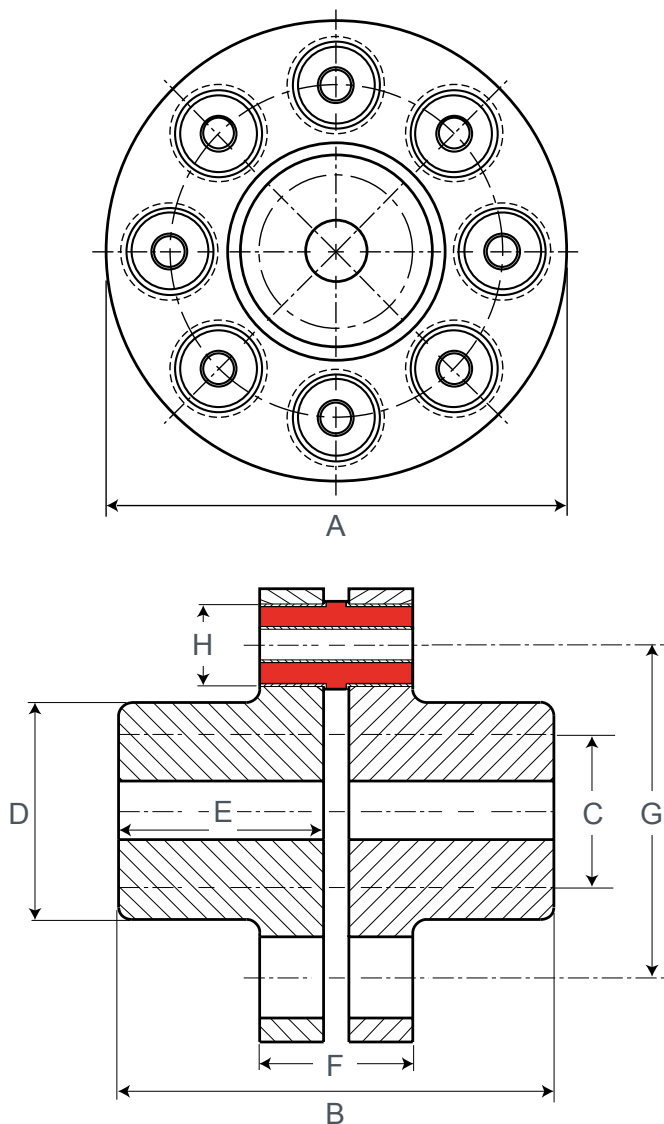
Coupling Reference	Nominal torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	Flexible stud		F (mm)	G (mm)	H (mm)	S (mm)
			min	max					Reference	Qty				
			610503	0,8										
610406	10	4 000	0	26	80	59	40	20	<b>521201</b>	6	19	60	-	5
611113	30	3 000	0	38	172	120	73	38	<b>521571</b>	3	44	114	50	4
611213	50	3 000	0	38	172	120	73	38	<b>521572</b>	3	44	114	50	4
611116	80	3 000	18	48	187	138	69	46	<b>521571</b>	6	44	130	70	4
611216	120	3 000	18	48	187	138	69	46	<b>521572</b>	6	44	130	70	4
611108	160	3 000	18	60	248	166	90	60	<b>521571</b>	8	44	190	85	4
611208	220	2 500	18	60	248	166	90	60	<b>521572</b>	8	44	190	85	4
611408	300	2 000	18	60	240	190	90	60	<b>521602</b>	8	60	180	85	8
611412	550	1 500	23	80	300	240	115	85	<b>521602</b>	12	60	236	115	8
611416	1 050	1 500	28	100	395	275	145	102,5	<b>621602</b>	16	60	330	145	8
611512	1 460	1 500	28	120	430	356	177	136	<b>521801</b>	12	70	340	178	10
611612	2 320	1 500	28	120	475	366	177	136	<b>521951</b>	12	76	380	178	12

1 N.m ≈ 0,1 mkg

# SPARE PARTS

## GV Coupling

Recommended in case of very high speed of rotation.



Coupling Reference	Nominal torque (N.m)	Max speed (rpm)	Hole size C (mm)		A (mm)	B (mm)	D (mm)	E (mm)	Type	Flexible stud		F (mm)	G (mm)	H (mm)
			min	max						Reference	Qty			
613101	80	9 000	10	35	100	125	56	60	G.V.10-8	523102	8	35	76	16
613400	450	7 000	24	60	180	170	85	80	G.V.40-8	523401	8	70	130	32
613800	1 000	5 000	35	70	220	235	100	110	G.V.80-8	523801	8	115	150	40
613901	3 800	3 500	35	120	330	320	170	150	G.V.150-10	523902	10	120	250	50
613902	5 400	3 000	35	140	380	340	200	160	G.V.150-12	523902	12	120	300	50
613903	9 000	2 500	40	180	480	400	250	190	G.V.150-16	523902	16	120	400	50

1 N.m ≈ 0,1 mkg







We make it **possible**

# DYNAMIC SEALING

# DYNAMIC SEALING

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See current price list for availability of items.

We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures and schemas of the products are supplied for information only.

# 1 - GENERAL

## 1.1 - What is a seal ?

An element forms a sealing function when it prevents the passage of a fluid from a one enclosure to another. Such elements are called "Seals".

If the object is to prevent the flow of a fluid from an enclosure into a neighbouring enclosure **the seal is called a single seal**. If the seal must prevent the flow of another fluid which may be in the second enclosure into the first, **the seal is called a double seal**.

If the two mechanical parts between which the leakage is likely to occur are fixed with relation to each other, **the seal is called a static seal**. If one or both of these parts is moving relative to the other, **the seal is called a dynamic seal**.

In this document, we will only be dealing with **dynamic seals**.

In practice, we only meet two sorts of relative movement, which may or may not be combined:

- linear translation (such as the sliding of a piston in a cylinder);
- rotation (the relative rotation about a common axis of a shaft in a hub or a crank case).



## 1.2 - Types of seals

Many different methods have been or are still used for sealing such as :

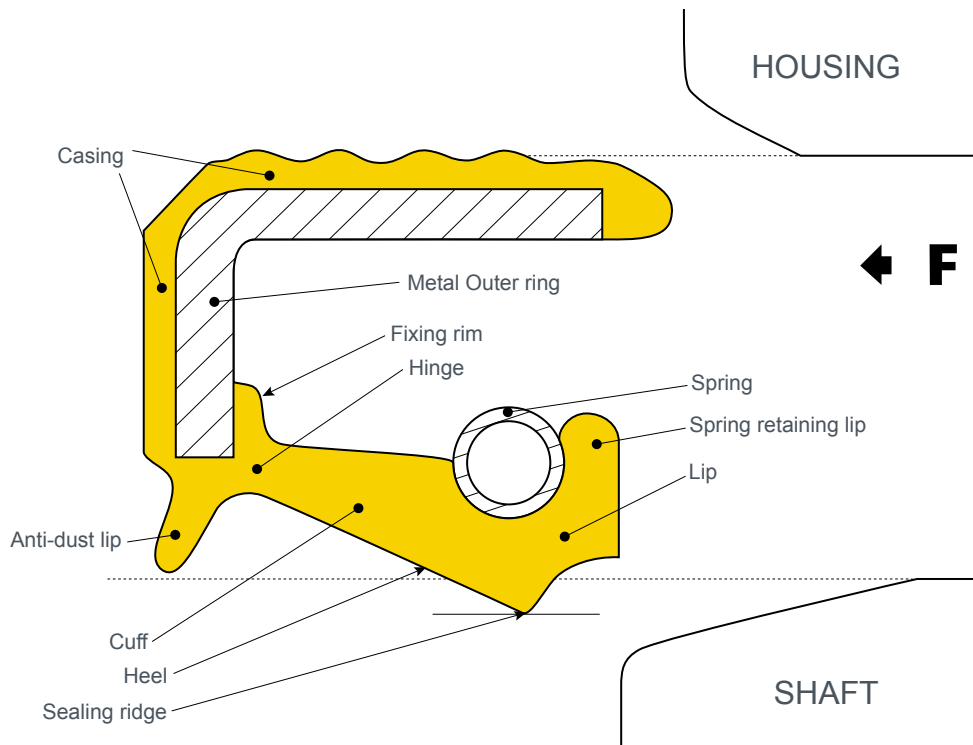
- labyrinth glands;
- stuffing-boxes;
- O-rings;
- lip seals;
- surface seals.

- **Labyrinth glands** are frictionless seals. They do not provide total sealing and do not seal if completely immersed in the fluid.
- **Stuffing-boxes** work by packing fibrous material which may or may not be braided tightly around a shaft by means of axial pressure applied by a screw cap or a flange tightened by a bolt. For many years, they have been the most common type of seals used. They produce a high frictional torque and absorb a relatively high amount of power. Although for many applications they have been replaced by lip seals or “surface” seals, they are still used a great deal, especially in the case of fluids under high pressure.
- **O-rings** are rings of synthetic elastomer of various cross-sections, most often circular (hence the name) but sometimes in the form of an X or a cross. They are most often used for static seals but can also be used in some cases as seals for rotating shafts, particularly at low speeds. They also give rise to a high frictional torque.
- **Lip seals for rotating shafts.** Lip seals first appeared about fifty years ago. They consisted of a leather cuff (which could be chromed) whose lip was kept in contact with the rotating shaft by an annular spring. In order to keep both the spring and the leather cuff in position, the parts were encased in a set of metallic collars and rings (normally at least three) which were crimped into each other. The external collar would usually be ground to size and “hard” mounted in a fixed hub. This type of seal was used a great deal, but its life was restricted as the leather wore out particularly in high temperatures. Nowadays, the leather has been replaced by synthetic elastomers which appeared on the market some forty years ago and gradually took over the role of the leather. The first of these elastomers to appear is today known as N.B.R. (Nitrile Butadiene Rubber) and was noted for its resistance to organic solvents, in particular liquid fuels and lubricating oils, even at high temperatures. The first seals manufactured had the same structure as the leather seal with its three crimped metal rings. The development of processes which ensure a very good bonding of N.B.R. to metal has enabled the structure of the seal to be simplified and has given it its present classic general shape. The discovery of new elastomers enables us to offer the user an increasingly varied range of seals, which are capable of solving increasingly difficult problems.



*Segré's Plant (Maine-et-Loire) - ISO 9001*

## 1.3 - Description of lip seals



In outline, a seal for a rotating shaft consists of three essential parts :

- the outer ring;
- the elastomer;
- the spring.

- **The Outer ring usually** consists of a metal ring in stamped steel with a right-angled cross-section.

- **The elastomer** is itself made up of 3 parts :

- the casing;
- the cuff;
- the lip.

- The casing (from the front surface to the back of the seal) is the part of the elastomer which is bonded to the Outer ring. It can cover it more or less entirely on the interior and/or the exterior.

- The cuff is cylindrical or slightly conical in shape and joins the Outer ring and the casing to the lip. It ensures a static seal and due to its elasticity - which is greater as it is longer - it allows slight movement of the lip due to movement of the shaft other than rotation.

- The lip is the element which ensures the dynamic seal by direct frictional contact with the shaft. It is made up of an annular beading including a double bevel forming a sharp ridge which is concentric with the perpendicular axis of the seal. The inclination of the surfaces of the bevel is designed to ensure the seal against leakage of a fluid situated on the side marked F.

- **The spring** is a spiral prestressed spring. It forms an annular ring. The join is usually effected by screwing into one end the conical spiral parts of the other end. The spring is fitted by light pressure into a groove in the beading of the lip.

## 2 - MATERIALS USED

### 2.1 - Armatures

Standard material : sheet steel of XE quality (AFNOR standard A 36 401)  
Special outer rings can be produced using other materials for special applications.

### 2.2 - Springs

Standard : Stabilised XC 70 steel  
On request : Z10 CN 18-09 stainless steel (AFNOR standard A 35 586).

**NOTA : All the PAULSTRA range of fluorinated elastomer seals fluorocarbon (FKM) are equipped with stainless steel springs.**

### 2.3 - Elastomers

	Mixes	Symbols	*Temperature range
STANDARD MIXES	<b>NITRILE (acrylo-nitrile butadiene)</b>  This material is particularly resistant to the action of mineral oils and grease.  Suitable in most other cases.	NBR	- 30°C to + 110°C
	<b>FLUOROCARBON ELASTOMER</b>  This elastomer has the best chemical and heat resistant characteristics.  The new fluorocarbon formula offers very low abrasion and : - low shaft and lip wear. - resistance to ageing.	FKM	- 20°C to + 200°C

\* Temperatures on samples



# 3 - THE SELECTION OF A SEAL FOR A ROTATING SHAFT\*

## 3.1 - The type of fluid to be sealed

The fluids in contact with each face of the seal can be gases or liquids which are more or less viscous even pasty (in the case of greases). They must not have too aggressive actions on the materials which make up the seal (the outer ring, spring and elastomer).

### 3.1.1 - Armature and spring

The armature and spring of standard seals are steel, so they have a good resistance to all the chemical solvents which are currently used in industry with the exception of water and aqueous liquids which can cause rust and corrosion.

For any other kind of material, please consult our technical services.

### 3.1.2 - Elastomer

#### Chemical resistance

The standard seals made from a nitrile elastomer based mix have been designed to resist most current lubricating oils.

**For more aggressive fluids, a formula based on fluorinated elastomer fluorocarbon (FKM) would be more appropriate.**

FLUIDS	ELASTOMERS		FLUIDS	ELASTOMERS	
	Nitrile (NBR)	Fluoro-carbon elastomer (FKM)		Nitrile (NBR)	Fluoro-carbon elastomer (FKM)
Acetone	D	D	ASTM3 oil at 100 °C	A	A
Acetic acid	A	D	ASTM3 oil at 150 °C	D	A
10 % Hydrochloric acid	A	A	Gear oil at 100 °C	A	A
Concentrated Hydrochloric acid	D	A	Gear oil at 130 °C	D	A
20 % Nitric acid	D	A	EP hypoid oil at 100 °C	A	A
10 % Sulphuric acid	A	A	EP hypoid oil at 130 °C	D	A
Concentrated Sulphuric acid	D	A	ATF oil at 100 °C	A	A
Atmospheric air at 100 °C	C	A	ATF oil at 150 °C	D	A
Atmospheric air at 200 °C	D	A	Mineral motor oil at 100 °C	A	A
Concentrated Ethyl alcohol	A	B	Mineral motor oil at 150 °C	D	A
Methyl alcohol	A	B	Synthetic motor oil at 100 °C	A	A
Propyl alcohol	A	B	Synthetic motor oil at 150 °C	D	A
Ammonia	C	A	Silicone oil	A	A
Benzene	D	B	Isooctane fuel (Fuel A)	B	A
Butter	A	A	Isooctane-toluene (Fuel B)	A	A
Butane	A	A	Kerosene JP 1	A	A
Petrol	A	A	Milk	B	B
Super petrol	C	A	Antifreeze (water + glycol)	D	C
Chlorine	B	A	Brake fluid (Lockheed)	D	D
Cyclohexane	B	A	Brake fluid (Lockheed) at 50 °C	D	A
Water	A	A	Ozone	A	A
Sewage	A	B	Paraffin	A	A
Concentrated Eau de Javel	C	A	Propane	A	A
Sea water	A	A	Saline aluminium solutions	A	A
Freon	C	C	Magnesium salt solutions	A	A
Freon 12	B	B	Sodium chloride solutions	A	A
Carbonic gas	A	A	Soda	C	A
Smoke	C	A	Toluene	C	A
Diesel oil	A	A	Trichlorethylene	D	A
Diesel oil at 100 °C	C	A			
Glycerine	A	A			
Cereal oils	A	A			
ASTM1 oil at 100 °C	A	A			
ASTM1 oil at 150 °C	D	A			
ASTM2 oil at 100 °C	A	A			
ASTM2 oil at 150 °C	D	A			

A: Good chemical resistance B: Average performance  
C: Acceptable (depending on conditions of use) D: Unsuitable  
\* For rotating housing applications please consult us.



## Mechanical resistance

The new brown colored fluorocarbon (FKM) formula presents a very low abrasivity and :

- low shaft and lip wear;
- resistance to ageing.

## Heat resistance

For good performance an elastomeric seal must be used within its operating temperature range. The standard elastomeric mix is not only sensitive to high temperatures which harden it causing cracks and fissures, but also to intense cold which makes it hard and hardens it. The temperature which must be considered is that at the contact lip. It must be borne in mind that this gets much hotter than the ambient fluid, due to friction. For example, the temperature of the lip of a seal which seals the motor oil of a crankcase, where the shaft is rotating at high velocity (more than 8 m/s), can increase by about fifty degrees after a few minutes of service, whereas the oil, even next to the seal, will only warm up by a few degrees in the same period. The temperature displayed by a thermometer dipped into the crankcase oil is not therefore a determining factor.

In addition to the shaft speed, which is the most important factor, other parameters influence the heating of the lip such as the condition of the shaft surface, the tightness of the seal, the ventilation of the crankcase, and so on, so that it is very difficult to know the temperature of the lip in continuous operation.

The temperatures indicated in the table below are only valid if the fluid being sealed is not degraded at these temperatures.

**Where high temperatures exceed the values shown in the table below, use seals in fluorinated elastomer.**

**Our technical services are at your disposal to reply to your questions about the properties of various mixes.**

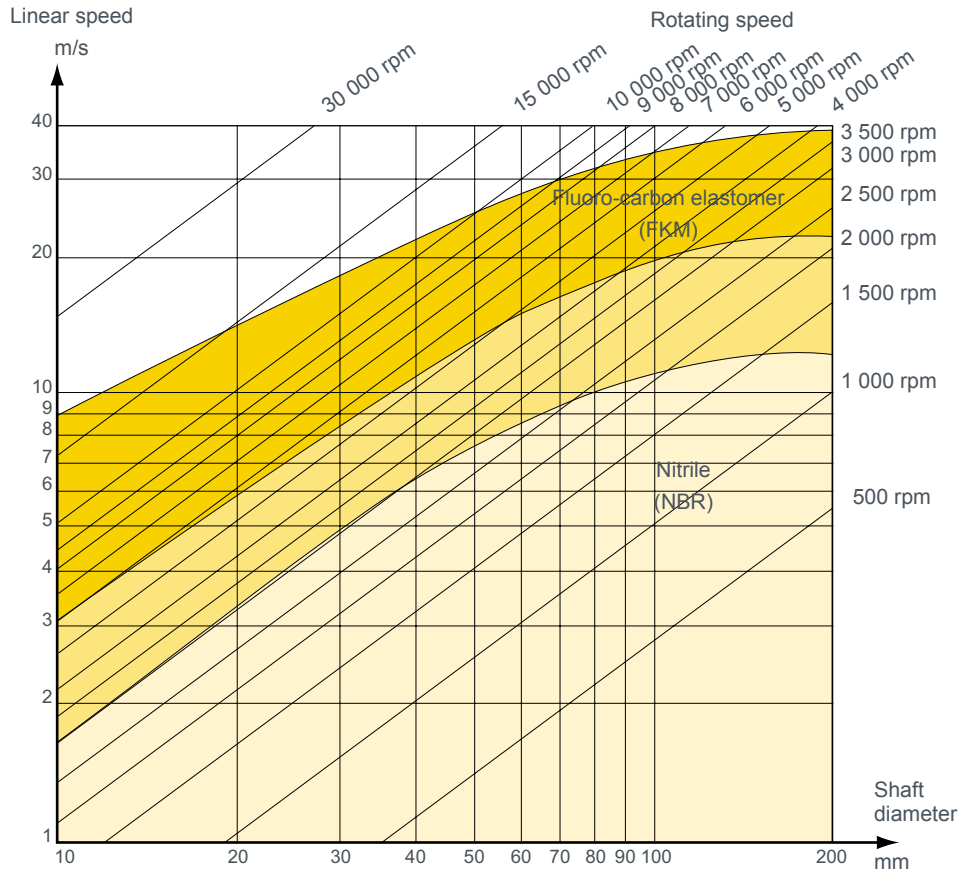
	Nitrile (NBR)		Fluoro-carbon elastomer (FKM)	
Low temperature in °C (1)	- 40		- 30	
Temperature in °C	Av. (2)	Max (3)	Av. (2)	Max (3)

Products to be sealed					
Mineral oil based	Motor oils	100	120	150	175
	Gear box oils	90	110	130	150
	Hypoid gear oils	90	110	130	150
	ATF oils	100	120	150	175
	Hydraulic oils	100	120	150	175
	EL and L diesel oils	90	100	+	
	Greases	100	120	150	175
Hydraulic liquids hard to ignite	HSB oil/water emulsion	80	100	-	
	HSC aqueous solution	80	100	-	
	HSD non-aqueous solution	--		130	150
Other products	Water	80	100	+	
	Detergents	80	100	+	
	Brake fluid	--		--	

- (1) Temperature at which the seal continues to function.
  - (2) Average operating temperature.
  - (3) Maximum permissible temperature for not more than 10 hours over the life of the seal.
- + Resistant. but normally not used.  
 - Resistant. under certain conditions.  
 -- Does not resist.

## 3.2 - Shaft speed

The graph below gives an indication of the rotary or linear velocity of the shaft in relation to various elastomers which are permissible under normal conditions of use.

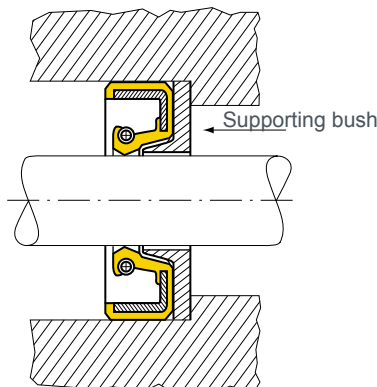


## 3.3 - Pressure

The effective pressure to which a seal is submitted is the difference between the pressures of the fluids on each of its two sides (one of which is often the atmosphere). It is clear that the sealing lip should be found on the side which has the higher pressure. In theory, the lip seal for rotary shafts is not a pressure seal.

However, most PAULSTRA seals will resist pressures of the order of 0.5 bars without special precautions if the velocities do not exceed 3 m/s. At higher pressures, there is a risk that the lip may be turned back on itself or pressed onto the shaft with a force which gives rise to an unacceptable tightness and frictional torque. At low velocities most PAULSTRA seals will bear pressures of up to 3 or 4 bars with the addition of a supporting bush. This is not provided by PAULSTRA but it can be made up by the customer according to PAULSTRA's drawings.

The effective pressure is not necessarily constant. If the variations are slow and remain within the limits above, this is not a big problem. On the other hand, if they pulsate rapidly they can interfere with the performance of the seal.



You are advised to consult our technical services for any application which involves an effective pressure greater than 0.5 bars or a pulsating pressure.

# 4 - CONDITIONS FOR GOOD OPERATION

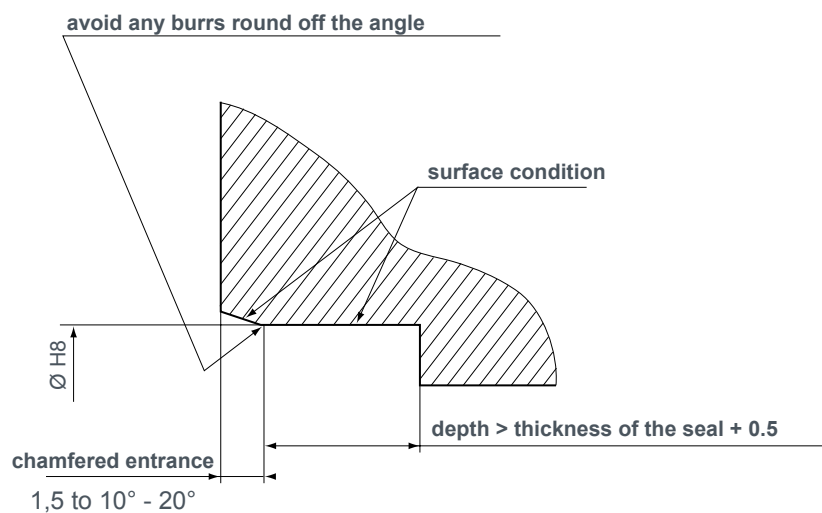
## 4.1 - The housing

It is extremely important that there be no sharp edges.

Our recommendations are shown on the figure below :

**Recommended shape of the housing :**

- for a covered seal :  
R = 4 to 12,5  $\mu$   
Ra = 1,6 to 4  $\mu$
- for an external outer ring :  
R = 3 to 8  $\mu$   
Ra = 1,2 to 2,5  $\mu$



**Note :** if the housing is made of a material with a high coefficient of expansion, this must be taken into consideration when defining the interference (tightness) with the seal.

The lack of a chamfer or too small a chamfer can cause :

- a deterioration of the exterior of the seals (cutting of the elastomer or stripping of the sealing lacquer);
- a big increase in the force of insertion which could cause deformation of the outer ring;
- a defective axial positioning.

A surface with a very rough finish can cause the same problems and can therefore also be the reason for a leak. On the other hand, if the finish is too smooth the extraction force may be too low.

## 4.2 - The shaft

The PAULSTRA recommendations are as follows :

- **Tolerance on the diameter** : h 11.
- **Surface state** : R = 0.4 to 1.2 ED (so Ra ≈0.2 to 0.5).
- **Hardness** : if  $V \leq 4$  m/s : 45 HRC minimum (say 455 HV or 155 kg/mm<sup>2</sup>).  
if  $V > 4$  m/s : 55 HRC minimum (say 625 HV or 195 kg/mm<sup>2</sup>).
- **Thickness of the treated zone** : 0.3 mm minimum.
- **Circularity** : 5 microns.
- **Neutrality** : All machined surfaces have grooves from the machining process. If these grooves are inclined in relation to the axis of the shaft, they form a helix which will produce a hydrodynamic action.

**The bearing surfaces of a seal must be neutral** (i.e. there must be no orientation of the machining grooves).

It is possible to orient the machine grooves deliberately to produce pumping from the exterior to the interior of the mechanism. However, **we advise against this as there will be increased wear of the seal.**

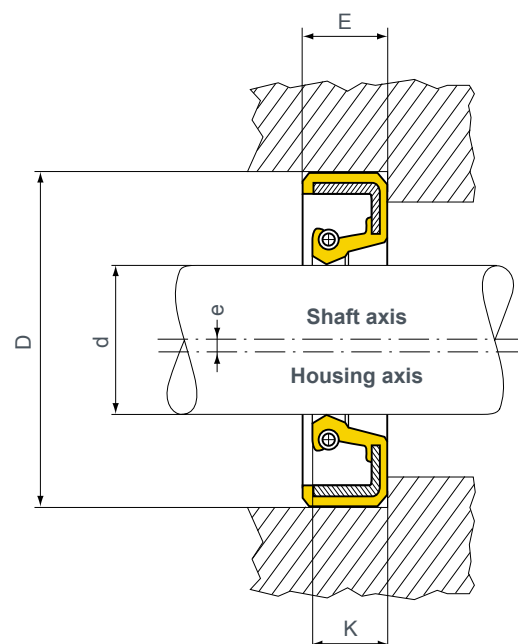
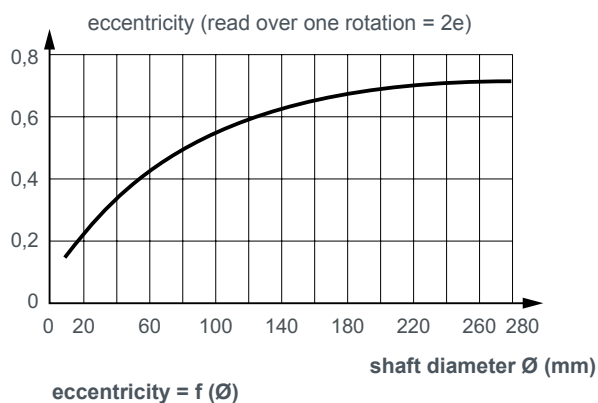
Hard chroming is also not to be recommended, unless it is of sufficient thickness and quality.

## 4.3 - Eccentricity between the housing and the shaft

The housing and the shaft should be centred on one another as precisely as possible. If there is a radial displacement between the axis of the seal and the axis of the shaft, the suppleness of the rubber lip enables assembly without “yawning” within certain limits.

The eccentricity is the distance between the axis of the seal housing and the axis of the shaft, the two axes being parallel to each other.

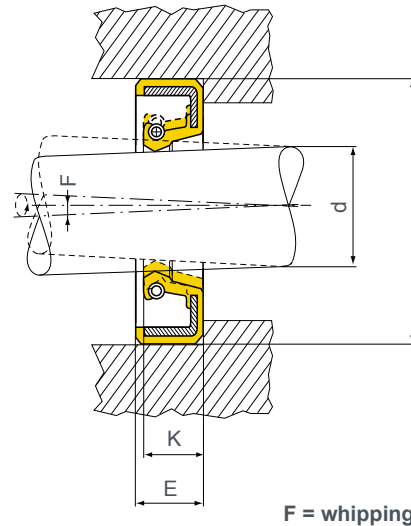
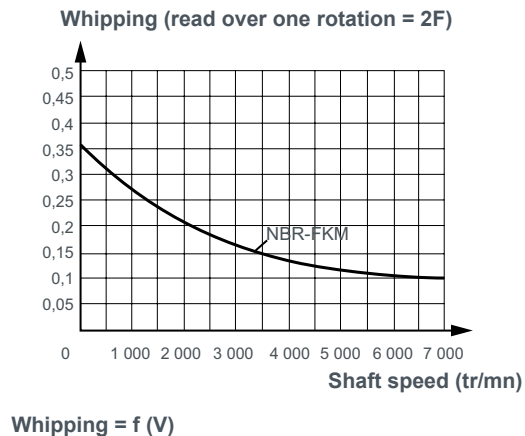
The curve below shows the maximum permitted eccentricities as a function of the shaft diameter.



## 4.4 - Whipping and out of true

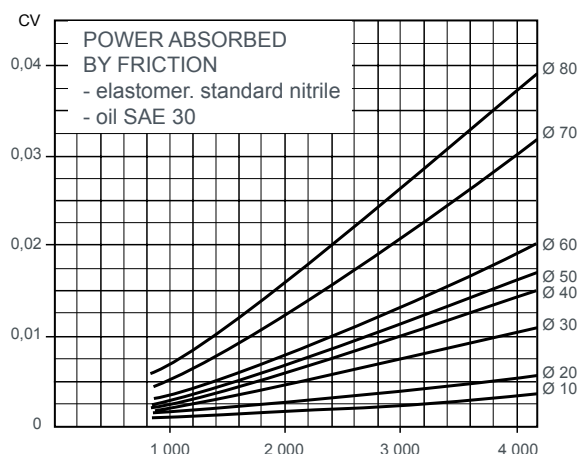
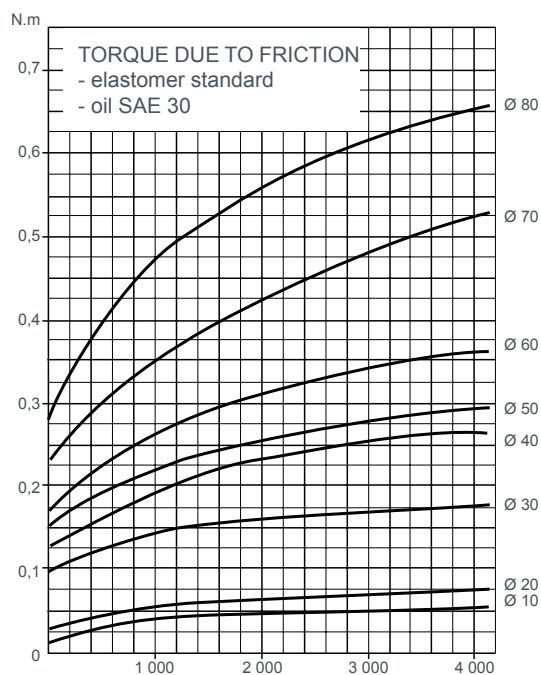
This phenomenon occurs when the geometric axis of the shaft does not coincide exactly with the rotational axis. This can be the result, for example, of a worn bearing or the bending of the shaft. The amplitude of whipping increases with distance from a bearing, so the seal should be placed as near as possible to the bearings. Whipping is measured in mm by the radius of the circle described by a point on the axis of the shaft which is in the same plane as the lip.

The curve below shows the maximum whipping permissible as a function of the rotational velocity of the shaft.



## 4.5 - Power absorbed due friction

Due to its design, a lip seal produces friction which will provide some resistance to the rotation of the shaft. For a chosen speed, the resisting torque is function of : the shape of the seal, the friction coefficient and other environment factors such as (materials, tightness of the seal on the shaft, roughness of the shaft, wear, lubrication, temperature ...).



The curves above gives a first indication for the standard Nitrile elastomer. They were plotted under average working conditions using a standard seal with little wear and a lubricated shaft with good surface finish and running temperature of less than 100 °C.

# 5 - THE ASSEMBLY OF SEALS

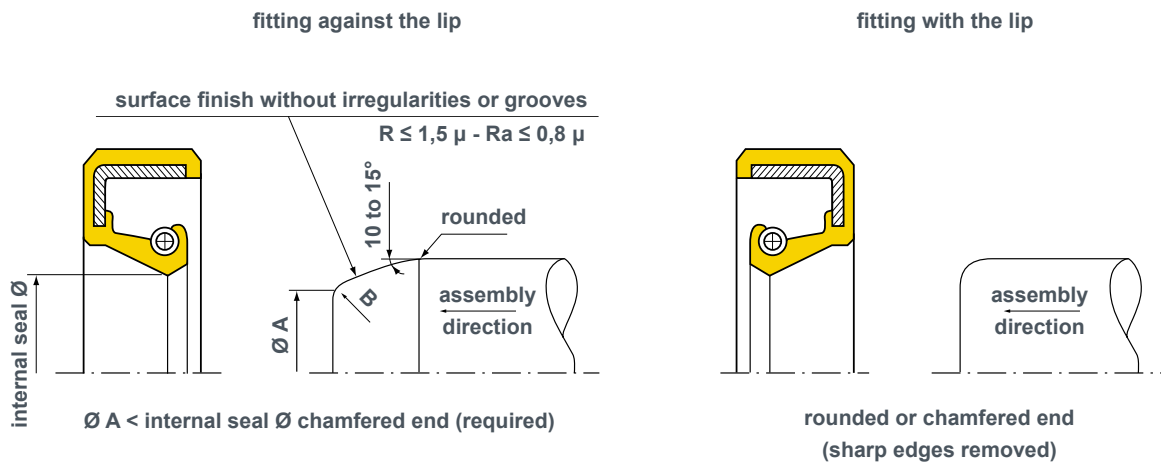
The assembly of seals is a very delicate operation which can ruin the efficiency of a very good product if it is not done properly.

The assembly of a seal must be done in accordance with the following rules :

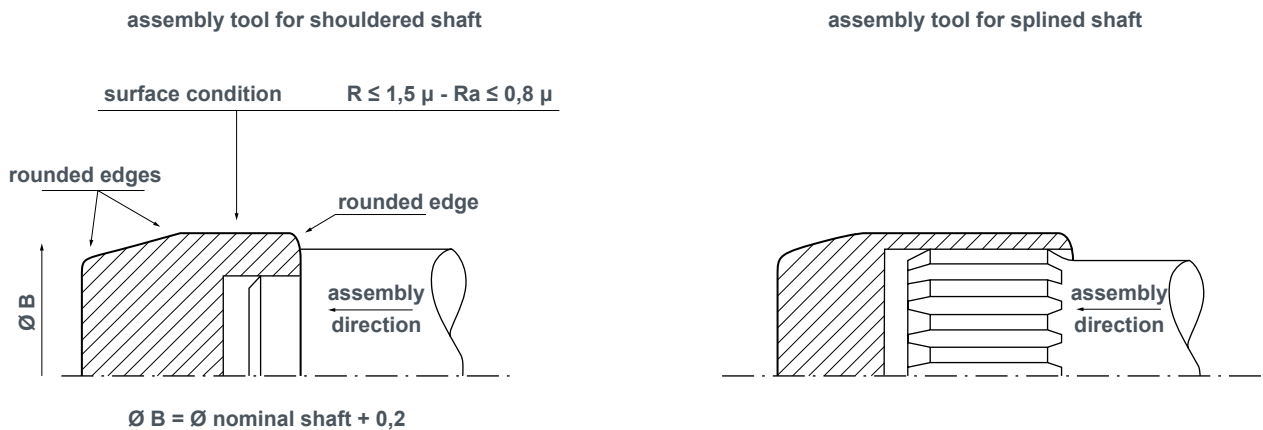
- avoid damage to the lip;
- avoid damage to the cover of the external diameter;
- lubricate the sealing ridge to avoid damage at the first start-up;
- position the seal correctly :
  - misalignment (the seal must be perpendicular in relation to the axis);
  - axial position.

The information given below should help constructors to put these rules into practice.

## 5.1 - Assembly on a shaft without splines

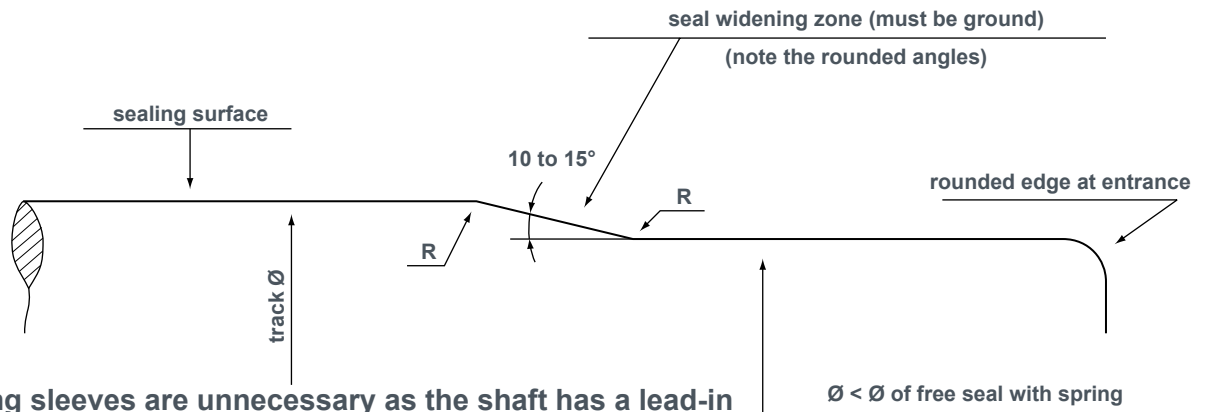


## 5.2 - Assembly on a shaft with splines or a shoulder



The use of these assembly tools is helpful. However, we recommend the use of a lead-in on the shaft whenever possible.

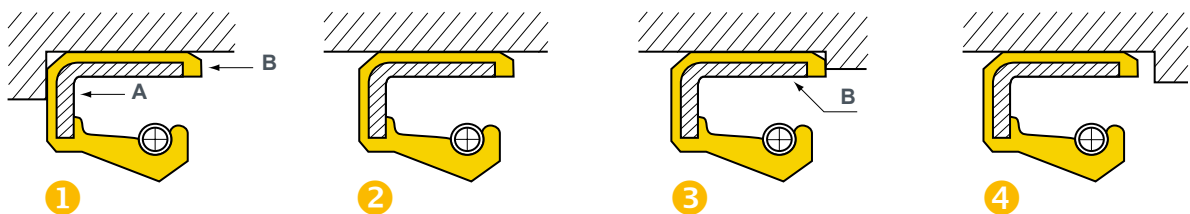
## 5.3 - Paulstra recommendations for the shape of the shaft



Mounting sleeves are unnecessary as the shaft has a lead-in

$\varnothing < \varnothing$  of free seal with spring

## 5.4 - Axial positioning and alignment



- 1 The seal is mounted against a stop on the rear side. This presents no particular problem provided that pressure is applied at "A" to insert it and not "B".
- 2 Here there is no axial stop. The mounting tool positions the seal both axially and perpendicularly.
- 3 The seal is mounted against a stop on the front side. This should be avoided as the elastomer at B could be compressed and the seal will tend to move out of position.
- 4 The housing has a shoulder as in 3, but the seal is positioned by the mounting tool. This case joint is preferable to case 3.

The mounting tool should be designed to position the seal correctly both axially and perpendicularly but its shape should be such as to allow deformation of the elastomer covering the outer ring towards the rear, thus avoiding cutting the covering at the time of insertion. In some cases, the bead "C" does not get cut off and sticks between the housing and the assembly mandrel in which case it is impossible to locate the seal. When the seals have an anti-dust lip, care should be taken that the mounting tools do not turn it back on itself.

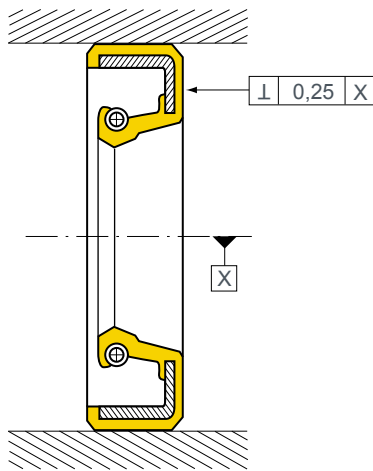
While it is true that modern seal design (corrugations on the outside, pre-centred shape chamfers without burrs, etc.) tends to reduce problems during assembly, the comments made are still worth noting.

Also, the elastomer part of a semi-covered seal behaves in the same way as a fully covered seal.

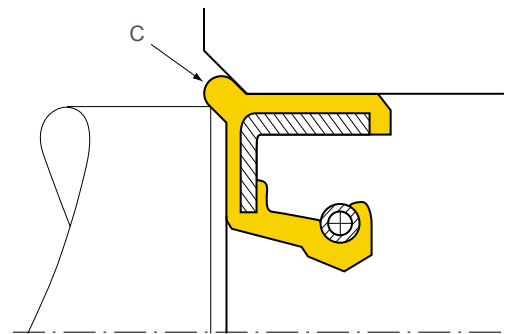
- Time should be allowed during assembly to allow in order to allow the elastomer time to settle.
- The seal must be held in position for a few seconds once mounted to avoid too large a return movement.

**We recommend the following :**

- $V = 1200 \text{ mm/mn}$  (maximum :  $1500 \text{ mm/mn}$ ).
- time held in position: 5 seconds (minimum 2 seconds).

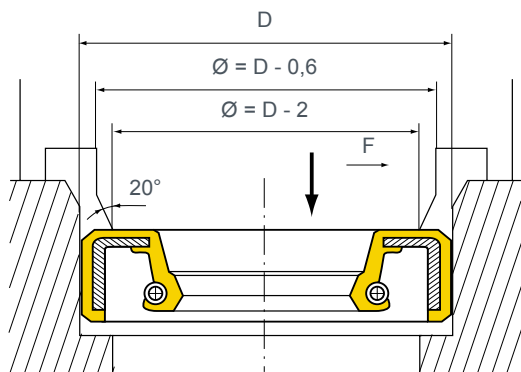


**Perpendicular tolerance**

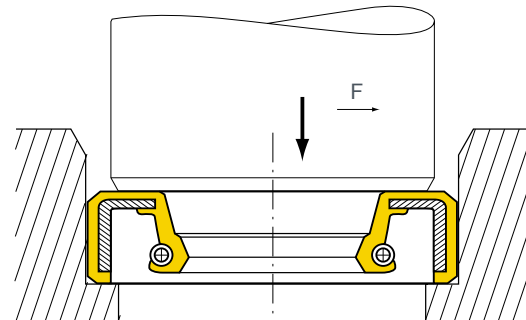


**Formation of the bead**

## 5.5 - Recommendations for the assembly tool



**GOOD**



**TO BE AVOIDED**



## 5.6 - Lubrication during assembly

While the first means of avoiding damage to the outside of the seal is to pay attention to the housing characteristics, the second means, which is just as important, is lubrication :

- be it of the housing;
- or the outside of the seals;
- or both at the same time.

This not only avoids damage to the seal but also ensures a better axial positioning.

A seal whose outside diameter is not lubricated will certainly be damaged on the outside when it is mounted in a dry housing (elastomer cover cut or ripped sealing lacquer removed).

Also, when the unit is started up, the oil will always take some time before it reaches the lip of the seal (from a few seconds to a few tenths of seconds depending to the application).

If it is the first start, and if the lip has not been lubricated at assembly, it will function "dry" dynamically which will lead to great wear and the risk of total deterioration.

It is therefore essential to lubricate the sealing ridge.

For later starts, the problem is different because a film of oil will be retained under the lip by capillarity action.

## 5.7 - Reminder of the main principles of assembly

- **Protect the lip and the outside of the seal by paying attention to the recommendations for the Shaft and the housing.**
- **Apply the insertion force to the rigid part of the outer ring.**
- **Centre the seal correctly in relation to the housing and/or the shaft.**
- **Lubricate the outside diameter and/or the housing.**
- **Lubricate the sealing ridge.**

# 6 - CLASSIFICATION OF THE MAIN PROFILES OF LIP SEALS

	SPRING			CORRUGATED COVER (W)	ANTI-DUST LIP		RIDGES		
	embedded (I)	visible (E)	none (O)		WITHOUT SPRING (L)	WITH SPRING (R)	on the left (G)	to the right (D)	bi-direct. (V)
<b>I</b> Covered outer ring	II 	IE 	IO 	IEW 	IEL 	IELR 	IEG 	IED 	IEV 
<b>E</b> Bare outer ring	-	EE 	EO 	-	EEL 	EELR 	EEG 	EED 	EEV 
<b>CS</b> Bare outer ring reinforced	-	-	-	-	CSEL 	-	-	-	-
<b>M</b> Semi-covered outer ring	-	ME 	MO 	MEW 	MEWL 	MEWLR 	MEG 	MED 	MEV 

Note : other cases are available  
 X = exterior lip  
 S = special cross-section  
 P = protector

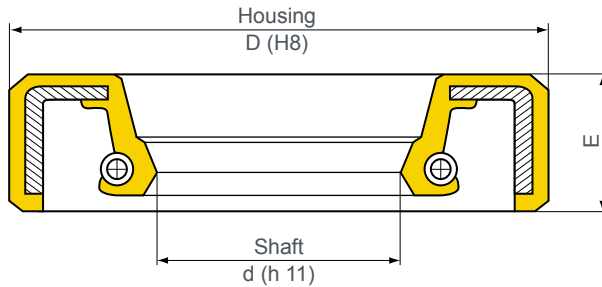
## CLASSIFICATION EXAMPLE

<b>M</b> Semi-covered	<b>M</b> Semi-covered	<b>M</b> Semi-covered
<b>E</b> Spring visible	<b>E</b> Spring visible	<b>O</b> No spring
<b>W</b> With corrugations	<b>W</b> With corrugations	<b>W</b> With corrugations
<b>LR</b> Anti-dust lip with spring	<b>G</b> Ridges to the left	<b>L</b> Anti-dust lip



# CATALOGUE OF SEALS FOR ROTATING SHAFTS

## SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER



- The part numbers indicated in bold type are normally kept in stock.
- All important orders or special elastomers are available on request. Part numbers ending in "01" include a STAINLESS STEEL SPRING.

Due to low demand we have now stopped making the II/IIL range of seals (with moulded in spring). Please refer to our cost effective standard range of seals (IE/IEL or CSEL type in both Nitrile or Fluorocarbon elastomer) to find the nearest equivalent. Our Technical support service is at your disposal to help you.

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
5	15	6	IE	NBR	<b>722034</b>
	15	6	IE	FKM	<b>722034/81</b>
	15	6	IEL	NBR	<b>792593</b>
	16	5	IO	NBR	723218
5,5	16	7	IE	FKM	772145
6	12	3,5	IE	NBR	772315
	15	7	IE	NBR	772309
	16	7	IE	NBR	<b>722987</b>
	22	7	IE	NBR	<b>722196</b>
	22	7	IOS	NBR	726167
6,3	19	5	IEW	NBR	772402
	19	6,3	IE	NBR	<b>722416</b>
	19	6,3	IE	FKM	772122
7	16	7	IE	NBR	<b>722290</b>
	19	6	IE	NBR	<b>722399</b>
	22	7	IE	NBR	<b>722721</b>
8	11,5	2,5	OOS	NBR	727093
	14	3	IO	NBR	723227
	14	3	IO	NBR	723250
	14	3	IO	NBR	723279
	15	5	IE	NBR	772233
	16	6,5	IE	NBR	<b>722455</b>
	16	6,5	IO	NBR	723216
	18	5	IE	NBR	<b>722477</b>
	18	5	IE	FKM	722477
	18	5	IEL	NBR	<b>792594</b>
	22	6	IEWL	NBR	725696
	22	7	IE	NBR	<b>772023</b>
	22	7	IEL	NBR	<b>792595</b>
22	8	IE	NBR	<b>722211</b>	
22	8	IE	FKM	722907	
8,4	16	6,5	IE	NBR	722061
9	22	7	IE	NBR	<b>722981</b>
	24	7	IE	NBR	772026
	25	8	IE	NBR	<b>722273</b>
	26	7	IE	NBR	<b>772028</b>
	26	8	IE	NBR	<b>772028</b>
	28	8	IE	NBR	772330

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
9,2	19	5,3	IE	NBR	<b>722003</b>
9,8	18	5	IOS	NBR	726787
	16	5	IE	FKM	722393
10	18	5	IE	NBR	<b>722495</b>
	19	7	IE	NBR	<b>722164</b>
	22	7	IE	NBR	<b>722940</b>
	22	7x8	IEL	NBR	<b>725331</b>
	22	8	IE	NBR	<b>722294</b>
	25	8	IE	NBR	<b>722267</b>
	26	7	IE	NBR	<b>722983</b>
	28,5	8	IE	NBR	722783
	35	8	IE	NBR	722784
10,3	22	8	IE	NBR	772311
10,8	22,2	6,3	IE	NBR	722417
11	17	4	IE	NBR	772379
	17	4	IEWL	NBR	725694
	22	7	IE	NBR	<b>772010</b>
	24	8	IEL	NBR	725183
	26	7	IE	NBR	<b>772027</b>
	26,9	8	IE	NBR	722007
	28,5	8	IE	NBR	722785
12	18	4	IOS	NBR	726024
	18,2	4	IOS	NBR	726072
	19	5	IE	NBR	<b>792700</b>
	20	5x6	EELS	NBR	725519
	22	4	IE	NBR	722372
	22	4	IE	NBR	772314
	22	4	IE	NBR	<b>792701</b>
	22	4	IEL	NBR	<b>792596</b>
	22	4,5	IE	NBR	<b>722303</b>
	22	7	IE	NBR	722660
	22	7	IEL	NBR	<b>792507</b>
	22	8	IE	NBR	722295
	24	6,5	IE	NBR	<b>722395</b>
	24	6,5	IEL	NBR	<b>792597</b>
	24	7	IE	NBR	<b>772204</b>
	26	8	IE	NBR	<b>722109</b>
26	8	IEL	NBR	<b>725352</b>	
26	8x13	IES	NBR	726223	

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference		
12	26	10	IELRS	NBR	725735	15	32	7	IE	FKM	772130		
	28	7	IE	NBR	<b>722992</b>		32	7	IEL	NBR	<b>792508</b>		
	28	7	IE	NBR	772346		33	5,5	IE	NBR	722787		
	28	8	IE	NBR	<b>722268</b>		33	7	IE	NBR	722042		
	28	8	IEL	NBR	<b>725589</b>		33	8	IE	NBR	722347		
	28,5	8	IE	NBR	722786		33	10	IEL	NBR	<b>725669</b>		
	30	7	IE	NBR	<b>772011</b>		35	7	IE	NBR	<b>772007</b>		
	30	8	IE	NBR	<b>722189</b>		35	7	IE	FKM	<b>772007/81</b>		
	30	8x13	IELS	NBR	725492		35	7	IEL	NBR	<b>792602</b>		
	30	8x13	IOS	NBR	726342		35	8	IE	NBR	<b>722316</b>		
	32	8x13	IES	NBR	726594		35	10	IE	NBR	<b>722300</b>		
	32	8	IE	NBR	722320		35	10	IEL	NBR	<b>725739</b>		
	32	10	IE	NBR	<b>792702</b>		42	8	IE	NBR	<b>722296</b>		
	32,9	5	EOS	NBR	726407		15,2	30	4,6	IOS	NBR	726188	
	35,9	5	EOS	NBR	726397			15,6	25	7	IE	NBR	<b>722006</b>
	12,5	22	4,5	IE	NBR		<b>722810</b>		15,7	25,5	4,6	IE	NBR
		22	8	IE	NBR		722545	15,8		28,5	9,5	IE	NBR
	13	24	7	IEL	NBR		725330		28,5	9,5	IEL	NBR	<b>725045</b>
		25	8x14	IELS	NBR		725134	15,9	28,6	9,5	IE	NBR	<b>722150</b>
		26	6	IE	NBR		<b>792703</b>		35	8x11,5	IOLS	NBR	723260
26		9	IEL	NBR	<b>725297</b>	16	22		3	IOS	NBR	726303	
26		9	IOS	NBR	726075		22		4	EE	NBR	720047	
30		8	IE	NBR	<b>722013</b>		22		4	EEL	NBR	726353	
35	10	IE	NBR	772345	22,7		4,2		IE	NBR	772278		
14	22	4	IE	NBR	<b>722234</b>		24	6	IEL	NBR	725659		
	22	4	IE	NBR	772308		24	7	IE	NBR	<b>722769</b>		
	22	4	IEL	NBR	<b>792598</b>		26	7	IEL	NBR	<b>725811</b>		
	22	4	IOS	NBR	726385		28	7	IEL	NBR	<b>792603</b>		
	22	7	IE	NBR	722453		28	7	IE	NBR	<b>772012</b>		
	24	6	IEL	FKM	<b>725628/81</b>		28	8	IE	NBR	722613		
	24	7	IE	NBR	<b>722659</b>	28	8	IE	NBR	<b>722742</b>			
	24	7	IE	FKM	<b>722659/81</b>	28,5	6,3	IE	NBR	722256			
	26	8	IE	NBR	<b>722177</b>	28,7	9,5	IE	NBR	722141			
	26	8	IELS	NBR	725342	30	4,5	IE	NBR	<b>722184</b>			
	28	8x10	IE	NBR	<b>722986</b>	30	7	IE	FKM	<b>772021/81</b>			
	30	7	IE	NBR	<b>772029</b>	30	10	IE	FKM	772291			
	30	7	IE	NBR	<b>722451</b>	32	7	IE	NBR	<b>772031</b>			
	30	8	IEL	NBR	725140	32	7	IE	FKM	<b>772031/81</b>			
	35	10	IE	NBR	<b>772030</b>	33	8	IE	NBR	<b>722717</b>			
	43	10	IELS	NBR	725566	35	6x6,5	IES	NBR	726339			
45,9	10	IELS	NBR	725512	35	7	IE	NBR	<b>722043</b>				
14,5	24	7	IE	NBR	722249	35	7	IEL	NBR	<b>792604</b>			
	15	21	4	IO	NBR	<b>723412</b>	35	10	IEL	NBR	725141		
21		4,4	EEL	NBR	725333	38	4	IE	NBR	722593			
23		4	IEWL	NBR	725691	16,8	24	4	IO	NBR	723801		
24		4,5	IE	NBR	772303		47	7	IE	NBR	722798		
24		4,5x5,5	IELS	NBR	725611	17	26	6	IE	NBR	<b>792707</b>		
24		7	IE	NBR	<b>722266</b>		27	6	IEL	NBR	725668		
24		7	IE	FKM	<b>722266/81</b>		28	6	IE	NBR	772288		
24		7	IE	FKM	772289		28	6	IEL	NBR	<b>792830</b>		
24		7	IEL	FKM	725658		28	6	IEL	NBR	<b>792830</b>		
24		7	IEL	NBR	<b>792599</b>		28	6x6,3	IELV	FKM	704020		
24		7	IE	NBR	<b>792704</b>		28	7	IE	NBR	<b>722969</b>		
25,5		5	IE	NBR	<b>722494</b>		28	7	IE	FKM	<b>722969/81</b>		
25,5		4,6	IE	NBR	772344		28	7	IEL	NBR	725602		
25,5		4,6	IE	FKM	<b>772344/81</b>		28	7x13	EESD	NBR	702224		
26		6	EEL	NBR	725483		28	8	IELR	FKM	725649		
26		7	IE	NBR	<b>722616</b>		28	8	IELR	FKM	725661		
26		7	IE	NBR	722832		28	8	IELR	FKM	725661		
26		7	IE	FKM	<b>722616/81</b>		29	7x13	EESG	NBR	702225		
26		9	EEL	NBR	725443		30	7	IE	NBR	<b>722726</b>		
26,5		4,6	IE	FKM	<b>772326/81</b>		30	7	IEL	NBR	<b>792509</b>		
28	4	IE	NBR	<b>722001</b>	30	7	IE	FKM	<b>722726/81</b>				
28	4	IEL	NBR	<b>792600</b>	32	7	IE	NBR	<b>722123</b>				
28	9	IE	NBR	<b>792706</b>	32	7	IE	FKM	<b>722123/81</b>				
30	4,5	IE	NBR	<b>722257</b>	32	7	IE	NBR	<b>722696</b>				
30	6	IE	NBR	<b>722780</b>	34	4	IE	NBR	<b>722603</b>				
30	7	IE	NBR	<b>722106</b>	35	7	IE	NBR	<b>722989</b>				
30	7	IE	FKM	<b>722106/81</b>	35	7	IE	NBR	772385				
30	7	IEL	NBR	<b>792601</b>	35	7	IE	NBR	<b>722989/81</b>				
30	8	IE	NBR	<b>722788</b>									
32	7	IE	NBR	<b>722165</b>									

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon

# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference																																																																																																		
17	35	7	IEL	NBR	<b>792605</b>	20	35	7	IE	FKM	<b>722952/81</b>																																																																																																		
	35	8	IE	NBR	<b>722201</b>		35	7	IEL	NBR	<b>792511</b>																																																																																																		
	35	8	IEL	NBR	<b>725351</b>		35	8	IE	NBR	<b>722506</b>																																																																																																		
	35	8	IED	NBR	702003		35	8	II	NBR	<b>721220</b>																																																																																																		
	35	8x13	IESG	NBR	702012		35	10	IE	NBR	<b>722521</b>																																																																																																		
	35	8x13	IESD	NBR	702066		35	10	II	NBR	721182																																																																																																		
	40	7	IE	NBR	<b>722735</b>		36,5	8x15	IESPD	NBR	702254																																																																																																		
	40	7	IEL	NBR	<b>792606</b>		37	8	IE	NBR	<b>722789</b>																																																																																																		
	40	10	IE	NBR	<b>722314</b>		38	6	IE	NBR	722773																																																																																																		
	47	8	IE	NBR	<b>722674</b>		38	8	IE	NBR	<b>722163</b>																																																																																																		
	17,5	34	8x15	IESD	NBR		702051	38	8	IEL	NBR	<b>725476</b>																																																																																																	
								40	6x10	IELS	NBR	725120																																																																																																	
	17,7	30	5	IO	NBR		723264	40	7	IE	NBR	<b>722642</b>																																																																																																	
	17,9	35,5	8,2	IEL	NBR		725652	40	7	IE	NBR	772185																																																																																																	
40						7		IE	FKM	<b>722642/81</b>																																																																																																			
18	25	7	IE	NBR	<b>722628</b>	40	7	IEL	NBR	<b>792512</b>																																																																																																			
	26	4,5	IE	NBR	772389	40	7	IES	NBR	726104																																																																																																			
	28	6	IE	NBR	<b>722774</b>	40	7	EES	NBR	726139																																																																																																			
	28	7	IEL	NBR	<b>792607</b>	40	8	IE	NBR	<b>722226</b>																																																																																																			
	30	5	IELD	NBR	702177	40	8	IEL	NBR	725682																																																																																																			
	30	5	IOS	NBR	726302	40	10	IE	NBR	<b>722119</b>																																																																																																			
	30	7	IE	NBR	<b>722107</b>	40	10	IELS	NBR	725455																																																																																																			
	32	5	IE	NBR	<b>722663</b>	42	6	IE	NBR	<b>722772</b>																																																																																																			
	32	7	IE	NBR	<b>722105</b>	42	6	IEL	NBR	<b>792609</b>																																																																																																			
	32	7	IE	FKM	<b>722105/81</b>	43	8,5	II	NBR	721250																																																																																																			
	33	8	IE	NBR	<b>722120</b>	45	10	IELS	NBR	725503																																																																																																			
	35	7	IE	NBR	<b>772102</b>	46	10	EELS	NBR	725535																																																																																																			
	35	8	IE	NBR	<b>722026</b>	46,4	10	EEELS	NBR	725541																																																																																																			
	35	10	IE	NBR	722252	46,4	10	EELS	NBR	725561																																																																																																			
	40	7	IE	NBR	<b>772032</b>	46,5	10	IELS	NBR	725328																																																																																																			
	40	10	IEL	NBR	725142	47	7	IE	NBR	<b>722671</b>																																																																																																			
	43	8,5	IE	NBR	722015	47	7	IE	FKM	<b>722671/81</b>																																																																																																			
	43	9,5	IES	NBR	726140	47	7	IEL	NBR	<b>792513</b>																																																																																																			
	18,6	30	4,7	IOS	NBR	726461	47	10	IE	NBR	<b>722083</b>																																																																																																		
							52	10	IE	NBR	<b>722155</b>																																																																																																		
							52	10	IEL	NBR	<b>792610</b>																																																																																																		
52							10	IE	FKM	<b>772432/81</b>																																																																																																			
57							6,5	EES	NBR	726963																																																																																																			
62							6,5	IES	NBR	726134																																																																																																			
20,5							35	8x13	IEL	NBR	725286																																																																																																		
20,8							32	8	IE	NBR	<b>722419</b>																																																																																																		
21							31	3,5x4,5	IES	FKM	726380	31	8	IE	NBR	<b>722360</b>																																																																																													
												31	3,5x4,5	IES	NBR	726309																																																																																													
	35	8	IE	NBR	772121																																																																																																								
	35	8	IE	NBR	772121																																																																																																								
21,9	47	8	EED	FKM	702356	22	32	4,6	IEL	NBR	725614																																																																																																		
							32	4,6	IOS	NBR	726017																																																																																																		
32	7	IE	NBR	<b>722850</b>																																																																																																									
32	7	IE	NBR	772310																																																																																																									
32	7	IE	FKM	722850/81																																																																																																									
32	7	IE	NBR	772123																																																																																																									
32	7	IEL	NBR	<b>792514</b>																																																																																																									
33	7	IE	NBR	<b>792710</b>																																																																																																									
35	5	IE	NBR	<b>722732</b>																																																																																																									
35	5	IEL	NBR	<b>792611</b>																																																																																																									
35	7	IE	NBR	<b>722727</b>																																																																																																									
35	7	IEL	NBR	<b>792515</b>																																																																																																									
35	8	IE	NBR	722675																																																																																																									
35	8	IEL	NBR	<b>725027</b>																																																																																																									
35	10	IE	NBR	<b>722285</b>																																																																																																									
38	8	IE	NBR	<b>792500</b>																																																																																																									
40	7	IE	FKM	772179																																																																																																									
40	7	IE	FKM	<b>772338/81</b>																																																																																																									
40	7	IE	FKM	772366																																																																																																									
40	7	IEL	NBR	725438																																																																																																									
40	7	II	NBR	<b>721404</b>																																																																																																									
40	8	IE	NBR	<b>72519</b>																																																																																																									
40	8	IE	FKM	<b>722519/81</b>																																																																																																									
40	8	IEL	NBR	<b>725421</b>																																																																																																									
40	8	II	NBR	<b>721165</b>																																																																																																									
19,3	30	4,7	IOS	NBR	726462	19,6	31,1	8	IE	NBR	722244																																																																																																		
												19,8	38	9,9	IE	NBR	722600																																																																																												
																		19,9	28	5	IEW	NBR	772408																																																																																						
																								20	28	4	IE	NBR	<b>792709</b>																																																																																
																														28	7	IE	NBR	<b>722133</b>																																																																											
																																			30	3	IO	NBR	723551																																																																						
																																								30	4,5	IES	NBR	726304																																																																	
																																													30	4,6	IOS	NBR	726187																																																												
																																																		30	4,7	IE	NBR	<b>722342</b>																																																							
																																																							30	4,7	IE	NBR	722146																																																		
																																																												30	5	IEL	NBR	725349																																													
																																																																	30	5	IEL	NBR	<b>792608</b>																																								
																																																																						30	7	IE	NBR	<b>722258</b>																																			
																																																																											30	7	IE	FKM	<b>722258/81</b>																														
																																																																																30	7	IEL	NBR	<b>792510</b>																									
																																																																																					30	7	IEL	FKM	725660																				
																																																																																										31	8	IEWLD	FKM	702416															
																																																																																															32	7	IE	NBR	<b>722479</b>										
																																																																																																				32	7	IE	FKM	<b>722479/81</b>					
																																																																																																									32	7	IEL	NBR	<b>725280</b>
33	8	IEWLG	FKM	702415																																																																																																									
					33,2	8	EOS	NBR	726155																																																																																																				
										35	6	IO	NBR	723626																																																																																															
															35	7	IE	NBR	<b>722952</b>																																																																																										

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
22	40	8x10	IEL	NBR	<b>725191</b>	25	40	8	IE	NBR	<b>722508</b>
	40	13x15,5	IES	NBR	726142		40	8	IE	NBR	<b>722508/81</b>
	43	8	IE	NBR	<b>722699</b>		40	8	IEL	NBR	<b>725067</b>
	45	7	IEWLG	FKM	702623		40	8	II	NBR	<b>721174</b>
	45	8	IOS	NBR	726168		40	10	IE	NBR	<b>792717</b>
	47	7	IE	NBR	<b>772033</b>		42	5x75	IELS	NBR	725650
	47	10	IE	NBR	<b>792711</b>		42	6,5	IE	NBR	<b>722439</b>
22,2	38,2	9,7	IE	NBR	722920		42	7	IE	NBR	<b>772201</b>
23	33	4,8	IOS	NBR	726143		42	7	IEL	NBR	<b>792615</b>
	36	6,5	EED	FKM	732373		42	7	IEWLD	FKM	702621
	38,5	8	II	NBR	<b>721173</b>		42	8	IE	NBR	<b>722517</b>
	40	10	IE	NBR	<b>792712</b>		42	8	IE	FKM	<b>722517/81</b>
23,5	29,5	3,3	IO	NBR	723283		42	8	IEL	NBR	<b>725621</b>
24	30	4	IOS	NBR	726050		42	8	IED	FKM	702410
	30	5,4	IOLS	NBR	726288		42	10	IEL	NBR	<b>792501</b>
	34,4	5	IES	NBR	726079		42	10,3x11	IELS	NBR	725466
	34,6	14,3x19,5	EES	NBR	726472		43	7	IE	NBR	<b>722091</b>
	35	7	IE	NBR	<b>772034</b>		43	8	IE	NBR	<b>722683</b>
	35	7	IEL	NBR	<b>792612</b>		45	7	IE	NBR	722310
	36	7	IE	NBR	772328		45	11	II	NBR	721898
	36	8x12	IESD	NBR	702028		46	7	IE	NBR	<b>792718</b>
	37	7	IE	NBR	<b>722909</b>		46	7,5	II	NBR	721153
	37	7	IE	FKM	722909/81		47	7	IE	NBR	<b>722523</b>
	38,5	7	IIL	NBR	724028		47	7	IE	FKM	<b>772339/81</b>
	38,5	10	IE	NBR	<b>722227</b>		47	7	IEL	NBR	<b>792517</b>
	38,5	10	IED	NBR	702005		47	7	II	NBR	<b>721353</b>
	40	7	IE	NBR	<b>772035</b>		47	10	IE	NBR	<b>722524</b>
	40	8	IEL	NBR	<b>725406</b>		47	13,5	IELS	NBR	725400
	42	8	IE	NBR	<b>792713</b>		49	10	IE	NBR	722117
	46	10	IE	NBR	<b>722028</b>		50	10	IE	NBR	<b>722260</b>
	47	7	IE	NBR	<b>722977</b>		52	7	IE	NBR	<b>722910</b>
	47	7	IE	FKM	772367		52	7	IEL	NBR	<b>792518</b>
	47	10	IE	NBR	<b>722176</b>		52	7	IEL	NBR	<b>792616</b>
	50	10	IE	NBR	<b>792714</b>		52	7	IE	FKM	<b>722910/81</b>
	50,5	11	II	NBR	721151		52	8	IEL	NBR	<b>725037</b>
24,5	40	8,4	IEWD	FKM	702565	25,4	41,2	11	II	NBR	721657
	42	6	IED	FKM	702598		42,9	5	IE	NBR	722220
24,7	35	4,8	IOS	NBR	726313		44,4	5	IE	NBR	<b>722094</b>
	40	7	IEL	NBR	725205	26	36	7	IE	NBR	<b>792721</b>
	40	7	II	NBR	721009		37	7	IE	NBR	<b>722990</b>
24,8	42	8	IE	NBR	722584		37	7	IE	FKM	<b>722990/81</b>
24,9	40	8	IELD	NBR	702231		42	8	IE	NBR	<b>722411</b>
25	33	7	IE	NBR	<b>722132</b>		42	8	IEL	NBR	725080
	35	5	IE	NBR	<b>722401</b>		42	8	IEWLD	FKM	702554
	35	5	IE	FKM	722702		52	8	IE	NBR	<b>792722</b>
	35	6	IE	NBR	<b>722771</b>	26,7	46,5	11,3	IE	NBR	722757
	35	7	IE	NBR	<b>722670</b>		46,5	11,3	II	NBR	721172
	35	7	IE	FKM	<b>722670/81</b>	27	37	7	IE	NBR	<b>722171</b>
	35	7	IEL	NBR	<b>725301</b>		42	10	IEL	NBR	<b>725733</b>
	35	5	IEL	NBR	<b>792613</b>		42	10x13	IED	NBR	702014
	35	7	IELR	NBR	725703		45	6	IE	NBR	722790
	35	7	IELR	FKM	725705		47	7	IE	NBR	<b>722797</b>
	35	10	IE	NBR	<b>722161</b>		47	8	IE	NBR	<b>722509</b>
	35	10,5	IEDP	NBR	702275		47	8	II	NBR	723104
	36	7	IE	NBR	<b>792715</b>	27,5	34	4	IO	NBR	723800
	36	8	IOS	NBR	726123		35	4	IO	NBR	723277
	36	8	OOS	NBR	727034	28	36	8	IE	NBR	<b>722031</b>
	36	10	IE	NBR	<b>722588</b>		36	8	IEL	NBR	<b>792617</b>
	37	6	IE	NBR	<b>792716</b>		37	7	IEWL	NBR	725685
	38	7	IE	NBR	<b>722259</b>		38	7	IE	NBR	772164
	38	7	IEL	NBR	<b>792614</b>		38	7	IE	NBR	<b>792723</b>
	38,3	10	IE	NBR	<b>722147</b>		38	7	IEWG	FKM	702549
	40	6	IE	NBR	<b>722761</b>		40	7	IE	NBR	<b>722212</b>
	40	7	IE	NBR	<b>722799</b>		40	7	IE	NBR	772312
	40	7	IE	FKM	<b>722799/81</b>		40	7	IE	FKM	<b>722212/81</b>
	40	7	IEL	NBR	<b>725767</b>		40	7	IEL	NBR	<b>792519</b>
							40	7	IEWD	NBR	702497
							42	8	IE	NBR	<b>722193</b>
							43	8	II	NBR	<b>721456</b>

The part numbers indicated in bold type are kept in stock.  
 \*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon

# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	
28	43		IE	NBR	<b>792724</b>	30	48	8	IE	NBR	722901	
	43		IEL	NBR	725131		48	8	IE	FKM	<b>722500/81</b>	
	45	10	IE	NBR	<b>722967</b>		48	8	IEL	NBR	<b>792523</b>	
	45	10	IE	FKM	<b>722967/81</b>		48	10	IE	NBR	<b>792727</b>	
	45	888	IEL	NBR	<b>792618</b>		50	7	IEW	FKM	772410	
	45	11,5	EESF	NBR	726348		50	7	MEWLD	FKM	702540	
	47	777	IE	NBR	<b>722911</b>		50	10	IE	NBR	<b>722836</b>	
	47	10	IED	NBR	702257		50	10	IEL	NBR	<b>792524</b>	
	47	10	IEL	NBR	<b>792619</b>		50	10	II	NBR	<b>721184</b>	
	47	10	IE	NBR	722490		50	11	II	NBR	<b>721149</b>	
	47	10	IEL	NBR	725606		52	7	IE	NBR	<b>722912</b>	
	47	10	II	NBR	<b>721194</b>		52	7	IE	FKM	<b>722912/81</b>	
	47	7	IIL	NBR	<b>724229</b>		52	7	IEL	NBR	<b>792525</b>	
	50	10	IE	NBR	<b>792725</b>		52	10	IE	NBR	<b>792728</b>	
	52	10	IE	NBR	<b>772038</b>		52	10	IEL	NBR	<b>792622</b>	
	52	10	IEL	NBR	<b>79281901</b>		55	7	IE	NBR	772342	
	52	10x11	II	NBR	721222		55	10	IE	NBR	<b>722892</b>	
	52	10	IOS	NBR	726323		55	10	IEL	NBR	<b>792526</b>	
	52		IELS	NBR	725377		55	10	II	NBR	<b>721102</b>	
	65		IE	NBR	772286		56	10	IEL	NBR	<b>792623</b>	
	28,5	45	8,5	IE	NBR		725062	60	10	IE	NBR	<b>792729</b>
								62	7	IE	NBR	<b>772040</b>
	28,6	38,1	6,3	IE	NBR		722305	62	7	IE	FKM	<b>772040/81</b>
39,6		4,7	IOS	NBR	726311	62	7	IEL	NBR	<b>792527</b>		
28,8	46,5	11,2	IE	NBR	722959	62	8	IES	NBR	726113		
	46,5	11,2	II	NBR	725950	62	10	IE	NBR	<b>792730</b>		
	46,5	11,2	II	NBR	721022	62	10	IEL	NBR	<b>792624</b>		
	46,5	11,2	IE	NBR	724215	72	10	IE	NBR	<b>792731</b>		
29	46	10	IE	NBR	<b>722966</b>	30,1	50,7	11	II	NBR	721329	
	46	10	II	NBR	721183	31	42	8	IE	NBR	<b>722691</b>	
	46,4	12	II	NBR	721148	47	7	IE	NBR	<b>722672</b>		
29,8	50	10	IE	NBR	<b>722066</b>	55	10	II	NBR	721156		
	47	9,9	IEL	NBR	725631	31,7	42,9	4,7	IOS	NBR	726463	
	47	9,9	ESWLD	NBR	702686	32	42	7	IEW	NBR	702498	
29,9	48,4	6,3	IOS	NBR	726566		45	6	IE	NBR	<b>792732</b>	
							45	7	IE	NBR	<b>722913</b>	
30	40	7	IE	NBR	<b>722623</b>		45	7	IEL	NBR	<b>792528</b>	
	40	7	IE	FKM	<b>722623/81</b>		45	10	IE	NBR	<b>722409</b>	
	40	7	IEL	NBR	<b>792520</b>		45	10	IEG	NBR	702240	
	40	7	IED	FKM	702409		46	7	IEL	NBR	725208	
	40	7	IEWLD	FKM	702622		46	7x9,7	IELS	NBR	725563	
	41	4,7	IOS	NBR	726312		47	7	IE	NBR	<b>772013</b>	
	42	5,7	IE	NBR	722583		47	7	IE	FKM	<b>772013/81</b>	
	42	6	IEWL	NBR	725637		47	7	IEL	NBR	<b>792625</b>	
	42	6x6,5	IELV	NBR	704033		47	8	IE	NBR	<b>722617</b>	
	42	7	IE	NBR	<b>722737</b>		47	8	IEL	NBR	<b>792626</b>	
	42	7	IE	FKM	<b>722737/81</b>	47	12	IILR	NBR	<b>724851</b>		
	42	7	IEL	NBR	<b>792521</b>	48	8	IE	NBR	<b>792734</b>		
	42	7	IEW	FKM	772409	50	8	IE	FKM	<b>722518/81</b>		
	42	8	IE	NBR	<b>722722</b>	50	8	IE	NBR	<b>722518</b>		
	42	8	IEL	NBR	<b>725143</b>	50	8	IEL	NBR	<b>792529</b>		
	42	8	IEG	NBR	702107	50	9	IOS	NBR	726015		
	42	8	IELD	NBR	702408	50	10	IE	NBR	<b>722607</b>		
	42	8	IOS	NBR	<b>726236</b>	50	10	II	NBR	721185		
	45	5	IEL	NBR	<b>792620</b>	50	10	IELS	NBR	<b>725408</b>		
	45	5	IE	NBR	<b>722402</b>	52	7	IE	NBR	<b>772202</b>		
	45	8	IE	NBR	<b>722684</b>	52	7	IEL	NBR	<b>792628</b>		
	45	8	IEL	NBR	<b>792621</b>	52	7	IE	FKM	<b>772202/81</b>		
	45	10	IE	NBR	<b>722541</b>	52	7,5	IE	NBR	<b>722478</b>		
45	10	II	NBR	<b>721175</b>	52	7,5	II	NBR	721154			
45	13	IEL	NBR	<b>725085</b>	52	7,5x13,5	IELR	NBR	725897			
47	6	IEWD	FKM	702522	52	10	IEL	NBR	725665			
47	7	IE	NBR	<b>772039</b>	52	10	IEL	NBR	<b>792627</b>			
47	7	IE	FKM	<b>772039/81</b>	52	10	IEG	NBR	702342			
47	7	IEL	NBR	<b>792522</b>	54	8	IE	NBR	<b>722039</b>			
47	8	IE	NBR	<b>722204</b>	54	8	II	NBR	721068			
47	8	IEL	NBR	<b>725293</b>	55	10	IE	NBR	<b>792735</b>			
47	10	IE	NBR	<b>792726</b>	55	10	IEL	NBR	79281801			
48	8	IE	NBR	<b>722500</b>	56	10	II	NBR	<b>721162</b>			
48	8	IE	NBR	<b>72250001</b>	56	12	IE	NBR	722038			
					56	12	II	NBR	<b>721096</b>			
					62	10	IE	NBR	<b>792736</b>			

The part numbers indicated in bold type are kept in stock.  
**\*\*Stainless steel spring**

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon





d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference		
33	45	7	IE	NBR	<b>792737</b>	35	68	6	IEL	NBR	<b>792634</b>		
	48	8	IE	NBR	<b>722971</b>		68	10	IE	FKM	772244		
	48	8	II	NBR	721145		68	10x12	IEL	NBR	725608		
33,5	47	4	IO	NBR	723252	72	77	IE	NBR	<b>722245</b>			
						72	10	IEL	NBR	<b>792635</b>			
34	46	8	IE	NBR	<b>792738</b>	72	10	IE	NBR	722170			
	50	10	IE	NBR	<b>792739</b>	72	10	IEL	NBR	<b>792636</b>			
	52	7,7,5	IE	NBR	<b>792814</b>	72	10	IEL	NBR	<b>79263601</b>			
	52	9	II	NBR	<b>721279</b>	72	12	IE	NBR	<b>792743</b>			
	54	10	IE	NBR	<b>722092</b>	72	12	IEL	NBR	<b>792637</b>			
	54	10	IE	NBR	<b>722685</b>	35,1	58	11,5	IE	NBR	722560		
34,8	50	7	IE	FKM	772400		58	11,5	II	NBR	721457		
						34,9	54	11	IE	NBR	722023	36	47
55,8	9,3	IELG	NBR	702299	50		7	IE	NBR	<b>772041</b>			
57,2	12,7	IE	NBR	722985	50		7	IEWLD	FKM	702659			
57,2	12,7	II	NBR	721468	52		4	IOX	NBR	726394			
58	9,8	IE	NBR	772276	52		7	IE	FKM	<b>722991/81</b>			
63,5	12,5	IELG	NBR	702183	52		7	IEL	NBR	<b>792638</b>			
35	45	6	IE	NBR	<b>722400</b>	52	10	II	NBR	<b>721309</b>			
	45	6	IE	FKM	<b>722400/81</b>	54	7,5	IE	NBR	<b>722496</b>			
	45	7	IEL	NBR	<b>792629</b>	54	7,5	IE	NBR	722895			
	47	6	IEWLD	FKM	702535	54	7,5	II	NBR	721278			
	47	7	IE	NBR	<b>722915</b>	54	11	EESF	NBR	726349			
	47	7	IE	FKM	<b>722915/81</b>	58	15	IEL	NBR	725494			
	47	7	IEL	NBR	<b>725411</b>	62	7	IE	NBR	<b>722404</b>			
	47	8	IE	NBR	<b>722554</b>	62	12	II	NBR	<b>721117</b>			
	50	5,8	IE	NBR	<b>722484</b>	62	12,5	II	NBR	721076			
	50	7	IE	NBR	<b>772022</b>	68	10	IEL	NBR	<b>792639</b>			
	50	7	IE	FKM	<b>772022/81</b>	83	12	II	NBR	<b>721129</b>			
	50	7	IEL	NBR	<b>792530</b>	37	50	10	IE	NBR	<b>792744</b>		
	50	7	MEWLD	FKM	702371		58	13	IE	NBR	<b>792745</b>		
	50	8	IE	NBR	<b>722389</b>		58	13	IEL	NBR	<b>725568</b>		
	50	8	IEL	NBR	725489		58	13	II	NBR	<b>721444</b>		
	50	8	IED	NBR	702239		70	13	IE	NBR	722804		
	50	10	IIL	NBR	<b>724001</b>		70	13	IE	FKM	722904		
	50	10	IEL	NBR	<b>792630</b>	38	50	7	IE	NBR	<b>792746</b>		
	50	12	IE	NBR	<b>722525</b>		52	7	IE	NBR	<b>722338</b>		
	50	12	II	NBR	<b>721069</b>		52	7	IE	FKM	<b>722338/81</b>		
	52	7	IE	NBR	<b>772014</b>		52	7	IEL	NBR	<b>792640</b>		
	52	7	IE	FKM	<b>772014/81</b>		52	8	IE	NBR	<b>722791</b>		
	52	7	IEL	NBR	<b>792531</b>		54	5	IE	NBR	<b>722293</b>		
	52	8	IE	NBR	<b>722778</b>		54	10	II	NBR	<b>721212</b>		
	52	8	IEL	NBR	<b>792532</b>		55	10	IE	NBR	<b>722641</b>		
	52	8	IES	NBR	726705		55	10	IE	FKM	<b>722641/81</b>		
	52	10	IE	NBR	<b>722526</b>		55	10	IEL	NBR	<b>725486</b>		
	52	10	IEL	NBR	725026		55	10	II	NBR	721029		
	52	10	IEL	NBR	<b>725747</b>		55	12	IE	NBR	772226		
	52	10	IELR	NBR	<b>792504</b>		56	10	IE	NBR	<b>792747</b>		
	52	10	II	NBR	721008		56	10	II	NBR	<b>721142</b>		
	52	10	IIL	NBR	724198		60	10	IEL	NBR	<b>792641</b>		
	52	10,5	IIS	NBR	726640		61	12	IE	NBR	722606		
	54	10	IE	NBR	<b>722893</b>	62	7	IE	NBR	772042			
	54	10	II	NBR	721195	62	7	IE	FKM	<b>772042/81</b>			
55	8	IE	NBR	<b>792740</b>	62	10	IE	NBR	<b>722556</b>				
55	10	IE	NBR	722192	62	10	IEL	NBR	<b>792642</b>				
55	10	IE	NBR	<b>792741</b>	65	8	IE	NBR	772368				
55	10	IEL	NBR	<b>792631</b>	38,1	52,5	11,1	IE	NBR	722921			
56	10	IE	NBR	<b>722499</b>		60,3	19	IEL	NBR	725212			
56	10	II	NBR	<b>721192</b>		63,5	12,7	IE	NBR	722251			
56	10	IEWLGL	FKM	702496		73	11	IE	NBR	722558			
59	12x14	IES	NBR	726718		78	11	IE	NBR	722667			
60,3	12,5	II	NBR	<b>721206</b>		38,7	50,8	6,4	IES	NBR	726073		
62	7	IE	NBR	<b>722918</b>	39		55	8	IE	NBR	722665		
62	7	IEL	NBR	<b>792534</b>			61	12	II	NBR	<b>721134</b>		
62	7	IE	FKM	<b>722918/81</b>			39,3	63,7	12,8	II	NBR	721140	
62	10	IE	NBR	<b>792742</b>				39,7	63,6	12,7	IE	NBR	722151
62	10	IEL	NBR	<b>792632</b>									
62	12	IE	NBR	<b>722493</b>									
62	12	IEL	NBR	<b>792633</b>									
64	7	IEWLD	FKM	702531									
65	10	IE	NBR	722288									
68	6	IE	NBR	<b>722815</b>									

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference		
39,8	65	8	IEW	FKM	772406	41	63,6	14	II	NBR	721108		
	65	8	IEWD	FKM	702504		70	13	IE	NBR	722647		
40	46	4	IOS	NBR	726098	41,2	60,3	9,5	IEL	NBR	725204		
	48	4	EO	NBR	727124		63,5	12,7	IE	NBR	772317		
	52	7	IE	NBR	<b>722325</b>	41,3	62,1	19	IE	NBR	725042		
	52	7	IE	FKM	<b>722325/81</b>		41,4	57,1	6,5	IE	NBR	<b>722723</b>	
	52	7	IEL	NBR	<b>792505</b>	57,1		12,2	IES	NBR	726744		
	52	7	IEL	NBR	725363	62		12,2	IES	NBR	726115		
	52	7	IED	FKM	<b>702546</b>	42		52	4	IOS	NBR	<b>726151</b>	
	52	7	EIWLD	FKM	<b>702511</b>		55	7	IED	FKM	702223		
	52	9	IEWLG	FKM	<b>702532</b>		55	7	IEWLD	FKM	702545		
	55	6,5	IE	NBR	<b>722746</b>		55	8	IE	NBR	<b>772045</b>		
	55	7	IE	NBR	<b>722919</b>		55	8	IE	FKM	<b>772045/81</b>		
	55	7	IE	FKM	<b>722919/81</b>		55	8	IEL	NBR	<b>792539</b>		
	55	7	IEL	NBR	<b>792535</b>		56	7	IE	NBR	772386		
	55	8	IE	NBR	<b>722792</b>		56	7	IE	NBR	<b>792753</b>		
	55	8	IEL	NBR	<b>725355</b>		58	7	IEL	NBR	725387		
	55	10	IE	NBR	<b>722166</b>		58	7	IEL	NBR	725543		
	55	10	IE	NBR	772364		58	7	EEL	NBR	725543		
	55	10	IEWG	NBR	702298		58	9	IE	FKM	772265		
	56	8	IE	NBR	<b>792748</b>	58	10x11,5	IELS	NBR	725184			
	56	8	IEL	NBR	<b>792644</b>	58	11	IESF	FKM	726483			
	56	10	IE	NBR	<b>722152</b>	60	10	IE	NBR	<b>722682</b>			
	56	10	IEL	NBR	<b>792643</b>	60	12	IE	NBR	<b>722763</b>			
	58	10	IE	NBR	<b>72250101</b>	60	14	IEL	NBR	<b>725919</b>			
	58	10	IE	NBR	<b>722501</b>	60	14	IIL	NBR	<b>724121</b>			
	58	10	IE	FKM	<b>722501/81</b>	62	7	IEL	NBR	725552			
	58	10	IEL	NBR	<b>725123</b>	62	7	EEL	NBR	725544			
	58	10	IELV	NBR	704031	62	8	IE	NBR	<b>722931</b>			
	58	10	IELWG	FKM	702476	62	8	IE	FKM	<b>722931/81</b>			
	58	10x14	IESPD	NBR	702222	62	8	IEL	NBR	<b>792540</b>			
	58	15	IELR	NBR	<b>725745</b>	62	8	IELD	FKM	702406			
	58	15	IILR	NBR	<b>724087</b>	62	8	IE	NBR	<b>722057</b>			
	60	7	IE	NBR	<b>792749</b>	62	10	IE	NBR	702526			
	60	7	IEWLG	FKM	702536	63	8	IEWLG	FKM	<b>722640</b>			
	60	10	IE	NBR	<b>792750</b>	64	7	IE	NBR	<b>722640</b>			
	60	10	IEL	NBR	<b>792645</b>	65	8,3x13	IELR	NBR	725016			
	60	12	II	NBR	<b>721301</b>	65	10	IE	NBR	<b>722064</b>			
	61	12	IE	NBR	<b>722498</b>	65	10	IEL	NBR	<b>792649</b>			
	61	12	II	NBR	721100	65	10	II	NBR	721093			
	62	7	IE	NBR	<b>772043</b>	67	10	IEL	NBR	725435			
	62	7	IE	FKM	<b>772043/81</b>	71,5	13	II	NBR	721143			
62	7	IEL	NBR	<b>792536</b>	72	8	IE	NBR	<b>772046</b>				
62	10	IE	NBR	<b>722505</b>	72	8	IEL	NBR	<b>792541</b>				
62	10	IE	FKM	722505/81	42,1	63,6	14,6	II	NBR	721018			
62	10	IE	FKM	722828		42,8	69,9	12,7	II	NBR	721469		
62	10	IEL	NBR	<b>725802</b>			43	58	7	MEWD	FKM	702370	
62	10	IELR	NBR	<b>792503</b>		58		13,5	IE	NBR	722522		
62	10	II	NBR	<b>721031</b>		58		13,5	II	NBR	721204		
62	10	MEWLG	NBR	702369		60		10	IE	NBR	722136		
62	10x11	IELS	NBR	725467		60		10	IE	NBR	<b>792754</b>		
62	12	IE	NBR	<b>722972</b>		60		10	IEL	NBR	<b>725975</b>		
62	12	II	NBR	<b>721168</b>		65		10	IE	NBR	<b>722958</b>		
62	11x13,5	IELS	NBR	725401		66		10	IEL	NBR	<b>792650</b>		
62	10,25x13	IELS	NBR	725600		75		10	II	NBR	721441		
65	12	II	NBR	<b>721123</b>		44		59,2	12	IEL	NBR	725642	
68	7	IEL	NBR	792537	62			10	IE	NBR	<b>792755</b>		
68	8	IE	NBR	722174	72			12	IE	NBR	<b>722741</b>		
68	10	IE	NBR	<b>792751</b>	78		7	IE	NBR	722190			
70	12	IE	NBR	<b>722203</b>	44,4		54	4,8	IE	NBR	722036		
70	12	II	NBR	<b>721251</b>			44,5	62	8	IEL	NBR	725442	
71,5	12	II	NBR	721144				62	10	IE	NBR	<b>722210</b>	
72	7	IE	NBR	<b>772044</b>			81	11,1	IE	NBR	722022		
72	7	IEL	NBR	<b>792538</b>			44,7	54	6x7,9	EOLS	NBR	727111	
72	7	IE	FKM	<b>772044/81</b>				54	6x8,5	IOLS	NBR	723258	
72	8	IE	NBR	<b>722169</b>			44,8	61,4	11,7	II	NBR	721201	
72	10	IEL	NBR	<b>792646</b>				41	54	12	EEL	NBR	725615
72	12	II	NBR	<b>721467</b>		63,4			6	IE	NBR	722550	
80	10	IE	NBR	<b>792752</b>		41			54	12	EEL	NBR	725615
80	10	IEL	NBR	<b>792647</b>					63,4	6	IE	NBR	722550
85	13	IEL	NBR	725376					41	54	12	EEL	NBR
90	8	IEL	NBR	<b>792648</b>	63,4					6	IE	NBR	722550

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference							
45	57	7	IEWLD	FKM	702567	47,6	58,8	9,6	IE	NBR	722292							
	58	7	IE	NBR	<b>792756</b>		66,7	9,3	IED	NBR	702245							
	58	7	IEWD	FKM	702775		69,8	16,7	IEL	NBR	725006							
	60	5	IE	NBR	722185		69,8	19	IIL	NBR	724003							
	60	6,5	IE	NBR	<b>722121</b>		69,8	19	IIL	NBR	724428							
	60	6,5	IEL	NBR	<b>792651</b>		70	8	IEWLD	FKM	702544							
	60	6,5x8,1	IOB	NBR	729009		70,2	15	II	NBR	721082							
	60	7	IE	NBR	722306		71,5	9,5	IE	NBR	772316							
	60	8	IE	NBR	<b>772115</b>		73,5	16,7	IEL	NBR	725100							
	60	8	IE	FKM	<b>772115/81</b>		48	58	4	IOS	NBR	<b>726046</b>						
	60	8	IEL	NBR	<b>792542</b>			62	7	IE	NBR	772322						
	60	10	IE	NBR	<b>722516</b>			62	8	IE	NBR	<b>722899</b>						
	60	10	IE	FKM	<b>722516/81</b>			62	8	IEL	NBR	<b>725263</b>						
	60	10	IE	FKM	722988			62	8	IEWG	FKM	702587						
	60	10	IEL	NBR	<b>792543</b>			63,5	12	II	NBR	<b>721072</b>						
	60	10	IEWLD	FKM	702614			65	10	IE	NBR	<b>722513</b>						
	60	12	II	NBR	721071			65	10	IEL	NBR	<b>792545</b>						
	62	7	IEL	NBR	725459			65	10	IELS	NBR	<b>725118</b>						
	62	7	EEL	NBR	725547			65	10	IOS	NBR	726010						
	62	8	IE	NBR	<b>772018</b>			65,1	10	IOS	NBR	726286						
	62	8	IE	FKM	<b>772018/81</b>			68	12	IE	NBR	<b>722873</b>						
	62	8	IEL	NBR	<b>725407</b>			68	12	IEL	NBR	<b>792658</b>						
	62	8	EEL	NBR	725549			68	12	II	NBR	<b>721166</b>						
	62	8	IEWLD	FKM	702465			68	12x15	IELS	NBR	725092						
	62	10	IE	NBR	<b>722621</b>			68	14	IEL	NBR	725890						
	62	10	IEL	NBR	<b>725748</b>			70	10	IE	NBR	<b>792767</b>						
	62	10	IEL	FKM	725315			72	8	IE	NBR	<b>722200</b>						
	62	10	IEL	NBR	<b>72574801</b>			72	8	IEL	NBR	<b>792659</b>						
	62	12	IE	NBR	<b>722504</b>			72	10	IE	NBR	<b>722209</b>						
	62	12	IEL	NBR	<b>792544</b>			72	10	IED	FKM	702364						
	65	8	IE	NBR	<b>772019</b>			72,2	12,5	IE	NBR	<b>722656</b>						
	65	8	IE	FKM	<b>772019/81</b>			72,2	12,5	II	NBR	721146						
	65	8	IEL	NBR	<b>792652</b>			72,5	10	IEL	NBR	725369						
	65	8	IEX	NBR	726157			75	8	EED	FKM	702334						
	65	9	IEWLD	FKM	702508			80	10	IE	NBR	<b>792768</b>						
	65	10	IE	NBR	<b>722764</b>			49	65	10	IE	NBR	<b>792769</b>					
	65	10	EELD	FKM	702251				49,7	65	10	IE	NBR	722960				
	65	12	IE	NBR	<b>722858</b>					65	10	IE	FKM	722725				
	65	12	II	NBR	<b>721217</b>					50	62	10	IE	NBR	<b>792770</b>			
	65	15	IIL	NBR	724449						65	8	IE	NBR	<b>722710</b>			
	66	6	IE	NBR	<b>792757</b>						65	8	IE	FKM	<b>722710/81</b>			
	66	9	IEWL	FKM	702478						65	8	IEL	NBR	<b>792546</b>			
	67	8	IEWLD	FKM	702467						65	10	IE	NBR	<b>722887</b>			
	68	10	IE	NBR	<b>792758</b>						65	10	IEL	NBR	<b>792547</b>			
	70	12	IE	NBR	<b>792760</b>						65	10	II	NBR	<b>721073</b>			
	70	12,5	II	NBR	<b>721341</b>						65	10	IEX	NBR	726357			
	70	12,5	IEL	NBR	<b>79282801</b>						65	10	IEL	NBR	725572			
	70	12,5	IELS	NBR	725794						67,5	13,5	EEL	NBR	725572			
	72	8	IE	NBR	<b>772104</b>						68	8	IE	NBR	<b>772047</b>			
	72	8	IEL	NBR	<b>792653</b>						68	8	IE	FKM	<b>772047/81</b>			
72	8	IE	FKM	<b>772104/81</b>	68	8					IEL	NBR	<b>792548</b>					
72	8,3x9	IELS	NBR	725468	68	8					IEWLD	FKM	702620					
72	10	IE	NBR	<b>792761</b>	68	10					IE	NBR	<b>792771</b>					
75	9	IEWLD	FKM	702515	68	10					IEL	NBR	<b>792660</b>					
75	10	IE	NBR	<b>792762</b>	68	10					IE	NBR	722219					
75	10	IELD	NBR	702126	70	10					IE	NBR	<b>792772</b>					
75	10	EELD	FKM	702250	70	10					IEL	NBR	<b>792661</b>					
80	10	IE	NBR	<b>792763</b>	70	10					IEL	NBR	<b>79266101</b>					
80	10	IEL	NBR	<b>792654</b>	70	10					IEL	NBR	<b>79282001</b>					
85	8	IEL	NBR	<b>792655</b>	70	12	IEL				NBR	725473						
100	8	IEL	NBR	<b>792656</b>	72	6	IE				NBR	<b>722287</b>						
46	60	10x16	IES	NBR	726378	72	8				IE	NBR	<b>772199</b>					
	64	8	IE	NBR	792764	72	8				IE	FKM	<b>772199/81</b>					
	65	10	IE	NBR	722793	72	8				IEL	NBR	<b>792549</b>					
	65	10	IEL	NBR	792657	72	10				IE	NBR	<b>722756</b>					
	65,5	9x13,5	IELS	NBR	725306	72	10				IEL	NBR	<b>792662</b>					
	78	9	IELS	FKM	725590	72	12				IE	NBR	<b>722503</b>					
	46,9	62	8	IE	NBR	<b>722271</b>	72				12	IE	FKM	<b>722503/81</b>				
		47	62	6	IE	NBR	<b>792765</b>				72	12	IEL	NBR	<b>792551</b>			
			47,2	60,3	6,3	IE	NBR				772120	72	12	EELD	FKM	702387		
				47,5	65	10	IEL				NBR	<b>725220</b>	72	15	IELR	NBR	<b>725003</b>	
47,6					65	10	IEL				NBR	<b>725220</b>	72	15	II	NBR	<b>721322</b>	
					47,6	65	10				IEL	NBR	<b>725220</b>	72	15	IILR	NBR	<b>724088</b>

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon

# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	
50	74	10	IE	NBR	722906	53	68	10,5	IE	NBR	<b>722605</b>	
	75	8	IEWLG	FKM	702521		68	10,5	II	NBR	721128	
	75	10	IE	NBR	772337	68	13	IEL	NBR	<b>725048</b>		
	75	10	IE	FKM	<b>772337/81</b>	68	13	IIL	NBR	724284		
	76,2	12,2	IE	NBR	<b>722650</b>	97	10	IE	NBR	772281		
	78	10	IE	NBR	<b>792773</b>	53,6	73,1	19	IEL	NBR	725043	
	80	8	IE	NBR	<b>772048</b>		77,8	13	IEL	NBR	725108	
	80	8	IEL	NBR	<b>792552</b>	54	68	10,5	IE	NBR	<b>722167</b>	
	80	8	IE	FKM	<b>772048/81</b>		70	10	IE	NBR	<b>792776</b>	
	80	9	IEWLD	FKM	702530		70	12	IE	NBR	722874	
	80	9	MEWLD	FKM	702624		72	5	IE	NBR	722738	
	80	10	IE	NBR	<b>792774</b>		72	5x12,5	IES	NBR	726643	
	80	10	IEL	NBR	<b>792663</b>		72	10	IE	NBR	<b>722448</b>	
	80	13	IE	NBR	<b>722512</b>		72	10	IEL	NBR	<b>725202</b>	
	80	13	IEL	NBR	<b>725779</b>		72	10	IED	FKM	702363	
	80	13	EELD	FKM	702263		72,5	9	IEL	NBR	725499	
	80	13	IEWLD	FKM	702477		72,5	9	EELS	NBR	725509	
	80	16	IELR	NBR	725612		72,5	9	EELS	NBR	725592	
	80	16	IIL	NBR	724089	72,5	9	EELS	NBR	725604		
	87	10	IE	NBR	722447	75	7	IEL	NBR	725559		
	90	8	IEL	NBR	<b>792664</b>	76,2	12,5	II	NBR	721307		
90	10	IE	NBR	<b>722888</b>	77,7	12,7	IE	NBR	722025			
90	10	IEL	NBR	<b>792665</b>	81	10	IEL	NBR	725651			
90	10x14	IES	FKM	726460	85	10	IEL	NBR	725501			
50,7	69,8	9,5	IE	NBR	<b>722596</b>	54,2	73,1	6	IEX	NBR	726158	
	76,1	17,5	II	NBR	721209		55	68	4	IOS	NBR	726285
50,8	69,8	12,7	IE	NBR	722035			68	8	IE	NBR	<b>792777</b>
	70	12,7	IE	NBR	722206			68	8	IEL	NBR	<b>792667</b>
	73,4	17	IIL	NBR	724308	70		7	IEWV	FKM	704039	
	81	11,9	II	NBR	721355	70		8	IE	NBR	<b>722938</b>	
50,9	101,8	11,5	II	NBR	721171	70	8	IE	FKM	<b>722938/81</b>		
						70	8	IEL	NBR	<b>792554</b>		
51	65	6,5	IEWD	FKM	702491	70	8	IELR	NBR	725896		
	76	19	II	NBR	721208	70	10	IE	NBR	722528		
51,4	69	10	IEL	NBR	725373	70	10	EEL	FKM	702381		
						70	10	II	NBR	<b>721349</b>		
52	68	7	IEL	NBR	725412	71,5	10	II	NBR	<b>721349</b>		
	68	8	IE	NBR	<b>722236</b>	72	8	IE	NBR	<b>772015</b>		
	68	8	IE	FKM	<b>722236/81</b>	72	8	IE	FKM	<b>772015/81</b>		
	68	8	IEL	NBR	<b>792553</b>	72	8	IE	NBR	<b>792555</b>		
	68	8	II	NBR	<b>721047</b>	72	8	EEL	NBR	725550		
	68	8	IEWLG	FKM	702552	72	10	IE	NBR	<b>722808</b>		
	69	10	IEL	NBR	725064	72	10	IEL	NBR	<b>792556</b>		
	69	10	IEL	FKM	<b>725064</b>	72	10	IEWLD	FKM	702615		
	69	10	IELS	NBR	725119	72	13	II	NBR	<b>721138</b>		
	69	10	IOS	NBR	726009	75	10	IEL	NBR	725102		
	69	10	IOS	NBR	726269	75	12	IE	NBR	<b>722749</b>		
	72	8	IE	NBR	<b>772049</b>	75	12	IE	FKM	<b>722749/81</b>		
	72	8	IEWD	FKM	702588	75	12	IEL	NBR	<b>725072</b>		
	72	10	IE	NBR	<b>722281</b>	75	12	II	NBR	721081		
	72	12	IE	NBR	<b>722611</b>	75	16	IIL	NBR	<b>724448</b>		
	72	12	IE	FKM	772137	75,4	12	II	NBR	721253		
	72	12	IEL	NBR	<b>792666</b>	76	6,5x8,1	IOB	NBR	729008		
	72	12	II	NBR	721199	76	8	IEWLD	FKM	702534		
	75	12	IE	NBR	<b>722502</b>	76	11	IE	NBR	722649		
	75	12	IE	FKM	772345	76	12	IE	NBR	<b>722712</b>		
	75	12	II	NBR	<b>721015</b>	76	12	IEL	NBR	<b>725713</b>		
	75	15	IEL	NBR	<b>725673</b>	76	12	IEL	FKM	725713/81		
	75	16	IIL	NBR	724562	78	10	IE	FKM	<b>722392/81</b>		
	78	15	IELR	NBR	725610	80	8	IE	NBR	<b>722008</b>		
	78	15	IIL	NBR	724261	80	8	IE	FKM	<b>722008/81</b>		
	80	8	IE	NBR	<b>792506</b>	80	8	IEL	NBR	<b>792557</b>		
	80	10	IE	NBR	<b>722824</b>	80	8	II	NBR	721013		
	80	10	II	NBR	721048	80	10	IE	NBR	<b>792778</b>		
	80	13	IE	NBR	722514	80	10	IEL	NBR	<b>792668</b>		
	80	13	II	NBR	721176	80	12	IEX	NBR	726711		
	85	10	IE	NBR	<b>792775</b>	82	12	IE	NBR	<b>722655</b>		
	52,5	72,7	8,5	IE	NBR	721019	85	8	IE	NBR	<b>772050</b>	
		80	11	II	NBR	722652	85	10	IE	NBR	<b>792779</b>	
53		60	4	IEL	NBR	725679	85	12	IE	NBR	722222	
							90	10	IE	NBR	<b>792780</b>	
							90	10	IEL	NBR	<b>792669</b>	

The part numbers indicated in bold type are kept in stock.

\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	
55	90	13	IEL	NBR	725061	60	80	13	IE	NBR	722686	
	90	13	IEL	NBR	<b>79282201</b>		80	13	II	NBR	<b>721275</b>	
	100	13	IE	NBR	<b>792781</b>		82	12	IEIX	NBR	726498	
56	66	8,5	EOLS	NBR	727120	85	8	IE	NBR	<b>772055</b>		
	69	10	IOS	NBR	726255	85	8	IEL	NBR	<b>792561</b>		
	70	8	IE	NBR	<b>772051</b>	85	8	IEWLD	FKM	702555		
	72	7	IEL	NBR	725338	85	12	IEL	NBR	725107		
	72	8	IE	NBR	<b>772052</b>	85	12	IEL	NBR	<b>79282101</b>		
	72	8	IE	FKM	<b>772052/81</b>	90	8	IE	NBR	<b>772056</b>		
	80	12	IE	NBR	<b>722615</b>	90	8	IEL	NBR	<b>792562</b>		
	85	8	IE	NBR	<b>772054</b>	90	8	IE	FKM	<b>772056/81</b>		
	86	12	IE	NBR	<b>722033</b>	90	13	IE	NBR	<b>722876</b>		
	57	73	8	IEWLGG	FKM	702561	90	13	II	NBR	<b>721238</b>	
75,6		12	II	NBR	<b>721247</b>	95	8	IE	FKM	772259		
80		12	IEL	NBR	722067	95	10	IE	NBR	<b>792787</b>		
85		15	IELR	NBR	<b>725625</b>	95	10	IEL	NBR	<b>792673</b>		
85		15	IIL	NBR	<b>724306</b>	96	13	IEL	NBR	725106		
90		13	IE	NBR	<b>722728</b>	100	10	IE	NBR	<b>792788</b>		
90		13	IEL	NBR	725760	110	13	IEL	NBR	<b>792674</b>		
57,1	73	12,7	II	NBR	721259	60,4	88,5	12,7	II	NBR	721480	
	76,2	12,7	IEL	NBR	725127	61	97	12	IE	NBR	722175	
58	72	8	IE	NBR	<b>722359</b>	62	74	6	IOS	NBR	726743	
	72	8	IE	FKM	<b>722359/81</b>		80	10	IE	NBR	<b>792789</b>	
	72	8	IEL	NBR	<b>792558</b>		81	6	IE	NBR	722540	
	75	5	IE	NBR	<b>722622</b>		85	10	IE	FKM	<b>722144/81</b>	
	75	10	IE	NBR	<b>792783</b>		85	12	IE	NBR	<b>722750</b>	
	80	5	IE	NBR	<b>722707</b>		85	12	IEL	NBR	<b>725762</b>	
	80	8	IE	NBR	<b>722939</b>		85	12	II	NBR	721033	
	80	8	IEL	NBR	<b>792559</b>		85	12	IIL	NBR	724543	
	80	10	IE	NBR	722200		90	10	IE	NBR	<b>722941</b>	
	80	10	IE	NBR	<b>792784</b>		90	13	II	NBR	<b>721034</b>	
	80	10	II	NBR	<b>721437</b>	100	12	IE	NBR	722877		
	80	10	IEL	NBR	<b>79282501</b>	63	83	12	IE	NBR	<b>772375</b>	
	80	12	IE	NBR	<b>722005</b>		85	12	IE	NBR	<b>772057</b>	
	80	12	IE	FKM	<b>722005/81</b>		85	10	IE	FKM	<b>772057/81</b>	
	80	12	IEL	NBR	<b>792670</b>		90	10	IE	FKM	<b>772105</b>	
	80	12	II	NBR	<b>721059</b>		90	12	IE	NBR	<b>722648</b>	
	81	5	IE	NBR	722254	110	13	II	NBR	721115		
	83,2	17	II	NBR	721210	63,5	80	5,5	IOS	NBR	726816	
	85	10	IE	NBR	<b>722559</b>		90	11,5	II	NBR	721207	
	85	10	II	NBR	<b>721135</b>	64	80	13	IE	NBR	<b>722984</b>	
85	12	II	NBR	<b>721124</b>	85		16	IEL	NBR	<b>725891</b>		
90	10	IEL	NBR	<b>792672</b>	85		16	IIL	NBR	<b>724090</b>		
102	10	IE	NBR	772282	90		12	II	NBR	721125		
59	72	12	MEWL	NBR	725588	90	13	IE	NBR	<b>792791</b>		
	72	7	EELS	NBR	725358	65	73,5	4	IOS	NBR	726049	
	80	7	IE	NBR	<b>792785</b>		80	8	IE	NBR	<b>722507</b>	
59,5	75	8	IE	NBR	722587		80	8	IE	FKM	<b>722507/81</b>	
	60	71,5	8	IE	NBR		772365	80	8	IE	FKM	772119
		75	8	IE	NBR		<b>722997</b>	80	8	IEL	NBR	<b>792675</b>
		75	8	IE	NBR		<b>72299701</b>	80	10	IEL	NBR	725434
		75	8	IE	FKM		<b>722997/81</b>	80	12	IE	NBR	<b>722093</b>
		75	8	IEL	NBR		<b>792560</b>	82	10	II	NBR	721319
		75	8,8	II	NBR		721221	85	10	IE	NBR	<b>722591</b>
		78	8,8	EEL	NBR		<b>725307</b>	85	10	IE	FKM	<b>722591/81</b>
		78	10	IE	NBR	<b>792786</b>	85	10	IEL	NBR	<b>725575</b>	
		78	8	IEWLGG	FKM	702502	85	12	IE	NBR	<b>722770</b>	
80		8	IE	NBR	<b>772016</b>	85	12	IE	FKM	<b>722770/81</b>		
80	8	IE	FKM	<b>772016/81</b>	85	12	IEL	NBR	<b>725709</b>			
80	8	IEL	NBR	<b>725361</b>	85	12	II	NBR	<b>721064</b>			
80	10	IEWLGG	FKM	702564	85	13	IEL	NBR	<b>792676</b>			
80	10	EEL	NBR	725545	85	16	IEL	NBR	<b>725598</b>			
80	10	IE	NBR	<b>722213</b>	85,2	16	IIL	NBR	<b>724561</b>			
80	10	IEL	NBR	<b>725163</b>	90	8	IEL	NBR	725513			
80	12	IEL	FKM	<b>725163/81</b>	90	10	IE	NBR	<b>772017</b>			
80	12	IE	NBR	<b>722459</b>	90	10	IEL	NBR	<b>792563</b>			
80	12	IE	FKM	<b>722459/81</b>	90	10	IE	FKM	<b>772017/81</b>			
80	12	IEL	NBR	<b>792671</b>	90	12	IE	NBR	<b>722859</b>			
80	13	IEIX	NBR	726262	95	12	II	NBR	721126			

The part numbers indicated in bold type are kept in stock.  
 \*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon

# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference					
65	95	10	IE	NBR	<b>792792</b>	75	90	10	IED	FKM	702365					
	100	10	IE	NBR	<b>722794</b>		95	8	IE	NBR	722902					
	100	10	IEL	NBR	<b>792564</b>		95	10	IE	NBR	<b>722379</b>					
	100	10	IE	FKM	<b>722794/81</b>		95	10	IE	FKM	<b>722333/81</b>					
	100	12	II	NBR	<b>721483</b>		95	10	IEL	NBR	<b>792567</b>					
66	88,5	12,5	II	NBR	721202		95	12	IE	NBR	<b>722333</b>					
							95	12	IE	FKM	<b>722333/81</b>					
66,5	102	11	IE	NBR	722651		95	12	IE	FKM	722470					
66,7	92	11,9	IE	NBR	722027		95	12	II	NBR	721219					
							100	10	IE	NBR	<b>722943</b>					
67	85	8	IEWLGD	FKM	702529		100	10	IE	FKM	<b>722943/81</b>					
							100	10	IEL	NBR	<b>792568</b>					
68	90	10	IE	NBR	<b>722751</b>		100	12	IE	NBR	722585					
	90	10	IE	FKM	<b>722751/81</b>		100	13	IE	NBR	<b>722687</b>					
	90	10	IEL	NBR	<b>792565</b>		100	13	IE	FKM	<b>722687/81</b>					
	90	10	II	NBR	721050		100	13	IEL	NBR	<b>792569</b>					
	90	13	IELD	FKM	702211		100	13	II	NBR	721190					
	100	10	IE	NBR	<b>772059</b>	102	15	IE	NBR	722698						
	100	10	IEL	NBR	<b>792677</b>	110	13	IE	NBR	<b>722752</b>						
	117	10	IE	NBR	772283	110	13	IEL	NBR	<b>792681</b>						
68,3	80	4,8x8,4	EOLS	NBR	723271	110	13	II	NBR	<b>721152</b>						
						115	10	IEL	NBR	<b>792682</b>						
69	85	8	IE	NBR	<b>722900</b>	120	15	IE	NBR	722221						
69,8	100	13	II	NBR	721274	120	15	IE	NBR	<b>792798</b>						
						76	100	16	IIL	NBR	<b>724245</b>					
70	85	8	IE	FKM	<b>722317/81</b>		76,2	102	17,4	IIL	NBR	<b>724291</b>				
													90	10	IE	NBR
90	10	IE	FKM	<b>722458/81</b>												
90	10	IEL	NBR	<b>792566</b>												
90	12	IE	NBR	<b>722639</b>												
90	12	IEL	NBR	<b>725758</b>												
90	12	IELR	NBR	<b>725634</b>												
90	12	II	NBR	<b>721051</b>												
90	12	IIL	NBR	<b>724544</b>												
95	10	IE	NBR	<b>792794</b>												
95	13	IE	NBR	<b>792795</b>												
100	10	IE	NBR	<b>722497</b>												
100	10	IEL	NBR	<b>792678</b>												
100	10	II	NBR	<b>721158</b>												
100	10	IE	FKM	<b>722497/81</b>												
100	13	IEL	NBR	<b>792679</b>												
110	12	IE	NBR	<b>792796</b>												
110	13	IE	NBR	<b>792797</b>												
70,5	85	10	IELS	NBR	725335	80	95	6,5	IOS	NBR	726125					
72	86	7	IEL	NBR	725367		95	8	IE	NBR	<b>722776</b>					
							95	10	IE	NBR	<b>722942</b>					
							95	10	IE	FKM	<b>722942/81</b>					
							95	10	IEL	NBR	<b>725444</b>					
							95	13	IE	NBR	<b>722004</b>					
							95	13	II	NBR	<b>721181</b>					
							100	10	IE	NBR	<b>722944</b>					
							100	12	IE	NBR	<b>722861</b>					
							100	12	IEL	NBR	725653					
							100	12	II	NBR	721104					
							100	12	IIL	NBR	724485					
							101,6	12,5	IE	NBR	722298	95	8	IEL	NBR	<b>792683</b>
72,5	100,5	14	IE	NBR	722604		95	8	II	NBR	721012					
							110	10	IE	NBR	<b>772061</b>					
74	90	13	IE	NBR	722618		110	10	IEL	NBR	<b>792571</b>					
							90	13	II	NBR	721074					
						90	15	IEL	NBR	725251						
						90	15	IILR	NBR	724453						
						90	15	IE	NBR	722061/81						
74,6	101,8	13	II	NBR	721150	110	10	IE	FKM	<b>793100</b>						
						110	13	CSEL	NBR	<b>722186</b>						
75	90	8	IE	NBR	<b>722053</b>	100	10	IE	FKM	<b>722847/81</b>						
						90	8	IEL	NBR	<b>792680</b>						
						90	8	II	NBR	<b>721393</b>						
						100	10	IE	NBR	<b>722476</b>						
						100	13	IE	FKM	722304						
82	102	13	IE	NBR	<b>722195</b>	100	13	IEL	NBR	725021						
						100	14	IEL	NBR	<b>79282901</b>						
						105	13	IE	NBR	<b>792799</b>						
						110	10	IE	NBR	<b>772061</b>						
						110	10	IEL	NBR	<b>792571</b>						
						110	10	IE	FKM	772061/81						
						110	13	CSEL	NBR	<b>793101</b>						
						110	13	IELR	NBR	<b>725704</b>						
						115	10	IE	NBR	<b>792800</b>						
						125	12	IE	NBR	<b>792802</b>						
						125	13	IE	NBR	<b>792803</b>						
						84	100	13	IE	NBR	<b>722680</b>	100	13	IE	NBR	<b>722195</b>
												110	16	IEL	NBR	<b>725597</b>
												112	14	IELX	NBR	725281
												112	14	IELX	NBR	725281
						85	100	9	IE	NBR	722973	100	13	IE	NBR	722102
												100	13	IE	NBR	<b>722552</b>
102	13	IE	NBR	<b>79282601</b>												
102	13	IEL	NBR	<b>79282601</b>												
105	8	IEWLGD	FKM	702619												
105	10	EE	FKM	720037												
105	10	EEG	FKM	702333												
105	10	IEWLGD	FKM	702596												
105	12	IEWLGD	FKM	702596												

The part numbers indicated in bold type are kept in stock.  
**\*\*Stainless steel spring**

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon



d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	
85	105	13	IE	NBR	<b>792804</b>	95	130	13	II	NBR	721213	
	110	12	IEL	NBR	<b>792572</b>		140	10x18	IIS	NBR	726452	
	110	12x6	IIS	NBR	726637	95,2	127,1	11,9	IE	NBR	722924	
	110	13	CSEL	NBR	<b>793102</b>							
	110	13	IE	NBR	<b>722510</b>							
	110	13	IE	FKM	<b>722510/81</b>	96	112	10	IE	NBR	<b>722633</b>	
	110	13	IEL	NBR	<b>725884</b>		112	10	II	NBR	<b>721320</b>	
	110	13	II	NBR	<b>721037</b>							
	110	13	IELG	FKM	702404	98	110	7	IEWL	FKM	702533	
	110	13	IEX	NBR	726076							
	120	13	CSEL	NBR	<b>793103</b>	100	114	8	IEWLG	FKM	702578	
	120	12	IE	NBR	<b>772062</b>		120	10	IE	NBR	<b>792809</b>	
	130	17	EELD	FKM	702379		120	10	IE	FKM	722704	
	130	13	IEL	NBR	<b>792684</b>		120	12	IE	NBR	<b>722993</b>	
88,9	114,3	15,9	IE	NBR	722631		120	12	IE	FKM	<b>722993/81</b>	
89,7	105	6	IE	NBR	722807		120	12	IEL	NBR	<b>792577</b>	
90	105	10	IE	NBR	<b>792805</b>		120	12	IEX	NBR	726258	
	105	10	II	NBR	721410		120	12	CSEL	NBR	<b>793108</b>	
	105	10	IEL	NBR	79282301		120	13	IE	NBR	<b>722957</b>	
	105	13	IE	NBR	<b>722720</b>		120	13	IE	FKM	772148	
	110	10	IEWLG	FKM	702389		120	13	IELG	FKM	702338	
	110	11	IEWG	FKM	702486		120	14	IELR	NBR	725231	
	110	12	IE	NBR	<b>772063</b>		120	17	IEL	NBR	725599	
	110	12	IE	FKM	<b>772063/81</b>		125	12	IEL	NBR	<b>792578</b>	
	110	12	IEL	NBR	<b>792573</b>		125	13	CSEL	NBR	<b>793109</b>	
	110	13	CSEL	NBR	<b>793104</b>		125	13	IE	NBR	<b>722949</b>	
	110	13	IE	NBR	<b>722719</b>		125	13	IEL	NBR	<b>792579</b>	
	110	13	IE	FKM	<b>722719/81</b>		125	13	II	NBR	<b>721080</b>	
	110	13	IEL	NBR	<b>792574</b>		130	13	CSEL	NBR	<b>793110</b>	
	110	13	II	NBR	721236		130	12	IE	NBR	<b>772068</b>	
	110	13	IEX	NBR	726500		130	12	IE	FKM	<b>772068/81</b>	
	110	15	IELG	FKM	702317		130	12	IEL	NBR	<b>792580</b>	
	110	16	IILR	NBR	724091		130	14	IE	NBR	<b>722464</b>	
	115	9	IE	NBR	722975		130	14	II	NBR	<b>721241</b>	
	115	9	IE	NBR	772302		150	12	IE	NBR	<b>792810</b>	
	115	13	IE	NBR	<b>722703</b>	101,6	130,2	14,3	IEL	NBR	<b>792687</b>	
	115	13	IEL	NBR	<b>725695</b>							
	115	13	IEL	NBR	<b>72569501</b>							
	120	13	CSEL	NBR	<b>793105</b>	102	120	12	IE	NBR	<b>722546</b>	
	120	12	IE	NBR	<b>772064</b>		122	14	IELD	FKM	702136	
	120	12	IE	FKM	772064		130	13	CSEL	NBR	<b>793111</b>	
	120	12	IEL	NBR	<b>792575</b>		135	14	II	NBR	<b>721130</b>	
	140	13	CSEL	NBR	<b>793106</b>							
	140	13	IEL	NBR	<b>792685</b>	104	120	13	IE	NBR	<b>722688</b>	
	150	12	IE	NBR	772343							
92	107	12	IE	NBR	722970	105	122	13	IE	NBR	772150	
	110	7	IEWLG	FKM	702644		125	13	IEX	NBR	726274	
	110	10	MEWL	FKM	702518		130	12	IE	NBR	<b>772069</b>	
	112	10	IE	NBR	722654		130	12	IE	FKM	<b>772069/81</b>	
	120	13	IEL	NBR	725044		130	12	IEL	NBR	725617	
	121	16	II	NBR	<b>721203</b>		130	12	IELR	NBR	<b>792502</b>	
	139	12x30	IES	NBR	726173		130	13	CSEL	NBR	<b>793112</b>	
	140	14x25	IELS	NBR	725225		130	13	IE	NBR	<b>72268901</b>	
93	114	13	IEWLG	FKM	702350		130	13	IE	FKM	<b>722689/81</b>	
95	109,2	7	IOLS	NBR	723263		130	13	IEL	NBR	725103	
	109,5	7	IEW	NBR	772390		132	13	IELD	FKM	702174	
	115	13	IE	NBR	<b>792815</b>		140	12	IE	NBR	721458	
	120	11,3	IELG	NBR	702355		140	12	IE	NBR	<b>772070</b>	
	120	12	IE	NBR	<b>772065</b>		140	13	CSEL	NBR	<b>793113</b>	
	120	12	IE	FKM	<b>772065/81</b>	107,9	152,6	17,3	IEL	NBR	725478	
	120	12	IEL	NBR	<b>792576</b>							
	120	13	CSEL	NBR	<b>793107</b>		109	122,2	7	IEW	NBR	772391
	120	13	IE	NBR	<b>722088</b>			7	IOLS	NBR	723262	
	120	13	IE	FKM	<b>722088/81</b>							
	120	13	IEL	NBR	<b>725410</b>		110	130	12	IE	NBR	<b>772071</b>
	120	13	IE	FKM	725410			130	12	IE	FKM	<b>772071/81</b>
	120	13	IELR	NBR	<b>725697</b>			130	12	IEL	NBR	<b>792581</b>
	125	12	IE	NBR	<b>772066</b>			130	13	CSEL	NBR	<b>793114</b>
	125	12	IEL	NBR	<b>792686</b>			130	13	IE	NBR	<b>722465</b>
	130	13	IE	NBR	<b>792808</b>			130	13	IEL	NBR	<b>725114</b>
								130	13	IEL	NBR	725114
								140	10,2	IE	NBR	772357
								140	12	IE	NBR	<b>772072</b>
								140	12	IE	FKM	<b>772072/81</b>
								140	12	IEL	NBR	<b>792688</b>

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 \*\*Stainless steel spring

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# SEALS WITH NITRILE AND FLUOROCARBON ELASTOMER

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	
110	140	13	CSEL	NBR	<b>793115</b>	130	158,9	15,9	IE	NBR	722232	
	140	13	IE	NBR	722708		160	12	IE	NBR	<b>772079</b>	
	140	13	IEL	NBR	<b>792582</b>		160	12	IE	FKM	<b>772079/81</b>	
112	130	13	IE	NBR	<b>722553</b>	160	13	CSEL	NBR	<b>793125</b>		
	130	13	IEL	NBR	<b>79282701</b>	160	15	IE	NBR	<b>722881</b>		
	140	13	CSEL	NBR	<b>793116</b>	160	15	IE	FKM	<b>722881/81</b>		
	140	13	IE	NBR	<b>722820</b>	160	15	IEL	NBR	725115		
	140	13	IEL	NBR	<b>725353</b>	160	15	IEX	NBR	726077		
113	160	12	II	NBR	721098	132	150	13	IE	NBR	<b>722134</b>	
	160	13	IE	NBR	722730		150	13	II	NBR	721328	
115	140	12	IE	NBR	<b>772073</b>	135	160	13	CSEL	NBR	793127	
	140	12	IE	FKM	<b>772073/81</b>		160	14	IE	NBR	<b>722270</b>	
	140	12	IEL	NBR	<b>792689</b>		165	15	IE	NBR	722261	
	140	13	CSEL	NBR	<b>793117</b>		165	15	IEX	NBR	726320	
	140	13	IE	NBR	722374		170	12	IE	NBR	<b>772081</b>	
	140	13	IEL	NBR	<b>725101</b>		170	12	IE	FKM	<b>772081/81</b>	
	140	13	IELG	FKM	702176		170	15	IE	NBR	<b>722280</b>	
	140	13	IEX	NBR	726260		170	15	IE	FKM	722280/81	
	140	15	IEL	NBR	725054		170	16	IEL	NBR	725055	
	140	15	IELRG	FKM	702260		139,7	171,4 171,6	21 15,9	IELR	NBR	725542
	150	12	IE	NBR	<b>772074</b>					IE	NBR	722914
	150	13	CSEL	NBR	<b>793118</b>		140	160	13	IE	NBR	772252
	150	13	II	NBR	<b>721053</b>			170	13	CSEL	NBR	<b>793128</b>
	150	13x24	IELS	NBR	725063			170	15	IE	NBR	<b>722700</b>
	116	150	13	II	NBR			721237	170	15	IE	FKM
170						15			IEL	NBR	<b>725716</b>	
119,1	152,7	11	II	NBR	721214	170	15	IEL	NBR	72571601		
120	140	13	CSEL	NBR	<b>793119</b>	175	15	IE	NBR	<b>772082</b>		
	140	13	IE	NBR	<b>722690</b>	180	14	IE	NBR	<b>722662</b>		
	140	13	IE	FKM	<b>722690/81</b>	144	160	12	IE	NBR	<b>722113</b>	
	140	13	IE	FKM	772133		180	12	II	NBR	721116	
	140	13x14,3	IEL	NBR	725644		145	170	15x20	EELS	NBR	725596
	140	16	IELR	NBR	725706			175	13	CSEL	NBR	<b>793129</b>
	150	12	IE	FKM	<b>772075/81</b>			175	14	EEL	NBR	725593
	150	12	IEL	NBR	<b>792583</b>	175		15	IE	NBR	<b>772114</b>	
	150	13	CSEL	NBR	<b>793120</b>	180		13	CSEL	NBR	<b>793130</b>	
	150	13	IE	NBR	<b>722573</b>	180	14	IE	NBR	<b>722956</b>		
	150	13	IEL	NBR	<b>792584</b>	180	14	IE	NBR	721054		
	150	13	IEX	NBR	726627	146	177,9	15,9	IE	NBR	722563	
	160	13	CSEL	NBR	<b>793121</b>		148	170	14,5	IELR	NBR	725630
	160	12	IE	NBR	<b>772076</b>			170	14,5	IIL	NBR	<b>724260</b>
	160	15	IEL	FKM	<b>725654/81</b>			170	14,5	IELG	NBR	702099
120,6	158,9	15	II	NBR	721482			150	168	12	II	NBR
						170			15	CSEL	NBR	<b>793131</b>
						172	14		EELSG	FKM	702301	
122	150	12	IILR	NBR	724454	175	16	IEX	NBR	726261		
	150	13	CSEL	NBR	<b>793122</b>	180	15	CSEL	NBR	<b>793132</b>		
150	13	II	NBR	<b>721063</b>	180	15	IE	NBR	<b>722731</b>			
122,2	152,4	6	IE	NBR	722548	180	15	IE	FKM	<b>722731/81</b>		
122,3	152,4	6	II	NBR	721298	180	15	IEL	NBR	<b>792586</b>		
125	145	13	IEX	NBR	726257	180	15	II	NBR	<b>721230</b>		
	150	12	IE	NBR	772077	152	190	15	IE	FKM	772195	
	150	12	IEL	NBR	<b>792585</b>		155	180	15	CSEL	NBR	<b>793133</b>
	150	13	CSEL	NBR	<b>793123</b>			180	15	IE	NBR	<b>722754</b>
	150	12	IE	FKM	<b>772077/81</b>			180	15	IEL	NBR	<b>792587</b>
	150	12	IELG	FKM	702064			180	15	II	NBR	721415
	150	14	II	NBR	721252	180		15	MEWLG	NBR	702457	
	160	12	IE	FKM	<b>772078/81</b>	190	15	CSEL	NBR	<b>793134</b>		
	160	13	CSEL	NBR	<b>793124</b>	190	15	IE	NBR	<b>772083</b>		
	160	13	II	NBR	<b>721133</b>	190	15	IEL	NBR	<b>792691</b>		
	160	15	IE	NBR	<b>722279</b>	157,1	190,5 190,5	6 6	IE	NBR	722547	
	160	15	IEL	NBR	<b>792690</b>				II	NBR	721299	
127	158,7	14,3	II	NBR	721358	130	145	7	IE	NBR	772270	
	158,7	18,5	IELS	NBR	725005		150	12	IEX	NBR	726259	

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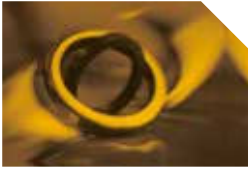
d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
158	180	16	IEL	NBR	725232	195	230	17	IE	NBR	<b>722759</b>
160	190	15	CSEL	NBR	<b>793135</b>		230	17	II	NBR	721362
	190	15	IEL	NBR	<b>725715</b>	196,8	228,6	16	IEL	NBR	725019
	190	15	IIL	NBR	724765	200	230	15	CSEL	NBR	<b>793145</b>
	190	15	IE	FKM	<b>722313/81</b>		230	15	IE	NBR	<b>772090</b>
165	190	13	CSEL	NBR	793136	230	15	IE	FKM	<b>772090/81</b>	
	190	15	IE	NBR	772321	230	15	IEL	NBR	<b>792695</b>	
	190	15	IE	NBR	792811	205	230	16	IEL	NBR	<b>79282401</b>
	200	15	CSEL	NBR	<b>793137</b>		210	240	15	CSEL	NBR
	200	15	IE	NBR	<b>772084</b>	240	15	IE	NBR	<b>772091</b>	
170	200	15	CSEL	NBR	<b>793138</b>	240	15	IE	FKM	<b>772091/81</b>	
	200	15	IE	NBR	<b>722377</b>	220	250	15	CSEL	NBR	<b>793147</b>
	200	15	IE	FKM	<b>722377/81</b>		250	15	IE	FKM	<b>772092/81</b>
	200	15	IEL	NBR	<b>792588</b>	250	15	IEL	NBR	<b>792696</b>	
175	200	13	II	NBR	<b>721122</b>	230	260	15	IE	NBR	<b>772093</b>
	200	13	IE	NBR	722979		240	270	15	IE	NBR
	200	15	IEL	NBR	<b>792692</b>	270	15	IE	FKM	<b>772094/81</b>	
	210	15	IE	NBR	<b>772085</b>	250	280	15	IE	NBR	<b>772095</b>
	210	15	IEL	NBR	<b>792693</b>		260	300	20	IE	NBR
	230	10	IIS	NBR	726200	260,3	298,4	22	IEL	NBR	725009
177,8	209,5	16	IEL	NBR	725018	265	290	16	IE	NBR	<b>722782</b>
180	210	15	CSEL	NBR	<b>793139</b>	280	320	20	IE	NBR	772097
	210	15	IE	FKM	<b>772086/81</b>	300	340	20	IE	NBR	772098
	210	15	IEL	FKM	<b>725655/81</b>	320	360	20	IE	NBR	<b>772099</b>
	210	15	IEL	NBR	<b>792589</b>	340	380	20	IE	NBR	<b>772100</b>
	215	15	CSEL	NBR	<b>793140</b>	380	420	20	IE	NBR	772203
185	215	16	IE	NBR	<b>722661</b>	440	480	20	IE	NBR	772110
	215	15	CSEL	NBR	<b>793141</b>	460	500	20	IE	NBR	772111
	215	16	IE	NBR	<b>722863</b>	480	520	20	IE	NBR	772112
215	16	II	NBR	<b>721280</b>							
190	220	15	CSEL	NBR	<b>793142</b>						
	220	15	IE	FKM	<b>772088/81</b>						
	220	15	IE	NBR	<b>772088</b>						
	220	15	IEL	NBR	<b>792694</b>						
	230	16	CSEL	NBR	<b>793143</b>						
	230	17	IE	NBR	<b>722860</b>						
190,5	228,6	16	IEL	NBR	725017						
	230	15	CSEL	NBR	<b>793144</b>						
195	230	15	IE	NBR	<b>772089</b>						
	230	15	IE	NBR	<b>772089</b>						

The part numbers indicated in bold type are kept in stock.

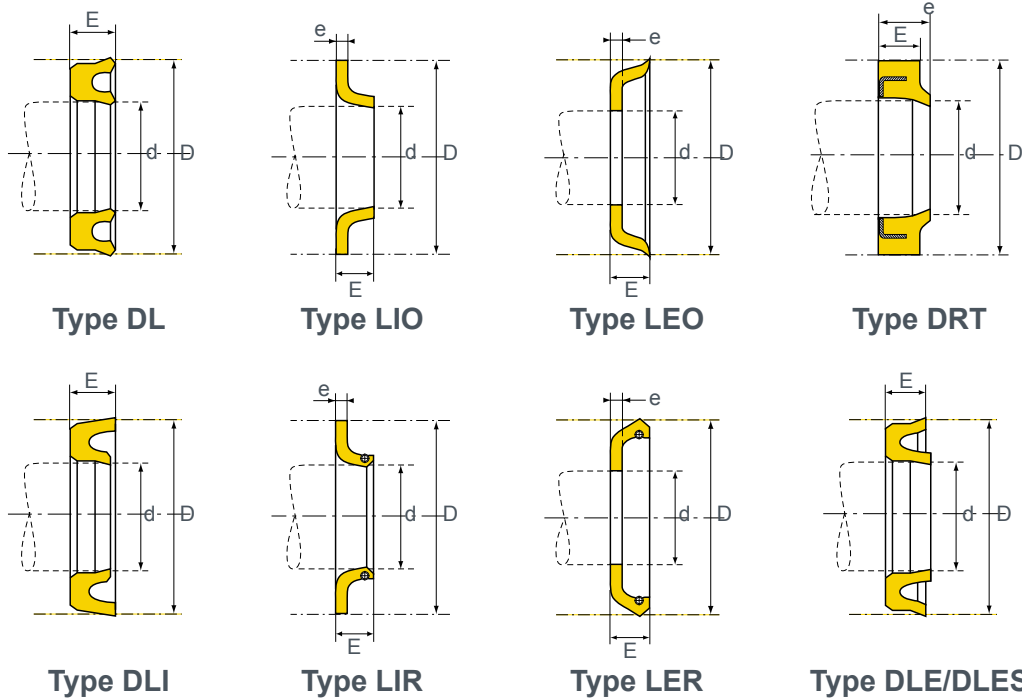
\*\*Stainless steel spring

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon





# CATALOGUE OF SEALS FOR SLIDING SHAFTS



- Width of the groove :  $E + 1$  mm (for DL).
- Operating parameters :  
 Maximum admissible pressure : 150 bars (for DL) ; 30 bars (for LIO, LEO).  
 Linear speed admissible : up to 0.3 m/sec depending on the operating conditions.

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
4	14	12	DL	NBR	710093
6	14	11,5	DL	NBR	<b>710620</b>
	32	10	LEO	NBR	714057
8	14	3,5x5	DRT	NBR	711700
	14	4	DLI	NBR	716501
	17,9	5,5x1,5	LEO	NBR	714432
9	20	4	DLS	NBR	710678
10	16	3,5x5	DRT	NBR	711701
	17,9	5,5	LEO	NBR	714045
	20	7	DLP	NBR	711001
11	28	7x2,5	LIO	NBR	712094
	36	12	LEO	NBR	714020
12	18	3,5x5	DRT	NBR	711702
	22	5,5	DLS	NBR	710679
	22	5x1,5	DLI	NBR	716502
	22	6,5	LIO	NBR	712350
	25	6,5	DLS	NBR	710233
13	21	5x2	LIO	NBR	712414
14	20	3,5x5	DRT	NBR	711703

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
14	26	8	LIR	NBR	713653
	38,1	10	DL	NBR	710132
15	21	3,5x5	DRT	NBR	711704
	25	8	DLT	NBR	711404
	25	10x3	LEO	NBR	<b>714178</b>
16	30	10x3	LEO	NBR	<b>714179</b>
	22	3,5x5	DRT	NBR	711705
	24	9	DL	NBR	710129
	25	6,5	DLE	NBR	716506
	26	8	DLT	NBR	711405
	28	9,6	DL	NBR	710218
	35	10	LER	NBR	715402
18	35	10x3	LEO	NBR	714418
	36	8x2,5	LIO	NBR	712095
	38	12	LEO	NBR	714442
	40	10	DL	NBR	710343
	40	12x3	LEO	NBR	714864
	28	5x7	DRT	NBR	711706
	30	8	DLES	NBR	716531
	30	10	DL	NBR	710290
	32,9	7,2	DL	NBR	710431
	36	6x2	LEO	NBR	714006
36	7x2,5	LIO	NBR	<b>712005</b>	
38	10	LIR	NBR	713613	

The part numbers indicated in bold type are kept in stock.

Abbreviations : NBR = Nitrile; FKM = Fluorocarbon

# DIMENSIONS

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference	d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
18	45	6x2	LEO	NBR	<b>714645</b>	40	62	14,5	DL	NBR	710489
	52	8x2	LEO	NBR	714013		65	10x5	LIO	NBR	<b>712491</b>
	55	10x3	LEO	NBR	714471		42	52	5x7	DRT	NBR
19	37	12	LEO	NBR	714817	52		12	DLES	NBR	716590
	19,6	49	10,5	LEO	NBR	714486	45	55	5x7	DRT	NBR
20	28	4,8	DL	NBR	710777	63		12	DL	NBR	<b>710529</b>
	30	5	DLI	NBR	716503	74		17x5	LIO	NBR	712737
	30	5x7	DRT	NBR	711707	48	63	9	DLP	NBR	711008
	30	8	DLT	NBR	711407		63,5	10	DLE	NBR	716561
	32	8	DL	NBR	710555		65	3,5x5	LEOS	NBR	714093
	35	6,5	DLS	NBR	710091	50	56	5x7	DRT	NBR	<b>711746</b>
	35	12	DL	NBR	<b>710795</b>		60	5x7	DRT	NBR	711718
	40	8x3	LIO	NBR	<b>712572</b>		65	7x10	DRT	NBR	<b>711745</b>
	40	12	DL	NBR	710111		65	10	DLT	NBR	711417
40	12	DL	NBR	710111	70		10x3	LIO	NBR	712571	
65	10x3	LEO	NBR	<b>714472</b>	70		12	DL	NBR	710530	
21	40	12	DL	NBR	710023		74	15	DL	NBR	710078
	45	12	DL	NBR	710344	76	17	DL	NBR	710056	
22	32	5x7	DRT	NBR	711708	50,5	66,5	12	DL	NBR	710196
	32	7	DLP	NBR	711004		68	10	LIR	NBR	713809
	32	8	DLT	NBR	711408	55	63	7x10	DRT	NBR	711747
	32	12	DLES	NBR	716588		65	12	DLES	NBR	716591
	40	12	DL	NBR	710527		71	12	DL	NBR	710629
	22,2	38	6x2,5	LIO	NBR	712701	75	10	DLS	NBR	710057
38		10	LIR	NBR	713702	56	66	5x7	DRT	NBR	711720
24	36	8x2,5	LIO	NBR	<b>712348</b>		72	12	DLES	NBR	716533
	36	9,6	DL	NBR	710289		80	12x3	LIO	NBR	712475
25	52	8x2,5	LIO	NBR	712012		80	14,5	DL	NBR	710474
	40	9	DLP	NBR	711005	57	73	9,6	DL	NBR	710086
	45	11	DL	NBR	<b>710061</b>		78	10	DLS	NBR	710058
	49	10,8	DL	NBR	710060	60	70	5x7	DRT	NBR	711721
	53	5x7	DRT	NBR	<b>711709</b>		80	10	DL	NBR	710423
	60	10x5	LEO	NBR	<b>714110</b>	80	12	LIR	NBR	713611	
25,4	38,1	8	DLE	NBR	716560	85	7x2,5	LEO	NBR	714421	
	26	41	8,4	DL	NBR	710144	89,5	20x5	LIO	NBR	712823
27		40	10	DLE	NBR	716507	62	85	12x3	LIO	NBR
	28	38	5x7	DRT	NBR	711710		63	73	5x7	DRT
46		10	DL	NBR	710528	93	18		DL	NBR	710531
47,5		4x3	LEO	NBR	714047	63,5	203,2	28,5x8,7	LEO	NBR	714497
49		13x4	LIO	NBR	712534		64	80	12	DL	NBR
29	41	10	DL	NBR	710570	82,5		13	DLE	NBR	716562
	30	40	5x7	DRT	NBR	711711	65	75	5x7	DRT	NBR
40		12	DLES	NBR	716589	83		12	DL	NBR	710729
42		8x2,5	LIO	NBR	<b>712092</b>	90		10	LER	NBR	715403
45		8	DLI	NBR	716629	90		10x5	LIO	NBR	712624
46		12	DL	NBR	710433	70	80	5x7	DRT	NBR	711724
48		10	DLES	NBR	716532		80	12	DLES	NBR	716592
95		14x4	LEO	NBR	714539		86	12	DL	NBR	710635
32		42	5x7	DRT	NBR		711712	95	15	DL	NBR
	47	10	DLT	NBR	711412	75	83	7x10	DRT	NBR	711725
	50	9x3	LIO	NBR	712535		91	12	DL	NBR	710413
	50	12	DL	NBR	710470		100	10x3	LIO	NBR	712022
34	44	12	DLES	NBR	716596	76,2	107,8	26,5	DL	NBR	710569
	50	14,4	DL	NBR	710073		94	12	DL	NBR	710632
	52	12x3,5	LIO	NBR	712694	80	88	7x10	DRT	NBR	711726
35	45	7x10	DRT	NBR	711713		90	7x10	DRT	NBR	711744
	50	9	DLP	NBR	711006		94	9	DLE	NBR	716335
	51	9,6	DL	NBR	<b>710354</b>		100	12	DLT	NBR	711425
36	46	5x7	DRT	NBR	711714	100	17	DL	NBR	710169	
	50	8	DLI	NBR	716536	117	14	LIR	NBR	713796	
	55	12	DL	NBR	710490	40	50	5	DL	NBR	710190
	60	10x4	LIO	NBR	<b>712492</b>		50	5x8	DRT	NBR	711715
40	50	5	DL	NBR	710190	55	10	DLT	NBR	711415	

The part numbers indicated in bold type are kept in stock.

Abbreviations: NBR = Nitrile; FKM = Fluorocarbon

# DIMENSIONS

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
85	95 103	7x10 13x3	DRT LIO	NBR NBR	711743 712981
86	117	14	LIR	NBR	713740
88	110	8x3,5	LIO	NBR	712430
90	130	10x4	LIO	NBR	712821
92	112	12,6	DL	NBR	710068
94	112	12	DL	NBR	710079
98	114	12	DL	NBR	<b>710724</b>
100	110 116	7x10 7	DRT LER	NBR NBR	711728 715666
104	120	11	DLE	NBR	716549
106	122	12	DL	NBR	710805

The part numbers indicated in bold type are kept in stock.

d (mm)	D (mm)	E (mm)	Type	Elastomer	Reference
110	120 126	7x10 7	DRT LER	NBR NBR	<b>711729</b> 715667
115	130,2	6,5	LEOS	NBR	714008
116	202	20	LEOS	NBR	714004
120	136	7	LER	NBR	715668
125	140	9x12	DRT	NBR	711735
130	160	18	DLP	NBR	711013
140	160 160 170	18 18 18	DL DL DLT	NBR NBR NBR	710002 710047 711433
150	209	25	LEO	NBR	714781
196	228	24	DL	NBR	710001
196,3	232	21	DL	NBR	710004
278	304,8	24	DL	NBR	710564

Abbreviations: NBR = Nitrile; FKM = Fluorocarbon



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